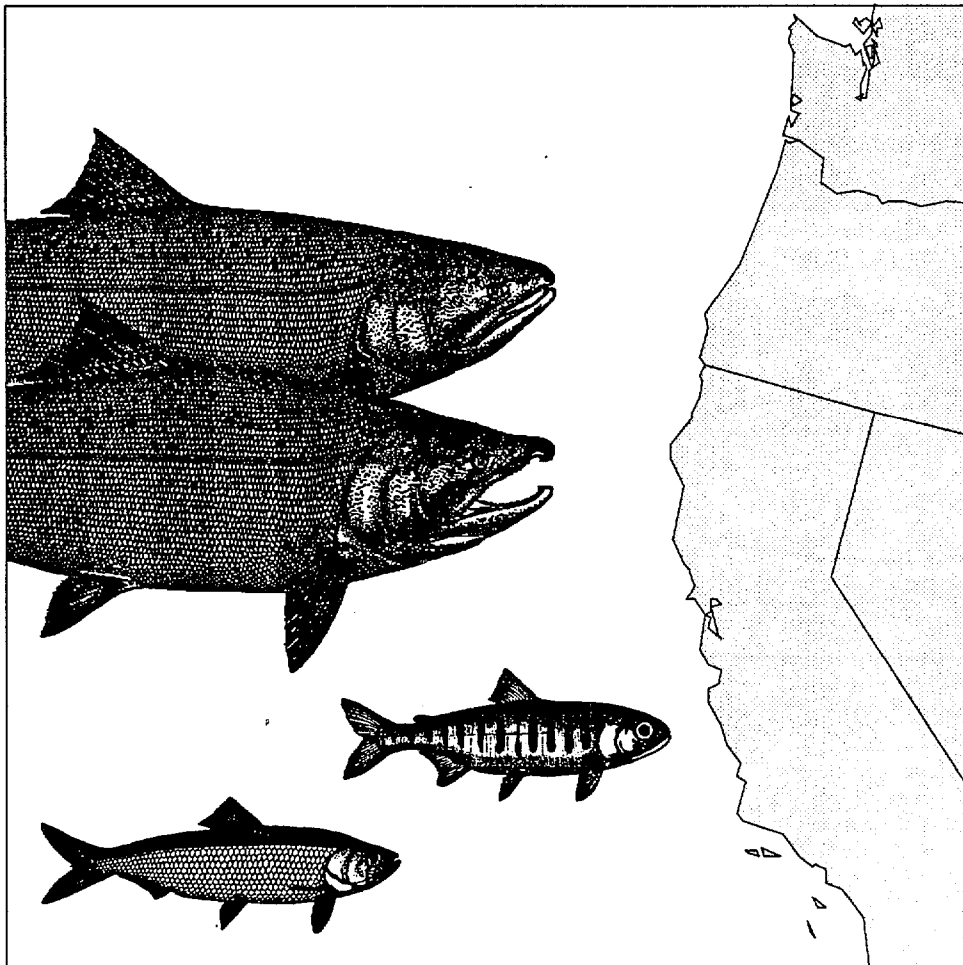


*Distribution and Abundance of Fishes and
Invertebrates in West Coast Estuaries
Volume I: Data Summaries*



March 1990

*U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Service*

NOAA's Estuarine Living Marine Resources Project

In June 1985, the National Oceanic and Atmospheric Administration (NOAA) began a project to develop a comprehensive information base on the life history, relative abundance and distribution of fishes and invertebrates in estuaries throughout the Nation (Monaco 1986). This project, the Estuarine Living Marine Resources (ELMR) project, is conducted jointly by the Strategic Assessment Branch (SAB) of the Office of Oceanography and Marine Assessment and laboratories of the National Marine Fisheries Service (NMFS). Currently, the Point Adams (Hammond), OR; Galveston, TX; Beaufort, NC; and Oxford, MD laboratories are compiling information for the contiguous West Coast, Gulf of Mexico, Southeast, and Northeast regions.

To date, the project has compiled data for 115 species in 73 estuaries. Four reports have been published: State of Washington (Monaco and Emmett 1988); State of Texas (Monaco et al. 1989); Eastern Gulf of Mexico (Williams et al. 1990), and this volume. Scheduled for publication in 1990 are reports for the Central Gulf of Mexico (Mississippi Sound, MS, through Calcasieu Lake, LA); the West Coast Vol. 2: *Life History Profiles*; and the Southeast (Albemarle Sound, NC, through Biscayne Bay, FL).

Three salinity zones, as defined in Volume 1 of NOAA's *National Estuarine Inventory Data Atlas* (NOAA 1985), provided the spatial framework for organizing information on species distribution and abundance within each estuary. These salinity zones are tidal fresh (0.0 to 0.5 ppt), mixing (0.5 to 25.0 ppt), and seawater (25.0 and greater ppt). The primary data developed for each species for each salinity zone include spatial and temporal distributions and relative abundance by life history stage, e. g., adult, spawning or mating, juvenile, larva, and egg. In addition, a detailed estuarine life history profile is written for each species.

Additional information on this or other projects of the Strategic Assessment Branch is available from:

Strategic Assessment Branch
Office of Oceanography and Marine Assessment
National Oceanic and Atmospheric Administration
6001 Executive Blvd., Rm. 220
Rockville, Maryland 20852
(301) 443-0453

Reports available from NOAA's Estuarine Living Marine Resources project include:

Monaco, M. E., et al. 1989. Distribution and Abundance of Fishes and Invertebrates in Texas Estuaries. ELMR Rpt. No. 3. Strategic Assessment Branch, NOS/NOAA. Rockville, MD. 107 p.

Monaco, M. E., et al. 1990. Distribution and Abundance of Fishes and Invertebrates in West Coast Estuaries, Volume I: Data Summaries. ELMR Rpt. No. 4. Strategic Assessment Branch, NOS/NOAA. Rockville, MD. 240 p.

Bulger, A. J., et al. 1990. A Proposed Estuarine Classification: Analysis of Species Salinity Ranges. ELMR Rpt. No. 5. Strategic Assessment Branch, NOS/NOAA. Rockville, MD. 28 p.

Williams, C. W., et al. 1990. Distribution and Abundance of Fishes and Invertebrates in Eastern Gulf of Mexico Estuaries. ELMR Rpt. No. 6. Strategic Assessment Branch, NOS/NOAA. Rockville, MD. 105 p.

Distribution and Abundance of Fishes and Invertebrates in West Coast Estuaries, Volume I: Data Summaries

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Introduction

This report is the first of two volumes that present information on the spatial and temporal distribution, relative abundance, and life history characteristics of 47 fish and invertebrate species in 32 estuaries along the contiguous West Coast of the U.S. Its purpose is to disseminate data developed in NOAA's *Estuarine Living Marine Resources (ELMR)* project (see inside front cover). ELMR is a joint study by NOAA's National Ocean Service and National Marine Fisheries Service (NMFS). The study framework, sample data sheet, and species life history profile presented are illustrative of the nationwide ELMR project. Volume II will be published in 1990 and will focus on how individual species utilize estuaries and on their life history characteristics. Distribution and abundance information, results of multivariate analyses to define species and estuary assemblages, and salmonid hatchery and escapement information will be presented.

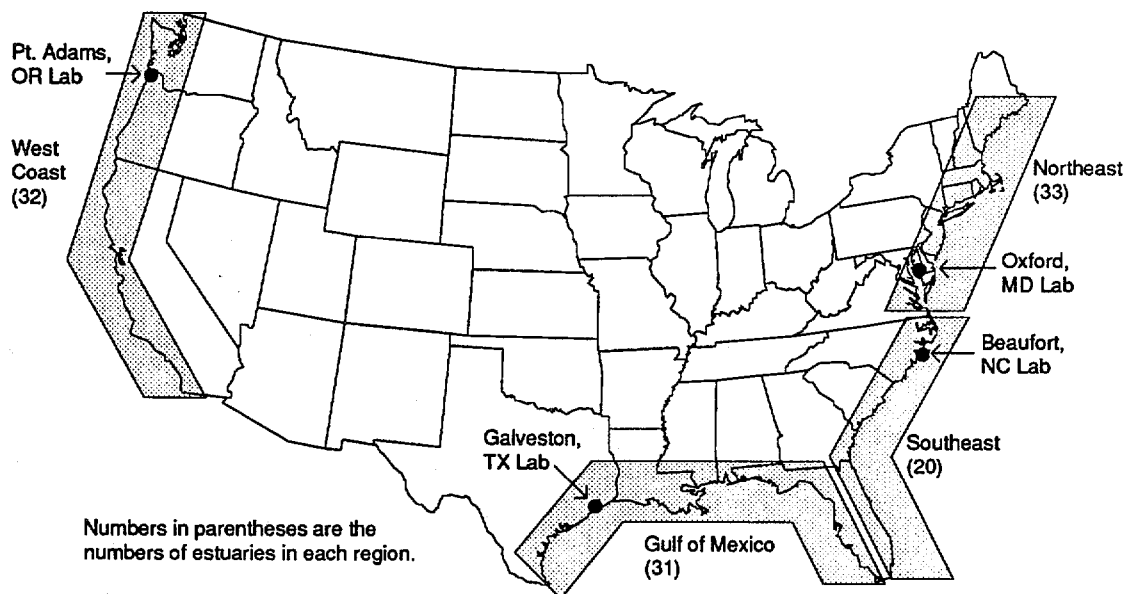
The objective of ELMR is to develop a consistent data base on the distribution and abundance of selected fishes and invertebrates in the Nation's estuaries. The nationwide data base is divided into four regions (Figure 1). The relative abundance and monthly occurrence of life stages of each species are recorded by estuary for three salinity zones (seawater, mixing, and tidal fresh) identified in NOAA's *National Estuarine Inventory (NEI) Data Atlas: Volume I* (NOAA 1985). When completed, the entire data base will contain information for approximately 150 fish and invertebrate species found in over 120 U. S. estuaries.

Why Conduct ELMR?

Estuaries are among the most productive natural systems (Mann 1982, Odum and Heald 1975). The physical, chemical, and biological components of estuaries are critical to many living resources (Gunter 1967, Weinstein 1979). They are important nursery areas that provide food, refuge from predation, and valuable habitat for many species (Joseph 1973). Estuarine organisms that support important commercial and recreational fisheries include salmonids, crabs, and shrimp. In spite of the well documented importance of these areas to fish and invertebrate populations, few consistent and comprehensive data sets exist that allow examinations of the relationships of many estuarine species found in or among groups of estuaries. Most of the distribution and abundance data for estuarine-dependent species are for the offshore life stages where major sampling programs have focused, and does not describe estuarine distributions adequately (Darnell et al. 1983, NOAA 1988).

Only a few comprehensive sampling programs, e.g., State of Texas (Hammerschmidt and McEachron 1986, McEachron and Green 1984), collect fishes and invertebrates with identical methods across groups of estuaries within a region. Because of the variability in sampling strategies, much of the existing estuarine fisheries data cannot be compared among estuaries. In addition, existing programs do not focus on how groups of estuaries may be important for regional management of fishery resources. Most of the existing comprehensive estuarine data are for relatively few important commercial and recreational species.

Figure 1. ELMR regions.



Since life stages of many species use both estuarine and marine habitats, it is necessary to combine information on distribution, temporal utilization, and life history strategies to understand the linkages between estuaries and nearshore/offshore areas. To date, a national, comprehensive, and consistent data base of this type does not exist. Consequently, there is a need to develop a framework that integrates the fragments of information on marine and estuarine species and their associated habitats into a useful, comprehensive, and consistent structure. NOAA's ELMR project was designed to help fulfill this need by developing a uniform, nationwide data base on selected estuarine species. Results will complement other NOAA efforts to formulate a national estuarine assessment capability (NOAA 1985) and oceanic fishery sampling programs (e.g., Sherman and Alexander 1985). Compiling this information also identifies data gaps and assesses the content and quality of existing estuarine fisheries data.

Data Collection and Organization

Figure 2 shows the major steps taken to collect and organize information on the distribution and abundance of fishes and invertebrates in West Coast estuaries.

Selection of Estuaries. Estuaries and marine embayments of the West Coast (Figure 3) were initially selected from the *National Estuarine Inventory Data Atlas: Volume I* (NOAA 1985). However, 13 additional West Coast estuaries were added to the NEI due to their biological importance.

Data on the spatial and temporal distributions of species were developed and organized based on the tidal fresh (0.0 to 0.5 ppt), mixing (0.5 to 25.0 ppt), and seawater (25.0 and greater ppt) zones delineated for each estuary in the NEI. A representative map and data table (Grays Harbor) from the NEI is shown in Appendix 1. Some West Coast embayments do not contain all three salinity zones. For example, southern California estuaries and embayments generally have only seawater zones and contain little or no tidal fresh and mixing zones. However, they were included because they provide important habitat for many euryhaline estuarine species.

Compiling large amounts of data limits the amount of information that can be organized and presented for each species/estuary combination. It would be time and cost prohibitive to map each species by life stage for each estuary (Monaco 1986). Thus, the salinity zone framework allows the available information on estuarine fish and invertebrate distribution to be consistently compiled and organized.

Figure 2. Major steps to complete the West Coast study.

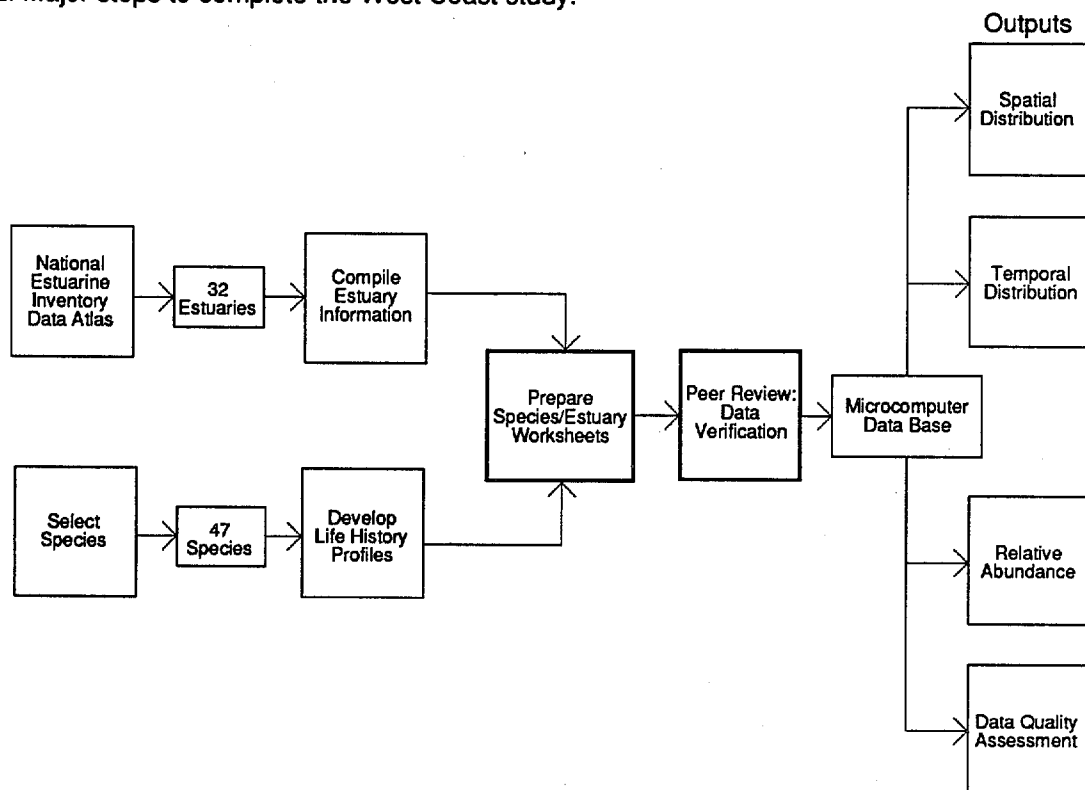
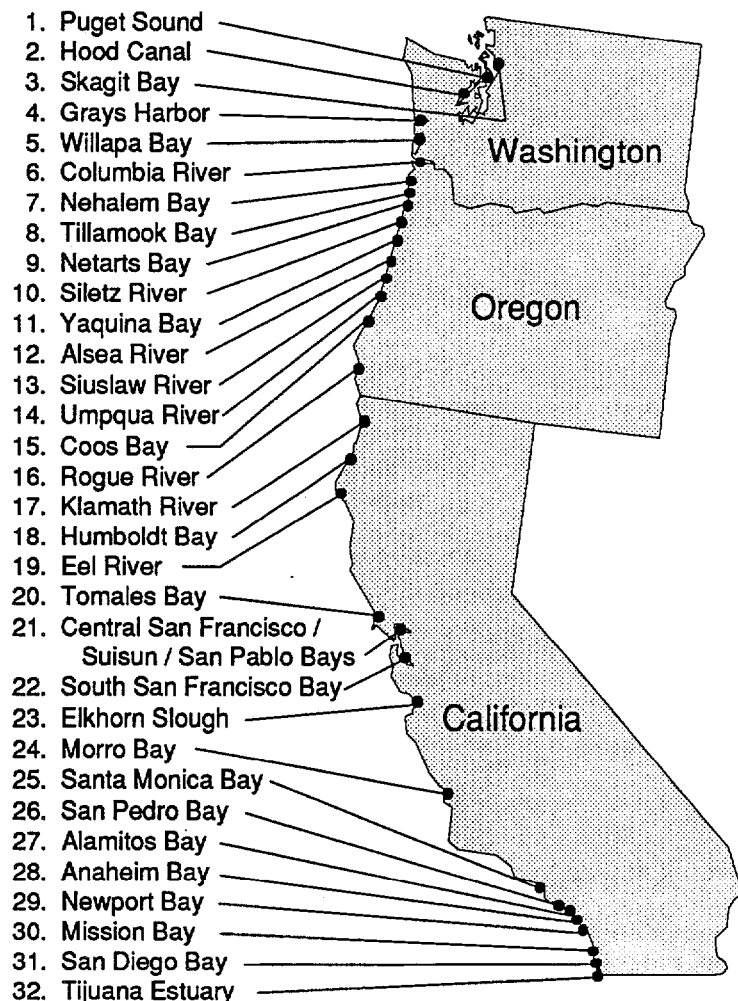


Figure 3. West Coast estuaries.



Selection of Species. Four criteria were used to identify 47 species that had been studied in detail. Many of the selected species are either commercially or recreationally important, and thus data on them are most available. Species of ecological value or indicators of environmental stress were also chosen. Also, eight races of Pacific salmon (*Oncorhynchus* spp.) from two species were chosen. A species list (Table 1) was developed and peer reviewed to ensure that the most "important" species were studied. The four criteria were:

1) Commercial value – determined by a review of catch data and value statistics from NMFS (e.g., Pacific herring, *Clupea pallasii*, and Dungeness crab, *Cancer magister*).

2) Recreational value – defined as a species that recreational fishermen specifically try to catch that may or may not be of commercial importance. Recreational species were determined by consulting regional experts and NMFS reports (e.g., steelhead,

Oncorhynchus mykiss, and California halibut, *Paralichthys californicus*).

3) Indicator species of environmental stress – identified from the literature, discussions with fisheries experts, and from monitoring programs such as NOAA's National Status and Trends Program (NOAA 1984). These species were mollusks or bottom fishes that consume benthic invertebrates or have a strong association with bottom sediments. Their physiological disorders, morphological abnormalities, and bioaccumulation of contaminants such as heavy metals, indicate environmental pollution and/or stress (e.g., Pacific oyster, *Crassostrea gigas*, and white croaker, *Genyonemus lineatus*).

4) Ecological value – based on several attributes, including trophic level, relative abundance, and evidence of its importance as a key predator or prey species (e.g., bay shrimp, *Crangon franciscorum*, and topsmelt, *Atherinops affinis*).

Table 1. West Coast species list.

Scientific name	Common name
<i>Mytilus edulis</i>	blue mussel
<i>Crassostrea gigas</i>	Pacific oyster
<i>Tresus capax</i>	horseneck gaper
<i>Tresus nuttali</i>	Pacific gaper
<i>Tagelus californianus</i>	California jackknife clam
<i>Protothaca staminea</i>	Pacific littleneck clam
<i>Venerupis japonica</i>	Manila clam
<i>Mya arenaria</i>	Eastern softshell clam
<i>Panope abrupta</i>	geoduck
<i>Crangon franciscorum</i>	bay shrimp
<i>Cancer magister</i>	Dungeness crab
<i>Triakis semifasciata</i>	leopard shark
<i>Acipenser medirostris</i>	green sturgeon
<i>Acipenser transmontanus</i>	white sturgeon
<i>Alosa sapidissima</i>	American shad
<i>Clupea pallasii</i>	Pacific herring
<i>Anchoa compressa</i>	deepbody anchovy
<i>Anchoa delicatissima</i>	slough anchovy
<i>Engraulis mordax</i>	northern anchovy
<i>Oncorhynchus clarki</i>	cutthroat trout
<i>Oncorhynchus gorboscha</i>	pink salmon
<i>Oncorhynchus keta</i>	chum salmon
<i>Oncorhynchus kisutch</i>	coho salmon
<i>Oncorhynchus mykiss</i>	steelhead (3 races)
<i>Oncorhynchus nerka</i>	sockeye salmon
<i>Oncorhynchus tshawytscha</i>	chinook salmon (5 races)
<i>Hypomesus pretiosus</i>	surf smelt
<i>Spirinchus thaleichthys</i>	longfin smelt
<i>Thaleichthys pacificus</i>	eulachon
<i>Microgadus proximus</i>	Pacific tomcod
<i>Atherinops affinis</i>	topsmelt
<i>Atherinopsis californiensis</i>	jacksmelt
<i>Gasterosteus aculeatus</i>	threespine stickleback
<i>Morone saxatilis</i>	striped bass
<i>Paralabrax clathratus</i>	kelp bass
<i>Paralabrax nebulifer</i>	barred sand bass
<i>Genyonemus lineatus</i>	white croaker
<i>Atractoscion nobilis</i>	white seabass
<i>Cymatogaster aggregata</i>	shiner perch
<i>Ammodytes hexapterus</i>	Pacific sand lance
<i>Clevelandia ios</i>	arrow goby
<i>Ophiodon elongatus</i>	lingcod
<i>Leptocottus armatus</i>	Pacific staghorn sculpin
<i>Paralichthys californicus</i>	California halibut
<i>Hypsopsetta guttulata</i>	diamond turbot
<i>Pleuronectes vetulus</i>	English sole
<i>Platichthys stellatus</i>	starry flounder

Species Profiles. A life history profile for each species was developed to provide an overview of how it utilizes estuaries. The profiles are essential in understanding the distribution of each species. Although many species profiles have been published previously, they often describe estuarine life stages inadequately. Therefore, the profiles emphasized estuarine ecology, salinity and temperature ranges, and life history information for estuarine-dependent

life stages. A representative species profile for Pacific herring is shown in Appendix 2. Volume II will contain a profile for each species.

Data Sheets. A data sheet was developed for each species for each estuary to enable quick compilation and simple presentation of the data. Figure 4 shows the data sheet for Pacific herring in the Columbia River estuary. A draft of each data sheet was developed by project staff and reviewed by local experts. Data compiled for each species include: 1) the salinity zone it occupies (seawater, mixing, or tidal fresh); 2) monthly distribution in the zones; and 3) life history stage(s) in a particular zone and their relative abundance level. The ELMR data are stored in a microcomputer data base management system.

The relative abundance of a species was classified using the following definitions:

- **Not present:** species or life history stage not found, questionable data as to identification of species, and/or recent loss of habitat or environmental degradation suggests absence.
- **No information available:** no data available, and after expert review it was determined that not even an educated guess would be appropriate.
- **Rare:** species is present but not frequently encountered.
- **Common:** species is generally encountered but not in large numbers; does not imply an even distribution over a specific salinity zone.
- **Abundant:** species is often encountered in substantial numbers relative to other species.
- **Highly abundant:** species is numerically dominant relative to other species.

Adults were defined as sexually mature individuals, juveniles as immature but otherwise similar to adults, and spawning as the release of eggs and sperm (fertilization). A few exceptions existed, such as mating of Dungeness crab, and parturition (live birth) of the viviparous leopard shark (*Triakis semifasciata*) and shiner perch (*Cymatogaster aggregata*). For Pacific oyster, spawning, larvae, and eggs are not shown because spawning is sporadic; most spat is hatchery produced and placed on beds.

Because migrating juveniles of different races of chinook salmon are difficult to distinguish in the field, the data on juvenile chinook salmon were combined. In general, yearling juveniles (spring and winter

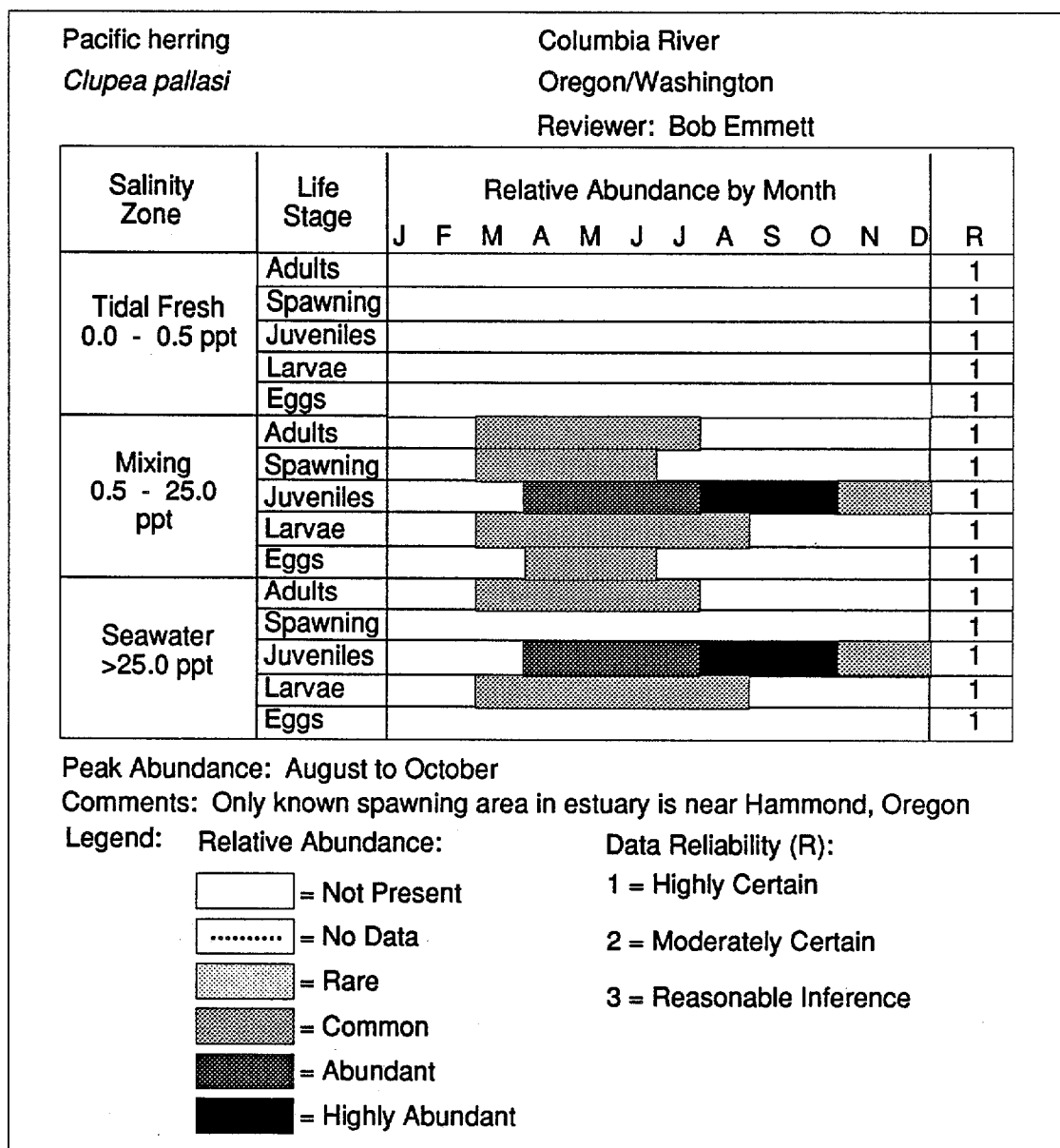
aces) migrate earlier than subyearling juveniles (fall races). The following terms are defined to help interpret the salmonid data:

- **Race:** A specific "run" of salmon defined by when the adults enter natal rivers to spawn. For example, spring chinook salmon is the race that enters rivers during spring. A *stock* of salmon is usually defined by both the time and location of spawning, thus, a race may be composed of many stocks.
- **Half-pounder:** Juvenile steelhead that migrate to sea in spring, but do not overwinter at sea their first year. Instead, they return to rivers to overwinter, and migrate to sea again the following spring.

- **Kelt:** An adult steelhead or cutthroat trout that has finished spawning.

For well-studied species such as salmon, quantitative data were used to estimate abundance levels. For many species, however, reliable quantitative data were limited. Therefore, regional and local experts were consulted to estimate relative abundance based on the preceding criteria. Reference or guide species with abundance levels corresponding to the preceding criteria were developed for each estuary in cooperation with local biologists. Other species were then placed into the appropriate categories relative to the guide species. These data represent relative abundances within a specific estuary. Relative abundance levels across West Coast estuaries **could not** be determined.

Figure 4. Example of a species/estuary data sheet: Pacific herring in the Columbia River estuary.



Data Verification. Approximately three years were required to develop the 1,760 data sheets (Figure 4) and consult with regional and local experts. Each data sheet was carefully reviewed during consultations or by mail. These consultations complemented the published and unpublished literature and data sets compiled by NOAA. Ninety-one scientists at 26 institutions or agencies were consulted. The names and affiliations of these experts are listed in Appendix 4. Local experts were particularly helpful in providing estuary/species-specific information. They also provided additional references and contacts and identified additional species to be included in the ELMR data base.

Data Summaries

The information compiled for each species and estuary (1,760 data sheets) was organized into four data summaries (pp. 10 - 197). Tables 2 and 3 provide graphic presentations of the spatial and temporal distribution and relative abundance by life stage for each species and estuary. The information shown represents the usual distribution of a species in a particular estuary. Table 4 ranks the relative reliability of the information presented for each species life stage and estuary.

Spatial distribution and relative abundance. Table 2 summarizes the spatial distribution and relative abundance by life stage for each species by salinity zone in each estuary. The highest level of abundance during the year in each estuary is depicted.

Temporal distribution. Table 3 summarizes the temporal distribution of each species by month and life stage for each estuary. This information combines data over the three salinity zones, with the highest level of abundance for a particular life stage shown by month.

Presence/absence data. Although each life stage of a species is assigned one of five levels of relative abundance (not present, rare, common, abundant, or highly abundant), Tables 2 and 3 do not distinguish between rare and not present. This was done because management of estuarine fisheries often does not direct efforts towards rare species. To distinguish between "not present" and "rare," Table 5 presents information on the presence/absence of species/life stages by salinity zone. If a life stage of a species was known to occur in an estuary, it was considered present.

Data Content and Quality

An important aspect of this study, especially since it was based primarily on published and unpublished literature and consultations, was to determine the quality of the data used. A deliberate effort was made to assess the overall reliability of the data base so that the information could be used appropriately. Depending upon the questions addressed, some data may not be suitable to use. Estimates of the reliability of the distribution and abundance information organized by species, life stage, and estuary are presented in Table 4 of the Data Summary Tables section. The following criteria were used to assess data reliability:

Highly certain: Considerable sampling data available. Distribution, ecology, and preferred habitats well documented within an estuary.

Moderately certain: Some sampling data available for an estuary. Distribution, preferred habitats, and ecology well documented in similar estuaries.

Reasonable inference: Little or no sampling data available. Information on species distributions, ecology, and preferred habitats documented in similar estuaries.

The quality and quantity of available data vary by species and by estuary. For example, a large amount of information is available on salmonids because they are economically valuable. In general, the lowest quality of data and the least amount available are for spawning, egg, and larval stages. Except for a few species (e.g., salmonids), very little research has focused on habitat preferences and environmental tolerances of species. This is particularly true for the small forage and/or non-commercial fishes and invertebrates. Gear selectivity, difficulty in correctly identifying larval stages, and difficulty of sampling various habitats limit the reliability of this information.

Since the amount and quality of information vary by species, life stage, estuary, and even within an estuary, considerable scientific judgment is required to derive or infer spatial and temporal distributions from existing data and literature. Unfortunately, even the most informed judgment is far from perfect due to the complexity of estuarine systems. Consequently, information on the level of certainty associated with each data element must be presented (Table 4). Appendices 3, 4, and 5 provide a complete summary of the references and personal communications used so that readers can track and obtain additional information efficiently.

Variability in Space and Time. Species data were organized according to the salinity zone boundaries identified in each estuary of the *National Estuarine Inventory Data Atlas* (NOAA 1985). However, these salinity zones are highly variable due to interacting factors that affect salinity, such as variations in freshwater inflow, wind, and tides. It was assumed that if the area of a particular salinity zone increases or decreases, the distribution of a mobile species in that zone will correspondingly shift. For example, if increased freshwater inflow shifts the tidal fresh zone further down the estuary, the distribution of a species confined to that zone increases accordingly. For euryhaline species, a distributional shift may or may not occur. The placement of species in a salinity zone was ultimately determined by where they have been observed or captured.

Species temporal distributions are often dependent on annual climatic conditions and water currents. Monthly distributional patterns were derived based on the consistent presence of a life stage within a particular month. If a species is present in an estuary only in unusual years (e.g., as a result of drought), it was not considered present. However, if a species is typically found, even during a restricted time period, it was considered present. Greater temporal resolution, such as on a biweekly rather than on a monthly basis, was not possible.

Abundance Data. Except for a few important commercial or recreational species, little or no quantitative information was available to determine the relative abundance of species across estuaries. Therefore, relative abundance estimates were made compared to other species within a specific estuary. For well-studied species, quantitative data were used to estimate the level of abundance within an estuary. However, in most cases the level of abundance assigned to a species was determined by asking regional and local biologists for expert opinions based on their knowledge of individual species within an estuary. This effort complemented the quantitative studies, and greatly increased the reliability of the abundance information. The relative abundance data shown in the data summaries are the best that could be synthesized from agency reports, academic studies, and expert reviews.

Use of ELMR Data

Classifying and Comparing Estuaries. Although the qualitative nature of the distributional data precluded statistical comparisons of species abundances among estuaries, comparisons can be made using data on the presence/absence of species in salinity zones. This information, combined with the spatial

and temporal distribution data, is the strength of the data base. Estuaries can be loosely categorized by their physical and chemical characteristics and their associated species assemblages. The relative importance of individual estuaries to specific species may also be determined.

The species found in an estuary are sensitive indicators of both the mean and extreme environmental conditions within that estuary. Estuaries can be classified by the number of species present and by whether the fauna are primarily marine, estuarine, or freshwater. Species assemblages may correlate with physical characteristics, such as bottom substrate, vegetation, and the areal and temporal characteristics of salinity zones. The information on species presence/absence or other attributes can be used to determine the faunal similarities and differences among estuaries.

A comparison of estuaries and associated species can identify differing factors among those estuaries that might account for shifts in species distribution and relative abundance, helping to define ecological variables controlling species distribution. For example, a species may show differing salinity tolerances among estuaries, indicating that some other factors, such as temperature, competition, or predation may be regulating its distribution.

Linkages to Marine Ecosystems. Many aquatic species use estuaries for specific parts of their life cycles and spend the rest of their lives offshore. Most species fall into four general categories: 1) diadromous species, which use estuaries as migration corridors and, in some instances, nursery areas; 2) species that use estuaries for spawning, often at specific salinities; 3) species that spawn offshore near the mouths of estuaries and depend on tidal- and wind-driven currents to carry eggs, larvae, or early juveniles into estuarine nursery areas; and 4) species that enter estuaries during certain times of year to feed on abundant prey. The importance of any estuary can be determined by the intensity with which species use estuarine habitats. Importance can be measured both by the number of species present as well as the abundance of specific life stages in estuaries relative to offshore habitats. These data may assist in identifying adverse effects of estuarine environmental degradation on offshore populations.

The presence or absence of members of a set of pre-selected species or species with specific life history strategies can be used to rank the importance of an estuary to these species on a regional basis. For example, if a species group is defined as anadromous

fishes that are commercially important offshore, the strength of the offshore-estuarine linkage for each estuary can be established. This can be used to identify estuaries needing special attention or management. This approach may facilitate the linking of estuaries to geographically defined marine ecosystems. Data sets developed or under development in SAB'S *Living Marine Resources Program* and other NOAA programs will enable regional assessments with consistent species information from the head-of-tide in estuaries to the continental shelf. Integration of biological and physical data will significantly improve our ability to identify and define the biological linkages and physical interchanges between estuarine and shelf habitats.

Concluding Comments

This is the fourth report in an effort to "capture" the Nation's data on fishes and invertebrates in estuaries (see inside front cover). This research is one step in developing an information base to bridge the gap between site-specific estuarine problems and formulating regional management strategies. Filling this gap is more important than ever, as it becomes clear that the cumulative effects of small changes in many estuaries may have a total systematic effect throughout the Nation's estuaries and coastal ocean. Compiling and organizing fragments of estuarine information is a difficult task, but is necessary to effectively manage the Nation's estuaries. Although the knowledge available to conserve and protect estuaries continues to be limited, the ELMR data base will allow comparisons among species, groups of species, specific life stages and times of year within an estuary, or by geographic regions. When combined with other data sets, the ELMR data base will enable development and testing of ecological hypotheses and identify gaps in our knowledge of estuarine fishes and invertebrates.

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Data Summary Tables

Table 2. Spatial distribution and relative abundance

Table 3. Temporal distribution

Table 4. Data reliability

Table 5. Presence/absence of 47 species in West Coast estuaries

In each data summary table, species are listed in a phylogenetic order, as in Table 1. Estuaries are listed in a north to south order, as in Figure 3. At the beginning of each data summary is an index table showing the page location of each species and estuary within the data summary.

Table 2. Spatial distribution and relative abundance

Index to Table 2: Page location of spatial distribution table for each species and estuary

Common and Scientific Name	Estuary															
	Puget Sound	Hood Canal	Skagit Bay	Grays Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay	Nemah River	Siletz River	Yaquina Bay	Alsea River	Siletz River	Umpqua River	Cosco River	Klamath River
Blue mussel (<i>Mytilus edulis</i>)																
Pacific oyster (<i>Crassostrea gigas</i>)																
Horseneck gaper (<i>Tresus capax</i>)																
Pacific gaper (<i>Tresus nuttalli</i>)																
California jackknife clam (<i>Tagelus californianus</i>)																
Pacific littleneck clam (<i>Protothaca staminea</i>)																
Manila (Japanese) clam (<i>Venerupis japonica</i>)																
Eastern softshell clam (<i>Mya arenaria</i>)																
Geoduck (<i>Panope abrupta</i>)																
Bay shrimp (<i>Crangon franciscorum</i>)																
Dungeness crab (<i>Cancer magister</i>)																
Leopard shark (<i>Triakis semifasciata</i>)																
Green sturgeon (<i>Acipenser medirostris</i>)																
White sturgeon (<i>Acipenser transmontanus</i>)																
American shad (<i>Alosa sapidissima</i>)																
Pacific herring (<i>Clupea pallasii</i>)																
Deepbody anchovy (<i>Anchoa compressa</i>)																
Slough anchovy (<i>Anchoa delicatissima</i>)																
Northern anchovy (<i>Engraulis mordax</i>)																
Cutthroat trout (<i>Oncorhynchus clarkii</i>)																
Steelhead (<i>Oncorhynchus mykiss</i>)*																
Coho salmon (<i>Oncorhynchus kisutch</i>)																
Chinook salmon (<i>Oncorhynchus tshawytscha</i>)*																
Chum salmon (<i>Oncorhynchus keta</i>)																
Pink salmon (<i>Oncorhynchus gorbuscha</i>)																
Sockeye salmon (<i>Oncorhynchus nerka</i>)																
Surf smelt (<i>Hypomesus pretiosus</i>)																
Longfin smelt (<i>Spirinchus thaleichthys</i>)																
Eulachon (<i>Thaleichthys pacificus</i>)																
Pacific tomcod (<i>Microgadus proximus</i>)																
Topsmelt (<i>Atherinops affinis</i>)																
Jacksmelt (<i>Atherinopsis californiensis</i>)																
Threespine stickleback (<i>Gasterosteus aculeatus</i>)																
Striped bass (<i>Morone saxatilis</i>)																
Kelp bass (<i>Paralabrax clathratus</i>)																
Barred sand bass (<i>Paralabrax nebulifer</i>)																
White seabass (<i>Atractoscion nobilis</i>)																
White croaker (<i>Genyonemus lineatus</i>)																
Shiner perch (<i>Cymatogaster aggregata</i>)																
Pacific sand lance (<i>Ammodytes hexapterus</i>)																
Arrow goby (<i>Clevelandia ios</i>)																
Lingcod (<i>Ophiodon elongatus</i>)																
Pacific staghorn sculpin (<i>Leptocottus armatus</i>)																
California halibut (<i>Paralichthys californicus</i>)																
Diamond turbot (<i>Hypsopsetta guttulata</i>)																
English sole (<i>Pleuronectes vetulus</i>)																
Starry flounder (<i>Platichthys stellatus</i>)																

* Winter steelhead and summer chinook salmon are located four pages after the pages shown here.

Table 2. Data Summary Table: Spatial Distribution and Relative Abundance

Species/Life Stage		West Coast Estuaries																							
		Puget Sound			Hood Canal			Skagit Bay			Grays Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
Blue mussel <i>Mytilus edulis</i>	A		●	●		●	●		●	●		○	○		○	○			○			●			●
	S		●	●		●	●		●	●		○	○		○	○			○			●			●
	J		●	●		●	●		●	●		○	○		○	○			○			●			●
	L		●	●		●	●		●	●		○	○		○	○			○			●			●
	E		●	●		●	●		●	●		○	○		○	○			○			●			●
Pacific oyster <i>Crassostrea gigas</i>	A		●	●		●	●			○		●	●		●	●								●	
	S											●	●												
	J		●	●		●	●			○		●	●		●	●							●		
	L																								
	E																								
Horseneck gaper <i>Tresus capax</i>	A		○	●		●	●			○	●			○				○						○	●
	S			○			○				○					○							○	○	○
	J		○	●		●	●			○	●				○								○	○	○
	L		○	○		○	○			○	○				○								○	○	○
	E			○			○				○				○								○	○	○
Pacific gaper <i>Tresus nuttalli</i>	A		●	●		●	●			○	○														
	S		●	●		●	●			○	○														
	J		●	●		●	●			○	○														
	L		●	●		●	●			○	○														
	E		●	●		●	●			○	○														
California jackknife clam <i>Tagelus californianus</i>	A																								
	S																								
	J																								
	L																								
	E																								
Pacific littleneck clam <i>Protothaca staminea</i>	A		●	●		●	●			●	●		○	○		○	○					●		○	●
	S		●	●		●	●			●	●		○	○		○	○					●		○	●
	J		●	●		●	●			●	●		○	○		○	○					●		○	●
	L		●	●		●	●			●	●		○	○		○	○					●		○	●
	E		●	●		●	●			●	●		○	○		○	○					●		○	●
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
		Puget Sound			Hood Canal			Skagit Bay			Grays Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Table 2 (continued). Data Summary Table: Spatial Distribution and Relative Abundance

Species/Life Stage		West Coast Estuaries																							
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
Blue mussel	A			●						●						●			●			●			
<i>Mytilus edulis</i>	S			●						●						●			●			●			
	J			●						●						●			●			●			
	L			●						●						●			●			●			
	E			●						●						●			●			●			
Pacific oyster	A			●						●								○		●	●				
<i>Crassostrea gigas</i>	S																								
	J			●						●									○		●	●			
	L																								
	E																								
Horseneck gaper	A			●						○	●			○							○	●			
<i>Tresus capax</i>	S			●						○	●			○							○	●			
	J			●						○	●			○							○	●			
	L			●						○	●			○							○	●			
	E			●						○	●			○							○	●			
Pacific gaper	A			●																					
<i>Tresus nuttalli</i>	S			●																					
	J			●																					
	L			●																					
	E			●																					
California jackknife clam	A																								
<i>Tagelus californianus</i>	S																								
	J																								
	L																								
	E																								
Pacific littleneck clam	A			●						○	○										○	●			
<i>Protothaca staminea</i>	S			●						○	○										○	●			
	J			●						○	○										○	●			
	L			●						○	○										○	●			
	E			●						○	○										○	●			
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Klamath River			Humboldt Bay			Eel River			Tomales Bay			Cent. S. Fr. / Suisun / S. Pablo Bays			South San Fran. Bay			Elkhorn Slough			Morro Bay		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S
Blue mussel	A					●	●			○			⊙		⊙	●		⊙	●			⊙			⊙
<i>Mytilis edulis</i>	S					●	●			○			⊙		⊙	●		⊙	●			⊙			⊙
	J					●	●			○			⊙		⊙	●		⊙	●			⊙			⊙
	L					●	●			○			⊙		⊙	●		⊙	●			⊙			⊙
	E					●	●			○			⊙		⊙	●		⊙	●			⊙			⊙
Pacific oyster	A					●	●						●												●
<i>Crassostrea gigas</i>	S					●	●						●												●
	J					●	●						●												●
	L					●	●						●												●
	E					●	●						●												●
Horseneck gaper	A					⊙	⊙																		
<i>Tresus capax</i>	S					⊙	⊙																		
	J					⊙	⊙																		
	L					⊙	⊙																		
	E					⊙	⊙																		
Pacific gaper	A					○	○						⊙									⊙			⊙
<i>Tresus nuttalli</i>	S					○	○						⊙									⊙			⊙
	J					○	○						⊙									⊙			⊙
	L					○	○						⊙									⊙			⊙
	E					○	○						⊙									⊙			⊙
California jackknife clam	A																								○
<i>Tagelus californianus</i>	S																								○
	J																								○
	L																								○
	E																								○
Pacific littleneck clam	A					⊙	⊙						⊙									○			○
<i>Protothaca staminea</i>	S					⊙	⊙						⊙									○			○
	J					⊙	⊙						⊙									○			○
	L					⊙	⊙						⊙									○			○
	E					⊙	⊙						⊙									○			○
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S
		Klamath River			Humboldt Bay			Eel River			Tomales Bay			Cent. S. Fr. / Suisun / S. Pablo Bays			South San Fran. Bay			Elkhorn Slough			Morro Bay		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- ⊙ Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater
- * - Salinity zone not present.

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Santa Monica Bay			San Pedro Bay			Alamitos Bay			Anaheim Bay			Newport Bay			Mission Bay			San Diego Bay			Tijuana Estuary		
		*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S
Blue mussel	A			●			●			●			●			○			●			●			○
<i>Mytilus edulis</i>	S			●			●			●			●			○			●			●			○
	J			●			●			●			●			○			●			●			○
	L			●			●			●			●			○			●			●			○
	E			●			●			●			●			○			●			●			○
Pacific oyster	A																								
<i>Crassostrea gigas</i>	S																								
	J																								
	L																								
	E																								
Horseneck gaper	A																								
<i>Tresus capax</i>	S																								
	J																								
	L																								
	E																								
Pacific gaper	A					●																			
<i>Tresus nuttalli</i>	S					●																			
	J					●																			
	L					●																			
	E					●																			
California jackknife clam	A			●		●		○		○		○		○		○		●		●		○		●	
<i>Tagelus californianus</i>	S			●		●		○		○		○		○		○		●		●		○		●	
	J			●		●		○		○		○		○		○		●		●		○		●	
	L			●		●		○		○		○		○		○		●		●		○		●	
	E			●		●		○		○		○		○		○		●		●		○		●	
Pacific littleneck clam	A			○		○		●		●		○		○		○								●	
<i>Protothaca staminea</i>	S			○		○		●		●		○		○		○								●	
	J			○		○		●		●		○		○		○								●	
	L			○		○		●		●		○		○		○								●	
	E			○		○		●		●		○		○		○								●	
		* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td></td></td>	S	* <td>*<td>S</td></td>	* <td>S</td>	S
		Santa Monica Bay			San Pedro Bay			Alamitos Bay			Anaheim Bay			Newport Bay			Mission Bay			San Diego Bay			Tijuana Estuary		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater
- * - Salinity zone not present.

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Table 2, continued. Spatial distribution and relative abundance

Species/Life Stage		West Coast Estuaries																							
		Puget Sound			Hood Canal			Skagit Bay			Gray's Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
Manila clam <i>Venerupis japonica</i>	A S J L E	●	○		●	○		○	○		●	○		●	○								○		
Eastern softshell clam <i>Mya arenaria</i>	A S J L E	●	○		○	○		●	○		●	○		●	○		○			●			●	○	
Geoduck <i>Panope abrupta</i>	A S J L E	●	○		●	○			○																
Bay shrimp <i>Crangon franciscorum</i>	A S J L E	●	○		○	○		●	○		●	○		●	○		●	○		●	○		○	○	
Dungeness crab <i>Cancer magister</i>	A M J L E	●	○		○	○		●	○		○	○		○	○		○	○		○	○		○	○	
Leopard shark <i>Triakis semifasciata</i>	A P J M E																								
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
		Puget Sound			Hood Canal			Skagit Bay			Gray's Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs
- P - Parturition
- M - Mating adults

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
Manila clam <i>Venerupis japonica</i>	A S J L E			○																		○			
Eastern softshell clam <i>Mya arenaria</i>	A S J L E		○	○					●	○		●	○		●			●			●	○			
Geoduck <i>Panope abrupta</i>	A S J L E																								
Bay shrimp <i>Crangon franciscorum</i>	A S J L E		○	○		●	●		●	●		●	●		●	●		●	●		●	●			
Dungeness crab <i>Cancer magister</i>	A M J L E		○	○		○	○		○	●		○	●		○	●		○	○		○	●		○	○
Leopard shark <i>Triakis semifasciata</i>	A P J M E																								
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs
- P - Parturition
- M - Mating

Table 2, continued. Spatial distribution and relative abundance.

Species/Life Stage		West Coast Estuaries																							
		Klamath River			Humboldt Bay			Eel River			Tomaes Bay			Cent. S. Fr. / Suisun / San Pablo Bays			South San Fran. Bay			Elkhorn Slough			Morro Bay		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S
Manila clam <i>Venerupis japonica</i>	A					●	○					○		●	●			●	●						
	S					●	○					○		●	●			●	●						
	J					●	○					○		●	●			●	●						
	L					●	○					○		●	●			●	●						
	E					●	○					○		●	●			●	●						
Eastern softshell clam <i>Mya arenaria</i>	A					●	○		○			○		○	○			●				○			
	S					●	○		○			○		●	○			●				○			
	J					●	○		○			○		●	○			●	○			○			
	L					●	○		○			○		●	○			●	○			○			
	E					●	○		○			○		●	○			●	○			○			
Geoduck <i>Panope abrupta</i>	A																								○
	S																								○
	J																								○
	L																								○
	E																								○
Bay shrimp <i>Crangon franciscorum</i>	A								●	●			○		●	●		●	○						
	S								●	●			○		○	○		○	○						
	J				●	○	○		●	●			○	○	●	●		○	○						
	L				○	○			●	●			○	○	○	○		○	○						
	E								●	●			○		●	●		○	○						
Dungeness crab <i>Cancer magister</i>	A		○	○		○	○		○	○			○												
	M																								
	J		○	○		●	●		●	●			●		●	●			○						
	L						●						○												
	E																								
Leopard shark <i>Triakis semifasciata</i>	A					●	●						○		○	●		●	●			○			○
	P												○									○			○
	J					●	●						○		○	○		○	○			○			○
	M																								
	E																								
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S
		Klamath River			Humboldt Bay			Eel River			Tomaes Bay			Cent. S. Fr. / Suisun / San Pablo Bays			South San Fran. Bay			Elkhorn Slough			Morro Bay		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs
- P - Parturition
- M - Mating

Table 2, continued. Spatial distribution and relative abundance.

Species/Life Stage		West Coast Estuaries																								
		Santa Monica Bay			San Pedro Bay			Alamitos Bay			Anaheim Bay			Newport Bay			Mission Bay			San Diego Bay			Tijuana Estuary			
		*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	
Manila clam <i>Venerupis japonica</i>		A S J L E																								
Eastern softshell clam <i>Mya arenaria</i>		A S J L E																								
Geoduck <i>Panope abrupta</i>		A S J L E																								
Bay shrimp <i>Crangon franciscorum</i>		A S J L E																								
Dungeness crab <i>Cancer magister</i>		A M J L E																								
Leopard shark <i>Triakis semifasciata</i>		A P J M E			○ ○ ○ ○			○ ○ ○ ○																		
			*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S
			Santa Monica Bay			San Pedro Bay			Alamitos Bay			Anaheim Bay			Newport Bay			Mission Bay			San Diego Bay			Tijuana Estuary		
			West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- ◎ Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater
- * - Salinity zone not present.

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs
- P - Parturition
- M - Mating

Table 2, continued. Spatial distribution and relative abundance (revised 1/91).

Species/Life Stage		West Coast Estuaries																							
		Puget Sound			Hood Canal			Skagit Bay			Gray's Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
Green sturgeon <i>Acipenser medirostris</i>	A S J L E											○	○		○	○		○	○						
White sturgeon <i>Acipenser transmontanus</i>	A S J L E										○	○	○	○	○	○	○	○	○	○	○	○			○
American shad <i>Alosa sapidissima</i>	A S J L E							○	○	○	●	●	●	●	●	●	●	●	○	●					
Pacific herring <i>Clupea pallasii</i>	A S J L E		●	●		●	●		●	●					○	○		○	○		●	●		○	●
Deepbody anchovy <i>Anchoa compressa</i>	A S J L E																								
Slough anchovy <i>Anchoa delicatissima</i>	A S J L E																								
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
		Puget Sound			Hood Canal			Skagit Bay			Gray's Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Table 2, continued. Spatial distribution and relative abundance (revised 1/91).

Species/Life Stage		West Coast Estuaries																								
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River			
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	
Green sturgeon	A																	○	○			○	○	○	○	○
<i>Acipenser medirostris</i>	S																					○	○	○	○	○
	J																									
	L																									
	E																									
White sturgeon	A							○	○	○							○	○	○			○	○	○	○	○
<i>Acipenser transmontanus</i>	S							○	○	○												○	○	○	○	○
	J																									
	L																									
	E																									
American shad	A							●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
<i>Alosa sapidissima</i>	S							●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	J																									
	L																									
	E																									
Pacific herring	A		●	●				●	●		○	○		○	○		●	●			●	●				
<i>Clupea pallasii</i>	S		○	○		○	○	●	●		○	○		○	○		○	○			○	○		○	○	
	J		○	○				●	●		○	○		○	○		○	○			○	○				
	L		○	○				●	●		○	○		○	○		○	○			○	○				
	E		○	○				●	●		○	○		○	○		○	○			○	○				
Deepbody anchovy	A																									
<i>Anchoa compressa</i>	S																									
	J																									
	L																									
	E																									
Slough anchovy	A																									
<i>Anchoa delicatissima</i>	S																									
	J																									
	L																									
	E																									
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River			
		West Coast Estuaries																								

Relative Abundance

- Highly Abundant
- ◎ Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Klamath River			Humboldt Bay			Eel River			Tomales Bay			Cent. S. Fr. / Suisun / S. Pablo Bays			South San Fran. Bay			Elkhorn Slough			Morro Bay		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S
Green sturgeon <i>Acipenser medirostris</i>	A	○	○	○		○	○	○	○	○					○	○		○	○						
	S																								
	J	○	○	○		○	○	○	○	○					○	○	○		○	○					
	L														○										
White sturgeon <i>Acipenser transmontanus</i>	A														○	●	○		○	○					
	S															●									
	J	○	○	○											○	●	○		○	○					
	L														○										
American shad <i>Alosa sapidissima</i>	A	○	○	○				●	●	●					●	●	●								
	S																								
	J	●	●	●				●	●	●					●	●	●		○	○					
	L																								
Pacific herring <i>Clupea pallasii</i>	A					●	●		○	○			●			●			●			●			○
	S					●	●		○	○			●			●			●			●			○
	J					●	●		●	●			●		○	●		○	○		●	●			○
	L		○			●	●		●	●			●		○	●		○	○		●	●			○
Deepbody anchovy <i>Anchoa compressa</i>	A																								
	S																								
	J																								
	L																								
Slough anchovy <i>Anchoa delicatissima</i>	A																								
	S																								
	J																								
	L																								
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S
		Klamath River			Humboldt Bay			Eel River			Tomales Bay			Cent. S. Fr. / Suisun / S. Pablo Bays			South San Fran. Bay			Elkhorn Slough			Morro Bay		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater
- * - Salinity zone not present.

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Santa Monica Bay			San Pedro Bay			Alamitos Bay			Anaheim Bay			Newport Bay			Mission Bay			San Diego Bay			Tijuana Estuary		
		*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S
Green sturgeon	A																								
<i>Acipenser medirostris</i>	S																								
	J																								
	L																								
	E																								
White sturgeon	A																								
<i>Acipenser transmontanus</i>	S																								
	J																								
	L																								
	E																								
American shad	A																								
<i>Alosa sapidissima</i>	S																								
	J																								
	L																								
	E																								
Pacific herring	A																								
<i>Clupea pallasii</i>	S																								
	J																								
	L																								
	E																								
Deepbody anchovy	A						○			○		●			●			○			●				
<i>Anchoa compressa</i>	S									○		○			○			○			○				
	J						○			○		○			○			○			○				
	L									○		○			○			○			○				
	E									○		○			○			○			○				
Slough anchovy	A									●					○			○			●				
<i>Anchoa delicatissima</i>	S									●					○			○			●				
	J									○					○			○			○				
	L									○					○			○			○				
	E									○					○			○			○				
		*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S
		Santa Monica Bay			San Pedro Bay			Alamitos Bay			Anaheim Bay			Newport Bay			Mission Bay			San Diego Bay			Tijuana Estuary		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- ◎ Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater
- * - Salinity zone not present.

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																									
		Puget Sound			Hood Canal			Skagit Bay			Gray's Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay				
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S		
Northern anchovy <i>Engraulis mordax</i>		A S J L E		○	○				○			○	○		●	●		●	●			○	○			○	○
Cutthroat trout <i>Oncorhynchus clarki</i>		A S J L E	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○
Cutthroat trout - Kelts <i>Oncorhynchus clarki (K)</i>		A S J L E	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Steelhead - Fall <i>Oncorhynchus mykiss (F)</i>		A S J L E																									
Steelhead - Half pounder <i>Oncorhynchus mykiss (H)</i>		A S J L E																									
Steelhead - Summer <i>Oncorhynchus mykiss (S)</i>		A S J L E	○	○	○	○	○	○	○	○	○	○	○					●	●	●					○	○	○
																		●	●	●					○	○	○
			T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	
			Puget Sound			Hood Canal			Skagit Bay			Gray's Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay			
			West Coast Estuaries																								

Relative Abundance

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Salinity Zone

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Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Table 2 (continued). Spatial distribution and relative abundance

Species/Life Stage		West Coast Estuaries																							
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
Northern anchovy <i>Engraulis mordax</i>	A S J L E			○		○	○		○	○		○	○					●	●		○	○			
Cutthroat trout <i>Oncorhynchus clarki</i>	A S J L E	○	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	○	○	○	○	○
Cutthroat trout - Kelts <i>Oncorhynchus clarki</i> (K)	A S J L E	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○				○	○	○		
Steelhead - Fall <i>Oncorhynchus mykiss</i> (F)	A S J L E																								
Steelhead - Half pounder <i>Oncorhynchus mykiss</i> (H)	A S J L E																					●	●	○	
Steelhead - Summer <i>Oncorhynchus mykiss</i> (S)	A S J L E				○	○	○				○	○	○				○	○	○			●	●	○	
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
 ● Abundant
 ○ Common
 Blank Not Present, Rare, or
 No Data Available

Salinity Zone

- T - Tidal Fresh
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 S - Seawater

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs

Table 2 (continued). Spatial distribution and relative abundance

Species/Life Stage		West Coast Estuaries																								
		Klamath River			Humboldt Bay			Eel River			Tomales Bay			Cent. S. Fr. / Suisun / S. Pablo Bays			South San Fran. Bay			Elkhorn Slough			Morro Bay			
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S	
Northern anchovy <i>Engraulis mordax</i>		A S J L E	●	●		●	●		○	○		○		●		●	●	●	●	●	●	●	●	●	●	
Cutthroat trout <i>Oncorhynchus clarki</i>		A S J L E	○	○	○				○	○	○															
Cutthroat trout - Kelts <i>Oncorhynchus clarki (K)</i>		A S J L E	○	○	○				○	○	○															
Steelhead - Fall <i>Oncorhynchus mykiss (F)</i>		A S J L E	○	○	○																					
Steelhead - Half pounder <i>Oncorhynchus mykiss (H)</i>		A S J L E	○	○	○				○	○	○															
Steelhead - Summer <i>Oncorhynchus mykiss (S)</i>		A S J L E	○	○	○				○	○	○															
			T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S
			Klamath River			Humboldt Bay			Eel River			Tomales Bay			Cent. S. Fr. / Suisun / S. Pablo Bays			South San Fran. Bay			Elkhorn Slough			Morro Bay		
			West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- ◎ Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater
- * - Salinity zone not present.

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Santa Monica Bay			San Pedro Bay			Alamitos Bay			Anaheim Bay			Newport Bay			Mission Bay			San Diego Bay			Tijuana Estuary		
		*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S
Northern anchovy <i>Engraulis mordax</i>	A			●			●			●			○			●						○			
	S			●			●			●			○			●						○			
	J			●			●			●			○			●						○			
	L			●			●			○			○			○			●			○			●
	E			●			●			○			○			●						○			●
Cutthroat trout <i>Oncorhynchus clarki</i>	A																								
	S																								
	J																								
	L																								
	E																								
Cutthroat trout - Kelts <i>Oncorhynchus clarki (K)</i>	A																								
	S																								
	J																								
	L																								
	E																								
Steelhead - Fall <i>Oncorhynchus mykiss (F)</i>	A																								
	S																								
	J																								
	L																								
	E																								
Steelhead - Half pounder <i>Oncorhynchus mykiss (H)</i>	A																								
	S																								
	J																								
	L																								
	E																								
Steelhead - Summer <i>Oncorhynchus mykiss (S)</i>	A																								
	S																								
	J																								
	L																								
	E																								
		*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S
		Santa Monica Bay			San Pedro Bay			Alamitos Bay			Anaheim Bay			Newport Bay			Mission Bay			San Diego Bay			Tijuana Estuary		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- Abundant
- Common
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Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater
- * - Salinity zone not present.

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Puget Sound			Hood Canal			Skagit Bay			Gray's Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
Steelhead - Winter <i>Oncorhynchus mykiss</i> (W)	A	○	○	○	○	○	○	○	○	○	●	○	○	●	○	○	●	●	●	●	●	●	○	○	○
	S										●	○	○	●	○	○	●	●	●	●	●	●	○	○	○
	J	○	○	○	○	○	○	○	○	○	●	○	○	●	○	○	●	●	●	●	●	○	○	○	
	L																								
Coho salmon <i>Oncorhynchus kisutch</i>	A	●	○	○	●	○	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	S																								
	J	●	○	○	●	○	○	●	○	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	L																								
Chinook salmon - Fall <i>Oncorhynchus tshawytscha</i> (F)	A	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	S																								
	J	●	●	○	●	○	○	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	L																								
Chinook salmon - Late Fall <i>Oncorhynchus tshawytscha</i> (LF)	A																								
	S																								
	J																								
	L																								
Chinook salmon - Winter <i>Oncorhynchus tshawytscha</i> (W)	A																								
	S																								
	J																								
	L																								
Chinook salmon - Spring <i>Oncorhynchus tshawytscha</i> (Sp)	A	●	●	○	○	○	○	●	●	●	●	●	●				●	●	●				○	○	○
	S																								
	J	●	●	○	●	○	○	●	●	○	●	●	●				●	●	●				●	●	●
	L																								
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
		Puget Sound			Hood Canal			Skagit Bay			Gray's Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
Steelhead - Winter <i>Oncorhynchus mykiss</i> (W)	A				○	○	○	○	○	○	●	●	●	○	○	○	○	○	○	●	●	●	●	●	●
	S																								
	J				○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	L																								
Coho salmon <i>Oncorhynchus kisutch</i>	A	○	○	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	S																								
	J	○	○	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	L																								
Chinook salmon - Fall <i>Oncorhynchus tshawytscha</i> (F)	A				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	S																								
	J				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	L																								
Chinook salmon - Late Fall <i>Oncorhynchus tshawytscha</i> (LF)	A																								
	S																								
	J																								
	L																								
Chinook salmon - Winter <i>Oncorhynchus tshawytscha</i> (W)	A																								
	S																								
	J																								
	L																								
Chinook salmon - Spring <i>Oncorhynchus tshawytscha</i> (Sp)	A				○	○	○	○	○	○	○	○	○				●	●	●	○	○	○	●	●	●
	S																								
	J				●	●	●	●	●	●	●	●	●				●	●	●	●	●	●	●	●	
	L																								
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Table 2 (continued). Spatial distribution and relative abundance

Species/Life Stage		West Coast Estuaries																							
		Klamath River			Humboldt Bay			Eel River			Tomaes Bay			Cent S. Fr. / Suisun / S. Pablo Bays			South San Fran. Bay			Elkhorn Slough			Morro Bay		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S
Steelhead - Winter <i>Oncorhynchus mykiss (W)</i>	A S J L E	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○									
Coho salmon <i>Oncorhynchus kisutch</i>	A S J L E	○	○	○	○	○	○	○	○	○	○	○													
Chinook salmon - Fall <i>Oncorhynchus tshawytscha (F)</i>	A S J L E	●	●	●	○	○	○	●	●	●				●	●	●									
Chinook salmon - Late Fall <i>Oncorhynchus tshawytscha (LF)</i>	A S J L E													○	○	○									
Chinook salmon - Winter <i>Oncorhynchus tshawytscha (W)</i>	A S J L E													○	○	○									
Chinook salmon - Spring <i>Oncorhynchus tshawytscha (Sp)</i>	A S J L E	●	●	●										○	○	○									
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S
		Klamath River			Humboldt Bay			Eel River			Tomaes Bay			Cent S. Fr. / Suisun / S. Pablo Bays			South San Fran. Bay			Elkhorn Slough			Morro Bay		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater
- * - Salinity zone not present.

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Santa Monica Bay			San Pedro Bay			Alamitos Bay			Anaheim Bay			Newport Bay			Mission Bay			San Diego Bay			Tijuana Estuary		
		*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S
Steelhead - Winter <i>Oncorhynchus mykiss</i> (W)	A S J L E																								
Coho salmon <i>Oncorhynchus kisutch</i>	A S J L E																								
Chinook salmon - Fall <i>Oncorhynchus tshawytscha</i> (F)	A S J L E																								
Chinook salmon - Late Fall <i>Oncorhynchus tshawytscha</i> (LF)	A S J L E																								
Chinook salmon - Winter <i>Oncorhynchus tshawytscha</i> (W)	A S J L E																								
Chinook salmon - Spring <i>Oncorhynchus tshawytscha</i> (Sp)	A S J L E																								
		* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td></td></td>	S	* <td>*<td>S</td></td>	* <td>S</td>	S
		Santa Monica Bay			San Pedro Bay			Alamitos Bay			Anaheim Bay			Newport Bay			Mission Bay			San Diego Bay			Tijuana Estuary		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- ◎ Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater
- * - Salinity zone not present.

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Table 2 (continued). Spatial distribution and relative abundance

Species/Life Stage		West Coast Estuaries																							
		Puget Sound			Hood Canal			Skagit Bay			Grays Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
Chinook salmon - Summer <i>Oncorhynchus tshawytscha</i> (Su)	A S J L E																○	○	○						
Chum salmon <i>Oncorhynchus keta</i>	A S J L E	●	●	⊙	●	●	●	●	●	●	⊙	⊙	⊙	●	●	●	○	○	○	○	○	○	⊙	⊙	⊙
Pink salmon <i>Oncorhynchus gorbuscha</i>	A S J L E	●	●	●	●	●	●	⊙	⊙																
Sockeye salmon <i>Oncorhynchus nerka</i>	A S J L E	⊙	⊙	○													○	○	○						
Surf smelt <i>Hypomesus pretiosus</i>	A S J L E	⊙	⊙	⊙	⊙	⊙		⊙	⊙		○	○		○	○		○	○		⊙	●		⊙	●	
Longfin smelt <i>Spirinchus thaleichthys</i>	A S J L E		○	○				○	○	⊙	○	○	⊙	○	○	⊙	⊙	⊙	○						
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
		Puget Sound			Hood Canal			Skagit Bay			Grays Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay		
		West Coast Estuaries																							

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Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
Chinook salmon - Summer <i>Oncorhynchus tshawytscha</i> (Su)	A S J L E																								
Chum salmon <i>Oncorhynchus keta</i>	A S J L E	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○				○	○	○			
Pink salmon <i>Oncorhynchus gorbuscha</i>	A S J L E																								
Sockeye salmon <i>Oncorhynchus nerka</i>	A S J L E																								
Surf smelt <i>Hypomesus pretiosus</i>	A S J L E		●	●		●	●		○	○		○	○	●	●		○	●		○	●			○	●
Longfin smelt <i>Spirinchus thaleichthys</i>	A S J L E							○	○	○									○	○	○				
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River		
		West Coast Estuaries																							

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Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																								
		Klamath River			Humboldt Bay			Eel River			Tomales Bay			Cent. S. Fr. / Suisun / San Pablo Bays			South San Fran. Bay			Elkhorn Slough			Morro Bay			
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S	
Chinook salmon - Summer <i>Oncorhynchus tshawytscha</i> (Su)	A S J L E																									
Chum salmon <i>Oncorhynchus keta</i>	A S J L E																									
Pink salmon <i>Oncorhynchus gorbuscha</i>	A S J L E																									
Sockeye salmon <i>Oncorhynchus nerka</i>	A S J L E																									
Surf smelt <i>Hypomesus pretiosus</i>	A S J L E					○	○			○			○			○										
			○	○		●	●		●	●			○	○												
						○	○		○	○			○													
Longfin smelt <i>Spirinchus thaleichthys</i>	A S J L E			○	○	○	○	○	○	○				●	●	●		○	○							
			○		○	○	○	○	○	○				●	●	●		○	○							
				○	○	○	○	○	○	○				●	●	●		○	○							
				○	○	○	○	○	○	○				●	●	●		○	○							
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S	
		Klamath River			Humboldt Bay			Eel River			Tomales Bay			Cent. S. Fr. / Suisun / San Pablo Bays			South San Fran. Bay			Elkhorn Slough			Morro Bay			
		West Coast Estuaries																								

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Salinity Zone

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- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
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Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																								
		Santa Monica Bay			San Pedro Bay			Alamitos Bay			Anaheim Bay			Newport Bay			Mission Bay			San Diego Bay			Tijuana Estuary			
		*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	
Chinook salmon - Summer <i>Oncorhynchus tshawytscha</i> (Su)		A																								
		S																								
		J																								
		L																								
		E																								
Chum salmon <i>Oncorhynchus keta</i>		A																								
		S																								
		J																								
		L																								
		E																								
Pink salmon <i>Oncorhynchus gorbuscha</i>		A																								
		S																								
		J																								
		L																								
		E																								
Sockeye salmon <i>Oncorhynchus nerka</i>		A																								
		S																								
		J																								
		L																								
		E																								
Surf smelt <i>Hypomesus pretiosus</i>		A																								
		S																								
		J																								
		L																								
		E																								
Longfin smelt <i>Spirinchus thaleichthys</i>		A																								
		S																								
		J																								
		L																								
		E																								
			*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S
			Santa Monica Bay			San Pedro Bay			Alamitos Bay			Anaheim Bay			Newport Bay			Mission Bay			San Diego Bay			Tijuana Estuary		
			West Coast Estuaries																							

Relative Abundance

- Highly Abundant
 ◎ Abundant
 ○ Common
 Blank Not Present, Rare, or
 No Data Available

Salinity Zone

- T - Tidal Fresh
 M - Mixing
 S - Seawater
 * - Salinity zone not present.

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Puget Sound			Hood Canal			Skagit Bay			Gray's Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
Eulachon <i>Thaleichthys pacificus</i>	A										○	○	○	○	○	○	●	●	●						
	S																●								
	J																								
	L										○	○	○	○	○	○	●	●	●						
Pacific tomcod <i>Microgadus proximus</i>	A		●	●		○	○		●	●		○	○		○	○		○	○		○	○		○	○
	S		●	●		○	○		●	●		●	●		●	●		●	●		●	●		●	●
	J		○	○		○	○		○	○		○	○		○	○		○	○		○	○		○	○
	L		○	○		○	○		○	○		○	○		○	○		○	○		○	○		○	○
Topsmelt <i>Atherinops affinis</i>	A																								○
	S																								○
	J																								
	L																								
Jacksmelt <i>Atherinopsis californiensis</i>	A																								
	S																								
	J																								
	L																								
Threespine stickleback <i>Gasterosteus aculeatus</i>	A	○	○	○	○	○	○	●	●	○	●	●	○	●	●	○	●	●		○	○	○	○	○	○
	S	○	○	○	○	○	○	●	●	○	●	●	○	●	●	○	●	●		○	○	○	○	○	○
	J	●	●	○	●	○	○	●	●	○	●	●	○	●	●	○	●	●		○	○	○	○	○	○
	L	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		○	○	○	○	○	○
Striped bass <i>Morone saxatilis</i>	A																								
	S																								
	J																								
	L																								
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
		Puget Sound			Hood Canal			Skagit Bay			Gray's Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
Eulachon <i>Thaleichthys pacificus</i>	A S J L E																○	○	○						
																	○	○	○						
Pacific tomcod <i>Microgadus proximus</i>	A S J L E					○	○			○		○			○			○	○		○	●		○	○
			○	○		○	○		○	○		○	○		○	○		○	○		○	●		○	○
				○																					
Topsmelt <i>Atherinops affinis</i>	A S J L E		○	●					●	●		○	○		●	●			○		●	●			
			○	○					○	○		○	○		○	○					○	○			
			○	○					○	○		○	○		○	○					○	○			
			○	○					○	○		○	○		○	○					○	○			
Jacksmelt <i>Atherinopsis californiensis</i>	A S J L E																				○				
																					○				
Threespine stickleback <i>Gasterosteus aculeatus</i>	A S J L E		●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○		○	○		○	○	○
			○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		○	○		○	○	○
			○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		○	○		○	○	○
			○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		○	○		○	○	○
Striped bass <i>Morone saxatilis</i>	A S J L E													○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				
														○			○	○	○	○	○				

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Klamath River			Humboldt Bay			Eel River			Tomales Bay			Cent. S. Fr. / Suisun / S. Pablo Bays			South San Fran. Bay			Elkhorn Slough			Morro Bay		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S
Eulachon <i>Thaleichthys pacificus</i>	A	●	●	●																					
	S																								
	J																								
	L	○	○	○																					
Pacific tomcod <i>Microgadus proximus</i>	A					○	○					○													
	S																								
	J					○	○					○													
	L																								
Topsmelt <i>Atherinops affinis</i>	A					○	○		○	○		●		○	○		○	●			●			●	
	S					○	○		○	○		●					○	●			●			●	
	J					○	○		○	○		●		○	○		○	●			●			●	
	L					○	○		○	○		●		○	○		○	●			●			●	
Jacksmelt <i>Atherinopsis californiensis</i>	A					○	○					●		●	●		●	●			●			●	
	S					○	○					●		●	●		●	●			●			●	
	J					○	○					●		○	○		○	●			○			○	
	L					○	○					●		○	○		○	●			○			○	
Threespine stickleback <i>Gasterosteus aculeatus</i>	A	●	●	●	●	●	○	●	●	○		○	●	○	○		○	○			○			○	
	S	●	●	●	●	●		○	○			○	○	○	○		○	○							
	J	●	●	●	●	●	○	○	○	○		○	○	○	○		○	○			○			○	
	L	●	●		○	○		○	○			○	○	○	○		○	○							
Striped bass <i>Morone saxatilis</i>	A											○	○	○	○		○	○							
	S												○	○	○										
	J												○	○	○		○	○							
	L												○	○	○										
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S
		Klamath River			Humboldt Bay			Eel River			Tomales Bay			Cent. S. Fr. / Suisun / S. Pablo Bays			South San Fran. Bay			Elkhorn Slough			Morro Bay		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater
- * - Salinity zone not present.

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Santa Monica Bay			San Pedro Bay			Alamitos Bay			Anaheim Bay			Newport Bay			Mission Bay			San Diego Bay			Tijuana Estuary		
		*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S
Eulachon <i>Thaleichthys pacificus</i>	A S J L E																								
Pacific tomcod <i>Microgadus proximus</i>	A S J L E																								
Topsmelt <i>Atherinops affinis</i>	A S J L E			● ○ ● ○ ○			● ○ ● ○ ○			● ● ● ● ○ ○			● ● ● ● ○ ○			● ● ● ● ○ ○			● ● ● ● ○ ○			● ● ● ● ○ ○			● ● ● ● ○ ○
Jacksmelt <i>Atherinopsis californiensis</i>	A S J L E			● ● ● ○ ●			● ● ● ○ ●												● ● ● ● ○ ○ ○			○ ○ ○ ○ ○			
Threespine stickleback <i>Gasterosteus aculeatus</i>	A S J L E																								
Striped bass <i>Morone saxatilis</i>	A S J L E																								
		* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td></td></td>	S	* <td>*<td>S</td></td>	* <td>S</td>	S
		Santa Monica Bay			San Pedro Bay			Alamitos Bay			Anaheim Bay			Newport Bay			Mission Bay			San Diego Bay			Tijuana Estuary		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- ◎ Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater
- * - Salinity zone not present.

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Puget Sound			Hood Canal			Skagit Bay			Gray's Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
Kelp bass <i>Paralabrax clathratus</i>	A																								
	S																								
	J																								
	L																								
	E																								
Barred sand bass <i>Paralabrax nebulifer</i>	A																								
	S																								
	J																								
	L																								
	E																								
White croaker <i>Genyonemus lineatus</i>	A																								
	S																								
	J																								
	L																								
	E																								
White seabass <i>Atractoscion nobilis</i>	A																								
	S																								
	J																								
	L																								
	E																								
Shiner perch <i>Cymatogaster aggregata</i>	A		●	●		●	●		●	●		●	○		●	○		●	○		●	●		●	●
	P		●			●			●			●			●			●			●	●		●	
	J	○	●	●	○	●	●	○	●	●	○	●	○	○	●	○	○	●	○	○	●	●	○	●	●
	L																								
	E																								
Pacific sand lance <i>Ammodytes hexapterus</i>	A		○	○		○	○		○	○			○			○		○	○		○	●		○	●
	S		●	●		●	●		●	●											○	●		○	●
	J		●	●		●	●		●	●		○	●		○	●		○	○		○	●		○	●
	L		●	●		●	●		●	●		○	○		○	○		○	○			○		○	○
	E		●	●		●	●		●	●															
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
		Puget Sound			Hood Canal			Skagit Bay			Gray's Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs
- P - Parturition

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
Kelp bass <i>Paralabrax clathratus</i>	A S J L E																								
Barred sand bass <i>Paralabrax nebulifer</i>	A S J L E																								
White croaker <i>Genyonemus lineatus</i>	A S J L E																								
White seabass <i>Atractoscion nobilis</i>	A S J L E																								
Shiner perch <i>Cymatogaster aggregata</i>	A P J L E		●	●		●	●		●	●		●	●		●	●		●	●		●	●		●	●
Pacific sand lance <i>Ammodytes hexapterus</i>	A S J L E			○			○			○			○			○			○			○			
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs
- P - Parturition

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Klamath River			Humboldt Bay			Eel River			Tomaes Bay			Cent S. Fr. / Suisun / S. Pablo Bays			South San Fran. Bay			Elkhorn Slough			Morro Bay		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S
Kelp bass <i>Paralabrax clathratus</i>	A S J L E																								
Barred sand bass <i>Paralabrax nebulifer</i>	A S J L E																								
White croaker <i>Genyonemus lineatus</i>	A S J L E						○					○			○		○	○							
						○						○			○		○	○							
												○			○		○	○							
												○			○		○	○							
												○			○		○	○							
												○			○		○	○							
White seabass <i>Atractoscion nobilis</i>	A S J L E																								
Shiner perch <i>Cymatogaster aggregata</i>	A P J L E		●	●		●	●		●	●			●		●	●		●	●			●		●	
			●	●		●	●		●	●			●		●	●		●	●			●		●	
			●	●		●	●		●	●			●		●	●		●	●			●		●	
Pacific sand lance <i>Ammodytes hexapterus</i>	A S J L E						○						○												
						○							○												
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						○																			

Relative Abundance

- Highly Abundant
- ◎ Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater
- * - Salinity zone not present.

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs
- P - Parturition

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Santa Monica Bay			San Pedro Bay			Alamitos Bay			Anaheim Bay			Newport Bay			Mission Bay			San Diego Bay			Tijuana Estuary		
		*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S
Kelp bass <i>Paralabrax clathratus</i>	A			●			●											○							
	S			○			○																		
	J			●			●											○							
	L			○			○											○							
Barred sand bass <i>Paralabrax nebulifer</i>	A			●			●			○			○			○			●			○			
	S			○			○					○				○			●				○		
	J			●			●			○			○					○				○			
	L			○			○											○							
White croaker <i>Genyonemus lineatus</i>	A			●			●			○			○									○			
	S			●			●						○									○			
	J			●			●			●			○					○							
	L			●			●			○			○					○							○
White seabass <i>Atractoscion nobilis</i>	A			○			○																		
	S			○			○																		
	J			○			○																		
	L			○			○																		
Shiner perch <i>Cymatogaster aggregata</i>	A			○			○			○			○			○			●			●			
	P			○			○			○			○			○			●			●			
	J			○			○			○			○			○			●			●			
	L						○			●			●			●			●			●			
Pacific sand lance <i>Ammodytes hexapterus</i>	A																								
	S																								
	J																								
	L																								
		* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td><td>*<td>*<td>S</td></td></td></td></td>	S	* <td>*<td>S</td><td>*<td>*<td>S</td></td></td></td>	* <td>S</td> <td>*<td>*<td>S</td></td></td>	S	* <td>*<td>S</td></td>	* <td>S</td>	S
		Santa Monica Bay			San Pedro Bay			Alamitos Bay			Anaheim Bay			Newport Bay			Mission Bay			San Diego Bay			Tijuana Estuary		
		West Coast Estuaries																							

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater
- * - Salinity zone not present.

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs
- P - Parturition

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																							
		Puget Sound			Hood Canal			Skagit Bay			Gray's Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
Arrow goby <i>Clevelandia ios</i>	A		○	○		○	○		○	○		○	○		○	○									
	S		○	○		○	○		○	○		○	○		○	○									
	J		○	○		○	○		○	○		○	○		○	○									
	L		○	○		○	○		○	○		○	○		○	○									
Lingcod <i>Ophiodon elongatus</i>	A			○			○			○															
	S			○			○			○															
	J		○	○		○	○		○	○		○	○		○	○				○				○	
	L		○	○		○	○		○	○		○	○		○	○									
Pacific staghorn sculpin <i>Leptocottus armatus</i>	A		●	●		●	●		●	●		●	●		●	●	○	●	○		●	●		●	●
	S		○	○		○	○		○	○		○	○		○	○		○	○		○	○		○	○
	J	○	●	●	○	●	●	○	●	●	○	●	●	○	●	●	○	●	●	○	●	●	○	●	●
	L		○	○		○	○		○	○		○	○		○	○		○	○		○	○		○	○
California halibut <i>Paralichthys californicus</i>	A																								
	S																								
	J																								
	L																								
Diamond turbot <i>Hypsopsetta guttulata</i>	A																								
	S																								
	J																								
	L																								
English sole <i>Pleuronectes vetulus</i>	A			●			●			●															
	S			●			●			●															
	J		●	●		●	●		●	●		●	●		●	●		●	○		●		●	●	
	L		●	●		●	●		○	○		○	○		○	○		○	○		○		○	○	
Starry flounder <i>Platichthys stellatus</i>	A		○	○		○	○		○	○		○	○		○	○		○	○		○	○		○	○
	S		○	○		○	○		○	○		○	○		○	○		○	○		○	○		○	○
	J	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	L		○	○		○	○		○	○		○	○		○	○		○	○		○	○		○	○
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
		Puget Sound			Hood Canal			Skagit Bay			Gray's Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay		
		West Coast Estuaries																							

Relative Abundance

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- Common
- Blank Not Present, Rare, or No Data Available

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Table 2, continued. Spatial distribution and relative abundance (revised 1/91).

Species/Life Stage		West Coast Estuaries																							
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
Arrow goby <i>Clevelandia ios</i>	A S J L E								○												○	○			
Lingcod <i>Ophiodon elongatus</i>	A S J L E								○												○	○			
Pacific staghorn sculpin <i>Leptocottus armatus</i>	A S J L E		●	●		●	●		●	●		●	●		●	●		●	●		●	●		●	●
California halibut <i>Paralichthys californicus</i>	A S J L E																								
Diamond turbot <i>Hypsopsetta guttulata</i>	A S J L E																								
English sole <i>Pleuronectes vetulus</i>	A S J L E		○	●		○	●		●	●		●	●		○	●		○	●		●	●			
Starry flounder <i>Platichthys stellatus</i>	A S J L E		○	○		○	○		○	○		○	○		○	○		○	○		○	○		○	○
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River		
		West Coast Estuaries																							

Relative Abundance

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Salinity Zone

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Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Table 2, continued. Spatial distribution and relative abundance (revised 1/91).

Species/Life Stage		West Coast Estuaries																							
		Klamath River			Humboldt Bay			Eel River			Tomales Bay			Cent S. Fr. / Suisun / S. Pablo Bays			South San Fran. Bay			Elkhorn Slough			Morro Bay		
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S
Arrow goby <i>Clevelandia ios</i>	A																								
	S																								
	J																								
	L																								
	E																								
Lingcod <i>Ophiodon elongatus</i>	A																								
	S																								
	J																								
	L																								
	E																								
Pacific staghorn sculpin <i>Leptocottus armatus</i>	A																								
	S																								
	J																								
	L																								
	E																								
California halibut <i>Paralichthys californicus</i>	A																								
	S																								
	J																								
	L																								
	E																								
Diamond turbot <i>Hypsopsetta guttulata</i>	A																								
	S																								
	J																								
	L																								
	E																								
English sole <i>Pleuronectes vetulus</i>	A																								
	S																								
	J																								
	L																								
	E																								
Starry flounder <i>Platichthys stellatus</i>	A																								
	S																								
	J																								
	L																								
	E																								
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S
		Klamath River			Humboldt Bay			Eel River			Tomales Bay			Cent S. Fr. / Suisun / S. Pablo Bays			South San Fran. Bay			Elkhorn Slough			Morro Bay		
		West Coast Estuaries																							

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- T - Tidal Fresh
- M - Mixing
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Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Spatial Distribution and Relative Abundance

Table 2 (continued).

Species/Life Stage		West Coast Estuaries																	
		Santa Monica Bay			San Pedro Bay			Alamitos Bay		Anaheim Bay		Newport Bay		Mission Bay		San Diego Bay		Tijuana Estuary	
		*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S
Arrow goby <i>Clevelandia ios</i>	A																		
	S																		
	J																		
	L																		
	E																		
Lingcod <i>Ophiodon elongatus</i>	A																		
	S																		
	J																		
	L																		
	E																		
Pacific staghorn sculpin <i>Leptocottus armatus</i>	A																		
	S																		
	J																		
	L																		
	E																		
California halibut <i>Paralichthys californicus</i>	A																		
	S																		
	J																		
	L																		
	E																		
Diamond turbot <i>Hypsopsetta guttulata</i>	A																		
	S																		
	J																		
	L																		
	E																		
English sole <i>Pleuronectes vetulus</i>	A																		
	S																		
	J																		
	L																		
	E																		
Starry flounder <i>Platichthys stellatus</i>	A																		
	S																		
	J																		
	L																		
	E																		
		*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S
		Santa Monica Bay			San Pedro Bay			Alamitos Bay		Anaheim Bay		Newport Bay		Mission Bay		San Diego Bay		Tijuana Estuary	
		West Coast Estuaries																	

Relative Abundance

- Highly Abundant
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- T - Tidal Fresh
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Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Table 3. Temporal Distribution

Index to Table 3: Page location of temporal distribution table for each species and estuary:

Common and Scientific Name	Estuary											
	Puget Sound	Hood Canal	Skagit Bay	Grays Harbor	Willapa Bay	Columbia River	Nemah River	Tillamook Bay	Nelam Bay	Siletz Bay	Yaquina Bay	Alsea Bay
Blue mussel (<i>Mytilus edulis</i>)												
Pacific oyster (<i>Crassostrea gigas</i>)												
Horseneck gaper (<i>Tresus capax</i>)	p.49	p.50	p.51	p.52	p.53	p.54	p.55	p.56	p.57	p.58	p.59	
Pacific gaper (<i>Tresus nuttall</i>)												
California jackknife clam (<i>Tagelus californianus</i>)												
Pacific littleneck clam (<i>Protothaca staminea</i>)												
Manila (Japanese) clam (<i>Venerupis japonica</i>)												
Eastern softshell clam (<i>Mya arenaria</i>)												
Geoduck (<i>Panope abrupta</i>)	p.60	p.61	p.62	p.63	p.64	p.65	p.66	p.67	p.68	p.69	p.70	
Bay shrimp (<i>Crangon franciscorum</i>)												
Dungeness crab (<i>Cancer magister</i>)												
Leopard shark (<i>Triakis semifasciata</i>)												
Green sturgeon (<i>Acipenser medirostris</i>)												
White sturgeon (<i>Acipenser transmontanus</i>)												
American shad (<i>Alosa sapidissima</i>)	p.71	p.72	p.73	p.74	p.75	p.76	p.77	p.78	p.79	p.80	p.81	
Pacific herring (<i>Clupea pallasii</i>)												
Deepbody anchovy (<i>Anchoa compressa</i>)												
Slough anchovy (<i>Anchoa delicatissima</i>)												
Northern anchovy (<i>Engraulis mordax</i>)												
Cutthroat trout (<i>Oncorhynchus clarki</i>)	p.82	p.83	p.84	p.85	p.86	p.87	p.88	p.89	p.90	p.91	p.92	
Steelhead (<i>Oncorhynchus mykiss</i>)*												
Coho salmon (<i>Oncorhynchus kisutch</i>)	p.93	p.94	p.95	p.96	p.97	p.98	p.99	p.100	p.101	p.102	103	
Chinook salmon (<i>Oncorhynchus tshawytscha</i>)*												
Chum salmon (<i>Oncorhynchus keta</i>)												
Pink salmon (<i>Oncorhynchus gorbuscha</i>)												
Sockeye salmon (<i>Oncorhynchus nerka</i>)	p.104	p.105	p.106	p.107	p.108	p.109	p.110	p.111	p.112	p.113	114	
Surf smelt (<i>Hypomesus pretiosus</i>)												
Longfin smelt (<i>Spirinchus thaleichthys</i>)												
Eulachon (<i>Thaleichthys pacificus</i>)												
Pacific tomcod (<i>Microgadus proximus</i>)												
Topsmelt (<i>Atherinops affinis</i>)	p.115	p.116	p.117	p.118	p.119	p.120	p.121	p.122	p.123	p.124	125	
Jacksmelt (<i>Atherinopsis californiensis</i>)												
Threespine stickleback (<i>Gasterosteus aculeatus</i>)												
Striped bass (<i>Morone saxatilis</i>)												
Kelp bass (<i>Paralabrax clathratus</i>)												
Barred sand bass (<i>Paralabrax nebulifer</i>)												
White seabass (<i>Atractoscion nobilis</i>)	p.126	p.127	p.128	p.129	p.130	p.131	p.132	p.133	p.134	p.135	136	
White croaker (<i>Genyonemus lineatus</i>)												
Shiner perch (<i>Cymatogaster aggregata</i>)												
Pacific sand lance (<i>Ammodytes hexapterus</i>)												
Arrow goby (<i>Clevelandia ios</i>)												
Lingcod (<i>Ophiodon elongatus</i>)												
Pacific staghorn sculpin (<i>Leptocottus armatus</i>)												
California halibut (<i>Paralichthys californicus</i>)	p.137	p.138	p.139	p.140	p.141	p.142	p.143	p.144	p.145	p.146	147	
Diamond turbot (<i>Hypsopsetta guttulata</i>)												
English sole (<i>Pleuronectes vetulus</i>)												
Starry flounder (<i>Platichthys stellatus</i>)												

* Winter steelhead and summer chinook salmon are located eleven pages after the pages shown here.

Table 3. Data Summary Table: Temporal Distribution

		West Coast Estuaries											
		Puget Sound				Hood Canal				Skagit Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Blue mussel <i>Mytilus edulis</i>	A												
	S												
	J												
	L												
	E												
Pacific oyster <i>Crassostrea gigas</i>	A												
	S												
	J												
	L												
	E												
Horseneck gaper <i>Tresus capax</i>	A												
	S												
	J												
	L												
	E												
Pacific gaper <i>Tresus nuttalli</i>	A												
	S												
	J												
	L												
	E												
California jackknife clam <i>Tagelus californianus</i>	A												
	S												
	J												
	L												
	E												
Pacific littleneck clam <i>Protothaca staminea</i>	A												
	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Puget Sound				Hood Canal				Skagit Bay			
		West Coast Estuaries											

Relative Abundance

[Solid Black]	Highly Abundant
[Stippled]	Abundant
[Common]	Common
Blank	Not present, Rare, or No Data Available

Life Stage

A	Adults
S	Spawning
J	Juveniles
L	Larvae
E	Eggs

Table 3 (continued). Data Summary Table: Temporal Distribution

		West Coast Estuaries																																			
		Grays Harbor				Willapa Bay				Columbia River																											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
Species/Life Stage																																					
Blue mussel <i>Mytilis edulis</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Pacific oyster <i>Crassostrea gigas</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Horseneck gaper <i>Tresus capax</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Pacific gaper <i>Tresus nuttalli</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
California jackknife clam <i>Tagelus californianus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Pacific littleneck clam <i>Protothaca staminea</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Grays Harbor				Willapa Bay				Columbia River																											
		West Coast Estuaries																																			

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Nehalem Bay				Tillamook Bay				Netarts Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Blue mussel <i>Mytilus edulis</i>	A												
	S												
	J												
	L												
	E												
Pacific oyster <i>Crassostrea gigas</i>	A												
	S												
	J												
	L												
	E												
Horseneck gaper <i>Tresus capax</i>	A												
	S												
	J												
	L												
	E												
Pacific gaper <i>Tresus nuttalli</i>	A												
	S												
	J												
	L												
	E												
California jackknife clam <i>Tagelus californianus</i>	A												
	S												
	J												
	L												
	E												
Pacific littleneck clam <i>Protothaca staminea</i>	A												
	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Nehalem Bay				Tillamook Bay				Netarts Bay			
		West Coast Estuaries											

Relative Abundance



Highly Abundant



Abundant



Common

Blank

Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

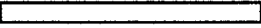
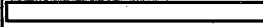
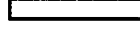
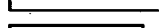
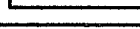
J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		Siletz River				Yaquina Bay				Alsea River															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Blue mussel	A																								
<i>Mytilis edulis</i>	S																								
	J																								
	L																								
	E																								
Pacific oyster	A																								
<i>Crassostrea gigas</i>	S																								
	J																								
	L																								
	E																								
Horseneck gaper	A																								
<i>Tresus capax</i>	S																								
	J																								
	L																								
	E																								
Pacific gaper	A																								
<i>Tresus nuttalli</i>	S																								
	J																								
	L																								
	E																								
California jackknife clam	A																								
<i>Tagelus californianus</i>	S																								
	J																								
	L																								
	E																								
Pacific littleneck clam	A																								
<i>Protothaca staminea</i>	S																								
	J																								
	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Siletz River				Yaquina Bay				Alsea River															
		West Coast Estuaries																							

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Siuslaw River				Umpqua River				Coos Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Blue mussel <i>Mytilus edulis</i>	A												
	S												
	J												
	L												
	E												
Pacific oyster <i>Crassostrea gigas</i>	A												
	S												
	J												
	L												
	E												
Horseneck gaper <i>Tresus capax</i>	A												
	S												
	J												
	L												
	E												
Pacific gaper <i>Tresus nuttalli</i>	A												
	S												
	J												
	L												
	E												
California jackknife clam <i>Tagelus californianus</i>	A												
	S												
	J												
	L												
	E												
Pacific littleneck clam <i>Protothaca staminea</i>	A												
	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Siuslaw River				Umpqua River				Coos Bay			
		West Coast Estuaries											

Relative Abundance

[Solid] Highly Abundant

[Dotted] Abundant

[Dashed] Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

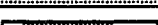
J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		Rogue River				Klamath River				Humboldt Bay															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Blue mussel <i>Mytilis edulis</i>	A																								
	S																								
	J																								
	L																								
Pacific oyster <i>Crassostrea gigas</i>	E																								
	A																								
	S																								
	J																								
Horseneck gaper <i>Tresus capax</i>	L																								
	E																								
	A																								
	S																								
Pacific gaper <i>Tresus nuttalli</i>	J																								
	L																								
	E																								
	A																								
California jackknife clam <i>Tagelus californianus</i>	S																								
	J																								
	L																								
	E																								
Pacific littleneck clam <i>Protothaca staminea</i>	A																								
	S																								
	J																								
	L																								
	E																								
	A																								
	S																								
	J																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Rogue River				Klamath River				Humboldt Bay															
		West Coast Estuaries																							

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		Eel River					Tomaes Bay					Central San Francisco / Suisun / San Pablo Bays													
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Blue mussel <i>Mytilus edulis</i>	A																								
	S																								
	J																								
	L																								
	E																								
Pacific oyster <i>Crassostrea gigas</i>	A																								
	S																								
	J																								
	L																								
	E																								
Horseneck gaper <i>Tresus capax</i>	A																								
	S																								
	J																								
	L																								
	E																								
Pacific gaper <i>Tresus nuttalli</i>	A																								
	S																								
	J																								
	L																								
	E																								
California jackknife clam <i>Tagelus californianus</i>	A																								
	S																								
	J																								
	L																								
	E																								
Pacific littleneck clam <i>Protothaca staminea</i>	A																								
	S																								
	J																								
	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Eel River					Tomaes Bay					Central San Francisco / Suisun / San Pablo Bays													
		West Coast Estuaries																							

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		South San Fran. Bay				Elkhorn Slough				Morro Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Blue mussel <i>Mytilus edulis</i>	A												
	S												
	J												
	L												
	E												
Pacific oyster <i>Crassostrea gigas</i>	A												
	S												
	J												
	L												
	E												
Horseneck gaper <i>Tresus capax</i>	A												
	S												
	J												
	L												
	E												
Pacific gaper <i>Tresus nuttalli</i>	A												
	S												
	J												
	L												
	E												
California jackknife clam <i>Tagelus californianus</i>	A												
	S												
	J												
	L												
	E												
Pacific littleneck clam <i>Protothaca staminea</i>	A												
	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		South San Fran. Bay				Elkhorn Slough				Morro Bay			
		West Coast Estuaries											

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Santa Monica Bay				San Pedro Bay				Alamitos Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Blue mussel <i>Mytilis edulis</i>	A												
	S												
	J												
	L												
	E												
Pacific oyster <i>Crassostrea gigas</i>	A												
	S												
	J												
	L												
	E												
Horseneck gaper <i>Tresus capax</i>	A												
	S												
	J												
	L												
	E												
Pacific gaper <i>Tresus nuttalli</i>	A												
	S												
	J												
	L												
	E												
California jackknife clam <i>Tagelus californianus</i>	A												
	S												
	J												
	L												
	E												
Pacific littleneck clam <i>Protothaca staminea</i>	A												
	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Santa Monica Bay				San Pedro Bay				Alamitos Bay			
		West Coast Estuaries											

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																																			
		Anaheim Bay												Newport Bay												Mission Bay											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																																					
Blue mussel <i>Mytilus edulis</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Pacific oyster <i>Crassostrea gigas</i>	A																																				
	S																																				
	J																																				
	L																																				
Horseneck gaper <i>Tresus capax</i>	A																																				
	S																																				
	J																																				
	L																																				
Pacific gaper <i>Tresus nuttalli</i>	A																																				
	S																																				
	J																																				
	L																																				
California jackknife clam <i>Tagelus californianus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Pacific littleneck clam <i>Protothaca staminea</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Anaheim Bay												Newport Bay												Mission Bay											
		West Coast Estuaries																																			

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		San Diego Bay						Tijuana Estuary					
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Blue mussel <i>Mytilis edulis</i>	A												
	S												
	J												
	L												
	E												
Pacific oyster <i>Crassostrea gigas</i>	A												
	S												
	J												
	L												
Horseneck gaper <i>Tresus capax</i>	A												
	S												
	J												
	L												
Pacific gaper <i>Tresus nuttalli</i>	A												
	S												
	J												
	L												
California jackknife clam <i>Tagelus californianus</i>	A												
	S												
	J												
	L												
	E												
Pacific littleneck clam <i>Protothaca staminea</i>	A												
	S												
	J												
	L												
	E												
		J <th>F</th> <th>M</th> <th>A</th> <th>M</th> <th>J</th> <th>J</th> <th>A</th> <th>S</th> <th>O</th> <th>N</th> <th>D</th>	F	M	A	M	J	J	A	S	O	N	D
		San Diego Bay						Tijuana Estuary					
		West Coast Estuaries											

Relative Abundance

 Highly Abundant Abundant CommonBlank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Puget Sound				Hood Canal				Skagit Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Manila clam <i>Venerupis japonica</i>	A												
	S												
	J												
	L												
	E												
Eastern softshell clam <i>Mya arenaria</i>	A												
	S												
	J												
	L												
	E												
Geoduck <i>Panope abrupta</i>	A												
	S												
	J												
	L												
	E												
Bay shrimp <i>Crangon franciscorum</i>	A												
	S												
	J												
	L												
	E												
Dungeness crab <i>Cancer magister</i>	A												
	M												
	J												
	L												
	E												
Leopard shark <i>Triakis semifasciata</i>	A												
	P												
	J												
	M E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Puget Sound				Hood Canal				Skagit Bay			
		West Coast Estuaries											

Relative Abundance

[Solid Black] Highly Abundant

[Stippled] Abundant

[White] Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

P - Parturition

M - Mating

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Gray's Harbor				Willapa Bay				Columbia River			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Manila clam <i>Venerupis japonica</i>	A												
	S												
	J												
	L												
	E												
Eastern softshell clam <i>Mya arenaria</i>	A												
	S												
	J												
	L												
	E												
Geoduck <i>Panope abrupta</i>	A												
	S												
	J												
	L												
	E												
Bay shrimp <i>Crangon franciscorum</i>	A												
	S												
	J												
	L												
	E												
Dungeness crab <i>Cancer magister</i>	A												
	M												
	J												
	L												
	E												
Leopard shark <i>Triakis semifasciata</i>	A												
	P												
	J												
	M												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Gray's Harbor				Willapa Bay				Columbia River			
		West Coast Estuaries											

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

P - Parturition

M - Mating

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Nehalem Bay				Tillamook Bay				Netarts Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Manila clam <i>Venerupis japonica</i>	A												
	S												
	J												
	L												
	E												
Eastern softshell clam <i>Mya arenaria</i>	A												
	S												
	J												
	L												
	E												
Geoduck <i>Panope abrupta</i>	A												
	S												
	J												
	L												
	E												
Bay shrimp <i>Crangon franciscorum</i>	A												
	S												
	J												
	L												
	E												
Dungeness crab <i>Cancer magister</i>	A												
	M												
	J												
	L												
	E												
Leopard shark <i>Triakis semifasciata</i>	A												
	P												
	J												
	M												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Nehalem Bay				Tillamook Bay				Netarts Bay			
		West Coast Estuaries											

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

P - Parturition

M - Mating

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Siletz River				Yaquina Bay				Alsea River			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Manila clam <i>Venerupis japonica</i>	A S J L E												
Eastern softshell clam <i>Mya arenaria</i>	A S J L E												
Geoduck <i>Panope abrupta</i>	A S J L E												
Bay shrimp <i>Crangon franciscorum</i>	A S J L E												
Dungeness crab <i>Cancer magister</i>	A M J L E												
Leopard shark <i>Triakis semifasciata</i>	A P J M E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Siletz River				Yaquina Bay				Alsea River			
		West Coast Estuaries											

Relative Abundance



Highly Abundant



Abundant



Common

Blank

Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

P - Parturition

M - Mating

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Siuslaw River				Umpqua River				Coos Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Manila clam	A												
<i>Venerupis japonica</i>	S												
	J												
	L												
	E												
Eastern softshell clam	A												
	S												
<i>Mya arenaria</i>	J												
	L												
	E												
Geoduck	A												
<i>Panope abrupta</i>	S												
	J												
	L												
	E												
Bay shrimp	A												
<i>Crangon franciscorum</i>	S												
	J												
	L												
	E												
Dungeness crab	A												
<i>Cancer magister</i>	M												
	J												
	L												
	E												
Leopard shark	A												
<i>Triakis semifasciata</i>	P												
	J												
	M												
	E												
		J	F	M	A	M	J <td>J</td> <td>A</td> <td>S</td> <td>O</td> <td>N</td> <td>D</td>	J	A	S	O	N	D
		Siuslaw River				Umpqua River				Coos Bay			
		West Coast Estuaries											

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

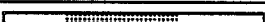
E - Eggs

P - Parturition

M - Mating

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Rogue River				Klamath River				Humboldt Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Manila clam	A												
<i>Venerupis japonica</i>	S												
	J												
	L												
	E												
Eastern softshell clam	A												
<i>Mya arenaria</i>	S												
	J												
	L												
	E												
Geoduck	A												
<i>Panope abrupta</i>	S												
	J												
	L												
	E												
Bay shrimp	A												
<i>Crangon franciscorum</i>	S												
	J												
	L												
	E												
Dungeness crab	A												
<i>Cancer magister</i>	M												
	J												
	L												
	E												
Leopard shark	A												
<i>Triakis semifasciata</i>	P												
	J												
	M												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Rogue River				Klamath River				Humboldt Bay			
		West Coast Estuaries											

Relative Abundance



Highly Abundant



Abundant



Common

Blank

Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

P - Parturition

M - Mating

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries												Central San Francisco / Suisun / San Pablo Bays																							
		Eel River						Tomaes Bay																													
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
Species/Life Stage																																					
Manila clam <i>Venerupis japonica</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Eastern softshell clam <i>Mya arenaria</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Geoduck <i>Panope abrupta</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Bay shrimp <i>Crangon franciscorum</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Dungeness crab <i>Cancer magister</i>	A																																				
	M																																				
	J																																				
	L																																				
	E																																				
Leopard shark <i>Triakis semifasciata</i>	A																																				
	P																																				
	J																																				
	M																																				
	E																																				
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
		Eel River						Tomaes Bay						Central San Francisco / Suisun / San Pablo Bays																							
		West Coast Estuaries																																			

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

P - Parturition

M - Mating

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		South San Fran. Bay				Elkhorn Slough				Morro Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Manila clam <i>Venerupis japonica</i>	A												
	S												
	J												
	L												
	E												
Eastern softshell clam <i>Mya arenaria</i>	A												
	S												
	J												
	L												
	E												
Geoduck <i>Panope abrupta</i>	A												
	S												
	J												
	L												
	E												
Bay shrimp <i>Crangon franciscorum</i>	A												
	S												
	J												
	L												
	E												
Dungeness crab <i>Cancer magister</i>	A												
	M												
	J												
	L												
	E												
Leopard shark <i>Triakis semifasciata</i>	A												
	P												
	J												
	M												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		South San Fran. Bay				Elkhorn Slough				Morro Bay			
		West Coast Estuaries											

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

P - Parturition

M - Mating

Table 3 (continued).

Relative Abundance

	Highly Abundant
	Abundant
	Common
Blank	Not present, Rare, or No Data Available

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Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		Anaheim Bay				Newport Bay				Mission Bay															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Manila clam <i>Venerupis japonica</i>	A S J L E																								
Eastern softshell clam <i>Mya arenaria</i>	A S J L E																								
Geoduck <i>Panope abrupta</i>	A S J L E																								
Bay shrimp <i>Crangon franciscorum</i>	A S J L E																								
Dungeness crab <i>Cancer magister</i>	A M J L E																								
Leopard shark <i>Triakis semifasciata</i>	A P J M E																								
		J F M A M J J A S O N D				J F M A M J J A S O N D				J F M A M J J A S O N D															
		Anaheim Bay				Newport Bay				Mission Bay															
		West Coast Estuaries																							

Relative Abundance



Highly Abundant



Abundant



Common

Blank

Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

P - Parturition

M - Mating

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		San Diego Bay						Tijuana Estuary					
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Manila clam <i>Venerupis japonica</i>	A S J L E												
Eastern softshell clam <i>Mya arenaria</i>	A S J L E												
Geoduck <i>Panope abrupta</i>	A S J L E												
Bay shrimp <i>Crangon franciscorum</i>	A S J L E												
Dungeness crab <i>Cancer magister</i>	A M J L E												
Leopard shark <i>Triakis semifasciata</i>	A P J M E												
		J	F	M	A	M	J	J	A	S	O	N	D
		San Diego Bay						Tijuana Estuary					
		West Coast Estuaries											

Relative Abundance



Highly Abundant



Abundant



Common

Blank

Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

P - Parturition

M - Mating

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		Puget Sound				Hood Canal				Skagit Bay															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Green sturgeon	A																								
<i>Acipenser</i>	S																								
<i>medirostris</i>	J																								
	L																								
	E																								
White sturgeon	A																								
<i>Acipenser</i>	S																								
<i>transmontanus</i>	J																								
	L																								
	E																								
American shad	A																								
<i>Alosa</i>	S																								
<i>sapidissima</i>	J																								
	L																								
	E																								
Pacific herring	A																								
<i>Clupea</i>	S																								
<i>pallasi</i>	J																								
	L																								
	E																								
Deepbody anchovy	A																								
<i>Anchoa</i>	S																								
<i>compressa</i>	J																								
	L																								
	E																								
Slough anchovy	A																								
<i>Anchoa</i>	S																								
<i>delicatissima</i>	J																								
	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Puget Sound				Hood Canal				Skagit Bay															
		West Coast Estuaries																							

Relative Abundance

	Highly Abundant
	Abundant
	Common
Blank	Not present, Rare, or No Data Available

Life Stage

A	Adults
S	Spawning
J	Juveniles
L	Larvae
E	Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																																			
		Gray's Harbor				Willapa Bay				Columbia River																											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
Species/Life Stage																																					
Green sturgeon	A																																				
<i>Acipenser medirostris</i>	S																																				
	J																																				
	L																																				
	E																																				
White sturgeon	A																																				
<i>Acipenser transmontanus</i>	S																																				
	J																																				
	L																																				
	E																																				
American shad	A																																				
<i>Alosa sapidissima</i>	S																																				
	J																																				
	L																																				
	E																																				
Pacific herring	A																																				
<i>Clupea pallasii</i>	S																																				
	J																																				
	L																																				
	E																																				
Deepbody anchovy	A																																				
<i>Anchoa compressa</i>	S																																				
	J																																				
	L																																				
	E																																				
Slough anchovy	A																																				
<i>Anchoa delicatissima</i>	S																																				
	J																																				
	L																																				
	E																																				
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Gray's Harbor				Willapa Bay				Columbia River																											
		West Coast Estuaries																																			

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Table 3, continued. Temporal distribution (revised 1/91).

		West Coast Estuaries											
		Nehalem Bay				Tillamook Bay				Netarts Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Green sturgeon	A												
<i>Acipenser medirostris</i>	S												
	J												
	L												
	E												
White sturgeon	A												
<i>Acipenser transmontanus</i>	S												
	J												
	L												
	E												
American shad	A												
<i>Alosa sapidissima</i>	S												
	J												
	L												
	E												
Pacific herring	A												
<i>Clupea pallasii</i>	S												
	J												
	L												
	E												
Deepbody anchovy	A												
<i>Anchoa compressa</i>	S												
	J												
	L												
	E												
Slough anchovy	A												
<i>Anchoa delicatissima</i>	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Nehalem Bay				Tillamook Bay				Netarts Bay			
		West Coast Estuaries											

Relative Abundance

■ Highly Abundant

▨ Abundant

□ Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Table 3 (continued). Temporal distribution (revised 1/91).

		West Coast Estuaries																							
		Siletz River				Yaquina Bay				Alsea River															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Green sturgeon	A																								
<i>Acipenser medirostris</i>	S																								
	J																								
	L																								
	E																								
White sturgeon	A																								
<i>Acipenser transmontanus</i>	S																								
	J																								
	L																								
	E																								
American shad	A																								
<i>Alosa sapidissima</i>	S																								
	J																								
	L																								
	E																								
Pacific herring	A																								
<i>Clupea pallasii</i>	S																								
	J																								
	L																								
	E																								
Deepbody anchovy	A																								
<i>Anchoa compressa</i>	S																								
	J																								
	L																								
	E																								
Slough anchovy	A																								
<i>Anchoa delicatissima</i>	S																								
	J																								
	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Siletz River				Yaquina Bay				Alsea River															
		West Coast Estuaries																							

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Siuslaw River				Umpqua River				Coos Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Green sturgeon	A												
	S												
<i>Acipenser</i>	J												
<i>medirostris</i>	L												
	E												
White sturgeon	A												
	S												
<i>Acipenser</i>	J												
<i>transmontanus</i>	L												
	E												
American shad	A												
	S												
<i>Alosa</i>	J												
<i>sapidissima</i>	L												
	E												
Pacific herring	A												
	S												
<i>Clupea</i>	J												
<i>pallasi</i>	L												
	E												
Deepbody anchovy	A												
	S												
<i>Anchoa</i>	J												
<i>compressa</i>	L												
	E												
Slough anchovy	A												
	S												
<i>Anchoa</i>	J												
<i>delicatissima</i>	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Siuslaw River				Umpqua River				Coos Bay			
		West Coast Estuaries											

Relative Abundance

	Highly Abundant
	Abundant
	Common
Blank	Not present, Rare, or No Data Available

Life Stage

A	Adults
S	Spawning
J	Juveniles
L	Larvae
E	Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																																			
		Rogue River				Klamath River				Humboldt Bay																											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
Species/Life Stage																																					
Green sturgeon <i>Acipenser medirostris</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
White sturgeon <i>Acipenser transmontanus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
American shad <i>Alosa sapidissima</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Pacific herring <i>Clupea pallasii</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Deepbody anchovy <i>Anchoa compressa</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Slough anchovy <i>Anchoa delicatissima</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Rogue River				Klamath River				Humboldt Bay																											
		West Coast Estuaries																																			

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		Eel River						Tomaes Bay						Central San Francisco / Suisun / San Pablo Bays											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Green sturgeon <i>Acipenser medirostris</i>	A																								
	S																								
	J																								
	L																								
	E																								
White sturgeon <i>Acipenser transmontanus</i>	A																								
	S																								
	J																								
	L																								
	E																								
American shad <i>Alosa sapidissima</i>	A																								
	S																								
	J																								
	L																								
	E																								
Pacific herring <i>Clupea pallasii</i>	A	 						 						 											
	S							 						 											
	J							 																	
	L							 						 											
	E							 						 											
Deepbody anchovy <i>Anchoa compressa</i>	A																								
	S																								
	J																								
	L																								
	E																								
Slough anchovy <i>Anchoa delicatissima</i>	A																								
	S																								
	J																								
	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Eel River						Tomaes Bay						Central San Francisco / Suisun / San Pablo Bays											
		West Coast Estuaries																							

Relative Abundance

	Highly Abundant
	Abundant
	Common
Blank	Not present, Rare, or No Data Available

Life Stage

A	Adults
S	Spawning
J	Juveniles
L	Larvae
E	Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		South San Fran. Bay				Elkhorn Slough				Morro Bay															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Green sturgeon <i>Acipenser medirostris</i>	A																								
	S																								
	J																								
	L																								
	E																								
White sturgeon <i>Acipenser transmontanus</i>	A																								
	S																								
	J																								
	L																								
	E																								
American shad <i>Alosa sapidissima</i>	A																								
	S																								
	J																								
	L																								
	E																								
Pacific herring <i>Clupea pallasii</i>	A																								
	S																								
	J																								
	L																								
	E																								
Deepbody anchovy <i>Anchoa compressa</i>	A																								
	S																								
	J																								
	L																								
	E																								
Slough anchovy <i>Anchoa delicatissima</i>	A																								
	S																								
	J																								
	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		South San Fran. Bay				Elkhorn Slough				Morro Bay															
		West Coast Estuaries																							

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Santa Monica Bay				San Pedro Bay				Alamitos Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Green sturgeon	A												
<i>Acipenser</i>	S												
<i>medirostris</i>	J												
	L												
	E												
White sturgeon	A												
<i>Acipenser</i>	S												
<i>transmontanus</i>	J												
	L												
	E												
American shad	A												
<i>Alosa</i>	S												
<i>sapidissima</i>	J												
	L												
	E												
Pacific herring	A												
<i>Clupea</i>	S												
<i>pallasi</i>	J												
	L												
	E												
Deepbody anchovy	A												
<i>Anchoa</i>	S												
<i>compressa</i>	J												
	L												
	E												
													
													
Slough anchovy	A												
<i>Anchoa</i>	S												
<i>delicatissima</i>	J												
	L												
	E												
													
													

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

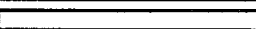
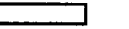
J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Anaheim Bay				Newport Bay				Mission Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Green sturgeon	A												
<i>Acipenser medirostris</i>	S												
	J												
	L												
	E												
White sturgeon	A												
<i>Acipenser transmontanus</i>	S												
	J												
	L												
	E												
American shad	A												
<i>Alosa sapidissima</i>	S												
	J												
	L												
	E												
Pacific herring	A												
<i>Clupea pallasii</i>	S												
	J												
	L												
	E												
Deepbody anchovy	A												
<i>Anchoa compressa</i>	S												
	J												
	L												
	E												
Slough anchovy	A												
<i>Anchoa delicatissima</i>	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Anaheim Bay				Newport Bay				Mission Bay			
		West Coast Estuaries											

Relative Abundance

	Highly Abundant
	Abundant
	Common
Blank	Not present, Rare, or No Data Available

Life Stage

A	Adults
S	Spawning
J	Juveniles
L	Larvae
E	Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		San Diego Bay						Tijuana Estuary																	
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Green sturgeon	A																								
	S																								
<i>Acipenser</i>	J																								
<i>medirostris</i>	L																								
	E																								
White sturgeon	A																								
	S																								
<i>Acipenser</i>	J																								
<i>transmontanus</i>	L																								
	E																								
American shad	A																								
	S																								
<i>Alosa</i>	J																								
<i>sapidissima</i>	L																								
	E																								
Pacific herring	A																								
	S																								
<i>Clupea</i>	J																								
<i>pallasi</i>	L																								
	E																								
Deep body anchovy	A																								
	S																								
<i>Anchoa</i>	J																								
<i>compressa</i>	L																								
	E																								
Slough anchovy	A																								
	S																								
<i>Anchoa</i>	J																								
<i>delicatissima</i>	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		San Diego Bay						Tijuana Estuary																	
		West Coast Estuaries																							

Relative Abundance



Highly Abundant



Abundant



Common

Blank

Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Puget Sound				Hood Canal				Skagit Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Northern anchovy <i>Engraulis mordax</i>	A												
	S												
	J												
	L												
	E												
Cutthroat trout <i>Oncorhynchus clarki</i>	A												
	S												
	J												
	L												
	E												
Cutthroat trout - Kelts <i>Oncorhynchus clarki (K)</i>	A												
	S												
	J												
	L												
	E												
Steelhead - Fall <i>Oncorhynchus mykiss (F)</i>	A												
	S												
	J												
	L												
	E												
Steelhead - Half pounder <i>Oncorhynchus mykiss (H)</i>	A												
	S												
	J												
	L												
	E												
Steelhead - Summer <i>Oncorhynchus mykiss (S)</i>	A												
	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Puget Sound				Hood Canal				Skagit Bay			
		West Coast Estuaries											

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

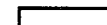
J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Gray's Harbor				Willapa Bay				Columbia River			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Northern anchovy <i>Engraulis mordax</i>	A												
	S												
	J												
	L												
	E												
Cutthroat trout <i>Oncorhynchus clarki</i>	A												
	S												
	J												
	L												
	E												
Cutthroat trout - Kelts <i>Oncorhynchus clarki (K)</i>	A												
	S												
	J												
	L												
	E												
Steelhead - Fall <i>Oncorhynchus mykiss (F)</i>	A												
	S												
	J												
	L												
	E												
Steelhead - Half pounder <i>Oncorhynchus mykiss (H)</i>	A												
	S												
	J												
	L												
	E												
Steelhead - Summer <i>Oncorhynchus mykiss (S)</i>	A												
	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Gray's Harbor				Willapa Bay				Columbia River			
		West Coast Estuaries											

Relative Abundance

	Highly Abundant
	Abundant
	Common
Blank	Not present, Rare, or No Data Available

Life Stage

A	Adults
S	Spawning
J	Juveniles
L	Larvae
E	Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																																			
		Nehalem Bay				Tillamook Bay				Netarts Bay																											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
Species/Life Stage																																					
Northern anchovy <i>Engraulis mordax</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Cutthroat trout <i>Oncorhynchus clarki</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Cutthroat trout - Kelts <i>Oncorhynchus clarki (K)</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Steelhead - Fall <i>Oncorhynchus mykiss (F)</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Steelhead - Half pounder <i>Oncorhynchus mykiss (H)</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Steelhead - Summer <i>Oncorhynchus mykiss (S)</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Nehalem Bay								Tillamook Bay								Netarts Bay																			
		West Coast Estuaries																																			

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																																			
		Siletz River				Yaquina Bay				Alsea River																											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
Species/Life Stage																																					
Northern anchovy	A																																				
<i>Engraulis mordax</i>	S																																				
	J																																				
	L																																				
	E																																				
Cutthroat trout	A																																				
<i>Oncorhynchus clarki</i>	S																																				
	J																																				
	L																																				
	E																																				
Cutthroat trout - Kelts	A																																				
<i>Oncorhynchus clarki (K)</i>	S																																				
	J																																				
	L																																				
	E																																				
Steelhead - Fall	A																																				
<i>Oncorhynchus mykiss (F)</i>	S																																				
	J																																				
	L																																				
	E																																				
Steelhead - Half pounder	A																																				
<i>Oncorhynchus mykiss (H)</i>	S																																				
	J																																				
	L																																				
	E																																				
Steelhead - Summer	A																																				
<i>Oncorhynchus mykiss (S)</i>	S																																				
	J																																				
	L																																				
	E																																				
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Siletz River				Yaquina Bay				Alsea River																											
		West Coast Estuaries																																			

Relative Abundance



Highly Abundant



Abundant



Common

Blank

Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Siuslaw River				Umpqua River				Coos Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Northern anchovy	A												
<i>Engraulis mordax</i>	S												
	J												
	L												
	E												
Cutthroat trout	A												
<i>Oncorhynchus clarki</i>	S												
	J												
	L												
	E												
Cutthroat trout - Kelts	A												
<i>Oncorhynchus clarki (K)</i>	S												
	J												
	L												
	E												
Steelhead - Fall	A												
<i>Oncorhynchus mykiss (F)</i>	S												
	J												
	L												
	E												
Steelhead - Half pounder	A												
<i>Oncorhynchus mykiss (H)</i>	S												
	J												
	L												
	E												
Steelhead - Summer	A												
<i>Oncorhynchus mykiss (S)</i>	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Siuslaw River				Umpqua River				Coos Bay			
		West Coast Estuaries											

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

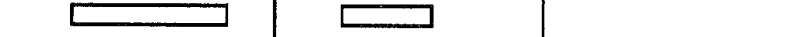
J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Rogue River				Klamath River				Humboldt Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Northern anchovy <i>Engraulis mordax</i>	A												
	S												
	J												
	L												
	E												
Cutthroat trout <i>Oncorhynchus clarki</i>	A												
	S												
	J												
	L												
	E												
Cutthroat trout - Kelts <i>Oncorhynchus clarki (K)</i>	A												
	S												
	J												
	L												
	E												
Steelhead - Fall <i>Oncorhynchus mykiss (F)</i>	A												
	S												
	J												
	L												
	E												
Steelhead - Half pounder <i>Oncorhynchus mykiss (H)</i>	A												
	S												
	J												
	L												
	E												
Steelhead - Summer <i>Oncorhynchus mykiss (S)</i>	A												
	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Rogue River				Klamath River				Humboldt Bay			
		West Coast Estuaries											

Relative Abundance

	Highly Abundant
	Abundant
	Common
Blank	Not present, Rare, or No Data Available

Life Stage

A	- Adults
S	- Spawning
J	- Juveniles
L	- Larvae
E	- Eggs

Table 3 (continued). Temporal distribution and relative abundance

		West Coast Estuaries																																															
		Eel River												Tomaes Bay												Central San Francisco / Suisun / San Pablo Bays																							
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
Species/Life Stage																																																	
Northern anchovy <i>Engraulis mordax</i>	A																																																
	S																																																
	J																																																
	L																																																
	E																																																
Cutthroat trout <i>Oncorhynchus clarki</i>	A																																																
	S																																																
	J																																																
	L																																																
	E																																																
Cutthroat trout - Kelts <i>Oncorhynchus clarki (K)</i>	A																																																
	S																																																
	J																																																
	L																																																
	E																																																
Steelhead - Fall <i>Oncorhynchus mykiss (F)</i>	A																																																
	S																																																
	J																																																
	L																																																
	E																																																
Steelhead - Half pounder <i>Oncorhynchus mykiss (H)</i>	A																																																
	S																																																
	J																																																
	L																																																
	E																																																
Steelhead - Summer <i>Oncorhynchus mykiss (S)</i>	A																																																
	S																																																
	J																																																
	L																																																
	E																																																
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
		Eel River												Tomaes Bay												Central San Francisco / Suisun / San Pablo Bays																							
		West Coast Estuaries																																															

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Table 3 (continued). Temporal distribution and relative abundance

		West Coast Estuaries											
		South San Fran. Bay				Elkhorn Slough				Morro Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Northern anchovy <i>Engraulis mordax</i>	A												
	S												
	J												
	L												
	E												
Cutthroat trout <i>Oncorhynchus clarki</i>	A												
	S												
	J												
	L												
	E												
Cutthroat trout - Kelts <i>Oncorhynchus clarki (K)</i>	A												
	S												
	J												
	L												
	E												
Steelhead - Fall <i>Oncorhynchus mykiss (F)</i>	A												
	S												
	J												
	L												
	E												
Steelhead - Half pounder <i>Oncorhynchus mykiss (H)</i>	A												
	S												
	J												
	L												
	E												
Steelhead - Summer <i>Oncorhynchus mykiss (S)</i>	A												
	S												
	J												
	L												
	E												
		J <th>F</th> <th>M</th> <th>A</th> <th>M</th> <th>J</th> <th>J</th> <th>A</th> <th>S</th> <th>O</th> <th>N</th> <th>D</th>	F	M	A	M	J	J	A	S	O	N	D
		South San Fran. Bay				Elkhorn Slough				Morro Bay			
		West Coast Estuaries											

Relative Abundance



Highly Abundant



Abundant



Common

Blank

Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Santa Monica Bay				San Pedro Bay				Alamitos Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Northern anchovy <i>Engraulis mordax</i>	A												
	S												
	J												
	L												
	E												
Cutthroat trout <i>Oncorhynchus clarki</i>	A												
	S												
	J												
	L												
Cutthroat trout - Kelts <i>Oncorhynchus clarki (K)</i>	A												
	S												
	J												
	L												
Steelhead - Fall <i>Oncorhynchus mykiss (F)</i>	A												
	S												
	J												
	L												
Steelhead - Half pounder <i>Oncorhynchus mykiss (H)</i>	A												
	S												
	J												
	L												
Steelhead - Summer <i>Oncorhynchus mykiss (S)</i>	A												
	S												
	J												
	L												
		J	F	M	A	M	J	J	A	S	O	N	D
		Santa Monica Bay				San Pedro Bay				Alamitos Bay			
		West Coast Estuaries											

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		Anaheim Bay				Newport Bay				Mission Bay															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Northern anchovy <i>Engraulis mordax</i>	A																								
	S																								
	J																								
	L																								
	E																								
Cutthroat trout <i>Oncorhynchus clarki</i>	A																								
	S																								
	J																								
	L																								
	E																								
Cutthroat trout - Kelts <i>Oncorhynchus clarki (K)</i>	A																								
	S																								
	J																								
	L																								
	E																								
Steelhead - Fall <i>Oncorhynchus mykiss (F)</i>	A																								
	S																								
	J																								
	L																								
	E																								
Steelhead - Half pounder <i>Oncorhynchus mykiss (H)</i>	A																								
	S																								
	J																								
	L																								
	E																								
Steelhead - Summer <i>Oncorhynchus mykiss (S)</i>	A																								
	S																								
	J																								
	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Anaheim Bay				Newport Bay				Mission Bay															
		West Coast Estuaries																							

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		San Diego Bay						Tijuana Estuary																	
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Northern anchovy <i>Engraulis mordax</i>	A																								
	S																								
	J																								
	L																								
	E																								
Cutthroat trout <i>Oncorhynchus clarki</i>	A																								
	S																								
	J																								
	L																								
	E																								
Cutthroat trout - Kelts <i>Oncorhynchus clarki (K)</i>	A																								
	S																								
	J																								
	L																								
	E																								
Steelhead - Fall <i>Oncorhynchus mykiss (F)</i>	A																								
	S																								
	J																								
	L																								
	E																								
Steelhead - Half pounder <i>Oncorhynchus mykiss (H)</i>	A																								
	S																								
	J																								
	L																								
	E																								
Steelhead - Summer <i>Oncorhynchus mykiss (S)</i>	A																								
	S																								
	J																								
	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		San Diego Bay												Tijuana Estuary											
		West Coast Estuaries																							

Relative Abundance



Highly Abundant



Abundant



Common

Blank

Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Puget Sound				Hood Canal				Skagit Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Steelhead - Winter <i>Oncorhynchus mykiss</i> (W)	A												
	S												
	J												
	L												
	E												
Coho salmon <i>Oncorhynchus kisutch</i>	A												
	S												
	J												
	L												
	E												
Chinook salmon - Fall <i>Oncorhynchus tshawytscha</i> (F)	A												
	S												
	J												
	L												
	E												
Chinook salmon - Late Fall <i>Oncorhynchus tshawytscha</i> (LF)	A												
	S												
	J												
	L												
	E												
Chinook salmon - Winter <i>Oncorhynchus tshawytscha</i> (W)	A												
	S												
	J												
	L												
	E												
Chinook salmon - Spring <i>Oncorhynchus tshawytscha</i> (Sp)	A												
	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Puget Sound				Hood Canal				Skagit Bay			
		West Coast Estuaries											

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A	Adults
S	Spawning
J	Juveniles
L	Larvae
E	Eggs

Table 3 (continued).

Relative Abundance

	Highly Abundant
	Abundant
	Common
Blank	Not present, Rare, or No Data Available

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Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Nehalem Bay				Tillamook Bay				Netarts Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Steelhead - Winter <i>Oncorhynchus mykiss</i> (W)	A												
	S												
	J												
	L												
	E												
Coho salmon <i>Oncorhynchus kisutch</i>	A												
	S												
	J												
	L												
	E												
Chinook salmon - Fall <i>Oncorhynchus tshawytscha</i> (F)	A												
	S												
	J												
	L												
	E												
Chinook salmon - Late Fall <i>Oncorhynchus tshawytscha</i> (LF)	A												
	S												
	J												
	L												
	E												
Chinook salmon - Winter <i>Oncorhynchus tshawytscha</i> (W)	A												
	S												
	J												
	L												
	E												
Chinook salmon - Spring <i>Oncorhynchus tshawytscha</i> (Sp)	A												
	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Nehalem Bay				Tillamook Bay				Netarts Bay			
		West Coast Estuaries											

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																																			
		Siletz River												Yaquina Bay												Alsea River											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																																					
Steelhead -	A																																				
Winter	S																																				
<i>Oncorhynchus</i>	J																																				
<i>mykiss</i> (W)	L																																				
	E																																				
Coho salmon	A																																				
<i>Oncorhynchus</i>	S																																				
<i>kisutch</i>	J																																				
	L																																				
	E																																				
Chinook salmon -	A																																				
Fall	S																																				
<i>Oncorhynchus</i>	J																																				
<i>tshawytscha</i> (F)	L																																				
	E																																				
Chinook salmon -	A																																				
Late Fall	S																																				
<i>Oncorhynchus</i>	J																																				
<i>tshawytscha</i> (LF)	L																																				
	E																																				
Chinook salmon -	A																																				
Winter	S																																				
<i>Oncorhynchus</i>	J																																				
<i>tshawytscha</i> (W)	L																																				
	E																																				
Chinook salmon -	A																																				
Spring	S																																				
<i>Oncorhynchus</i>	J																																				
<i>tshawytscha</i> (Sp)	L																																				
	E																																				
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Siletz River												Yaquina Bay												Alsea River											
		West Coast Estuaries																																			

Relative Abundance

	Highly Abundant
	Abundant
	Common
Blank	Not present, Rare, or No Data Available

Life Stage

A	Adults
S	Spawning
J	Juveniles
L	Larvae
E	Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Siuslaw River				Umpqua River				Coos Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Steelhead - Winter <i>Oncorhynchus mykiss</i> (W)	A												
	S												
	J												
	L												
	E												
Coho salmon <i>Oncorhynchus kisutch</i>	A												
	S												
	J												
	L												
	E												
Chinook salmon - Fall <i>Oncorhynchus tshawytscha</i> (F)	A												
	S												
	J												
	L												
	E												
Chinook salmon - Late Fall <i>Oncorhynchus tshawytscha</i> (LF)	A												
	S												
	J												
	L												
	E												
Chinook salmon - Winter <i>Oncorhynchus tshawytscha</i> (W)	A												
	S												
	J												
	L												
	E												
Chinook salmon - Spring <i>Oncorhynchus tshawytscha</i> (Sp)	A												
	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Siuslaw River				Umpqua River				Coos Bay			
		West Coast Estuaries											

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A	- Adults
S	- Spawning
J	- Juveniles
L	- Larvae
E	- Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Rogue River				Klamath River				Humboldt Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Steelhead - Winter <i>Oncorhynchus mykiss</i> (W)	A												
	S												
	J												
	L												
	E												
Coho salmon <i>Oncorhynchus kisutch</i>	A												
	S												
	J												
	L												
	E												
Chinook salmon - Fall <i>Oncorhynchus tshawytscha</i> (F)	A												
	S												
	J												
	L												
	E												
Chinook salmon - Late Fall <i>Oncorhynchus tshawytscha</i> (LF)	A												
	S												
	J												
	L												
	E												
Chinook salmon - Winter <i>Oncorhynchus tshawytscha</i> (W)	A												
	S												
	J												
	L												
	E												
Chinook salmon - Spring <i>Oncorhynchus tshawytscha</i> (Sp)	A												
	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Rogue River				Klamath River				Humboldt Bay			
		West Coast Estuaries											

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Table 3 (continued).

Relative Abundance

	Highly Abundant
	Abundant
	Common
Blank	Not present, Rare, or No Data Available

Life Stage
A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																																			
		South San Fran. Bay												Elkhorn Slough												Morro Bay											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
Species/Life Stage																																					
Steelhead -	A																																				
Winter	S																																				
<i>Oncorhynchus</i>	J																																				
<i>mykiss</i> (W)	L																																				
	E																																				
Coho salmon	A																																				
<i>Oncorhynchus</i>	S																																				
<i>kisutch</i>	J																																				
	L																																				
	E																																				
Chinook salmon -	A																																				
Fall	S																																				
<i>Oncorhynchus</i>	J																																				
<i>tshawytscha</i> (F)	L																																				
	E																																				
Chinook salmon -	A																																				
Late Fall	S																																				
<i>Oncorhynchus</i>	J																																				
<i>tshawytscha</i> (LF)	L																																				
	E																																				
Chinook salmon -	A																																				
Winter	S																																				
<i>Oncorhynchus</i>	J																																				
<i>tshawytscha</i> (W)	L																																				
	E																																				
Chinook salmon -	A																																				
Spring	S																																				
<i>Oncorhynchus</i>	J																																				
<i>tshawytscha</i> (Sp)	L																																				
	E																																				
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
		South San Fran. Bay												Elkhorn Slough												Morro Bay											
		West Coast Estuaries																																			

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank: Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		Santa Monica Bay				San Pedro Bay				Alamitos Bay															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Steelhead -	A																								
Winter	S																								
<i>Oncorhynchus</i>	J																								
<i>mykiss</i> (W)	L																								
	E																								
Coho salmon	A																								
<i>Oncorhynchus</i>	S																								
<i>kisutch</i>	J																								
	L																								
	E																								
Chinook salmon -	A																								
Fall	S																								
<i>Oncorhynchus</i>	J																								
<i>tshawytscha</i> (F)	L																								
	E																								
Chinook salmon -	A																								
Late Fall	S																								
<i>Oncorhynchus</i>	J																								
<i>tshawytscha</i> (LF)	L																								
	E																								
Chinook salmon -	A																								
Winter	S																								
<i>Oncorhynchus</i>	J																								
<i>tshawytscha</i> (W)	L																								
	E																								
Chinook salmon -	A																								
Spring	S																								
<i>Oncorhynchus</i>	J																								
<i>tshawytscha</i> (Sp)	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Santa Monica Bay				San Pedro Bay				Alamitos Bay															
		West Coast Estuaries																							

Relative Abundance



Highly Abundant



Abundant



Common

Blank

Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		Anaheim Bay				Newport Bay				Mission Bay															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Steelhead - Winter <i>Oncorhynchus mykiss</i> (W)	A S J L E																								
Coho salmon <i>Oncorhynchus kisutch</i>	A S J L E																								
Chinook salmon - Fall <i>Oncorhynchus tshawytscha</i> (F)	A S J L E																								
Chinook salmon - Late Fall <i>Oncorhynchus tshawytscha</i> (LF)	A S J L E																								
Chinook salmon - Winter <i>Oncorhynchus tshawytscha</i> (W)	A S J L E																								
Chinook salmon - Spring <i>Oncorhynchus tshawytscha</i> (Sp)	A S J L E																								
		J F M A M J J A S O N D				J F M A M J J A S O N D				J F M A M J J A S O N D															
		Anaheim Bay				Newport Bay				Mission Bay															
		West Coast Estuaries																							

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		San Diego Bay						Tijuana Estuary																	
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Steelhead - Winter	A																								
<i>Oncorhynchus mykiss</i> (W)	S																								
	J																								
	L																								
	E																								
Coho salmon	A																								
<i>Oncorhynchus kisutch</i>	S																								
	J																								
	L																								
	E																								
Chinook salmon - Fall	A																								
<i>Oncorhynchus tshawytscha</i> (F)	S																								
	J																								
	L																								
	E																								
Chinook salmon - Late Fall	A																								
<i>Oncorhynchus tshawytscha</i> (LF)	S																								
	J																								
	L																								
	E																								
Chinook salmon - Winter	A																								
<i>Oncorhynchus tshawytscha</i> (W)	S																								
	J																								
	L																								
	E																								
Chinook salmon - Spring	A																								
<i>Oncorhynchus tshawytscha</i> (Sp)	S																								
	J																								
	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		San Diego Bay						Tijuana Estuary																	
		West Coast Estuaries																							

Relative Abundance



Highly Abundant



Abundant



Common

Blank

Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Puget Sound				Hood Canal				Skagit Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Chinook salmon - Summer	A												
<i>Oncorhynchus tshawytscha</i> (Su)	S												
	J												
	L												
	E												
Chum salmon	A												
<i>Oncorhynchus keta</i>	S												
	J												
	L												
	E												
Pink salmon	A												
<i>Oncorhynchus gorbuscha</i>	S												
	J												
	L												
	E												
Sockeye salmon	A												
<i>Oncorhynchus nerka</i>	S												
	J												
	L												
	E												
Surf smelt	A												
<i>Hypomesus pretiosus</i>	S												
	J												
	L												
	E												
Longfin smelt	A												
<i>Spirinchus thaleichthys</i>	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Puget Sound				Hood Canal				Skagit Bay			
		West Coast Estuaries											

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A	Adults
S	Spawning
J	Juveniles
L	Larvae
E	Eggs

Table 3 (continued).

Relative Abundance

	Highly Abundant
	Abundant
	Common
Blank	Not present, Rare, or No Data Available

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Table 3 (continued).

Relative Abundance

	Highly Abundant
	Abundant
	Common
Blank	Not present, Rare, or No Data Available

Life Stage
A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Siletz River				Yaquina Bay				Alsea River			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Chinook salmon - Summer <i>Oncorhynchus tshawytscha</i> (Su)	A S J L E												
Chum salmon <i>Oncorhynchus keta</i>	A S J L E												
Pink salmon <i>Oncorhynchus gorbuscha</i>	A S J L E												
Sockeye salmon <i>Oncorhynchus nerka</i>	A S J L E												
Surf smelt <i>Hypomesus pretiosus</i>	A S J L E												
Longfin smelt <i>Spirinchus thaleichthys</i>	A S J L E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Siletz River				Yaquina Bay				Alsea River			
		West Coast Estuaries											

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Siuslaw River				Umpqua River				Coos Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Chinook salmon - Summer <i>Oncorhynchus tshawytscha</i> (Su)	A												
	S												
	J												
	L												
	E												
Chum salmon <i>Oncorhynchus keta</i>	A												
	S												
	J												
	L												
	E												
Pink salmon <i>Oncorhynchus gorbuscha</i>	A												
	S												
	J												
	L												
	E												
Sockeye salmon <i>Oncorhynchus nerka</i>	A												
	S												
	J												
	L												
	E												
Surf smelt <i>Hypomesus pretiosus</i>	A												
	S												
	J												
	L												
	E												
Longfin smelt <i>Spirinchus thaleichthys</i>	A												
	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Siuslaw River				Umpqua River				Coos Bay			
		West Coast Estuaries											

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Rogue River				Klamath River				Humboldt Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Chinook salmon - Summer	A												
<i>Oncorhynchus tshawytscha</i> (Su)	S												
	J												
	L												
	E												
Chum salmon	A												
<i>Oncorhynchus keta</i>	S												
	J												
	L												
	E												
Pink salmon	A												
<i>Oncorhynchus gorbuscha</i>	S												
	J												
	L												
	E												
Sockeye salmon	A												
<i>Oncorhynchus nerka</i>	S												
	J												
	L												
	E												
Surf smelt	A												
<i>Hypomesus pretiosus</i>	S												
	J												
	L												
	E												
Longfin smelt	A												
<i>Spirinchus thaleichthys</i>	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Rogue River				Klamath River				Humboldt Bay			
		West Coast Estuaries											

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																																			
		Eel River						Tomaes Bay						Central San Francisco / Suisun / San Pablo Bays																							
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
Species/Life Stage																																					
Chinook salmon - Summer <i>Oncorhynchus tshawytscha</i> (Su)	A S J L E																																				
Chum salmon <i>Oncorhynchus keta</i>	A S J L E																																				
Pink salmon <i>Oncorhynchus gorbuscha</i>	A S J L E																																				
Sockeye salmon <i>Oncorhynchus nerka</i>	A S J L E																																				
Surf smelt <i>Hypomesus pretiosus</i>	A S J L E																																				
Longfin smelt <i>Spirinchus thaleichthys</i>	A S J L E																																				
		J F M A M J J A S O N D												J F M A M J J A S O N D												J F M A M J J A S O N D											
		Eel River						Tomaes Bay						Central San Francisco / Suisun / San Pablo Bays																							
		West Coast Estuaries																																			

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A	Adults
S	Spawning
J	Juveniles
L	Larvae
E	Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		South San Fran. Bay				Elkhorn Slough				Morro Bay															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Chinook salmon - Summer <i>Oncorhynchus tshawytscha</i> (Su)	A S J L E																								
Chum salmon <i>Oncorhynchus keta</i>	A S J L E																								
Pink salmon <i>Oncorhynchus gorbuscha</i>	A S J L E																								
Sockeye salmon <i>Oncorhynchus nerka</i>	A S J L E																								
Surf smelt <i>Hypomesus pretiosus</i>	A S J L E																								
Longfin smelt <i>Spirinchus thaleichthys</i>	A S J L E																								

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Santa Monica Bay				San Pedro Bay				Alamitos Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Chinook salmon - Summer <i>Oncorhynchus tshawytscha</i> (Su)	A S J L E												
Chum salmon <i>Oncorhynchus keta</i>	A S J L E												
Pink salmon <i>Oncorhynchus gorbuscha</i>	A S J L E												
Sockeye salmon <i>Oncorhynchus nerka</i>	A S J L E												
Surf smelt <i>Hypomesus pretiosus</i>	A S J L E												
Longfin smelt <i>Spirinchus thaleichthys</i>	A S J L E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Santa Monica Bay				San Pedro Bay				Alamitos Bay			
		West Coast Estuaries											

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		Anaheim Bay				Newport Bay				Mission Bay															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Chinook salmon - Summer <i>Oncorhynchus tshawytscha</i> (Su)	A S J L E																								
Chum salmon <i>Oncorhynchus keta</i>	A S J L E																								
Pink salmon <i>Oncorhynchus gorbuscha</i>	A S J L E																								
Sockeye salmon <i>Oncorhynchus nerka</i>	A S J L E																								
Surf smelt <i>Hypomesus pretiosus</i>	A S J L E																								
Longfin smelt <i>Spirinchus thaleichthys</i>	A S J L E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Anaheim Bay				Newport Bay				Mission Bay															
		West Coast Estuaries																							

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		San Diego Bay						Tijuana Estuary					
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Chinook salmon - Summer <i>Oncorhynchus tshawytscha</i> (Su)	A S J L E												
Chum salmon <i>Oncorhynchus keta</i>	A S J L E												
Pink salmon <i>Oncorhynchus gorbuscha</i>	A S J L E												
Sockeye salmon <i>Oncorhynchus nerka</i>	A S J L E												
Surf smelt <i>Hypomesus pretiosus</i>	A S J L E												
Longfin smelt <i>Spirinchus thaleichthys</i>	A S J L E												
		J	F	M	A	M	J	J	A	S	O	N	D
		San Diego Bay						Tijuana Estuary					
		West Coast Estuaries											

Relative Abundance



Highly Abundant



Abundant



Common

Blank

Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Puget Sound				Hood Canal				Skagit Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Eulachon <i>Thaleichthys pacificus</i>	A												
	S												
	J												
	L												
	E												
Pacific tomcod <i>Microgadus proximus</i>	A												
	S												
	J												
	L												
	E												
Topsmelt <i>Atherinops affinis</i>	A												
	S												
	J												
	L												
	E												
Jacksmelt <i>Atherinopsis californiensis</i>	A												
	S												
	J												
	L												
	E												
Threespine stickleback <i>Gasterosteus aculeatus</i>	A												
	S												
	J												
	L												
	E												
Striped bass <i>Morone saxatilis</i>	A												
	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Puget Sound				Hood Canal				Skagit Bay			
		West Coast Estuaries											

Relative Abundance

Highly Abundant

Abundant

Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

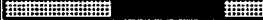
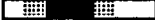
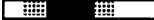
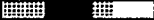
J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																																															
		Gray's Harbor												Willapa Bay												Columbia River																							
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
Species/Life Stage																																																	
Eulachon <i>Thaleichthys pacificus</i>	A																																																
	S																																																
	J																																																
	L																																																
	E																																																
Pacific tomcod <i>Microgadus proximus</i>	A																																																
	S																																																
	J																																																
	L																																																
	E																																																
Topsmelt <i>Atherinops affinis</i>	A																																																
	S																																																
	J																																																
	L																																																
	E																																																
Jacksmelt <i>Atherinopsis californiensis</i>	A																																																
	S																																																
	J																																																
	L																																																
	E																																																
Threespine stickleback <i>Gasterosteus aculeatus</i>	A																																																
	S																																																
	J																																																
	L																																																
	E																																																
Striped bass <i>Morone saxatilis</i>	A																																																
	S																																																
	J																																																
	L																																																
	E																																																
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
		Gray's Harbor												Willapa Bay												Columbia River																							
		West Coast Estuaries																																															

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																																			
		Nehalem Bay				Tillamook Bay				Netarts Bay																											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
Species/Life Stage																																					
Eulachon	A																																				
<i>Thaleichthys</i>	S																																				
<i>pacificus</i>	J																																				
	L																																				
	E																																				
Pacific tomcod	A																																				
<i>Microgadus</i>	S																																				
<i>proximus</i>	J																																				
	L																																				
	E																																				
Topsmelt	A																																				
<i>Atherinops</i>	S																																				
<i>affinis</i>	J																																				
	L																																				
	E																																				
Jacksmelt	A																																				
<i>Atherinopsis</i>	S																																				
<i>californiensis</i>	J																																				
	L																																				
	E																																				
Threespine stickleback	A																																				
<i>Gasterosteus</i>	S																																				
<i>aculeatus</i>	J																																				
	L																																				
	E																																				
Striped bass	A																																				
<i>Morone</i>	S																																				
<i>saxatilis</i>	J																																				
	L																																				
	E																																				
		J	F	M	A	M	J <th>J</th> <th>A</th> <th>S</th> <th>O</th> <th>N</th> <th>D</th> <td>J</td> <td>F</td> <td>M</td> <td>A</td> <td>M</td> <td>J<th>J</th><th>A</th><th>S</th><th>O</th><th>N</th><th>D</th></td>	J	A	S	O	N	D	J	F	M	A	M	J <th>J</th> <th>A</th> <th>S</th> <th>O</th> <th>N</th> <th>D</th>	J	A	S	O	N	D												
		Nehalem Bay								Tillamook Bay								Netarts Bay																			
		West Coast Estuaries																																			

Relative Abundance



Highly Abundant



Abundant



Common

Blank

Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

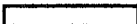
J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Siletz River				Yaquina Bay				Alsea River			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Eulachon	A												
<i>Thaleichthys</i>	S												
<i>pacificus</i>	J												
	L												
	E												
Pacific tomcod	A												
<i>Microgadus</i>	S												
<i>proximus</i>	J												
	L												
	E												
Topsmelt	A												
<i>Atherinops</i>	S												
<i>affinis</i>	J												
	L												
	E												
Jacksmelt	A												
<i>Atherinopsis</i>	S												
<i>californiensis</i>	J												
	L												
	E												
Threespine stickleback	A												
<i>Gasterosteus</i>	S												
<i>aculeatus</i>	J												
	L												
	E												
Striped bass	A												
<i>Morone</i>	S												
<i>saxatilis</i>	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Siletz River				Yaquina Bay				Alsea River			
		West Coast Estuaries											

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Siuslaw River				Umpqua River				Coos Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Eulachon <i>Thaleichthys pacificus</i>	A												
	S												
	J												
	L												
	E												
Pacific tomcod <i>Microgadus proximus</i>	A												
	S												
	J												
	L												
	E												
Topsmelt <i>Atherinops affinis</i>	A												
	S												
	J												
	L												
	E												
Jacksmelt <i>Atherinopsis californiensis</i>	A												
	S												
	J												
	L												
	E												
Threespine stickleback <i>Gasterosteus aculeatus</i>	A												
	S												
	J												
	L												
	E												
Striped bass <i>Morone saxatilis</i>	A												
	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Siuslaw River				Umpqua River				Coos Bay			
		West Coast Estuaries											

Relative Abundance

 Highly Abundant
 Abundant
 Common
Blank Not present, Rare, or No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																																			
		Rogue River				Klamath River				Humboldt Bay																											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
Species/Life Stage																																					
Eulachon <i>Thaleichthys pacificus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Pacific tomcod <i>Microgadus proximus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Topsmelt <i>Atherinops affinis</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Jacksmelt <i>Atherinopsis californiensis</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Threespine stickleback <i>Gasterosteus aculeatus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Striped bass <i>Morone saxatilis</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
		J <th>F</th> <th>M</th> <th>A</th> <th>M</th> <th>J</th> <th>J</th> <th>A</th> <th>S</th> <th>O</th> <th>N</th> <th>D</th> <th>J</th> <th>F</th> <th>M</th> <th>A</th> <th>M</th> <th>J</th> <th>J</th> <th>A</th> <th>S</th> <th>O</th> <th>N</th> <th>D</th>	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
		Rogue River				Klamath River				Humboldt Bay																											
														West Coast Estuaries																							

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Eel River					Tomales Bay					Central San Francisco / Suisun / San Pablo Bays	
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Eulachon <i>Thaleichthys pacificus</i>	A S J L E												
Pacific tomcod <i>Microgadus proximus</i>	A S J L E												
													
Topsmelt <i>Atherinops affinis</i>	A S J L E												
													
													
													
													
Jacksmelt <i>Atherinopsis californiensis</i>	A S J L E												
													
													
													
													
Threespine stickleback <i>Gasterosteus aculeatus</i>	A S J L E												
													
													
													
													
Striped bass <i>Morone saxatilis</i>	A S J L E												
													
													
													
													
		J	F	M	A	M	J	J	A	S	O	N	D
		Eel River					Tomales Bay					Central San Francisco / Suisun / San Pablo Bays	
		West Coast Estuaries											

Relative Abundance

	Highly Abundant
	Abundant
	Common
Blank	Not present, Rare, or No Data Available

Life Stage

A	Adults
S	Spawning
J	Juveniles
L	Larvae
E	Eggs

Table 3 (continued).

Relative Abundance

	Highly Abundant
	Abundant
	Common
Blank	Not present, Rare, or No Data Available

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Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Santa Monica Bay				San Pedro Bay				Alamitos Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Eulachon	A												
<i>Thaleichthys</i>	S												
<i>pacificus</i>	J												
	L												
	E												
Pacific tomcod	A												
<i>Microgadus</i>	S												
<i>proximus</i>	J												
	L												
	E												
Topsmelt	A												
<i>Atherinops</i>	S												
<i>affinis</i>	J												
	L												
	E												
Jacksmelt	A												
<i>Atherinopsis</i>	S												
<i>californiensis</i>	J												
	L												
	E												
Threespine stickleback	A												
<i>Gasterosteus</i>	S												
<i>aculeatus</i>	J												
	L												
	E												
Striped bass	A												
<i>Morone</i>	S												
<i>saxatilis</i>	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Santa Monica Bay				San Pedro Bay				Alamitos Bay			
		West Coast Estuaries											

Relative Abundance

Highly Abundant

Abundant

Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		Anaheim Bay				Newport Bay				Mission Bay															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Eulachon <i>Thaleichthys pacificus</i>	A																								
	S																								
	J																								
	L																								
	E																								
Pacific tomcod <i>Microgadus proximus</i>	A																								
	S																								
	J																								
	L																								
	E																								
Topsmelt <i>Atherinops affinis</i>	A																								
	S																								
	J																								
	L																								
	E																								
Jacksmelt <i>Atherinopsis californiensis</i>	A																								
	S																								
	J																								
	L																								
	E																								
Threespine stickleback <i>Gasterosteus aculeatus</i>	A																								
	S																								
	J																								
	L																								
	E																								
Striped bass <i>Morone saxatilis</i>	A																								
	S																								
	J																								
	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Anaheim Bay				Newport Bay				Mission Bay															
		West Coast Estuaries																							

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		San Diego Bay						Tijuana Estuary																	
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Eulachon <i>Thaleichthys pacificus</i>	A S J L E																								
Pacific tomcod <i>Microgadus proximus</i>	A S J L E																								
Topsmelt <i>Atherinops affinis</i>	A S J L E																								
Jacksmelt <i>Atherinopsis californiensis</i>	A S J L E																								
Threespine stickleback <i>Gasterosteus aculeatus</i>	A S J L E																								
Striped bass <i>Morone saxatilis</i>	A S J L E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		San Diego Bay						Tijuana Estuary																	
		West Coast Estuaries																							

Relative Abundance



Highly Abundant



Abundant



Common

Blank

Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Puget Sound				Hood Canal				Skagit Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Kelp bass	A												
<i>Paralabrax</i>	S												
<i>clathratus</i>	J												
	L												
	E												
Barred sand bass	A												
<i>Paralabrax</i>	S												
<i>nebulifer</i>	J												
	L												
	E												
White croaker	A												
<i>Genyonemus</i>	S												
<i>lineatus</i>	J												
	L												
	E												
White seabass	A												
<i>Atractoscion</i>	S												
<i>nobilis</i>	J												
	L												
	E												
Shiner perch	A												
<i>Cymatogaster</i>	P												
<i>aggregata</i>	J												
	L												
	E												
Pacific sand lance	A												
<i>Ammodytes</i>	S												
<i>hexapterus</i>	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Puget Sound				Hood Canal				Skagit Bay			
		West Coast Estuaries											

Relative Abundance

	Highly Abundant
	Abundant
	Common

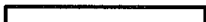
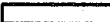
Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs
P - Parturition

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Gray's Harbor				Willapa Bay				Columbia River			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Kelp bass	A												
<i>Paralabrax</i>	S												
<i>clathratus</i>	J												
	L												
	E												
Barred sand bass	A												
<i>Paralabrax</i>	S												
<i>nebulifer</i>	J												
	L												
	E												
White croaker	A												
<i>Genyonemus</i>	S												
<i>lineatus</i>	J												
	L												
	E												
White seabass	A												
<i>Atractoscion</i>	S												
<i>nobilis</i>	J												
	L												
	E												
Shiner perch	A												
<i>Cymatogaster</i>	P												
<i>aggregata</i>	J												
	L												
	E												
Pacific sand lance	A												
<i>Ammodytes</i>	S												
<i>hexapterus</i>	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Gray's Harbor				Willapa Bay				Columbia River			
		West Coast Estuaries											

Relative Abundance

	Highly Abundant
	Abundant
	Common
Blank	Not present, Rare, or No Data Available

Life Stage

A	Adults
S	Spawning
J	Juveniles
L	Larvae
E	Eggs
P	Parturition

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Nehalem Bay				Tillamook Bay				Netarts Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Kelp bass <i>Paralabrax clathratus</i>	A S J L E												
Barred sand bass <i>Paralabrax nebulifer</i>	A S J L E												
White croaker <i>Genyonemus lineatus</i>	A S J L E												
White seabass <i>Atractoscion nobilis</i>	A S J L E												
Shiner perch <i>Cymatogaster aggregata</i>	A P J L E												
Pacific sand lance <i>Ammodytes hexapterus</i>	A S J L E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Nehalem Bay				Tillamook Bay				Netarts Bay			
		West Coast Estuaries											

Relative Abundance

Highly Abundant

Abundant

Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

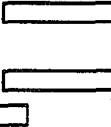
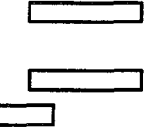
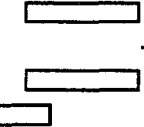
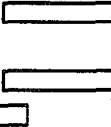
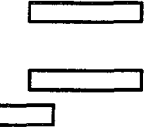
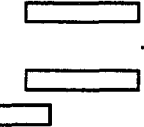
L - Larvae

E - Eggs

P - Parturition

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		Siletz River				Yaquina Bay				Alsea River															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Kelp bass	A																								
<i>Paralabrax</i>	S																								
<i>clathratus</i>	J																								
	L																								
	E																								
Barred sand bass	A																								
<i>Paralabrax</i>	S																								
<i>nebulifer</i>	J																								
	L																								
	E																								
White croaker	A																								
<i>Genyonemus</i>	S																								
<i>lineatus</i>	J																								
	L																								
	E																								
White seabass	A																								
<i>Atractoscion</i>	S																								
<i>nobilis</i>	J																								
	L																								
	E																								
Shiner perch	A																								
<i>Cymatogaster</i>	P																								
<i>aggregata</i>	J																								
	L																								
	E																								
Pacific sand lance	A																								
<i>Ammodytes</i>	S																								
<i>hexapterus</i>	J																								
	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Siletz River				Yaquina Bay				Alsea River															
		West Coast Estuaries																							

Relative Abundance

 Highly Abundant Abundant CommonBlank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

P - Parturition

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Siuslaw River				Umpqua River				Coos Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Kelp bass <i>Paralabrax clathratus</i>	A S J L E												
Barred sand bass <i>Paralabrax nebulifer</i>	A S J L E												
White croaker <i>Genyonemus lineatus</i>	A S J L E												
White seabass <i>Atractoscion nobilis</i>	A S J L E												
Shiner perch <i>Cymatogaster aggregata</i>	A P J L E												
Pacific sand lance <i>Ammodytes hexapterus</i>	A S J L E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Siuslaw River				Umpqua River				Coos Bay			
		West Coast Estuaries											

Relative Abundance



Highly Abundant



Abundant



Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

P - Parturition

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																																			
		Rogue River												Klamath River												Humboldt Bay											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
Species/Life Stage																																					
Kelp bass <i>Paralabrax clathratus</i>	A S J L E																																				
Barred sand bass <i>Paralabrax nebulifer</i>	A S J L E																																				
White croaker <i>Genyonemus lineatus</i>	A S J L E																																				
White seabass <i>Atractoscion nobilis</i>	A S J L E																																				
Shiner perch <i>Cymatogaster aggregata</i>	A P J L E																																				
Pacific sand lance <i>Ammodytes hexapterus</i>	A S J L E																																				
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
		Rogue River												Klamath River												Humboldt Bay											
		West Coast Estuaries																																			

Relative Abundance



Highly Abundant



Abundant



Common

Blank

Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

P - Parturition

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Central San Francisco / Suisun / San Pablo Bays											
		Eel River						Tomaes Bay					
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Kelp bass <i>Paralabrax clathratus</i>	A S J L E												
Barred sand bass <i>Paralabrax nebulifer</i>	A S J L E												
White croaker <i>Genyonemus lineatus</i>	A S J L E												
White seabass <i>Atractoscion nobilis</i>	A S J L E												
Shiner perch <i>Cymatogaster aggregata</i>	A P J L E												
Pacific sand lance <i>Ammodytes hexapterus</i>	A S J L E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Eel River						Tomaes Bay					
		West Coast Estuaries											

Relative Abundance



Highly Abundant



Abundant



Common

Blank

Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

P - Parturition

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		South San Fran. Bay				Elkhorn Slough				Morro Bay															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Kelp bass <i>Paralabrax clathratus</i>	A S J L E																								
Barred sand bass <i>Paralabrax nebulifer</i>	A S J L E																								
White croaker <i>Genyonemus lineatus</i>	A S J L E																								
White seabass <i>Atractoscion nobilis</i>	A S J L E																								
Shiner perch <i>Cymatogaster aggregata</i>	A P J L E																								
Pacific sand lance <i>Ammodytes hexapterus</i>	A S J L E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		South San Fran. Bay				Elkhorn Slough				Morro Bay															
		West Coast Estuaries																							

Relative Abundance

	Highly Abundant
	Abundant
	Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs
P - Parturition

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Santa Monica Bay				San Pedro Bay				Alamitos Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Kelp bass <i>Paralabrax clathratus</i>	A												
	S												
	J												
	L												
	E												
Barred sand bass <i>Paralabrax nebulifer</i>	A												
	S												
	J												
	L												
	E												
White croaker <i>Genyonemus lineatus</i>	A												
	S												
	J												
	L												
	E												
White seabass <i>Atractoscion nobilis</i>	A												
	S												
	J												
	L												
	E												
Shiner perch <i>Cymatogaster aggregata</i>	A												
	P												
	J												
	L												
	E												
Pacific sand lance <i>Ammodytes hexapterus</i>	A												
	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Santa Monica Bay				San Pedro Bay				Alamitos Bay			
		West Coast Estuaries											

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

P - Parturition

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		Anaheim Bay				Newport Bay				Mission Bay															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Kelp bass <i>Paralabrax clathratus</i>	A																								
	S																								
	J																								
	L																								
	E																								
Barred sand bass <i>Paralabrax nebulifer</i>	A																								
	S																								
	J																								
	L																								
	E																								
White croaker <i>Genyonemus lineatus</i>	A																								
	S																								
	J																								
	L																								
	E																								
White seabass <i>Atractoscion nobilis</i>	A																								
	S																								
	J																								
	L																								
	E																								
Shiner perch <i>Cymatogaster aggregata</i>	A																								
	P																								
	J																								
	L																								
	E																								
Pacific sand lance <i>Ammodytes hexapterus</i>	A																								
	S																								
	J																								
	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Anaheim Bay				Newport Bay				Mission Bay															
		West Coast Estuaries																							

Relative Abundance

	Highly Abundant
	Abundant
	Common
Blank	Not present, Rare, or No Data Available

Life Stage

A	Adults
S	Spawning
J	Juveniles
L	Larvae
E	Eggs
P	Parturition

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		San Diego Bay						Tijuana Estuary																	
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Kelp bass <i>Paralabrax</i> <i>clathratus</i>	A S J L E																								
Barred sand bass <i>Paralabrax</i> <i>nebulifer</i>	A S J L E																								
																									
																									
White croaker <i>Genyonemus</i> <i>lineatus</i>	A S J L E																								
																									
White seabass <i>Atractoscion</i> <i>nobilis</i>	A S J L E																								
Shiner perch <i>Cymatogaster</i> <i>aggregata</i>	A P J L E																								
																									
																									
Pacific sand lance <i>Ammodytes</i> <i>hexapterus</i>	A S J L E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		San Diego Bay						Tijuana Estuary																	
		West Coast Estuaries																							

Relative Abundance

 Highly Abundant Abundant CommonBlank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

P - Parturition

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Puget Sound				Hood Canal				Skagit Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Arrow goby <i>Clevelandia ios</i>	A												
	S												
	J												
	L												
	E												
Lingcod <i>Ophiodon elongatus</i>	A												
	S												
	J												
	L												
	E												
Pacific staghorn sculpin <i>Leptocottus armatus</i>	A												
	S												
	J												
	L												
	E												
California halibut <i>Paralichthys californicus</i>	A												
	S												
	J												
	L												
	E												
Diamond turbot <i>Hypsopsetta guttulata</i>	A												
	S												
	J												
	L												
	E												
English sole <i>Pleuronectes vetulus</i>	A												
	S												
	J												
	L												
	E												
Starry flounder <i>Platichthys stellatus</i>	A												
	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Puget Sound				Hood Canal				Skagit Bay			
		West Coast Estuaries											

Relative Abundance

Highly Abundant

Abundant

Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

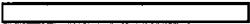
J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																																			
		Gray's Harbor				Willapa Bay				Columbia River																											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
Species/Life Stage																																					
Arrow goby <i>Clevelandia ios</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Lingcod <i>Ophiodon elongatus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Pacific staghorn sculpin <i>Leptocottus armatus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
California halibut <i>Paralichthys californicus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Diamond turbot <i>Hypsopsetta guttulata</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
English sole <i>Pleuronectes vetulus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Starry flounder <i>Platichthys stellatus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Gray's Harbor								Willapa Bay								Columbia River																			
		West Coast Estuaries																																			

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries											
		Nehalem Bay				Tillamook Bay				Netarts Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Arrow goby <i>Clevelandia ios</i>	A S J L E												
Lingcod <i>Ophiodon elongatus</i>	A S J L E												
Pacific staghorn sculpin <i>Leptocottus armatus</i>	A S J L E												
California halibut <i>Paralichthys californicus</i>	A S J L E												
Diamond turbot <i>Hypsopsetta guttulata</i>	A S J L E												
English sole <i>Pleuronectes vetulus</i>	A S J L E												
Starry flounder <i>Platichthys stellatus</i>	A S J L E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Nehalem Bay				Tillamook Bay				Netarts Bay			
		West Coast Estuaries											

Relative Abundance



Highly Abundant



Abundant



Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Table 3 (continued). Temporal distribution (revised 1/91).

		West Coast Estuaries											
		Siletz River				Yaquina Bay				Alsea River			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Arrow goby <i>Clevelandia</i> <i>ios</i>	A												
	S												
	J												
	L												
	E												
Lingcod <i>Ophiodon</i> <i>elongatus</i>	A												
	S												
	J												
	L												
	E												
Pacific staghorn sculpin <i>Leptocottus</i> <i>armatus</i>	A												
	S												
	J												
	L												
	E												
California halibut <i>Paralichthys</i> <i>californicus</i>	A												
	S												
	J												
	L												
	E												
Diamond turbot <i>Hypsopsetta</i> <i>guttulata</i>	A												
	S												
	J												
	L												
	E												
English sole <i>Pleuronectes</i> <i>vetulus</i>	A												
	S												
	J												
	L												
	E												
Starry flounder <i>Platichthys</i> <i>stellatus</i>	A												
	S												
	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Siletz River				Yaquina Bay				Alsea River			
		West Coast Estuaries											

Relative Abundance

 Highly Abundant

 Abundant

 Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Table 3, continued. Temporal distribution (revised 1/91).

		West Coast Estuaries											
		Siuslaw River				Umpqua River				Coos Bay			
Month		J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage													
Arrow goby	A												
<i>Clevelandia</i>	S												
<i>ios</i>	J												
	L												
	E												
Lingcod	A												
<i>Ophiodon</i>	S												
<i>elongatus</i>	J												
	L												
	E												
Pacific staghorn sculpin	A												
	S												
<i>Leptocottus</i>	J												
<i>armatus</i>	L												
	E												
California halibut	A												
<i>Paralichthys</i>	S												
<i>californicus</i>	J												
	L												
	E												
Diamond turbot	A												
<i>Hypsopsetta</i>	S												
<i>guttulata</i>	J												
	L												
	E												
English sole	A												
<i>Pleuronectes</i>	S												
<i>vetulus</i>	J												
	L												
	E												
Starry flounder	A												
<i>Platichthys</i>	S												
<i>stellatus</i>	J												
	L												
	E												
		J	F	M	A	M	J	J	A	S	O	N	D
		Siuslaw River				Umpqua River				Coos Bay			
		West Coast Estuaries											

Relative Abundance

■ Highly Abundant

▨ Abundant

□ Common

Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Table 3 (continued). Temporal distribution (revised 1/91).

		West Coast Estuaries																																			
		Rogue River												Klamath River												Humboldt Bay											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																																					
Arrow goby <i>Clevelandia ios</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Lingcod <i>Ophiodon elongatus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Pacific staghorn sculpin <i>Leptocottus armatus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
California halibut <i>Paralichthys californicus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Diamond turbot <i>Hypsopsetta guttulata</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
English sole <i>Pleuronectes vetulus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Starry flounder <i>Platichthys stellatus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
		Rogue River												Klamath River												Humboldt Bay											
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D

Relative Abundance



Highly Abundant



Abundant



Common

Blank

Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

		West Coast Estuaries		
		Eel River	Tomales Bay	Central San Francisco / Suisun / San Pablo Bays
Month		J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
Species/Life Stage				
Arrow goby <i>Clevelandia ios</i>	A			
	S			
	J			
	L			
	E			
Lingcod <i>Ophiodon elongatus</i>	A			
	S			
	J			
	L			
	E			
Pacific staghorn sculpin <i>Leptocottus armatus</i>	A			
	S			
	J			
	L			
	E			
California halibut <i>Paralichthys californicus</i>	A			
	S			
	J			
	L			
	E			
Diamond turbot <i>Hypsopsetta guttulata</i>	A			
	S			
	J			
	L			
	E			
English sole <i>Pleuronectes vetulus</i>	A			
	S			
	J			
	L			
	E			
Starry flounder <i>Platichthys stellatus</i>	A			
	S			
	J			
	L			
	E			
		J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
		Eel River	Tomales Bay	Central San Francisco / Suisun / San Pablo Bays
		West Coast Estuaries		

	Highly Abundant
	Abundant
	Common
Blank	Not present, Rare, or No Data Available

A - Adults
S - Spawning
J - Juveniles
L - Larvae
E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		South San Fran. Bay				Elkhorn Slough				Morro Bay															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Arrow goby <i>Clevelandia ios</i>	A																								
	S																								
	J																								
	L																								
	E																								
Lingcod <i>Ophiodon elongatus</i>	A																								
	S																								
	J																								
	L																								
	E																								
Pacific staghorn sculpin <i>Leptocottus armatus</i>	A																								
	S																								
	J																								
	L																								
	E																								
California halibut <i>Paralichthys californicus</i>	A																								
	S																								
	J																								
	L																								
	E																								
Diamond turbot <i>Hypsopsetta guttulata</i>	A																								
	S																								
	J																								
	L																								
	E																								
English sole <i>Pleuronectes vetulus</i>	A																								
	S																								
	J																								
	L																								
	E																								
Starry flounder <i>Platichthys stellatus</i>	A																								
	S																								
	J																								
	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		South San Fran. Bay				Elkhorn Slough				Morro Bay															
		West Coast Estuaries																							

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Table 3 (continued).

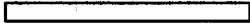
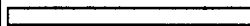
Relative Abundance

	Highly Abundant
	Abundant
	Common
Blank	Not present, Rare, or No Data Available

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Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																																			
		Anaheim Bay												Newport Bay												Mission Bay											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																																					
Arrow goby <i>Clevelandia ios</i>	A																																				
	S																									 											
	J													 																							
	L																																				
	E																									 											
Lingcod <i>Ophiodon elongatus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Pacific staghorn sculpin <i>Leptocottus armatus</i>	A																																				
	S	 																																			
	J																																				
	L	 																																			
	E	 																																			
California halibut <i>Paralichthys californicus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Diamond turbot <i>Hypsopsetta guttulata</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
English sole <i>Pleuronectes vetulus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Starry flounder <i>Platichthys stellatus</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Anaheim Bay												Newport Bay												Mission Bay											
		West Coast Estuaries																																			

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Data Summary Table: Temporal Distribution

Table 3 (continued).

		West Coast Estuaries																							
		San Diego Bay						Tijuana Estuary																	
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species/Life Stage																									
Arrow goby <i>Clevelandia ios</i>	A																								
	S																								
	J																								
	L																								
	E																								
Lingcod <i>Ophiodon elongatus</i>	A																								
	S																								
	J																								
	L																								
	E																								
Pacific staghorn sculpin <i>Leptocottus armatus</i>	A																								
	S																								
	J																								
	L																								
	E																								
California halibut <i>Paralichthys californicus</i>	A																								
	S																								
	J																								
	L																								
	E																								
Diamond turbot <i>Hypsopsetta guttulata</i>	A																								
	S																								
	J																								
	L																								
	E																								
English sole <i>Pleuronectes vetulus</i>	A																								
	S																								
	J																								
	L																								
	E																								
Starry flounder <i>Platichthys stellatus</i>	A																								
	S																								
	J																								
	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		San Diego Bay						Tijuana Estuary																	
		West Coast Estuaries																							

Relative Abundance

 Highly Abundant

 Abundant

 Common

 Blank Not present, Rare, or
No Data Available

Life Stage

A - Adults

S - Spawning

J - Juveniles

L - Larvae

E - Eggs

Table 4. Data reliability

Index to Table 4: Page location of data reliability table for each species and estuary

Common and Scientific Name	Estuary			
	Puget Sound Hood Canal Skagit Bay Grays Harbor Willapa Bay Columbia River Nehalem Bay Tillamook Bay Neah Bay Siletz River Yaquina Bay Agua River Siuslaw River Umpqua River Cove River Rogue River Klamath River Eel River Trask River Cent. Bay San Francisco Bay San Pablo Bay San Francisco Bay Elkhorn Slough Morro Bay Santa Monica Bay San Pedro Bay Annapolis Bay Newport Bay Mission Bay San Diego Bay Tijuana Estuary			
Blue mussel (<i>Mytilus edulis</i>)				
Pacific oyster (<i>Crassostrea gigas</i>)				
Horseneck gaper (<i>Tresus capax</i>)				
Pacific gaper (<i>Tresus nuttali</i>)				
California jackknife clam (<i>Tagelus californianus</i>)				
Pacific littleneck clam (<i>Protothaca staminea</i>)				
Manila (Japanese) clam (<i>Venerupis japonica</i>)				
Eastern softshell clam (<i>Mya arenaria</i>)				
Geoduck (<i>Panope abrupta</i>)				
Bay shrimp (<i>Crangon franciscorum</i>)				
Dungeness crab (<i>Cancer magister</i>)				
Leopard shark (<i>Triakis semifasciata</i>)				
Green sturgeon (<i>Acipenser medirostris</i>)				
White sturgeon (<i>Acipenser transmontanus</i>)				
American shad (<i>Alosa sapidissima</i>)				
Pacific herring (<i>Clupea pallasii</i>)				
Deepbody anchovy (<i>Anchoa compressa</i>)				
Slough anchovy (<i>Anchoa delicatissima</i>)				
Northern anchovy (<i>Engraulis mordax</i>)				
Cutthroat trout (<i>Oncorhynchus clarkii</i>)				
Steelhead (<i>Oncorhynchus mykiss</i>)*				
Coho salmon (<i>Oncorhynchus kisutch</i>)				
Chinook salmon (<i>Oncorhynchus tshawytscha</i>)*				
Chum salmon (<i>Oncorhynchus keta</i>)				
Pink salmon (<i>Oncorhynchus gorbuscha</i>)				
Sockeye salmon (<i>Oncorhynchus nerka</i>)				
Surf smelt (<i>Hypomesus pretiosus</i>)				
Longfin smelt (<i>Spirinchus thaleichthys</i>)				
Eulachon (<i>Thaleichthys pacificus</i>)				
Pacific tomcod (<i>Microgadus proximus</i>)				
Topsmelt (<i>Atherinops affinis</i>)				
Jacksmelt (<i>Atherinopsis californiensis</i>)				
Threespine stickleback (<i>Gasterosteus aculeatus</i>)				
Striped bass (<i>Morone saxatilis</i>)				
Kelp bass (<i>Paralabrax clathratus</i>)				
Barred sand bass (<i>Paralabrax nebulifer</i>)				
White seabass (<i>Atractoscion nobilis</i>)				
White croaker (<i>Genyonemus lineatus</i>)				
Shiner perch (<i>Cymatogaster aggregata</i>)				
Pacific sand lance (<i>Ammodytes hexapterus</i>)				
Arrow goby (<i>Clevlandia ios</i>)				
Lingcod (<i>Ophiodon elongatus</i>)				
Pacific staghorn sculpin (<i>Leptocottus armatus</i>)				
California halibut (<i>Paralichthys californicus</i>)				
Diamond turbot (<i>Hypsopsetta guttulata</i>)				
English sole (<i>Pleuronectes vetulus</i>)				
Starry flounder (<i>Platichthys stellatus</i>)				

* Winter steelhead and summer chinook salmon are located four pages after the pages shown here.

Table 4. Data Summary Table: Data Reliability

		West Coast Estuaries							
		Puget Sound	Hood Canal	Skagit Bay	Grays Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay
Species/Life Stage									
Blue mussel <i>Mytilus edulis</i>	A	■	■	■	■	■	■	□	■
	S	■	■	■	■	■	□	□	□
	J	■	■	■	■	■	■	□	■
	L	■	■	■	■	■	□	□	□
	E	■	■	■	■	■	□	□	□
Pacific oyster <i>Crassostrea gigas</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Horseneck gaper <i>Tresus capax</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	□	■	□	□
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	□	■	□	□
	E	■	■	■	■	□	■	□	□
Pacific gaper <i>Tresus nuttalli</i>	A	■	■	■	■	■	■	■	■
	S	□	□	□	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	□	□	□	■	■	■	■	■
	E	□	□	□	■	■	■	■	■
California jackknife clam <i>Tagelus californianus</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Pacific littleneck clam <i>Protothaca staminea</i>	A	■	■	■	■	□	■	■	■
	S	■	■	■	□	□	■	□	■
	J	■	■	■	■	□	■	■	■
	L	□	□	■	□	□	■	□	■
	E	□	□	■	□	□	■	□	■
		Puget Sound	Hood Canal	Skagit Bay	Grays Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay
		West Coast Estuaries							

Reliability

- Highly Certain
- Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Table 4 (continued). Data Summary Table: Data Reliability

Species/Life Stage		West Coast Estuaries							
		Netarts Bay	Siletz River	Yaquina Bay	Alsea River	Siuslaw River	Umpqua River	Coos Bay	Rogue River
Blue mussel <i>Mytilus edulis</i>	A	■	■	■	■	■	■	■	■
	S	□	□	□	□	□	□	□	□
	J	■	■	■	■	■	■	■	■
	L	□	□	□	□	□	□	□	□
	E	□	□	□	□	□	□	□	□
Pacific oyster <i>Crassostrea gigas</i>	A	□	■	■	■	■	■	■	■
	S	□	■	□	■	■	■	□	■
	J	□	■	■	■	■	■	■	■
	L	□	■	□	■	■	■	□	■
	E	□	■	□	■	■	■	□	■
Horseneck gaper <i>Tresus capax</i>	A	■	■	■	■	■	■	■	■
	S	□	■	■	□	□	□	■	■
	J	■	■	■	■	■	■	■	■
	L	□	■	■	□	□	□	■	■
	E	□	■	■	□	□	□	■	■
Pacific gaper <i>Tresus nuttalli</i>	A	■	■	■	■	■	■	■	■
	S	□	■	□	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	□	■	□	■	■	■	■	■
	E	□	■	□	■	■	■	■	■
California jackknife clam <i>Tagelus californianus</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Pacific littleneck clam <i>Protothaca staminea</i>	A	□	■	■	■	■	■	■	■
	S	□	■	■	□	□	■	□	■
	J	□	■	■	■	■	■	■	■
	L	□	■	■	□	□	■	□	■
	E	□	■	■	□	□	■	□	■
		Netarts Bay	Siletz River	Yaquina Bay	Alsea River	Siuslaw River	Umpqua River	Coos Bay	Rogue River
West Coast Estuaries									

Reliability

- Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs

Data Summary Table: Data Reliability

Table 4 (continued).

Species/Life Stage		West Coast Estuaries							
		Klamath River	Humboldt Bay	Eel River	Tomaes Bay	Cent. S. Fr. / Suisun / S. Pablo Bays	South San Fran. Bay	Elkhorn Slough	Morro Bay
Blue mussel <i>Mytilus edulis</i>	A	■	■	■	■	■	■	■	■
	S	■	■	□	□	□	□	□	■
	J	■	■	□	■	■	■	■	■
	L	■	□	■	□	□	□	□	■
	E	■	■	□	□	□	□	□	■
Pacific oyster <i>Crassostrea gigas</i>	A	■	■	■	■	■	□	■	■
	S	■	■	■	■	□	□	□	■
	J	■	■	■	■	■	□	■	■
	L	■	■	■	■	□	□	□	■
	E	■	■	■	■	□	□	□	■
Horseneck gaper <i>Tresus capax</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Pacific gaper <i>Tresus nuttalli</i>	A	■	■	■	□	□	□	■	■
	S	■	□	■	□	□	□	■	□
	J	■	■	■	□	□	□	■	■
	L	■	□	■	□	□	□	■	□
	E	■	□	■	□	□	□	■	□
California jackknife clam <i>Tagelus californianus</i>	A	■	■	■	□	□	■	□	■
	S	■	■	■	□	□	■	□	□
	J	■	■	■	□	□	■	□	■
	L	■	■	■	□	□	■	□	□
	E	■	■	■	□	□	■	□	□
Pacific littleneck clam <i>Protothaca staminea</i>	A	■	■	■	■	□	□	■	■
	S	■	□	■	□	□	□	□	□
	J	■	■	■	■	□	□	■	■
	L	■	□	■	□	□	□	□	□
	E	■	□	■	□	□	□	□	□
		Klamath River	Humboldt Bay	Eel River	Tomaes Bay	Cent. S. Fr. / Suisun / S. Pablo Bays	South San Fran. Bay	Elkhorn Slough	Morro Bay
West Coast Estuaries									

Reliability

- Highly Certain
- Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Data Reliability

Table 4 (continued).

Species/Life Stage		West Coast Estuaries							
		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary
Blue mussel <i>Mytilus edulis</i>	A	☐	☒	☒	☒	☒	☐	☒	☐
	S	☐	☐	☒	☐	☐	☐	☐	☐
	J	☐	☒	☒	☒	☒	☐	☒	☐
	L	☐	☐	☒	☐	☐	☐	☐	☐
	E	☐	☐	☒	☐	☐	☐	☐	☐
Pacific oyster <i>Crassostrea gigas</i>	A	☒	☒	☒	☒	☒	☒	☒	☒
	S	☒	☒	☒	☒	☒	☒	☒	☒
	J	☒	☒	☒	☒	☒	☒	☒	☒
	L	☒	☒	☒	☒	☒	☒	☒	☒
	E	☒	☒	☒	☒	☒	☒	☒	☒
Horseneck gaper <i>Tresus capax</i>	A	☒	☒	☒	☒	☒	☒	☒	☒
	S	☒	☒	☒	☒	☒	☒	☒	☒
	J	☒	☒	☒	☒	☒	☒	☒	☒
	L	☒	☒	☒	☒	☒	☒	☒	☒
	E	☒	☒	☒	☒	☒	☒	☒	☒
Pacific gaper <i>Tresus nuttalli</i>	A	☐	☒	☐	☒	☐	☒	☒	☒
	S	☐	☐	☐	☐	☐	☒	☒	☒
	J	☐	☒	☐	☐	☐	☒	☒	☒
	L	☐	☐	☐	☐	☐	☒	☒	☒
	E	☐	☐	☐	☐	☐	☒	☒	☒
California jackknife clam <i>Tagelus californianus</i>	A	☒	☒	☐	☐	☒	☐	☒	☒
	S	☐	☐	☐	☐	☐	☐	☐	☐
	J	☒	☒	☐	☐	☒	☐	☒	☒
	L	☐	☐	☐	☐	☐	☐	☐	☐
	E	☐	☐	☐	☐	☐	☐	☐	☐
Pacific littleneck clam <i>Protothaca staminea</i>	A	☒	☒	☒	☒	☐	☐	☒	☒
	S	☐	☐	☐	☐	☐	☐	☒	☐
	J	☒	☒	☒	☒	☐	☐	☒	☒
	L	☐	☐	☐	☐	☐	☐	☒	☐
	E	☐	☐	☐	☐	☐	☐	☒	☐
		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary
		West Coast Estuaries							

Reliability

- ☒ Highly Certain
☒ Moderately Certain
☐ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs

Data Summary Table: Data Reliability

Table 4 (continued).

		West Coast Estuaries							
		Puget Sound	Hood Canal	Skagit Bay	Gray's Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay
Species/Life Stage									
Manila clam <i>Venerupis japonica</i>	A	■	■	■	■	■	■	■	■
	S	■	■	□	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	□	■	■	■	■	■
	E	■	■	□	■	■	■	■	■
Eastern softshell clam <i>Mya arenaria</i>	A	■	■	■	■	■	■	■	■
	S	■	□	■	■	■	□	□	□
	J	■	■	■	■	■	■	■	■
	L	■	□	■	■	■	□	□	□
	E	■	□	■	■	■	□	□	□
Geoduck <i>Panope abrupta</i>	A	■	■	■	■	■	■	■	■
	S	■	■	□	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	□	■	□	■	■	■	■	■
	E	■	■	□	■	■	■	■	■
Bay shrimp <i>Crangon franciscorum</i>	A	■	□	■	■	□	□	□	□
	S	■	□	□	□	□	□	□	□
	J	■	□	□	□	□	■	□	□
	L	□	□	□	□	□	□	□	□
	E	■	□	□	□	□	□	□	□
Dungeness crab <i>Cancer magister</i>	A	■	■	■	■	■	■	□	■
	M	■	□	■	■	■	■	□	□
	J	■	□	■	■	■	■	□	■
	L	■	□	■	□	□	■	□	□
	E	■	□	■	■	■	■	□	□
Leopard shark <i>Triakis semifasciata</i>	A	■	■	■	■	■	■	■	■
	P	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	M	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
		Puget Sound	Hood Canal	Skagit Bay	Gray's Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay
		West Coast Estuaries							

Reliability

- Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs
 P - Parturition
 M - Mating

Data Summary Table: Data Reliability

Table 4 (continued).

Species/Life Stage		West Coast Estuaries							
		Netarts Bay	Siletz River	Yaquina Bay	Alsea River	Siuslaw River	Umpqua River	Coos Bay	Rogue River
Manila clam <i>Venerupis japonica</i>	A	■	■	■	■	■	■	■	■
	S	□	■	■	■	■	■	□	■
	J	■	■	■	■	■	■	■	■
	L	□	■	■	■	■	■	□	■
	E	□	■	■	■	■	■	□	■
Eastern softshell clam <i>Mya arenaria</i>	A	■	□	■	■	■	■	■	■
	S	□	□	□	□	□	□	□	■
	J	■	□	■	■	■	■	■	■
	L	□	□	□	□	□	□	□	■
	E	□	□	□	□	□	□	□	■
Geoduck <i>Panope abrupta</i>	A	■	■	■	■	■	■	■	■
	S	□	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	□	■	■	■	■	■	■	■
	E	□	■	■	■	■	■	■	■
Bay shrimp <i>Crangon franciscorum</i>	A	□	□	■	□	■	□	□	□
	S	□	□	■	□	□	□	□	■
	J	□	□	■	□	■	□	□	□
	L	□	□	□	□	□	□	□	■
	E	□	□	■	□	□	□	□	■
Dungeness crab <i>Cancer magister</i>	A	□	□	■	■	■	■	■	□
	M	□	□	□	■	■	■	□	■
	J	■	□	■	■	■	■	■	□
	L	□	□	■	□	□	□	■	□
	E	□	□	□	■	■	□	□	■
Leopard shark <i>Triakis semifasciata</i>	A	■	■	■	■	■	■	□	■
	P	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	M	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
		Netarts Bay	Siletz River	Yaquina Bay	Alsea River	Siuslaw River	Umpqua River	Coos Bay	Rogue River
West Coast Estuaries									

Reliability

- Highly Certain
- Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs
- P - Parturition
- M - Mating

Data Summary Table: Data Reliability

Table 4 (continued).

Species/Life Stage		West Coast Estuaries							
		Klamath River	Humboldt Bay	Eel River	Tomaes Bay	Cent. S. Fr. / Suisun / S. Pablo Bays	South San Fran. Bay	Elkhorn Slough	Morro Bay
Manila clam <i>Venerupis japonica</i>	A	■	■	■	□	■	■	□	■
	S	■	□	■	□	□	□	□	■
	J	■	■	■	□	■	■	□	■
	L	■	□	■	□	□	□	□	■
	E	■	□	■	□	□	□	□	■
Eastern softshell clam <i>Mya arenaria</i>	A	■	■	□	□	■	■	■	□
	S	■	■	□	□	□	□	□	□
	J	■	■	□	□	■	■	■	□
	L	■	■	□	□	□	□	□	□
	E	■	■	□	□	□	□	□	□
Geoduck <i>Panope abrupta</i>	A	■	■	■	■	■	■	■	■
	S	■	□	■	■	■	■	■	□
	J	■	■	■	■	■	■	■	■
	L	■	□	■	■	■	■	■	□
	E	■	□	■	■	■	■	■	□
Bay shrimp <i>Crangon franciscorum</i>	A	□	□	□	□	■	■	■	■
	S	■	□	□	□	■	■	■	■
	J	□	■	□	□	■	■	■	■
	L	■	■	□	□	■	■	■	■
	E	■	□	□	□	□	■	■	■
Dungeness crab <i>Cancer magister</i>	A	□	■	□	□	■	■	■	■
	M	■	■	■	□	□	■	■	■
	J	□	■	□	■	■	■	■	■
	L	□	□	□	□	■	■	■	■
	E	□	□	■	□	■	■	■	■
Leopard shark <i>Triakis semifasciata</i>	A	■	■	■	□	■	■	■	■
	P	■	□	■	□	■	■	■	■
	J	■	■	■	□	□	■	■	■
	M	■	■	■	□	□	■	■	■
	E	■	■	■	■	■	■	■	■
		Klamath River	Humboldt Bay	Eel River	Tomaes Bay	Cent. S. Fr. / Suisun / S. Pablo Bays	South San Fran. Bay	Elkhorn Slough	Morro Bay
		West Coast Estuaries							

Reliability

- Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs
 P - Parturition
 M - Mating

Data Summary Table: Data Reliability

Table 4 (continued).

Species/Life Stage		West Coast Estuaries							
		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary
Manila clam <i>Venerupis japonica</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Eastern softshell clam <i>Mya arenaria</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Geoduck <i>Panope abrupta</i>	A	■	□	■	■	■	■	■	■
	S	■	□	■	■	■	■	■	■
	J	■	□	■	■	■	■	■	■
	L	■	□	■	■	■	■	■	■
	E	■	□	■	■	■	■	■	■
Bay shrimp <i>Crangon franciscorum</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Dungeness crab <i>Cancer magister</i>	A	■	■	■	■	■	■	■	■
	M	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Leopard shark <i>Triakis semifasciata</i>	A	■	■	■	■	■	■	■	■
	P	□	□	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	M	□	□	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary
		West Coast Estuaries							

Reliability

- Highly Certain
- Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs
- P - Parturition
- M - Mating

Data Summary Table: Data Reliability

Table 4 (continued).

		West Coast Estuaries							
		Puget Sound	Hood Canal	Skagit Bay	Gray's Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay
Species/Life Stage									
Green sturgeon <i>Acipenser medirostris</i>	A	■	■	■	▣	▣	■	□	□
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	□	□
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
White sturgeon <i>Acipenser transmontanus</i>	A	■	■	■	■	▣	■	□	▣
	S	■	■	■	■	■	■	■	■
	J	■	■	■	▣	□	▣	□	▣
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
American shad <i>Alosa sapidissima</i>	A	▣	▣	□	■	□	■	□	■
	S	■	■	■	■	▣	■	■	■
	J	■	■	□	■	□	■	□	▣
	L	■	■	■	■	▣	■	■	■
	E	■	■	■	■	▣	■	■	■
Pacific herring <i>Clupea pallasii</i>	A	■	■	■	■	□	■	□	▣
	S	■	■	■	■	□	■	□	□
	J	■	■	■	■	▣	■	□	■
	L	■	■	■	▣	□	■	□	□
	E	■	■	■	■	□	■	□	□
Deepbody anchovy <i>Anchoa compressa</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Slough anchovy <i>Anchoa delicatissima</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
		Puget Sound	Hood Canal	Skagit Bay	Gray's Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay
		West Coast Estuaries							

Reliability

- Highly Certain
- ▣ Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Species/Life Stage		West Coast Estuaries							
		Netarts Bay	Siletz River	Yaquina Bay	Alsea River	Siuslaw River	Umpqua River	Coos Bay	Rogue River
Green sturgeon <i>Acipenser medirostris</i>	A	■	■	■	■	■	□	■	□
	S	■	■	■	■	■	■	■	■
	J	■	□	■	■	■	□	□	□
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
White sturgeon <i>Acipenser transmontanus</i>	A	■	□	■	□	□	□	□	■
	S	■	□	■	□	□	■	■	■
	J	■	□	□	□	□	■	□	■
	L	■	□	■	□	□	■	■	■
	E	■	□	■	□	□	■	■	■
American shad <i>Alosa sapidissima</i>	A	■	■	■	■	■	■	■	■
	S	■	■	□	□	■	□	□	□
	J	■	■	■	□	■	□	■	□
	L	■	■	□	□	■	□	□	□
	E	■	■	□	□	■	□	□	□
Pacific herring <i>Clupea pallasii</i>	A	□	□	■	■	■	■	■	□
	S	□	□	■	□	■	■	■	□
	J	■	□	■	□	■	■	■	□
	L	□	□	■	□	□	□	□	□
	E	□	□	■	□	■	□	■	□
Deepbody anchovy <i>Anchoa compressa</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Slough anchovy <i>Anchoa delicatissima</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
		Netarts Bay	Siletz River	Yaquina Bay	Alsea River	Siuslaw River	Umpqua River	Coos Bay	Rogue River
West Coast Estuaries									

Reliability

- Highly Certain
- Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Data Reliability

Table 4 (continued).

Species/Life Stage		West Coast Estuaries							
		Klamath River	Humboldt Bay	Eel River	Tomaes Bay	Cent. S. Fr. / Suisun / S. Pablo Bays	South San Fran. Bay	Elkhorn Slough	Morro Bay
Green sturgeon	A	■	■	□	■	■	□	■	□
<i>Acipenser medirostris</i>	S	■	■	■	■	■	□	■	■
	J	■	□	□	■	■	□	■	□
	L	■	■	■	■	□	□	■	■
	E	■	■	■	■	■	□	■	■
White sturgeon	A	■	■	□	□	■	■	■	■
<i>Acipenser transmontanus</i>	S	■	■	■	□	■	■	■	■
	J	■	■	□	□	■	■	■	■
	L	■	■	■	□	■	■	■	■
	E	■	■	■	□	■	■	■	■
American shad	A	■	■	■	■	■	■	■	■
<i>Alosa sapidissima</i>	S	□	■	□	■	■	■	■	□
	J	□	■	■	■	■	□	■	□
	L	□	■	□	■	■	■	■	□
	E	□	■	□	■	■	■	■	□
Pacific herring	A	□	■	□	■	■	■	■	□
<i>Clupea pallasii</i>	S	■	■	□	■	■	■	■	□
	J	□	■	■	■	■	■	■	□
	L	■	■	□	■	■	■	■	□
	E	■	■	□	■	■	■	■	□
Deepbody anchovy	A	■	■	■	■	■	■	■	■
<i>Anchoa compressa</i>	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Slough anchovy	A	■	■	■	■	■	■	■	■
<i>Anchoa delicatissima</i>	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
		Klamath River	Humboldt Bay	Eel River	Tomaes Bay	Cent. S. Fr. / Suisun / S. Pablo Bays	South San Fran. Bay	Elkhorn Slough	Morro Bay
		West Coast Estuaries							

Reliability

- Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs

Data Summary Table: Data Reliability

Table 4 (continued).

Species/Life Stage		West Coast Estuaries							
		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary
Green sturgeon <i>Acipenser medirostris</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
White sturgeon <i>Acipenser transmontanus</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
American shad <i>Alosa sapidissima</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Pacific herring <i>Clupea pallasii</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Deepbody anchovy <i>Anchoa compressa</i>	A	■	■	□	■	■	■	■	■
	S	■	■	□	■	■	■	■	■
	J	■	□	□	□	■	■	■	■
	L	■	■	□	■	■	■	■	■
	E	■	■	□	■	■	□	■	■
Slough anchovy <i>Anchoa delicatissima</i>	A	■	■	■	■	■	■	■	■
	S	■	■	□	■	■	■	■	■
	J	■	■	□	■	■	■	■	■
	L	■	■	□	■	■	■	■	■
	E	■	■	□	■	■	□	■	■
		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary
		West Coast Estuaries							

Reliability

- Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs

		West Coast Estuaries							
		Puget Sound	Hood Canal	Skagit Bay	Gray's Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay
Species/Life Stage									
Northern anchovy <i>Engraulis mordax</i>	A	■	■	■	■	□	■	□	■
	S	■	■	□	■	■	■	□	■
	J	■	■	■	■	□	■	□	■
	L	■	■	■	■	□	■	□	□
	E	■	■	□	■	□	■	□	□
Cutthroat trout <i>Oncorhynchus clarki</i>	A	■	■	■	■	■	■	□	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	□	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Cutthroat trout - Kelts <i>Oncorhynchus clarki (K)</i>	A	■	■	■	■	■	■	□	□
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Steelhead - Fall <i>Oncorhynchus mykiss (F)</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Steelhead - Half pounder <i>Oncorhynchus mykiss (H)</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Steelhead - Summer <i>Oncorhynchus mykiss (S)</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
		Puget Sound	Hood Canal	Skagit Bay	Gray's Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay
West Coast Estuaries									

Reliability

- Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs

Data Summary Table: Data Reliability

Table 4 (continued).

		West Coast Estuaries							
		Netarts Bay	Siletz River	Yaquina Bay	Alsea River	Siuslaw River	Umpqua River	Coos Bay	Rogue River
Species/Life Stage									
Northern anchovy <i>Engraulis mordax</i>	A	☐	☐	☒	☐	☒	☐	☒	☐
	S	☒	☒	☒	☒	☒	☒	☒	☒
	J	☐	☐	☒	☐	☒	☐	☒	☐
	L	☐	☐	☒	☐	☐	☐	☐	☐
	E	☐	☒	☒	☒	☒	☒	☒	☒
Cutthroat trout <i>Oncorhynchus clarki</i>	A	☐	☒	☒	☒	☒	☒	☐	☒
	S	☒	☒	☒	☒	☒	☒	☒	☒
	J	☒	☐	☒	☒	☒	☒	☒	☒
	L	☒	☒	☒	☒	☒	☒	☒	☒
	E	☒	☒	☒	☒	☒	☒	☒	☒
Cutthroat trout - Kelts <i>Oncorhynchus clarki (K)</i>	A	☐	☐	☐	☒	☐	☐	☐	☒
	S	☒	☒	☒	☒	☒	☒	☒	☒
	J	☒	☒	☒	☒	☒	☒	☒	☒
	L	☒	☒	☒	☒	☒	☒	☒	☒
	E	☒	☒	☒	☒	☒	☒	☒	☒
Steelhead - Fall <i>Oncorhynchus mykiss (F)</i>	A	☒	☒	☒	☒	☒	☒	☒	☒
	S	☒	☒	☒	☒	☒	☒	☒	☒
	J	☒	☒	☒	☒	☒	☒	☒	☒
	L	☒	☒	☒	☒	☒	☒	☒	☒
	E	☒	☒	☒	☒	☒	☒	☒	☒
Steelhead - Half pounder <i>Oncorhynchus mykiss (H)</i>	A	☒	☒	☒	☒	☒	☒	☒	☒
	S	☒	☒	☒	☒	☒	☒	☒	☒
	J	☒	☒	☒	☒	☒	☒	☒	☒
	L	☒	☒	☒	☒	☒	☒	☒	☒
	E	☒	☒	☒	☒	☒	☒	☒	☒
Steelhead - Summer <i>Oncorhynchus mykiss (S)</i>	A	☒	☒	☒	☒	☒	☒	☒	☒
	S	☒	☒	☒	☒	☒	☒	☒	☒
	J	☒	☐	☒	☒	☒	☒	☒	☒
	L	☒	☒	☒	☒	☒	☒	☒	☒
	E	☒	☒	☒	☒	☒	☒	☒	☒
		Netarts Bay	Siletz River	Yaquina Bay	Alsea River	Siuslaw River	Umpqua River	Coos Bay	Rogue River
		West Coast Estuaries							

Reliability

- ☒ Highly Certain
- ☒ Moderately Certain
- ☐ Reasonable Inference

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Data Reliability

Table 4 (continued).

		West Coast Estuaries							
		Klamath River	Humboldt Bay	Eel River	Tomaes Bay	Cent. S. Fr. / Suisun / S. Pablo Bays	South San Fran. Bay	Elkhorn Slough	Morro Bay
Species/Life Stage									
Northern anchovy <i>Engraulis mordax</i>	A	□	■	■	□	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	□	■	■	□	■	■	■	■
	L	□	■	□	□	■	■	■	□
	E	■	■	■	■	■	■	□	□
Cutthroat trout <i>Oncorhynchus clarki</i>	A	□	■	□	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	□	■	□	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Cutthroat trout - Kelts <i>Oncorhynchus clarki (K)</i>	A	□	■	□	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Steelhead - Fall <i>Oncorhynchus mykiss (F)</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Steelhead - Half pounder <i>Oncorhynchus mykiss (H)</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Steelhead - Summer <i>Oncorhynchus mykiss (S)</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
		Klamath River	Humboldt Bay	Eel River	Tomaes Bay	Cent. S. Fr. / Suisun / S. Pablo Bays	South San Fran. Bay	Elkhorn Slough	Morro Bay
		West Coast Estuaries							

Reliability

- Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs

Data Summary Table: Data Reliability

Table 4 (continued).

Species/Life Stage		West Coast Estuaries							
		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary
Northern anchovy <i>Engraulis mordax</i>	A	■	■	■	■	▣	■	▣	□
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	▣	■	▣	□
	L	■	■	□	□	■	▣	▣	■
	E	■	■	□	□	■	□	▣	■
Cutthroat trout <i>Oncorhynchus clarki</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Cutthroat trout - Kelts <i>Oncorhynchus clarki (K)</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	□	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Steelhead - Fall <i>Oncorhynchus mykiss (F)</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Steelhead - Half pounder <i>Oncorhynchus mykiss (H)</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Steelhead - Summer <i>Oncorhynchus mykiss (S)</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary
		West Coast Estuaries							

Reliability

- Highly Certain
- ▣ Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Species/Life Stage		West Coast Estuaries							
		Puget Sound	Hood Canal	Skagit Bay	Gray's Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay
Steelhead - Winter <i>Oncorhynchus mykiss (W)</i>	A	■	■	■	■	▣	■	▣	▣
	S	■	■	■	■	■	■	■	■
	J	▣	▣	■	■	□	■	□	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Coho salmon <i>Oncorhynchus kisutch</i>	A	■	■	■	■	■	■	▣	■
	S	■	■	■	■	■	■	■	■
	J	■	▣	■	■	▣	■	□	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Chinook salmon - Fall <i>Oncorhynchus tshawytscha (F)</i>	A	■	■	■	■	■	■	■	■
	S	■	□	■	■	■	■	■	■
	J	■	▣	■	■	□	■	▣	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Chinook salmon - Late Fall <i>Oncorhynchus tshawytscha (LF)</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Chinook salmon - Winter <i>Oncorhynchus tshawytscha (W)</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Chinook salmon - Spring <i>Oncorhynchus tshawytscha (Sp)</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	▣	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
		Puget Sound	Hood Canal	Skagit Bay	Gray's Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay
		West Coast Estuaries							

Reliability

- Highly Certain
- ▣ Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Species/Life Stage		West Coast Estuaries							
		Netarts Bay	Siletz River	Yaquina Bay	Alesea River	Siuslaw River	Umpqua River	Coos Bay	Rogue River
Steelhead - Winter <i>Oncorhynchus mykiss</i> (W)	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	□	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Coho salmon <i>Oncorhynchus kisutch</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	□	■	□	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Chinook salmon - Fall <i>Oncorhynchus tshawytscha</i> (F)	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Chinook salmon - Late Fall <i>Oncorhynchus tshawytscha</i> (LF)	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Chinook salmon - Winter <i>Oncorhynchus tshawytscha</i> (W)	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Chinook salmon - Spring <i>Oncorhynchus tshawytscha</i> (Sp)	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
		Netarts Bay	Siletz River	Yaquina Bay	Alesea River	Siuslaw River	Umpqua River	Coos Bay	Rogue River
West Coast Estuaries									

Reliability

- Highly Certain
- Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Data Reliability

Table 4 (continued).

Species/Life Stage		West Coast Estuaries							
		Klamath River	Humboldt Bay	Eel River	Tomaes Bay	Cent. S. Fr. / Suisun / S. Pablo Bays	South San Fran. Bay	Elkhorn Slough	Morro Bay
Steelhead - Winter <i>Oncorhynchus mykiss</i> (W)	A	■	■	■	■	■	■	■	□
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	□
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Coho salmon <i>Oncorhynchus kisutch</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	□	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Chinook salmon - Fall <i>Oncorhynchus tshawytscha</i> (F)	A	■	■	■	□	■	■	■	■
	S	■	■	■	□	■	■	■	■
	J	■	■	■	□	■	■	■	■
	L	■	■	■	□	■	■	■	■
	E	■	■	■	□	■	■	■	■
Chinook salmon - Late Fall <i>Oncorhynchus tshawytscha</i> (LF)	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Chinook salmon - Winter <i>Oncorhynchus tshawytscha</i> (W)	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Chinook salmon - Spring <i>Oncorhynchus tshawytscha</i> (Sp)	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
		Klamath River	Humboldt Bay	Eel River	Tomaes Bay	Cent. S. Fr. / Suisun / S. Pablo Bays	South San Fran. Bay	Elkhorn Slough	Morro Bay
		West Coast Estuaries							

Reliability

- Highly Certain
- Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Data Reliability

Table 4 (continued).

Species/Life Stage		West Coast Estuaries							
		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary
Steelhead - Winter <i>Oncorhynchus mykiss</i> (W)	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Coho salmon <i>Oncorhynchus kisutch</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Chinook salmon - Fall <i>Oncorhynchus tshawytscha</i> (F)	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Chinook salmon - Late Fall <i>Oncorhynchus tshawytscha</i> (LF)	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Chinook salmon - Winter <i>Oncorhynchus tshawytscha</i> (W)	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Chinook salmon - Spring <i>Oncorhynchus tshawytscha</i> (Sp)	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary
		West Coast Estuaries							

Reliability

- Highly Certain
- Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Data Reliability (revised 2/91).

		West Coast Estuaries							
		Puget Sound	Hood Canal	Skagit Bay	Gray's Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay
Species/Life Stage									
Chinook salmon - Summer <i>Oncorhynchus tshawytscha</i> (Su)	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Chum salmon <i>Oncorhynchus keta</i>	A	■	■	■	■	■	■	□	□
	S	■	□	■	■	■	■	■	■
	J	■	■	□	■	■	■	□	■
	L	■	□	■	□	■	■	■	■
	E	■	□	■	□	■	■	■	■
Pink salmon <i>Oncorhynchus gorbuscha</i>	A	■	■	■	□	■	□	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	□	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Sockeye salmon <i>Oncorhynchus nerka</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Surf smelt <i>Hypomesus pretiosus</i>	A	■	■	■	■	□	■	□	■
	S	■	■	■	□	■	■	□	□
	J	■	■	■	■	□	■	□	■
	L	■	■	■	■	□	■	□	□
	E	■	■	■	□	□	■	□	□
Longfin smelt <i>Spirinchus thaleichthys</i>	A	□	■	□	■	□	■	□	■
	S	□	■	□	■	□	■	□	■
	J	□	■	□	■	□	■	□	■
	L	□	■	□	□	□	■	□	■
	E	□	■	□	□	□	■	□	■
		Puget Sound	Hood Canal	Skagit Bay	Gray's Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay
		West Coast Estuaries							

Reliability

- Highly Certain
- Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Data Reliability

Table 4 (continued).

		West Coast Estuaries							
		Netarts Bay	Siletz River	Yaquina Bay	Alsea River	Siuslaw River	Umpqua River	Coos Bay	Rogue River
Species/Life Stage									
Chinook salmon - Summer <i>Oncorhynchus tshawytscha</i> (Su)	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Chum salmon <i>Oncorhynchus keta</i>	A	■	□	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	□	■	□	■	■	□	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Pink salmon <i>Oncorhynchus gorbuscha</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Sockeye salmon <i>Oncorhynchus nerka</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Surf smelt <i>Hypomesus pretiosus</i>	A	□	□	□	□	□	■	□	□
	S	□	□	□	■	■	■	□	■
	J	■	□	■	□	■	■	■	□
	L	□	□	■	□	□	□	□	□
	E	□	□	■	■	□	■	□	■
Longfin smelt <i>Spirinchus thaleichthys</i>	A	■	■	□	■	■	■	□	■
	S	■	■	□	■	■	■	□	■
	J	■	■	□	■	■	■	□	■
	L	■	■	□	■	■	■	□	■
	E	■	■	□	■	■	■	□	■
		Netarts Bay	Siletz River	Yaquina Bay	Alsea River	Siuslaw River	Umpqua River	Coos Bay	Rogue River
		West Coast Estuaries							

Reliability

- Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs

Data Summary Table: Data Reliability

Table 4 (continued).

Species/Life Stage	West Coast Estuaries							
	Klamath River	Humboldt Bay	Eel River	Tomaes Bay	Cent. S. Fr. / Suisun / S. Pablo Bays	South San Fran. Bay	Elkhorn Slough	Morro Bay
Chinook salmon - Summer	A	■	■	■	■	■	■	■
<i>Oncorhynchus tshawytscha</i> (Su)	S	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■
Chum salmon	A	■	■	■	■	■	■	■
<i>Oncorhynchus keta</i>	S	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■
Pink salmon	A	■	■	■	■	■	■	■
<i>Oncorhynchus gorbuscha</i>	S	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■
Sockeye salmon	A	■	■	■	■	■	■	■
<i>Oncorhynchus nerka</i>	S	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■
Surf smelt	A	□	■	□	■	■	■	■
<i>Hypomesus pretiosus</i>	S	□	■	□	■	■	■	■
	J	□	■	□	■	■	■	■
	L	□	■	□	■	■	■	■
	E	□	■	□	■	■	■	■
Longfin smelt	A	□	■	■	■	■	■	■
<i>Spirinchus thaleichthys</i>	S	□	□	■	■	■	■	■
	J	□	□	■	■	■	■	■
	L	□	■	□	■	■	■	■
	E	□	□	□	■	■	■	■
	Klamath River	Humboldt Bay	Eel River	Tomaes Bay	Cent. S. Fr. / Suisun / S. Pablo Bays	South San Fran. Bay	Elkhorn Slough	Morro Bay
West Coast Estuaries								

Reliability

- Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs

Data Summary Table: Data Reliability

Table 4 (continued).

Species/Life Stage	West Coast Estuaries							
	Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary
Chinook salmon - Summer <i>Oncorhynchus tshawytscha</i> (Su)	A ■ S ■ J ■ L ■ E ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Chum salmon <i>Oncorhynchus keta</i>	A ■ S ■ J ■ L ■ E ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Pink salmon <i>Oncorhynchus gorbuscha</i>	A ■ S ■ J ■ L ■ E ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Sockeye salmon <i>Oncorhynchus nerka</i>	A ■ S ■ J ■ L ■ E ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Surf smelt <i>Hypomesus pretiosus</i>	A ■ S ■ J ■ L ■ E ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Longfin smelt <i>Spirinchus thaleichthys</i>	A ■ S ■ J ■ L ■ E ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
	Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary
	West Coast Estuaries							

Reliability

- Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs

Data Summary Table: Data Reliability (revised 2/91).

		West Coast Estuaries							
		Puget Sound	Hood Canal	Skagit Bay	Gray's Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay
Species/Life Stage									
Eulachon <i>Thaleichthys pacificus</i>	A	□	■	□	□	□	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	□	□	■	■	■
	E	■	■	■	□	■	■	■	■
Pacific tomcod <i>Microgadus proximus</i>	A	■	■	■	■	□	■	□	■
	S	■	□	□	■	□	■	□	□
	J	■	■	■	■	□	■	□	■
	L	□	□	■	□	□	■	□	□
	E	□	□	□	■	□	■	□	□
Topsmelt <i>Atherinops affinis</i>	A	■	■	■	■	■	■	□	■
	S	■	■	■	■	■	■	□	■
	J	■	■	■	■	■	■	□	■
	L	■	■	■	■	■	■	□	■
	E	■	■	■	■	■	■	□	■
Jacksmelt <i>Atherinopsis californiensis</i>	A	■	■	■	■	■	■	□	■
	S	■	■	■	■	■	■	□	■
	J	■	■	■	■	■	■	□	■
	L	■	■	■	■	■	■	□	■
	E	■	■	■	■	■	■	□	■
Threespine stickleback <i>Gasterosteus aculeatus</i>	A	■	■	■	■	□	■	□	■
	S	□	□	■	□	□	■	□	□
	J	■	□	□	□	□	■	□	■
	L	□	□	□	■	□	□	□	□
	E	□	□	□	□	□	□	□	□
Striped bass <i>Morone saxatilis</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
		Puget Sound	Hood Canal	Skagit Bay	Gray's Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay
West Coast Estuaries									

Reliability

- Highly Certain
- Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Data Summary Table: Data Reliability

Table 4 (continued).

		West Coast Estuaries							
		Netarts Bay	Siletz River	Yaquina Bay	Alsea River	Siuslaw River	Umpqua River	Coos Bay	Rogue River
Species/Life Stage									
Eulachon <i>Thaleichthys pacificus</i>	A	■	■	■	■	■	□	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	□	■	■
	E	■	■	■	■	■	■	■	■
Pacific tomcod <i>Microgadus proximus</i>	A	□	□	■	□	□	■	□	□
	S	■	□	■	□	□	□	□	□
	J	□	□	■	□	□	□	□	□
	L	□	□	■	□	□	□	□	□
	E	■	□	■	□	□	□	□	□
Topsmelt <i>Atherinops affinis</i>	A	■	■	■	□	■	□	■	■
	S	□	■	□	□	□	■	■	■
	J	□	■	■	■	■	□	■	■
	L	□	■	□	□	□	■	□	■
	E	□	■	□	□	□	■	■	■
Jacksmelt <i>Atherinopsis californiensis</i>	A	■	■	■	■	■	■	□	■
	S	■	■	■	■	■	■	□	■
	J	■	■	■	■	■	■	□	■
	L	■	■	■	■	■	■	□	■
	E	■	■	■	■	■	■	□	■
Threespine stickleback <i>Gasterosteus aculeatus</i>	A	■	□	■	■	■	□	□	□
	S	□	□	□	□	□	□	□	□
	J	■	□	■	■	■	□	□	□
	L	□	□	□	□	□	□	□	□
	E	□	□	□	□	□	□	□	□
Striped bass <i>Morone saxatilis</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	□	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
		Netarts Bay	Siletz River	Yaquina Bay	Alsea River	Siuslaw River	Umpqua River	Coos Bay	Rogue River
		West Coast Estuaries							

Reliability

- Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs

Data Summary Table: Data Reliability

Table 4 (continued).

Species/Life Stage		West Coast Estuaries							
		Klamath River	Humboldt Bay	Eel River	Tomaes Bay	Cent. S. Fr. / Suisun / S. Pablo Bays	South San Fran. Bay	Elkhorn Slough	Morro Bay
Eulachon <i>Thaleichthys pacificus</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	□	■	■	■	■	■	■	■
	L	□	■	■	■	■	■	■	■
	E	□	■	■	■	■	■	■	■
Pacific tomcod <i>Microgadus proximus</i>	A	■	■	■	□	■	■	■	■
	S	■	■	■	□	■	■	■	■
	J	■	■	■	□	■	■	■	■
	L	■	■	■	□	■	■	■	■
	E	■	■	■	□	■	■	■	■
Topsmelt <i>Atherinops affinis</i>	A	□	□	■	□	■	■	■	■
	S	■	□	□	□	■	■	■	□
	J	□	□	■	□	■	■	■	■
	L	■	□	□	□	■	■	■	□
	E	■	□	□	□	■	■	□	□
Jacksmelt <i>Atherinopsis californiensis</i>	A	■	■	■	□	■	■	■	■
	S	■	■	■	□	■	■	■	■
	J	■	■	■	□	■	■	□	□
	L	■	■	■	□	■	■	■	□
	E	■	■	■	□	■	■	■	□
Threespine stickleback <i>Gasterosteus aculeatus</i>	A	■	□	■	□	□	□	■	□
	S	□	□	□	□	□	□	□	□
	J	■	□	■	□	□	□	■	□
	L	□	□	□	□	□	□	□	□
	E	□	□	□	□	□	□	□	□
Striped bass <i>Morone saxatilis</i>	A	■	■	■	□	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	□	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
		Klamath River	Humboldt Bay	Eel River	Tomaes Bay	Cent. S. Fr. / Suisun / S. Pablo Bays	South San Fran. Bay	Elkhorn Slough	Morro Bay
West Coast Estuaries									

Reliability

- Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs

Data Summary Table: Data Reliability

Table 4 (continued).

Species/Life Stage		West Coast Estuaries							
		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary
Eulachon <i>Thaleichthys pacificus</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Pacific tomcod <i>Microgadus proximus</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Topsmelt <i>Atherinops affinis</i>	A	□	■	■	■	■	■	■	■
	S	■	□	□	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	□	□	■	■	□	■	■
	E	■	□	□	■	■	□	■	■
Jacksmelt <i>Atherinopsis californiensis</i>	A	□	■	■	■	■	■	■	■
	S	□	■	■	■	■	□	■	■
	J	□	□	■	■	■	□	■	■
	L	□	■	■	■	■	□	□	■
	E	□	□	■	■	■	□	□	■
Threespine stickleback <i>Gasterosteus aculeatus</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Striped bass <i>Morone saxatilis</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary
		West Coast Estuaries							

Reliability

- Highly Certain
- Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

		West Coast Estuaries							
		Puget Sound	Hood Canal	Skagit Bay	Gray's Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay
Species/Life Stage									
Kelp bass <i>Paralabrax clathratus</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Barred sand bass <i>Paralabrax nebulifer</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
White croaker <i>Genyonemus lineatus</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
White seabass <i>Atractoscion nobilis</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Shiner perch <i>Cymatogaster aggregata</i>	A	■	■	■	■	□	■	■	■
	P	■	■	■	□	□	□	■	■
	J	□	□	■	■	□	■	□	■
	L	□	□	□	■	□	□	□	■
	E	■	■	■	■	□	□	■	■
Pacific sand lance <i>Ammodytes hexapterus</i>	A	■	■	■	■	□	■	□	■
	S	■	□	□	■	□	■	□	□
	J	■	■	■	■	□	■	□	■
	L	■	□	■	■	□	■	□	□
	E	■	□	■	■	□	■	□	□
		Puget Sound	Hood Canal	Skagit Bay	Gray's Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay
		West Coast Estuaries							

Reliability

- Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs
 P - Parturition

Species/Life Stage		West Coast Estuaries							
		Netarts Bay	Siletz River	Yaquina Bay	Alsea River	Siuslaw River	Umpqua River	Coos Bay	Rogue River
Kelp bass <i>Paralabrax clathratus</i>	A S J L E	■	■	■	■	■	■	■	■
Barred sand bass <i>Paralabrax nebulifer</i>	A S J L E	■	■	■	■	■	■	■	■
White croaker <i>Genyonemus lineatus</i>	A S J L E	■	■	■	■	■	■	■	■
White seabass <i>Atractoscion nobilis</i>	A S J L E	■	■	■	■	■	■	■	■
Shiner perch <i>Cymatogaster aggregata</i>	A P J L E	□	■	■	□	■	■	■	□
Pacific sand lance <i>Ammodytes hexapterus</i>	A S J L E	■	□	■	□	■	■	■	■
		Netarts Bay	Siletz River	Yaquina Bay	Alsea River	Siuslaw River	Umpqua River	Coos Bay	Rogue River
West Coast Estuaries									

Reliability

- Highly Certain
- Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs
- P - Parturition

Data Summary Table: Data Reliability

Table 4 (continued).

		West Coast Estuaries							
		Klamath River	Humboldt Bay	Eel River	Tomaes Bay	Cent. S. Fr. / Suisun / S. Pablo Bays	South San Fran. Bay	Elkhorn Slough	Morro Bay
Species/Life Stage									
Kelp bass <i>Paralabrax clathratus</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Barred sand bass <i>Paralabrax nebulifer</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
White croaker <i>Genyonemus lineatus</i>	A	■	■	■	□	■	■	■	■
	S	■	■	■	□	■	■	■	■
	J	■	■	■	□	■	■	■	■
	L	■	■	■	□	■	■	■	■
	E	■	■	■	□	■	■	■	■
White seabass <i>Atractoscion nobilis</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Shiner perch <i>Cymatogaster aggregata</i>	A	□	■	■	□	■	■	■	■
	P	□	■	□	□	■	■	■	■
	J	□	■	■	□	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Pacific sand lance <i>Ammodytes hexapterus</i>	A	■	■	■	□	■	■	■	■
	S	■	■	■	□	■	■	■	■
	J	■	■	■	□	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	□	■	□	■	■	■	■
		Klamath River	Humboldt Bay	Eel River	Tomaes Bay	Cent. S. Fr. / Suisun / S. Pablo Bays	South San Fran. Bay	Elkhorn Slough	Morro Bay
		West Coast Estuaries							

Reliability

- Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs
 P - Parturition

Data Summary Table: Data Reliability

Table 4 (continued).

Species/Life Stage		West Coast Estuaries							
		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary
Kelp bass <i>Paralabrax clathratus</i>	A	■	■	■	■	■	■	■	■
	S	□	□	■	■	■	□	■	■
	J	■	■	■	■	■	■	■	■
	L	□	□	■	■	■	■	□	■
	E	□	□	■	■	■	□	□	■
Barred sand bass <i>Paralabrax nebulifer</i>	A	■	■	■	■	■	■	■	■
	S	□	□	■	■	■	□	□	■
	J	■	■	■	■	■	■	■	■
	L	□	□	□	■	■	■	■	■
	E	□	□	□	■	■	□	■	■
White croaker <i>Genyonemus lineatus</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	□	■	■	■	■	■
	E	■	■	□	■	■	□	■	■
White seabass <i>Atractoscion nobilis</i>	A	■	■	■	■	■	□	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	□	□	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Shiner perch <i>Cymatogaster aggregata</i>	A	■	■	■	■	■	■	■	■
	P	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Pacific sand lance <i>Ammodytes hexapterus</i>	A	□	■	■	■	■	■	■	■
	S	□	■	■	■	■	■	■	■
	J	□	■	■	■	■	■	■	■
	L	□	■	■	■	■	■	■	■
	E	□	■	■	■	■	■	■	■
		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary
		West Coast Estuaries							

Reliability

- Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs
 P - Parturition

Table 4 (continued). Data Reliability

Species/Life Stage		West Coast Estuaries							
		Puget Sound	Hood Canal	Skagit Bay	Grays Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay
Arrow goby <i>Clevelandia ios</i>	A	■	■	■	■	□	■	□	■
	S	□	□	□	□	□	■	□	■
	J	■	■	■	■	□	■	□	■
	L	□	□	□	□	□	■	□	■
	E	□	□	□	□	□	■	□	■
Lingcod <i>Ophiodon elongatus</i>	A	■	■	■	■	■	□	■	■
	S	■	■	□	■	■	□	■	■
	J	■	□	■	■	□	□	□	■
	L	□	□	□	□	□	□	□	■
	E	■	■	■	■	■	□	■	■
Pacific staghorn sculpin <i>Leptocottus armatus</i>	A	■	■	■	■	□	■	□	■
	S	□	□	■	□	□	■	□	□
	J	■	□	■	■	□	■	□	■
	L	□	□	■	□	□	■	□	□
	E	□	□	■	□	□	□	□	□
California halibut <i>Paralichthys californicus</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Diamond turbot <i>Hypsopsetta guttulata</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
English sole <i>Pleuronectes vetulus</i>	A	■	■	■	■	□	■	■	■
	S	■	■	■	■	□	■	■	■
	J	■	■	■	■	□	■	□	■
	L	■	■	■	■	□	■	□	□
	E	■	■	■	■	□	■	■	■
Starry flounder <i>Platichthys stellatus</i>	A	■	■	■	■	□	■	□	■
	S	■	□	■	■	□	■	■	■
	J	■	□	■	■	□	■	□	■
	L	■	□	■	□	□	■	□	□
	E	□	□	■	□	□	■	□	■
		Puget Sound	Hood Canal	Skagit Bay	Grays Harbor	Willapa Bay	Columbia River	Nehalem Bay	Tillamook Bay
		West Coast Estuaries							

Reliability

- Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs

Table 4 (continued). Data Reliability

		West Coast Estuaries							
		Netarts Bay	Siletz River	Yaquina Bay	Alsea River	Siuslaw River	Umpqua River	Coos Bay	Rogue River
Species/Life Stage									
Arrow goby <i>Clevelandia ios</i>	A	☐	☐	☐	☒	☒	☒	☐	☒
	S	☐	☐	☐	☒	☒	☒	☐	☒
	J	☐	☐	☒	☒	☒	☒	☐	☒
	L	☐	☐	☐	☒	☒	☒	☐	☒
	E	☐	☐	☐	☒	☒	☒	☐	☒
Lingcod <i>Ophiodon elongatus</i>	A	☒	☒	☒	☒	☒	☒	☐	☒
	S	☒	☒	☒	☒	☒	☒	☒	☒
	J	☒	☒	☒	☐	☒	☒	☒	☒
	L	☐	☒	☒	☒	☒	☐	☐	☒
	E	☒	☒	☒	☒	☒	☒	☒	☒
Pacific staghorn sculpin <i>Leptocottus armatus</i>	A	☒	☐	☒	☐	☒	☒	☒	☐
	S	☐	☐	☐	☐	☐	☐	☐	☐
	J	☐	☐	☒	☐	☒	☒	☐	☐
	L	☐	☐	☒	☐	☐	☐	☐	☐
	E	☐	☐	☐	☐	☐	☐	☐	☐
California halibut <i>Paralichthys californicus</i>	A	☒	☒	☒	☒	☒	☒	☒	☒
	S	☒	☒	☒	☒	☒	☒	☒	☒
	J	☒	☒	☒	☒	☒	☒	☒	☒
	L	☒	☒	☒	☒	☒	☒	☒	☒
	E	☒	☒	☒	☒	☒	☒	☒	☒
Diamond turbot <i>Hypsopsetta guttulata</i>	A	☒	☒	☒	☒	☒	☒	☒	☒
	S	☒	☒	☒	☒	☒	☒	☒	☒
	J	☒	☒	☒	☒	☒	☒	☒	☒
	L	☒	☒	☒	☒	☒	☒	☒	☒
	E	☒	☒	☒	☒	☒	☒	☒	☒
English sole <i>Pleuronectes vetulus</i>	A	☒	☒	☒	☒	☒	☒	☒	☒
	S	☒	☒	☒	☒	☒	☒	☒	☒
	J	☒	☐	☒	☐	☒	☒	☒	☐
	L	☐	☐	☐	☐	☐	☐	☐	☐
	E	☒	☒	☒	☒	☒	☒	☒	☒
Starry flounder <i>Platichthys stellatus</i>	A	☒	☐	☒	☐	☒	☒	☒	☒
	S	☒	☒	☐	☐	☐	☐	☐	☐
	J	☒	☐	☒	☐	☒	☒	☒	☐
	L	☐	☐	☒	☐	☐	☐	☐	☐
	E	☐	☐	☒	☐	☐	☐	☐	☐
		Netarts Bay	Siletz River	Yaquina Bay	Alsea River	Siuslaw River	Umpqua River	Coos Bay	Rogue River
		West Coast Estuaries							

Reliability

- ☒ Highly Certain
- ☒ Moderately Certain
- ☐ Reasonable Inference

Life Stage

- A - Adults
- S - Spawning
- J - Juveniles
- L - Larvae
- E - Eggs

Table 4 (continued). Data Reliability

Species/Life Stage		West Coast Estuaries							
		Klamath River	Humboldt Bay	Eel River	Tomaes Bay	Cent. S. Fr. / Suisun / S. Pablo Bays	South San Fran. Bay	Elkhorn Slough	Morro Bay
Arrow goby <i>Clevelandia ios</i>	A	■	■	■	□	■	■	■	□
	S	■	□	■	□	■	■	■	□
	J	■	■	■	□	■	■	■	□
	L	■	■	■	□	■	■	■	□
	E	■	□	■	□	■	■	■	□
Lingcod <i>Ophiodon elongatus</i>	A	■	■	■	□	■	■	■	■
	S	■	□	■	□	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	□	■	■	■	■
	E	■	□	■	□	■	■	■	■
Pacific staghorn sculpin <i>Leptocottus armatus</i>	A	□	■	■	□	■	■	■	■
	S	□	□	□	■	■	■	□	□
	J	□	■	■	□	■	■	■	■
	L	□	■	□	■	■	■	■	□
	E	□	□	□	■	□	□	□	□
California halibut <i>Paralichthys californicus</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	□	■	■	■	■
	L	■	■	■	□	■	■	■	■
	E	■	■	■	■	■	■	■	■
Diamond turbot <i>Hypsopsetta guttulata</i>	A	■	■	■	□	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	□	■	■	■	■
	L	■	■	■	□	■	■	□	□
	E	■	■	■	□	■	■	□	□
English sole <i>Pleuronectes vetulus</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	□	■	■	□	■	■	■	■
	L	□	■	□	□	■	■	■	□
	E	■	■	■	□	■	■	■	□
Starry flounder <i>Platichthys stellatus</i>	A	□	■	□	□	□	■	■	■
	S	□	□	□	■	□	■	■	■
	J	□	■	■	□	■	■	■	■
	L	□	■	□	□	□	■	■	■
	E	□	□	□	■	□	■	■	■
		Klamath River	Humboldt Bay	Eel River	Tomaes Bay	Cent. S. Fr. / Suisun / S. Pablo Bays	South San Fran. Bay	Elkhorn Slough	Morro Bay
West Coast Estuaries									

Reliability

- Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs

Table 4 (continued). Data Reliability

Species/Life Stage		West Coast Estuaries							
		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary
Arrow goby <i>Clevelandia ios</i>	A	■	□	□	■	■	■	■	□
	S	■	□	□	■	■	■	■	□
	J	■	□	□	■	■	■	■	■
	L	□	□	□	■	■	■	■	■
	E	■	□	□	□	□	■	■	□
Lingcod <i>Ophiodon elongatus</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Pacific staghorn sculpin <i>Leptocottus armatus</i>	A	■	■	■	■	■	■	■	■
	S	■	■	□	■	■	□	□	□
	J	■	■	■	■	■	■	■	■
	L	■	■	□	■	■	■	■	■
	E	■	■	□	■	■	□	□	□
California halibut <i>Paralichthys californicus</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	□	■	■	■	■	■
	E	□	□	□	■	■	■	■	■
Diamond turbot <i>Hypsopsetta guttulata</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	□	■	□	■	■	■	■	■
	E	□	□	□	□	■	■	■	□
English sole <i>Pleuronectes vetulus</i>	A	■	■	■	■	■	■	■	■
	S	■	□	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
Starry flounder <i>Platichthys stellatus</i>	A	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■
		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary
		West Coast Estuaries							

Reliability

- Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage

- A - Adults
 S - Spawning
 J - Juveniles
 L - Larvae
 E - Eggs

Table 5. Presence/absence of 47 species in West Coast estuaries

Index to Table 5: Page location of presence/absence table for each species and estuary

Common and Scientific Name	Estuary															
	Puget Sound	Hood Canal	Strait of Juan de Fuca	Grays Harbor	Willapa Bay	Columbia River	Nehalem River	Tillamook Bay	Nemah River	Siletz River	Yaquina Bay	Alsea River	Siuslaw River	Umpqua River	Cope River	Rogue River
Blue mussel (<i>Mytilus edulis</i>)																
Pacific oyster (<i>Crassostrea gigas</i>)																
Horseneck gaper (<i>Tresus capax</i>)																
Pacific gaper (<i>Tresus nuttalli</i>)																
California jackknife clam (<i>Tagelus californianus</i>)																
Pacific littleneck clam (<i>Protothaca staminea</i>)																
Manila (Japanese) clam (<i>Venerupis japonica</i>)																
Eastern softshell clam (<i>Mya arenaria</i>)																
Geoduck (<i>Panope abrupta</i>)																
Bay shrimp (<i>Crangon franciscorum</i>)																
Dungeness crab (<i>Cancer magister</i>)																
Leopard shark (<i>Triakis semifasciata</i>)																
Green sturgeon (<i>Acipenser medirostris</i>)																
White sturgeon (<i>Acipenser transmontanus</i>)																
American shad (<i>Alosa sapidissima</i>)																
Pacific herring (<i>Clupea pallasii</i>)																
Deepbody anchovy (<i>Anchoa compressa</i>)																
Slough anchovy (<i>Anchoa delicatissima</i>)																
Northern anchovy (<i>Engraulis mordax</i>)																
Cutthroat trout (<i>Oncorhynchus clarkii</i>)																
Steelhead (<i>Oncorhynchus mykiss</i>)																
Coho salmon (<i>Oncorhynchus kisutch</i>)																
Chinook salmon (<i>Oncorhynchus tshawytscha</i>)																
Chum salmon (<i>Oncorhynchus keta</i>)																
Pink salmon (<i>Oncorhynchus gorbuscha</i>)																
Sockeye salmon (<i>Oncorhynchus nerka</i>)																
Surf smelt (<i>Hypomesus pretiosus</i>)																
Longfin smelt (<i>Spirinchus thaleichthys</i>)																
Eulachon (<i>Thaleichthys pacificus</i>)																
Pacific tomcod (<i>Microgadus proximus</i>)																
Topsmelt (<i>Atherinops affinis</i>)																
Jacksmelt (<i>Atherinopsis californiensis</i>)																
Threespine stickleback (<i>Gasterosteus aculeatus</i>)																
Striped bass (<i>Morone saxatilis</i>)																
Kelp bass (<i>Paralabrax clathratus</i>)																
Barred sand bass (<i>Paralabrax nebulifer</i>)																
White seabass (<i>Atractoscion nobilis</i>)																
White croaker (<i>Genyonemus lineatus</i>)																
Shiner perch (<i>Cymatogaster aggregata</i>)																
Pacific sand lance (<i>Ammodytes hexapterus</i>)																
Arrow goby (<i>Clevelandia ios</i>)																
Lingcod (<i>Ophiodon elongatus</i>)																
Pacific staghorn sculpin (<i>Leptocottus armatus</i>)																
California halibut (<i>Paralichthys californicus</i>)																
Diamond turbot (<i>Hypsopsetta guttulata</i>)																
English sole (<i>Pleuronectes vetulus</i>)																
Starry flounder (<i>Platichthys stellatus</i>)																

Table 5. Presence/absence of 47 species in west coast estuaries (revised 1/91).

Species/life stage		Puget Sound			Hood Canal			Skagit Bay			Grays Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay			Salinity Zone
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	
Blue mussel	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Mytilus edulis</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Pacific oyster	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	
<i>Crassostrea gigas</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	
Horseneck gaper	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	
<i>Tresus capax</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	
Pacific gaper	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓										
<i>Tresus nuttallii</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓										
California jackknife clam	A																									
<i>Tagelus californianus</i>	J																									
Pacific littleneck clam	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	
<i>Protothaca staminea</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	
Manila clam	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	
<i>Venerupis japonica</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	
Softshell	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Mya arenaria</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Geoduck	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓										
<i>Panopea abrupta</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓										
Bay shrimp	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Crangon franciscorum</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Dungeness crab	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Cancer magister</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Leopard shark	A																									
<i>Triakis semifasciata</i>	J																									
Green sturgeon	A			✓							✓	✓	✓		✓	✓	✓	✓	✓					✓	✓	
<i>Acipenser medirostris</i>	J																									
White sturgeon	A			✓			✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	
<i>Acipenser transmontanus</i>	J										✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	
American shad	A			✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	
<i>Alosa sapidissima</i>	J							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
Pacific herring	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Clupea pallasii</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Deepbody anchovy	A																									
<i>Anchoa compressa</i>	J																									
Slough anchovy	A																									
<i>Anchoa delicatissima</i>	J																									
Northern anchovy	A	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Engraulis mordax</i>	J	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	L																									
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	
		Puget Sound			Hood Canal			Skagit Bay			Grays Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay			

Legend:

T = Tidal fresh zone

M = Mixing zone

S = Seawater zone

A = Adults

J = Juveniles

L = Larvae

P = Parturition

✓ = Species / lifestage is present

Blank = Species / lifestage is not present

Table 5, continued. Presence/absence of 47 species in west coast estuaries (revised 1/91).

Species		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River			Salinity Zone
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	
Blue mussel	A			✓			✓			✓			✓			✓			✓			✓			✓	
<i>Mytilus edulis</i>	J			✓			✓			✓			✓			✓			✓			✓			✓	
	L			✓			✓			✓			✓			✓			✓			✓			✓	
Pacific oyster	A			✓						✓									✓			✓			✓	
<i>Crassostrea gigas</i>	J			✓						✓									✓			✓			✓	
	L			✓						✓									✓			✓			✓	
Horseneck gaper	A			✓						✓			✓			✓			✓			✓			✓	
<i>Tresus capax</i>	J			✓						✓			✓			✓			✓			✓			✓	
	L			✓						✓			✓			✓			✓			✓			✓	
Pacific gaper	A			✓						✓																
<i>Tresus nuttallii</i>	J			✓						✓																
	L			✓						✓																
California jackknife clam	A																									
<i>Tagelus californianus</i>	J																									
	L																									
Pacific littleneck clam	A			✓						✓			✓			✓						✓			✓	
<i>Protothaca staminea</i>	J			✓						✓			✓			✓						✓			✓	
	L			✓						✓			✓			✓						✓			✓	
Manila clam	A			✓						✓																
<i>Venerupis japonica</i>	J			✓						✓																
	L			✓						✓																
Softshell	A		✓	✓		✓			✓	✓		✓	✓		✓			✓			✓	✓			✓	
<i>Mya arenaria</i>	J		✓	✓		✓			✓	✓		✓	✓		✓			✓			✓	✓			✓	
	L		✓	✓		✓			✓	✓		✓	✓		✓			✓			✓	✓			✓	
Geoduck	A			✓																						
<i>Panopea abrupta</i>	J			✓																						
	L			✓																						
Bay shrimp	A		✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		
<i>Crangon franciscorum</i>	J		✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		
	L		✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		
Dungeness crab	A		✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓
<i>Cancer magister</i>	J		✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓
	L		✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓
Leopard shark	A																									
<i>Triakis semifasciata</i>	J																									
	P																									
Green sturgeon	A								✓	✓		✓			✓			✓	✓	✓		✓	✓	✓	✓	✓
<i>Acipenser medirostris</i>	J								✓	✓		✓			✓			✓	✓	✓		✓	✓	✓	✓	✓
	L								✓	✓		✓			✓			✓	✓	✓		✓	✓	✓	✓	✓
White sturgeon	A								✓	✓	✓		✓			✓		✓	✓	✓		✓	✓	✓	✓	✓
<i>Acipenser transmontanus</i>	J								✓	✓	✓		✓			✓		✓	✓	✓		✓	✓	✓	✓	✓
	L								✓	✓	✓		✓			✓		✓	✓	✓		✓	✓	✓	✓	✓
American shad	A								✓	✓	✓		✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
<i>Alosa sapidissima</i>	J								✓	✓	✓		✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
	L								✓	✓	✓		✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
Pacific herring	A		✓	✓					✓	✓		✓	✓		✓	✓		✓	✓	✓		✓	✓		✓	✓
<i>Clupea pallasii</i>	J		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓	✓		✓	✓		✓	✓
	L		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓	✓		✓	✓		✓	✓
Deepbody anchovy	A																									
<i>Anchoa compressa</i>	J																									
	L																									
Slough anchovy	A																									
<i>Anchoa delicatissima</i>	J																									
	L																									
Northern anchovy	A			✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓	✓		✓	✓		✓	✓
<i>Engraulis mordax</i>	J			✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓	✓		✓	✓		✓	✓
	L			✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓	✓		✓	✓		✓	✓
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River			

Legend:
T = Tidal fresh zone
M = Mixing zone
S = Seawater zone

A = Adults
J = Juveniles
L = Larvae
P = Parturition

✓ = Species / lifestage is present
Blank = Species / lifestage is not present

Table 5, continued. Presence/absence of 47 species in west coast estuaries (revised 1/91).

Species		Klamath River			Humboldt Bay			Eel River			Tomales Bay			Central San Francisco Bay ¹			South San Francisco Bay			Elkhorn Slough			Morro Bay			Salinity Zone
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S	
Blue mussel	A				✓	✓	✓			✓			✓	✓	✓	✓	✓	✓	✓			✓			✓	
<i>Mytilus edulis</i>	J				✓	✓	✓			✓			✓	✓	✓	✓	✓	✓	✓			✓			✓	
	L				✓	✓	✓			✓			✓	✓	✓	✓	✓	✓	✓			✓			✓	
Pacific oyster	A				✓	✓	✓						✓			✓			✓			✓			✓	
<i>Crassostrea gigas</i>	J				✓	✓	✓						✓			✓			✓			✓			✓	
	L				✓	✓	✓						✓			✓			✓			✓			✓	
Horseneck gaper	A				✓	✓	✓																			
<i>Tresus capax</i>	J				✓	✓	✓																			
	L				✓	✓	✓																			
Pacific gaper	A				✓	✓	✓						✓			✓			✓			✓			✓	
<i>Tresus nuttallii</i>	J				✓	✓	✓						✓			✓			✓			✓			✓	
	L				✓	✓	✓						✓			✓			✓			✓			✓	
California jackknife clam	A												✓			✓									✓	
<i>Tagelus californianus</i>	J												✓			✓									✓	
	L												✓			✓									✓	
Pacific littleneck clam	A				✓	✓	✓						✓			✓			✓			✓			✓	
<i>Protothaca staminea</i>	J				✓	✓	✓						✓			✓			✓			✓			✓	
	L				✓	✓	✓						✓			✓			✓			✓			✓	
Manila clam	A				✓	✓	✓						✓			✓			✓			✓				
<i>Venerupis japonica</i>	J				✓	✓	✓						✓			✓			✓			✓				
	L				✓	✓	✓						✓			✓			✓			✓				
Softshell	A				✓	✓	✓	✓					✓			✓			✓			✓			✓	
<i>Mya arenaria</i>	J				✓	✓	✓	✓					✓			✓			✓			✓			✓	
	L				✓	✓	✓	✓					✓			✓			✓			✓			✓	
Geoduck	A						✓																		✓	
<i>Panopea abrupta</i>	J						✓																		✓	
	L						✓																		✓	
Bay shrimp	A						✓	✓	✓	✓			✓	✓	✓	✓			✓	✓	✓					
<i>Crangon franciscorum</i>	J				✓	✓	✓	✓	✓	✓			✓	✓	✓	✓			✓	✓	✓					
	L				✓	✓	✓	✓	✓	✓			✓	✓	✓	✓			✓	✓	✓					
Dungeness crab	A		✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓			✓	✓	✓				✓	
<i>Cancer magister</i>	J		✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓			✓	✓	✓				✓	
	L		✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓			✓	✓	✓				✓	
Leopard shark	A				✓	✓	✓						✓	✓	✓	✓			✓	✓	✓				✓	
<i>Triakis semifasciata</i>	J				✓	✓	✓						✓	✓	✓	✓			✓	✓	✓				✓	
	P				✓	✓	✓						✓	✓	✓	✓			✓	✓	✓				✓	
Green sturgeon	A	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓			✓	✓	✓					
<i>Acipenser medirostris</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓			✓	✓	✓					
	L													✓	✓	✓			✓	✓	✓					
White sturgeon	A		✓	✓	✓		✓			✓				✓	✓	✓			✓	✓	✓					
<i>Acipenser transmontanus</i>	J		✓	✓	✓		✓			✓				✓	✓	✓			✓	✓	✓					
	L													✓	✓	✓			✓	✓	✓					
American shad	A	✓	✓	✓			✓	✓	✓	✓				✓	✓	✓			✓	✓						
<i>Alosa sapidissima</i>	J	✓	✓	✓			✓	✓	✓	✓				✓	✓	✓			✓	✓						
	L													✓	✓	✓			✓	✓						
Pacific herring	A		✓	✓	✓	✓	✓	✓	✓	✓			✓			✓			✓	✓	✓				✓	
<i>Clupea pallasii</i>	J		✓	✓	✓	✓	✓	✓	✓	✓			✓			✓			✓	✓	✓				✓	
	L				✓	✓	✓	✓	✓	✓			✓			✓			✓	✓	✓				✓	
Deepbody anchovy	A																									
<i>Anchoa compressa</i>	J																									
	L																									
Slough anchovy	A																									
<i>Anchoa delicatissima</i>	J																									
	L																									
Northern anchovy	A		✓	✓		✓	✓		✓	✓			✓			✓			✓	✓	✓				✓	
<i>Engraulis mordax</i>	J		✓	✓		✓	✓		✓	✓			✓			✓			✓	✓	✓				✓	
	L				✓	✓	✓						✓			✓			✓	✓	✓				✓	
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S	
		Klamath River			Humboldt Bay			Eel River			Tomales Bay			Central San Francisco Bay ¹			South San Francisco Bay			Elkhorn Slough			Morro Bay			

¹ Includes San Pablo and Suisun Bays.

Legend:

T = Tidal fresh zone

M = Mixing zone

S = Seawater zone

* = Salinity zone is not present

A = Adults

J = Juveniles

L = Larvae

P = Parturition

✓ = Species / lifestage is present

Blank = Species / lifestage is not present

Table 5, continued. Presence/absence of 47 species in west coast estuaries (revised 1/91).

Species		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary	Salinity Zone
		* * S	* * S	* * S	* * S	* * S	* * S	* * S	* * S	
Blue mussel <i>Mytilus edulis</i>	A J L	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	
Pacific oyster <i>Crassostrea gigas</i>	A J L									
Horseneck gaper <i>Tresus capax</i>	A J L									
Pacific gaper <i>Tresus nuttallii</i>	A J L	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	
California jackknife clam <i>Tagelus californianus</i>	A J L	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	
Pacific littleneck clam <i>Protothaca staminea</i>	A J L	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	
Manila clam <i>Venerupis japonica</i>	A J L									
Softshell <i>Mya arenaria</i>	A J L									
Geoduck <i>Panopea abrupta</i>	A J L		✓ ✓ ✓							
Bay shrimp <i>Crangon franciscorum</i>	A J L									
Dungeness crab <i>Cancer magister</i>	A J L									
Leopard shark <i>Triakis semifasciata</i>	A J P	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	
Green sturgeon <i>Acipenser medirostris</i>	A J L									
White sturgeon <i>Acipenser transmontanus</i>	A J L									
American shad <i>Alosa sapidissima</i>	A J L									
Pacific herring <i>Clupea pallasii</i>	A J L	✓ ✓ ✓	✓ ✓ ✓							
Deepbody anchovy <i>Anchoa compressa</i>	A J L	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	
Slough anchovy <i>Anchoa delicatissima</i>	A J L		✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓
Northern anchovy <i>Engraulis mordax</i>	A J L	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓
		* * S	* * S	* * S	* * S	* * S	* * S	* * S	* * S	
		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary	

Legend:

T = Tidal fresh zone

M = Mixing zone

S = Seawater zone

* = Salinity zone is not present

A = Adults

J = Juveniles

L = Larvae

P = Parturition

√ = Species / lifestage is present

Blank = Species / lifestage is not present

Table 5, continued. Presence/absence of 47 species in west coast estuaries (revised 2/91).

Species		Puget Sound			Hood Canal			Skagit Bay			Grays Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay			Salinity Zone
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	
Cutthroat trout <i>Oncorhynchus clarki</i>	A J L	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Pink salmon <i>Oncorhynchus gorbuscha</i>	A J L	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓							
Chum salmon <i>Oncorhynchus keta</i>	A J L	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Coho salmon <i>Oncorhynchus kisutch</i>	A J L	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Steelhead - fall <i>Oncorhynchus mykiss (F)</i>	A J L																									
Steelhead - half pounder <i>Oncorhynchus mykiss (H)</i>	A J L																									
Steelhead - summer <i>Oncorhynchus mykiss (S)</i>	A J L	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓				✓	✓	✓	
Steelhead - winter <i>Oncorhynchus mykiss (W)</i>	A J L	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Sockeye salmon <i>Oncorhynchus nerka</i>	A J L	✓	✓	✓				✓	✓	✓							✓	✓	✓							
Chinook salmon - fall <i>Oncorhynchus tshawytscha (F)</i>	A J L	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Chinook salmon - late fall <i>Oncorhynchus tshawytscha (LF)</i>	A J L																									
Chinook salmon - winter <i>Oncorhynchus tshawytscha (W)</i>	A J L																									
Chinook salmon - spring <i>Oncorhynchus tshawytscha (Sp)</i>	A J L	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓				✓	✓	✓	
Chinook salmon - summer <i>Oncorhynchus tshawytscha (Su)</i>	A J L																✓	✓	✓							
Surf smelt <i>Hypomesus pretiosus</i>	A J L		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓	
Longfin smelt <i>Spirinchus thaleichthys</i>	A J L		✓	✓					✓	✓		✓	✓		✓	✓		✓	✓							✓
Eulachon <i>Thaleichthys pacificus</i>	A J L			✓					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
Pacific tomcod <i>Microgadus proximus</i>	A J L		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓	
Topsmelt <i>Atherinops affinis</i>	A J L											✓			✓			✓			✓			✓	✓	
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	
		Puget Sound			Hood Canal			Skagit Bay			Grays Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay			

Legend:

T = Tidal fresh zone

M = Mixing zone

S = Seawater zone

A = Adults

J = Juveniles

L = Larvae

✓ = Species / lifestage is present

Blank = Species / lifestage is not present

Table 5. continued. Presence/absence of 47 species in west coast estuaries (revised 1/91).

Species		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River			Salinity Zone
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	
Cutthroat trout	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Oncorhynchus clarki</i>	J	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	L																									
Pink salmon	A							✓	✓	✓	✓	✓	✓										✓	✓	✓	
<i>Oncorhynchus gorbuscha</i>	J																									
	L																									
Chum salmon	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓				✓	
<i>Oncorhynchus keta</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓					
	L																									
Coho salmon	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Oncorhynchus kisutch</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	L																									
Steelhead - fall	A																									
<i>Oncorhynchus mykiss (F)</i>	J																									
	L																									
Steelhead - half pounder	A																						✓	✓	✓	
<i>Oncorhynchus mykiss (H)</i>	J																									
	L																									
Steelhead - summer	A				✓	✓	✓				✓	✓	✓				✓	✓	✓				✓	✓	✓	
<i>Oncorhynchus mykiss (S)</i>	J				✓	✓	✓				✓	✓	✓				✓	✓	✓				✓	✓	✓	
	L																									
Steelhead - winter	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Oncorhynchus mykiss (W)</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	L																									
Sockeye salmon	A																									
<i>Oncorhynchus nerka</i>	J																									
	L																									
Chinook salmon - fall	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Oncorhynchus tshawytscha (F)</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	L																									
Chinook salmon - late fall	A																									
<i>Oncorhynchus tshawytscha (LF)</i>	J																									
	L																									
Chinook salmon - winter	A																									
<i>Oncorhynchus tshawytscha (W)</i>	J																									
	L																									
Chinook salmon - spring	A				✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Oncorhynchus tshawytscha (Sp)</i>	J				✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	
	L																									
Chinook salmon - summer	A																									
<i>Oncorhynchus tshawytscha (Su)</i>	J																									
	L																									
Surf smelt	A		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓	
<i>Hypomesus pretiosus</i>	J		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓	
	L			✓			✓					✓	✓					✓	✓			✓		✓	✓	
Longfin smelt	A							✓	✓	✓			✓			✓			✓							
<i>Spirinchus thaleichthys</i>	J							✓	✓	✓			✓			✓			✓							
	L							✓											✓							
Eulachon	A														✓		✓	✓	✓			✓	✓	✓	✓	
<i>Thaleichthys pacificus</i>	J																✓	✓	✓							
	L																✓	✓	✓							
Pacific tomcod	A			✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓	
<i>Microgadus proximus</i>	J			✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓	
	L								✓	✓		✓	✓		✓	✓		✓	✓					✓	✓	
Topsmelt	A		✓	✓					✓	✓		✓	✓		✓	✓			✓							
<i>Atherinops affinis</i>	J		✓	✓					✓	✓		✓	✓		✓	✓			✓							
	L		✓	✓					✓	✓		✓	✓		✓	✓			✓							
			T	M	S		T	M	S		T	M	S		T	M	S		T	M	S		T	M	S	
			Netarts Bay				Siletz River				Yaquina Bay				Alsea River				Siuslaw River				Umpqua River			

T = Tidal fresh zone
M = Mixing zone
S = Seawater zone

A = Adults
J = Juveniles
L = Larvae

√ = Species / lifestage is present
Blank = Species / lifestage is not present

Table 5, continued. Presence/absence of 47 species in west coast estuaries (revised 1/91).

Species		Klamath River			Humboldt Bay			Eel River			Tomales Bay			Central San Francisco Bay ¹			South San Francisco Bay			Elkhorn Slough			Morro Bay			Salinity Zone
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S	
Cutthroat trout <i>Oncorhynchus clarki</i>	A J L	✓	✓	✓	✓	✓	✓	✓	✓	✓																
Pink salmon <i>Oncorhynchus gorbuscha</i>	A J L	✓	✓	✓								✓														
Chum salmon <i>Oncorhynchus keta</i>	A J L	✓	✓	✓			✓	✓	✓	✓																
Coho salmon <i>Oncorhynchus kisutch</i>	A J L	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓												
Steelhead - fall <i>Oncorhynchus mykiss (F)</i>	A J L	✓	✓	✓																						
Steelhead - half pounder <i>Oncorhynchus mykiss (H)</i>	A J L		✓	✓	✓			✓	✓	✓																
Steelhead - summer <i>Oncorhynchus mykiss (S)</i>	A J L	✓	✓	✓				✓	✓	✓																
Steelhead - winter <i>Oncorhynchus mykiss (W)</i>	A J L	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓								✓	✓	
Sockeye salmon <i>Oncorhynchus nerka</i>	A J L																									
Chinook salmon - fall <i>Oncorhynchus tshawytscha (F)</i>	A J L	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓			✓								
Chinook salmon - late fall <i>Oncorhynchus tshawytscha (LF)</i>	A J L												✓	✓	✓			✓								
Chinook salmon - winter <i>Oncorhynchus tshawytscha (W)</i>	A J L												✓	✓	✓			✓								
Chinook salmon - spring <i>Oncorhynchus tshawytscha (Sp)</i>	A J L	✓	✓	✓									✓	✓	✓			✓								
Chinook salmon - summer <i>Oncorhynchus tshawytscha (Su)</i>	A J L																									
Surf smelt <i>Hypomesus pretiosus</i>	A J L			✓		✓	✓		✓	✓		✓		✓	✓			✓				✓				
Longfin smelt <i>Spirinchus thaleichthys</i>	A J L			✓	✓	✓	✓	✓	✓	✓			✓	✓	✓			✓	✓							
Eulachon <i>Thaleichthys pacificus</i>	A J L	✓	✓	✓			✓																			
Pacific tomcod <i>Microgadus proximus</i>	A J L			✓		✓	✓			✓		✓		✓	✓			✓	✓			✓				
Topsmelt <i>Atherinops affinis</i>	A J L					✓	✓		✓	✓		✓		✓	✓			✓	✓			✓			✓	
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S	
		Klamath River			Humboldt Bay			Eel River			Tomales Bay			Central San Francisco Bay ¹			South San Francisco Bay			Elkhorn Slough			Morro Bay			

Legend:

T = Tidal fresh zone

M = Mixing zone

S = Seawater zone

* = Salinity zone is not present

¹ Includes San Pablo and Suisun Bays.

A = Adults

J = Juveniles

L = Larvae

✓ = Species / lifestage is present

Blank = Species / lifestage is not present

Table 5, continued. Presence/absence of 47 species in west coast estuaries (revised 1/91).

Species		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary	Salinity Zone
		* * S	* * S	* * S	* * S	* * S	* * S	* * S	* * S	
Cutthroat trout	A									
<i>Oncorhynchus clarki</i>	J									
	L									
Pink salmon	A									
<i>Oncorhynchus gorbusha</i>	J									
	L									
Chum salmon	A									
<i>Oncorhynchus keta</i>	J									
	L									
Coho salmon	A									
<i>Oncorhynchus kisutch</i>	J									
	L									
Steelhead - fall	A									
<i>Oncorhynchus mykiss (F)</i>	J									
	L									
Steelhead - half pounder	A									
<i>Oncorhynchus mykiss (H)</i>	J									
	L									
Steelhead - summer	A									
<i>Oncorhynchus mykiss (S)</i>	J									
	L									
Steelhead - winter	A									
<i>Oncorhynchus mykiss (W)</i>	J									
	L									
Sockeye salmon	A									
<i>Oncorhynchus nerka</i>	J									
	L									
Chinook salmon - fall	A	√								
<i>Oncorhynchus tshawytscha (F)</i>	J									
	L									
Chinook salmon - late fall	A									
<i>Oncorhynchus tshawytscha (LF)</i>	J									
	L									
Chinook salmon - winter	A									
<i>Oncorhynchus tshawytscha (W)</i>	J									
	L									
Chinook salmon - spring	A									
<i>Oncorhynchus tshawytscha (Sp)</i>	J									
	L									
Chinook salmon - summer	A									
<i>Oncorhynchus tshawytscha (Su)</i>	J									
	L									
Surf smelt	A									
<i>Hypomesus pretiosus</i>	J									
	L									
Longfin smelt	A									
<i>Spirinchus thaleichthys</i>	J									
	L									
Eulachon	A									
<i>Thaleichthys pacificus</i>	J									
	L									
Pacific tomcod	A									
<i>Microgadus proximus</i>	J									
	L									
Topsmelt	A	√	√	√	√	√	√	√	√	
<i>Atherinops affinis</i>	J	√	√	√	√	√	√	√	√	
	L	√	√	√	√	√	√	√	√	
		* * S	* * S	* * S	* * S	* * S	* * S	* * S	* * S	
		Santa Monica Bay	San Pedro Bay	Alamitos Bay	Anaheim Bay	Newport Bay	Mission Bay	San Diego Bay	Tijuana Estuary	

Legend:

T = Tidal fresh zone

M = Mixing zone

S = Seawater zone

* = Salinity zone is not present

A = Adults

J = Juveniles

L = Larvae

√ = Species / lifestage is present

Blank = Species / lifestage is not present

Table 5, continued. Presence/absence of 47 species in west coast estuaries (revised 1/91).

Species		Puget Sound			Hood Canal			Skagit Bay			Grays Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay			Salinity Zone
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	
Jacksnelt	A																									
<i>Atherinopsis californiensis</i>	J																									
	L																									
Threespine stickleback	A	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
<i>Gasterosteus aculeatus</i>	J	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	L	√	√		√	√		√	√		√	√		√	√		√	√		√	√		√	√		
Striped bass	A			√					√																	
<i>Morone saxatilis</i>	J																									
	L																									
Kelp bass	A																									
<i>Paralabrax clathratus</i>	J																									
	L																									
Barred sand bass	A																									
<i>Paralabrax nebulifer</i>	J																									
	L																									
White seabass	A								√																	
<i>Atractoscion nobilis</i>	J																									
	L																									
White croaker	A																									
<i>Genyonemus lineatus</i>	J																									
	L																									
Shiner perch	A		√	√		√	√		√	√	√		√	√	√		√	√	√		√	√	√		√	√
<i>Cymatogaster aggregata</i>	J	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	P		√			√			√				√	√			√				√			√		
Pacific sand lance	A		√	√		√	√		√	√	√		√	√	√		√	√	√		√	√	√		√	√
<i>Ammodytes hexapterus</i>	J		√	√		√	√		√	√	√		√	√	√		√	√	√		√	√	√		√	√
	L		√	√		√	√		√	√	√		√	√	√		√	√	√		√	√	√		√	√
Arrow goby	A		√	√		√	√		√	√	√		√	√	√											
<i>Clevelandia ios</i>	J		√	√		√	√		√	√	√		√	√	√											
	L		√	√		√	√		√	√	√		√	√	√											
Lingcod	A		√	√		√	√		√	√	√		√	√	√											
<i>Ophiodon elongatus</i>	J		√	√		√	√		√	√	√		√	√	√											
	L		√	√		√	√		√	√	√		√	√	√											
Pacific staghorn sculpin	A		√	√		√	√		√	√	√		√	√	√		√	√	√		√	√	√		√	√
<i>Leptocottus armatus</i>	J	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	L		√	√		√	√		√	√	√		√	√	√		√	√	√		√	√	√		√	√
California halibut	A																									
<i>Paralichthys californicus</i>	J																									
	L																									
Diamond turbot	A																									
<i>Hypsopsetta guttulata</i>	J																									
	L																									
English sole	A			√			√			√					√			√				√			√	
<i>Pleuronectes vetulus</i>	J		√	√		√	√		√	√		√	√		√	√		√	√		√	√		√	√	
	L		√	√		√	√		√	√		√	√		√	√		√	√		√	√		√	√	
Starry flounder	A		√	√		√	√		√	√		√	√		√	√		√	√		√	√		√	√	
<i>Platichthys stellatus</i>	J	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	L		√	√		√	√		√	√		√	√		√	√		√	√		√	√		√	√	
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	
		Puget Sound			Hood Canal			Skagit Bay			Grays Harbor			Willapa Bay			Columbia River			Nehalem Bay			Tillamook Bay			

Legend:

T = Tidal fresh zone
M = Mixing zone
S = Seawater zone

A = Adults
J = Juveniles
L = Larvae
P = Parturition

√ = Species / lifestage is present
Blank = Species / lifestage is not present

Table 5, continued. Presence/absence of 47 species in west coast estuaries (revised 1/91).

Species		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River			Salinity Zone
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	
Jacksnelt	A									✓											✓	✓				
<i>Atherinopsis californiensis</i>	J									✓											✓	✓				
	L																									
Threespine stickleback	A		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Gasterosteus aculeatus</i>	J		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	L		✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		
Striped bass	A						✓			✓							✓	✓	✓	✓	✓	✓				
<i>Morone saxatilis</i>	J																✓	✓	✓	✓	✓	✓				
	L																✓	✓	✓	✓	✓	✓				
Kelp bass	A																									
<i>Paralabrax clathratus</i>	J																									
	L																									
Barred sand bass	A																									
<i>Paralabrax nebulifer</i>	J																									
	L																									
White seabass	A									✓												✓				
<i>Atractoscion nobilis</i>	J																									
	L																									
White croaker	A																									
<i>Genyonemus lineatus</i>	J																									
	L																									
Shiner perch	A		✓	✓		✓	✓		✓	✓	✓	✓	✓		✓	✓		✓	✓		✓	✓		✓	✓	✓
<i>Cymatogaster aggregata</i>	J		✓	✓		✓	✓		✓	✓	✓	✓	✓		✓	✓		✓	✓		✓	✓		✓	✓	✓
	P		✓	✓		✓	✓		✓	✓	✓	✓	✓		✓	✓		✓	✓		✓	✓		✓	✓	✓
Pacific sand lance	A			✓			✓			✓			✓			✓			✓			✓				
<i>Ammodytes hexapterus</i>	J			✓			✓			✓			✓			✓			✓			✓				
	L			✓			✓			✓			✓			✓			✓			✓				
Arrow goby	A			✓					✓	✓					✓			✓	✓		✓	✓				
<i>Clevelandia ios</i>	J			✓					✓	✓					✓			✓	✓		✓	✓				
	L								✓									✓	✓		✓	✓				
Lingcod	A									✓											✓	✓				
<i>Ophiodon elongatus</i>	J			✓						✓			✓						✓		✓	✓				
	L																					✓	✓			
Pacific staghorn sculpin	A		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓	✓		✓	✓	✓
<i>Leptocottus armatus</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	L			✓			✓			✓			✓			✓			✓			✓				
California halibut	A																									
<i>Paralichthys californicus</i>	J																									
	L																									
Diamond turbot	A																									
<i>Hypsopsetta guttulata</i>	J																									
	L																									
English sole	A			✓	✓		✓	✓		✓	✓		✓		✓	✓		✓	✓		✓	✓				✓
<i>Pleuronectes vetulus</i>	J			✓	✓		✓	✓		✓	✓		✓		✓	✓		✓	✓		✓	✓				✓
	L			✓			✓			✓			✓			✓		✓			✓					
Starry flounder	A		✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Platichthys stellatus</i>	J		✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
	L		✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	
		Netarts Bay			Siletz River			Yaquina Bay			Alsea River			Siuslaw River			Umpqua River			Coos Bay			Rogue River			

Legend:
T = Tidal fresh zone
M = Mixing zone
S = Seawater zone

A = Adults
J = Juveniles
L = Larvae
P = Parturition

✓ = Species / lifestage is present
Blank = Species / lifestage is not present

Table 5, continued. Presence/absence of 47 species in west coast estuaries (revised 1/91).

Species		Klamath River			Humboldt Bay			Eel River			Tomales Bay			Central San Francisco Bay ¹			South San Francisco Bay			Elkhorn Slough			Morro Bay			Salinity Zone
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S	
Jacksnelt	A					✓	✓						✓		✓	✓		✓	✓			✓			✓	
<i>Atherinopsis californiensis</i>	J					✓	✓						✓		✓	✓		✓	✓			✓			✓	
	L					✓	✓						✓		✓	✓		✓	✓			✓			✓	
Threespine stickleback	A	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓		✓	✓			✓			✓	
<i>Gasterosteus aculeatus</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓		✓	✓			✓			✓	
	L	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓		✓	✓			✓			✓	
Striped bass	A			✓									✓	✓	✓	✓		✓	✓							
<i>Morone saxatilis</i>	J												✓	✓	✓	✓		✓	✓							
	L												✓	✓	✓	✓		✓	✓							
Kelp bass	A																									
<i>Paralabrax clathratus</i>	J																									
	L																									
Barred sand bass	A																									
<i>Paralabrax nebulifer</i>	J																									
	L																									
White seabass	A					✓							✓		✓			✓								
<i>Atractoscion nobilis</i>	J					✓							✓		✓			✓								
	L					✓							✓		✓			✓								
White croaker	A					✓							✓		✓			✓	✓							
<i>Genyonemus lineatus</i>	J					✓							✓		✓			✓	✓							
	L					✓							✓		✓			✓	✓						✓	
Shiner perch	A		✓	✓		✓	✓		✓	✓			✓		✓	✓		✓	✓			✓			✓	
<i>Cymatogaster aggregata</i>	J		✓	✓		✓	✓		✓	✓			✓		✓	✓		✓	✓			✓			✓	
	P		✓	✓		✓	✓		✓	✓			✓		✓	✓		✓	✓			✓			✓	
Pacific sand lance	A					✓			✓				✓		✓			✓								
<i>Ammodytes hexapterus</i>	J					✓			✓				✓		✓			✓								
	L					✓			✓				✓		✓			✓								
Arrow goby	A					✓	✓						✓		✓	✓		✓	✓			✓			✓	
<i>Clevelandia ios</i>	J					✓	✓						✓		✓	✓		✓	✓			✓			✓	
	L					✓	✓						✓		✓	✓		✓	✓			✓			✓	
Lingcod	A					✓	✓						✓		✓	✓		✓								
<i>Ophiodon elongatus</i>	J					✓	✓						✓		✓	✓		✓								
	L					✓	✓						✓		✓	✓		✓								
Pacific staghorn sculpin	A		✓	✓		✓	✓		✓	✓			✓		✓	✓		✓	✓			✓			✓	
<i>Leptocottus armatus</i>	J		✓	✓		✓	✓		✓	✓			✓		✓	✓		✓	✓			✓			✓	
	L			✓		✓			✓				✓		✓	✓		✓	✓			✓			✓	
California halibut	A					✓							✓		✓	✓		✓	✓			✓			✓	
<i>Paralichthys californicus</i>	J					✓							✓		✓	✓		✓	✓			✓			✓	
	L					✓							✓		✓	✓		✓	✓			✓			✓	
Diamond turbot	A												✓		✓			✓	✓			✓			✓	
<i>Hypsopsetta guttulata</i>	J												✓		✓			✓	✓			✓			✓	
	L												✓		✓			✓	✓			✓			✓	
English sole	A			✓		✓	✓		✓	✓			✓		✓	✓		✓	✓			✓			✓	
<i>Pleuronectes vetulus</i>	J			✓		✓	✓		✓	✓			✓		✓	✓		✓	✓			✓			✓	
	L					✓	✓		✓	✓			✓		✓	✓		✓	✓			✓			✓	
Starry flounder	A					✓	✓	✓	✓	✓			✓		✓	✓		✓	✓			✓			✓	
<i>Platichthys stellatus</i>	J	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓		✓	✓			✓			✓	
	L			✓		✓	✓		✓	✓			✓		✓	✓		✓	✓			✓			✓	
		T	M	S	T	M	S	T	M	S	T	M	S	T	M	S	*	M	S	*	*	S	*	*	S	
		Klamath River			Humboldt Bay			Eel River			Tomales Bay			Central San Francisco Bay ¹			South San Francisco Bay			Elkhorn Slough			Morro Bay			

¹ Includes San Pablo and Suisun Bays.

Legend:

T = Tidal fresh zone

M = Mixing zone

S = Seawater zone

* = Salinity zone not present

A = Adults

J = Juveniles

L = Larvae

P = Parturition

✓ = Species / lifestage is present

Blank = Species / lifestage is not present

Table 5, continued. Presence/absence of 47 species in west coast estuaries (revised 1/91).

Species		Santa Monica Bay			San Pedro Bay			Alamitos Bay			Anaheim Bay			Newport Bay			Mission Bay			San Diego Bay			Tijuana Estuary			Salinity Zone
		*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	
Jacksnelt	A			✓			✓									✓			✓			✓				
<i>Atherinopsis californiensis</i>	J			✓			✓									✓			✓			✓				
	L			✓			✓												✓			✓				
Threespine stickleback	A																									
<i>Gasterosteus aculeatus</i>	J																									
	L																									
Striped bass	A			✓												✓			✓							
<i>Morone saxatilis</i>	J																									
	L																									
Kelp bass	A			✓			✓			✓			✓			✓			✓			✓				✓
<i>Paralabrax clathratus</i>	J			✓			✓			✓			✓			✓			✓			✓				✓
	L			✓			✓			✓			✓			✓			✓			✓				✓
Barred sand bass	A			✓			✓			✓			✓			✓			✓			✓				✓
<i>Paralabrax nebulifer</i>	J			✓			✓			✓			✓			✓			✓			✓				✓
	L			✓			✓			✓			✓			✓			✓			✓				✓
White seabass	A			✓			✓						✓			✓			✓			✓				✓
<i>Atractoscion nobilis</i>	J			✓			✓						✓			✓			✓			✓				✓
	L			✓			✓						✓			✓			✓			✓				✓
White croaker	A			✓			✓			✓			✓			✓			✓			✓				✓
<i>Genyonemus lineatus</i>	J			✓			✓			✓			✓			✓			✓			✓				✓
	L			✓			✓			✓			✓			✓			✓			✓				✓
Shiner perch	A			✓			✓			✓			✓			✓			✓			✓				✓
<i>Cymatogaster aggregata</i>	J			✓			✓			✓			✓			✓			✓			✓				✓
	P			✓			✓			✓			✓			✓			✓			✓				✓
Pacific sand lance	A																									
<i>Ammodytes hexapterus</i>	J																									
	L																									
Arrow goby	A			✓			✓			✓			✓			✓			✓			✓				✓
<i>Clevelandia ios</i>	J			✓			✓			✓			✓			✓			✓			✓				✓
	L			✓			✓			✓			✓			✓			✓			✓				✓
Lingcod	A			✓			✓																			
<i>Ophiodon elongatus</i>	J			✓			✓																			
	L			✓			✓																			
Pacific staghorn sculpin	A			✓			✓			✓			✓			✓			✓			✓				✓
<i>Leptocottus armatus</i>	J			✓			✓			✓			✓			✓			✓			✓				✓
	L			✓			✓			✓			✓			✓			✓			✓				✓
California halibut	A			✓			✓			✓			✓			✓			✓			✓				✓
<i>Paralichthys californicus</i>	J			✓			✓			✓			✓			✓			✓			✓				✓
	L			✓			✓			✓			✓			✓			✓			✓				✓
Diamond turbot	A			✓			✓			✓			✓			✓			✓			✓				✓
<i>Hypsopsetta guttulata</i>	J			✓			✓			✓			✓			✓			✓			✓				✓
	L			✓			✓			✓			✓			✓			✓			✓				✓
English sole	A			✓			✓																			
<i>Pleuronectes vetulus</i>	J			✓			✓																			
	L			✓			✓																			
Starry flounder	A																									
<i>Platichthys stellatus</i>	J																									
	L																									
		*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	*	*	S	
		Santa Monica Bay			San Pedro Bay			Alamitos Bay			Anaheim Bay			Newport Bay			Mission Bay			San Diego Bay			Tijuana Estuary			

Legend:

T = Tidal fresh zone

M = Mixing zone

S = Seawater zone

* = Salinity zone is not present

A = Adults

J = Juveniles

L = Larvae

P = Parturition

✓ = Species / lifestage is present

Blank = Species / lifestage is not present

Appendices

Appendix 1. National Estuarine Inventory map of Grays Harbor estuary

Appendix 2. Species profile and sample data sheet: Pacific herring

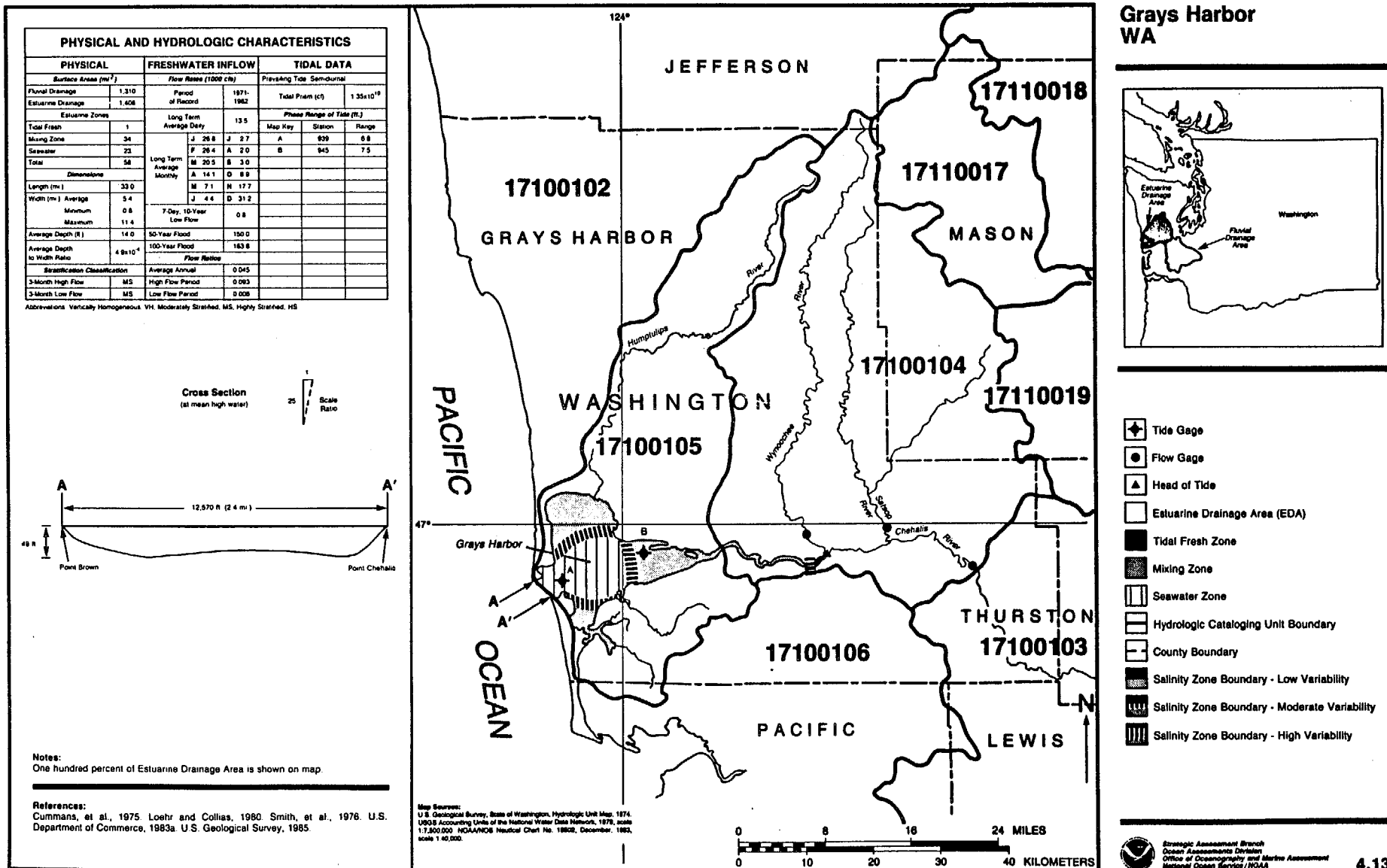
Appendix 3. Table of references and personal communications

Appendix 4. Personal communications

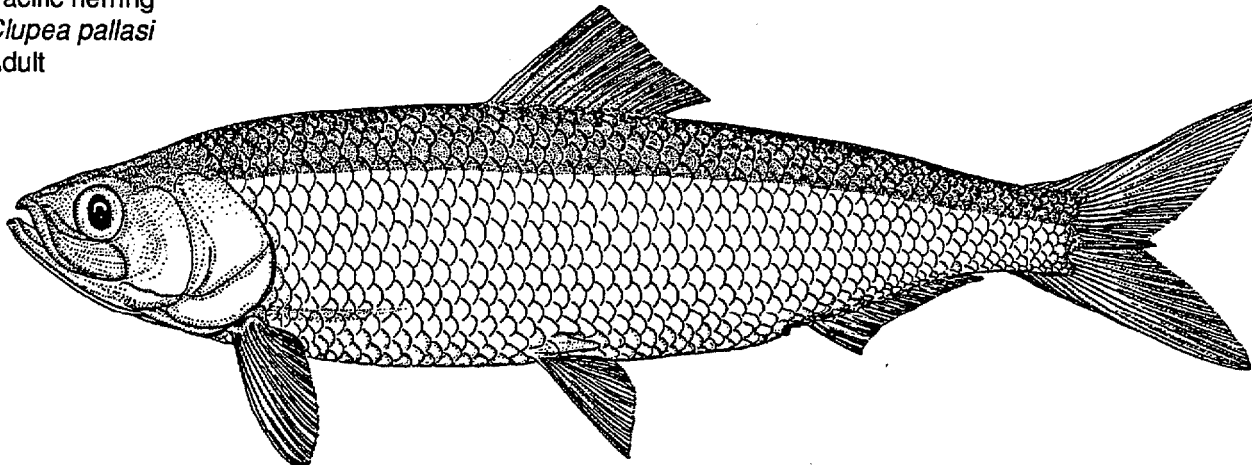
Appendix 5. References

Appendix 1. National Estuarine Inventory map of Grays Harbor

National Estuarine Atlas



Pacific herring
Clupea pallasii
Adult



0 5 cm

Common Name: Pacific herring

Scientific Name: *Clupea pallasii* Valenciennes

Other Common Names: California herring, Ches-Pechora herring, eastern herring, herring, Kara herring, Pacific Ocean herring, seld, white sea herring.

Classification

Phylum: Chordata

Class: Osteichthyes

Order: Clupeiformes

Family: Clupeidae (Robins et al. 1980)

Value

Commercial: Pacific herring has a long history of exploitation. It has been sold fresh or salted and also used for fish meal. Since 1965 the fishery has concentrated on gravid females for roe (eggs), which are exported primarily to Japan. Presently, over 90% of the Pacific herring caught are in the roe fishery. Fishermen take advantage of Pacific herring's natural spawning cycle by fishing in nearshore areas where and when it spawns. They are primarily caught by purse seine and gill net. Recent U.S. annual harvests have been 116 million pounds, worth \$47 million (Thompson 1986). The San Francisco and Tomales Bay fishery alone is worth \$11 million (Suer 1987). Most U.S. harvest comes from Alaska, California, and Washington. Since spawning adults are highly vulnerable to overfishing, the fishery is strictly regulated (Grosse and Hay 1989). Commercial bait fisheries, which harvest juveniles, exist in Puget Sound and other West Coast estuaries (Trumble 1983).

Recreational: Used as bait for Pacific salmon (*Oncorhynchus* spp.) and other fishes. However, some are caught for human consumption.

Indicator of Environmental Stress: Herring larvae appear to have high mortality rates in oil-contaminated water (Nelson-Smith 1973). Populations show wide fluctuations in abundance, which is apparently related to environmental conditions (see Factors Influencing Populations), and are affected by alterations of bays and estuaries (spawning habitats).

Ecological: Seasonally, Pacific herring is one of the most abundant species in West Coast marine and estuarine neritic zones. Juveniles are highly abundant in many West Coast estuaries in summer. They are important prey for many marine species (Pacific salmon, seals, gulls, etc.).

Range

Overall: Arctic-circumboreal. In the eastern Pacific it ranges from Ensenada, Baja California, to St. Michael Island and to Cape Bathurst in the Beaufort Sea (Hart 1973). Also found in Arctic waters from Coronation Gulf, Canada to the Chuckchi Sea and the USSR Arctic. In the Western Pacific it is found to Toyama Bay, Japan, west to Korea and the Yellow Sea (Haegeler and Schweigert 1985; Wang 1986).

Within Study Area: Found in most West Coast estuaries north of San Diego, California, but occurs primarily north of Point Conception.

Life Mode

Eggs are adhesive after fertilization and attach to benthic substrates. Larvae, juveniles, and adults are schooling, pelagic, and nektonic.

Habitat

Type: Eggs are laid in intertidal (3.7 m above mean lowest low water) and subtidal areas (to 20 m), but normally occur in +1 to -2 m depth. Larvae and

juveniles are neritic while adults are neritic-oceanic (Eldridge and Kaill 1973; Suer 1987).

Substrate: Eggs occur on eelgrass, algae, tube worms, oysters, hydroids, driftwood, pilings, brush, rocks, and rocky-sandy bottoms (Garrison and Miller 1982). Larvae, juveniles, and adults occur in the water column.

Physical/Chemical Characteristics: Eggs can tolerate temperatures of 5-14°C and salinities of 3-33 ‰ (Haegeler and Schweigert 1985). Larvae are tolerant of salinities ranging from 2-28 ‰ (Alderice and Velsen 1971; Alderice and Hourston 1985). Best spawning salinities in British Columbia are 27-28.7 ‰ (Alderice and Hourston 1985). Optimum temperatures and salinities for egg and larva survival appear to be 5.5-8.7°C and 13-19 ‰ (Alderice and Velsen 1971). However, in California spawning temperatures are normally above 9°C (Barnhart 1988). Salinity tolerances of larvae are affected by salinity and temperature during egg incubation (Alderice and Hourston 1985). Turbidity in estuaries may increase larval survival (Boehlert and Morgan 1985).

Migrations and Movements: A schooling fish, Pacific herring does not make extensive coastal migrations but moves onshore and offshore in association with spawning and feeding (Morrow 1980). Adults typically move onshore during winter and early spring, residing in "holding" areas before moving to adjacent spawning grounds. The Pacific herring population consists of many discrete stocks (Grosse and Hay 1989). However, offshore distributions of adults for many West Coast stocks are unknown (Barnhart 1988). Pacific herring return to natal spawning grounds to spawn. Larvae are easily dispersed by currents, but their behavior and local currents often retain them in specific areas. Juveniles usually stay in nearshore shallow-water areas until fall when they disperse to deeper offshore waters. However, they may reside year-round in some estuaries (San Francisco Bay) (Wang 1986). Adult Pacific herring are found down to 100-150 m, with vertical distribution apparently controlled by temperature (Grosse and Hay 1989). Larvae, juveniles, and adults move toward the surface to feed at dawn and dusk (Grosse and Hay 1989).

Reproduction

Mode: Sexual, separate sexes, oviparous, iteroparous, spawning annually after reaching maturity.

Spawning: Spawning time ranges from November in the southern part of its range to August in the far north. Spawning peaks in December-January in

California (Spratt 1981) and February-March in Puget Sound (Trumble 1983). Herring spawn in particular areas every year. These are high-energy areas, located in protected coastal habitats or bays and estuaries, and are usually influenced by freshwater. Spawning apparently does not occur until a tactile stimulus (a storm, contact with bottom or other fish) causes some males to extrude milt, which in turn stimulates the entire school to spawn. During spawning both sexes come in contact with the spawning substrate (Haegeler and Schweigert 1985). Most spawning occurs at night (Eldridge and Kaill 1973; Suer 1987).

Fertilization and Fecundity: External; fecundity increases with female size and ranges from 4,000 to 134,000 eggs/female (Hart 1973). Fecundity is 227 and 220 eggs/gram of female weight in Tomales Bay and San Francisco Bay, respectively (Hardwick 1973; Rabin and Barnhart 1977). Size specific fecundity is inversely related to latitude (Hay 1985).

Growth and Development

Egg Size: Unfertilized egg is 1.0 mm in diameter (Outram 1955); 1.2-1.5 mm in diameter after fertilization (Hart 1973).

Embryonic Development: Hatching occurs in 11-12 days at 10.7°C, 14-15 days at 8.5°C, and 28-40 days at 4.4°C (Outram 1955). Most eggs hatch at night (Alderice and Velsen 1971).

Larval Size: 5 to about 26 mm total length (TL). Metamorphosis to juvenile begins at about 26 mm TL and is completed by 35 mm (Fraser 1922, Stevenson 1962).

Juvenile Size: 35 to 150 mm TL depending on region. Growth of juveniles is dependent on population size and environmental factors (Reilly 1988).

Age and Size of Adults: From 13 to 26 cm TL depending on region. Herring mature at 2-3 years in California and 3-4 years in Washington. Herring live up to 19 years and grow to a maximum length of 50 cm TL (Morrow 1980). Northern stocks live longer than southern stocks (Wang 1986; Grosse and Hay 1989).

Food and Feeding

Trophic Mode: Selective pelagic plankton feeder, although filter feeding has been observed.

Food items: Larvae consume diatoms, tintinnids, invertebrate and fish eggs, crustacean larvae, mollusc larvae, and copepods. Juveniles eat primarily crustaceans: copepods, cladocerans, euphausiids,

mysids, amphipods, and decapod larvae. They also consume molluscs and fish larvae. Adults eat planktonic crustaceans: copepods, euphausiids, and amphipods; and fish larvae (Hart 1973; Simenstad et al. 1979; Miller et al. 1980; McCabe et al. 1983).

Biological Interactions

Predation: Eggs are eaten by many species of fishes, ducks, and gulls, while larvae are prey for ctenophores, jellyfish, amphipods, chaetognaths, clupeoid fishes, and salmonids. Juveniles and adults are consumed by squid, sharks, salmon, cods, sculpins, lingcod (*Ophiodon elongatus*), sand sole (*Psettichthys melanostictus*), and other fishes. They are also eaten by many species of birds and marine mammals such as seals and sperm whales (*Physeter catodon*) (Hart 1973; Simenstad et al. 1979; Grosse and Hay 1989).

Factors Influencing Populations: There is no relation between number of eggs spawned and number of recruits to adult population (Pacific Fishery Management Council 1981). Egg and larva mortalities are thought to be the major component affecting population sizes. Substantial natural mortalities of both eggs and larvae occur during their development by tidal fluctuations, desiccation, freezing, low oxygen, wave action, and predation. Approximately 98-99% of all larvae are killed by predation, competition, and offshore transport. Many hypotheses have been developed to describe which factors determine year-class abundance. In general, clupeoid year-class strength appears to be determined within its first six months (Smith 1985). Other studies indicate that onshore transport, density-dependent mechanisms, upwelling, sea temperatures, predation, climate fluctuations, initial feeding period of larvae, and larval dispersal patterns may be important in determining population abundances (Lasker 1985; Grosse and Hay 1989). Juveniles and adults are affected by competition, predation, disease, spawning stress, and fishing. Human and natural alterations of water quality, spawning substrate and habitat, food supplies, and migration rates can also affect populations (Alaska Dept. Fish Game 1985).

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Pacific herring
Clupea pallasii

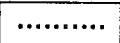
Grays Harbor
Washington

Reviewer: C. A. Simenstad

Salinity Zone	Life Stage	Relative Abundance by Month												R
		J	F	M	A	M	J	J	A	S	O	N	D	
Tidal Fresh 0.0 - 0.5 ppt	Adults													1
	Spawning													1
	Juveniles													1
	Larvae													1
	Eggs													1
Mixing 0.5 - 25.0 ppt	Adults													1
	Spawning													1
	Juveniles													1
	Larvae													2
	Eggs													1
Seawater >25.0 ppt	Adults													1
	Spawning													1
	Juveniles													1
	Larvae													2
	Eggs													1

Comments: No official documentation of spawning, but it is possible.

Legend: Relative Abundance:

-  = Not Present
-  = No Data
-  = Rare
-  = Common
-  = Abundant
-  = Highly Abundant

Data Reliability (R):

- 1 = Highly Certain
- 2 = Moderately Certain
- 3 = Reasonable Inference

Appendix 3. Table of References and Personal Communications

Common/Scientific Name	Skagit Bay	Hood Canal	Puget Sound
Blue mussel <i>Mytilus edulis</i>	71, 194, 266, 360, 361, AJ, BX	266, 360, 361, 453, AJ, BX	71, 201, 266, 360, 361, AJ, BX
Pacific oyster <i>Crassostrea gigas</i>	71, 266, AJ, BX	71, 266, 295, 316, AJ, BX	71, 266, 316, AJ, AQ, BX
Horseneck or gaper clam <i>Tresus capax</i>	43, 266, 317, AJ, BX	43, 266, 317, AJ, BX	43, 266, 317, AJ, BX
Pacific gaper <i>Tresus nuttalli</i>	71, 317, AJ, BX	71, 317, AJ, BX	71, 317, AJ, BX
California jackknife clam <i>Tagelus californianus</i>	not found 168, 215	not found 168, 215	not found 168, 215
Pacific littleneck clam <i>Protothaca staminea</i>	71, 194, 355, AJ, BX	71, 355, 453, AJ, BX	71, AJ, BX
Manila (Japanese) clam <i>Venerupis japonica</i>	71, 73, 194, AJ, BX	71, 73, 163, 184, 288, 453, AJ, BX	73, 288, 332, AJ, BX
Eastern softshell clam <i>Mya arenaria</i>	162, 266, 291, 310, AJ, BX	310, 453, AJ, BX	266, 291, 310, AJ, BX, Y
Geoduck <i>Panope abrupta</i>	11, 160, 161, AJ, BX	11, 160, 161, AJ, BX	11, 160, 161, AJ, BX
Bay shrimp <i>Crangon franciscorum</i>	248, 219	453, E	71, 219, Y
Dungeness crab <i>Cancer magister</i>	100, 246, Y	453, E, Y	101, Y
Leopard shark <i>Triakis semifasciata</i>	not found 95, 264	not found 95, 264	not found 95, 264
White sturgeon <i>Acipenser transmontanus</i>	rare 95, 260	not found 95, 260	not found 95, 260
Green sturgeon <i>Acipenser medirostris</i>	not found 95, 260	not found 95, 260	rare 95, 260
American shad <i>Alosa sapidissima</i>	260, 141	rare 260	rare 260
Pacific herring <i>Clupea pallasii</i>	412, 159, 266, 37, AD, BQ	158, 159, 266, 412, 453, BQ	133, 134, 158, 159, 266, 412, AD, BQ
Northern anchovy <i>Engraulis mordax</i>	37, 260, 141, AD, BQ	260, AD, BQ, BZ	37, 260, AD, BQ
Deepbody anchovy <i>Anchoa compressa</i>	not found 264	not found 264	not found 264
Slough anchovy <i>Anchoa delicatissima</i>	not found 264	not found 264	not found 264
Cutthroat trout <i>Oncorhynchus clarki</i>	202, AS	202, 453, AS	202, AS
Pink salmon <i>Oncorhynchus gorbuscha</i>	397, 359, 287, AD, BO, BZ	287, 338, 448, 453, AD, BZ	287, 359, 448, AD, BZ
Chum salmon <i>Oncorhynchus keta</i>	84, 287, 396, AD, BO, BZ	287, 338, 359, 448, 453, AD, BZ	124, 134, 287, 359, 448, AD, BZ
Coho salmon <i>Oncorhynchus kisutch</i>	287, 397, 436, 448, AD, BO	338, 448, 453, AD, BZ	133, 134, 287, 359, 448, AD
Steelhead <i>Oncorhynchus mykiss</i>	136, 260, 296, 297, AD, AE, BZ	136, 260, 350, 453, AD, AE, BZ	136, 260, 297, AD, AE, BZ
Sockeye salmon <i>Oncorhynchus nerka</i>	rare 448	rare 448	287, 448, AD, BZ
Chinook salmon <i>Oncorhynchus tshawytscha</i>	84, 397, 448, AD, BO, BZ	287, 359, 448, 453, AD, BZ	134, 287, 359, 396, 448, AD, BZ
Surf smelt <i>Hypomesus pretiosus</i>	266, 303, 397, 412, BQ	266, 303, 412, BQ	266, 303, 412, BQ
Longfin smelt <i>Spirinchus thaleichthys</i>	37, 397, AD, BQ, BZ	not found 95, BQ	37, 104, 260, 261, BQ, BZ
Eulachon <i>Thaleichthys pacificus</i>	rare 260, BQ	not found 260, BQ	rare 260, 452
Pacific tomcod <i>Microgadus proximus</i>	37, 397, 433, 438	260, 301, 433, 438	95, 103, 134, 260, 433, 438, CK
Topsmelt <i>Atherinops affinis</i>	not found 95, 260	not found 95, 260	not found 95, 260
Jacksmelt <i>Atherinopsis californiensis</i>	not found 95, 260	not found 95, 260	not found 95, 260
Threespine stickleback <i>Gasterosteus aculeatus</i>	95, 260, 397, 417, 427, BO	95, 260, 427, 453	95, 133, 260, 262, 427, 452, AD, BZ
Striped bass <i>Morone saxatilis</i>	rare 95	not found 95, 260	not found 95, 260
Kelp bass <i>Paralabrax clathratus</i>	not found 95, 260	not found 95, 260	not found 95, 260
Barred sand bass <i>Paralabrax nebulifer</i>	not found 95, 260	not found 95, 260	not found 95, 260
White seabass <i>Atractoscion (=Cynoscion) nobilis</i>	rare 95	not found 95	not found 95
White croaker <i>Gonyonemus lineatus</i>	not found 95, 260	not found 95	not found 95
Shiner perch <i>Cymatogaster aggregata</i>	85, 141, 260, 397, BO	95, 141, 260, 453	95, 103, 134, 141, 260, 262, 438, 446
Arrow goby <i>Clevionia ios</i>	37, 95, 141, 260	37, 95, 141, 260, 453	37, 65, 95, 141, 260, 431
Pacific sand lance <i>Ammodytes hexapterus</i>	37, 260, AD, BQ	453, AD, BQ	37, 133, 134, 260, 411, 431, AD, BQ
Lingcod <i>Ophiodon elongatus</i>	24, 51, 224, 260, AP	24, 51, 224, AP, BZ	24, 51, 224, AP, BZ
Pacific staghorn sculpin <i>Leptocottus armatus</i>	37, 85, 397, AD, BZ	37, 438, 453, AD, BZ	37, 103, 134, AD, BZ
California halibut <i>Paralichthys californicus</i>	not found 95, 260	not found 95, 260	not found 95, 260
Diamond turbot <i>Hypsosetta guttulata</i>	not found 95, 260	not found 95, 260	not found 95, 260
English sole <i>Pleuronectes vetulus</i>	37, 396, 397	37, 141, 300	37, 134, 141, 260, 300, 426, 431
Starry flounder <i>Platichthys stellatus</i>	37, 85, 397, BO	37, 300, 431, 438, 453	37, 134, 431, 438, AD, BZ

Skagit Bay

Hood Canal

Puget Sound

Numbers correspond to references listed in Appendix 5, References, pp. 219 - 240.

Letters correspond to individuals listed in Appendix 4, Personal Communications, pp. 216 - 218.

Appendix 3 (continued). Table of references and personal communications.

Common/Scientific Name	Grays Harbor	Willapa Bay	Columbia River
Blue mussel <i>Mytilus edulis</i>	CI	CI	AA
Pacific oyster <i>Crassostrea gigas</i>	266, 437, CI	266, 423, 437, CI	not found AA
Horseneck or gaper clam <i>Tresus capax</i>	54, 172, 368, CI	54, 172, 368, CI	not found AA
Pacific gaper <i>Tresus nuttali</i>	rare CI	rare CI	not found AA
California jackknife clam <i>Tagelus californianus</i>	not found 368, CI	not found 368, CI	not found AA
Pacific littleneck clam <i>Protothaca staminea</i>	71, 368, CI	368, CI	not found AA
Manila (Japanese) clam <i>Venerupis japonica</i>	71, 73, 368, CI	73, 368, CI	not found AA
Eastern softshell clam <i>Mya arenaria</i>	96, 310, 368, CI	310, 423, CI	310 AA
Geoduck <i>Panope abrupta</i>	not found CI	not found CI	not found AA
Bay shrimp <i>Crangon franciscorum</i>	181, 219, C	181, 219, C	108, 219, 447
Dungeness crab <i>Cancer magister</i>	18, 389, C	18, C	248, BD
Leopard shark <i>Triakis semifasciata</i>	not found 264	not found 264	not found BD
White sturgeon <i>Acipenser transmontanus</i>	AZ 96	96, 398, AZ	398, AT, AZ, BD
Green sturgeon <i>Acipenser medirostris</i>	96, AZ, M	96, AZ, M	294, AT, AZ, BD
American shad <i>Alosa sapidissima</i>	96, 358, BZ, M	96, 358, BZ	40, 118, 171, 279, 294, 403
Pacific herring <i>Clupea pallasii</i>	269, 358, AD, BZ	266, 269, 358, AD, BZ	40, 132, 251, 269, 279, BD
Northern anchovy <i>Engraulis mordax</i>	269, 358, BZ	204, 269, BZ	40, 132, 169, 204, 269, 279, BD
Deepbody anchovy <i>Anchoa compressa</i>	not found 264	not found 264	not found 264
Slough anchovy <i>Anchoa delicatissima</i>	not found 264	not found 264	not found 264
Cutthroat trout <i>Oncorhynchus clarki</i>	96	420, 423	234, 279, BB
Pink salmon <i>Oncorhynchus gorbuscha</i>	rare 308, AD	rare 308	rare AF
Chum salmon <i>Oncorhynchus keta</i>	96, 308, 312, 366, AD, BZ, M	308, 420, 437, M	40, 72, 92, BD
Coho salmon <i>Oncorhynchus kisutch</i>	96, 308, 358, 366, AD, BZ, M	308, 420, 437, AD, M	40, 92, 107, 251, 279, BD
Steelhead <i>Oncorhynchus mykiss</i>	96, 358, AD, BZ	177, 420, AD	40, 92, 279, 294, AF, BD
Sockeye salmon <i>Oncorhynchus nerka</i>	not found 308	not found 308	40, 92, 118, 279, Y
Chinook salmon <i>Oncorhynchus tshawytscha</i>	96, 308, 358, 359, 366, AD, BZ, M	308, 437, AD, M	40, 92, 139, 248, 251, 279, AF, BD, Y
Surf smelt <i>Hypomesus pretiosus</i>	96, 358, BQ, BZ	96, 358, BZ	40, 269, 279, BD
Longfin smelt <i>Spirinchus thaleichthys</i>	104, 180, 269, 340, 358, 366, AD, BZ	180, 269, 358, 423	40, 169, 269, 279, BD
Eulachon <i>Thaleichthys pacificus</i>	96, M	M	118, 269, BG
Pacific tomcod <i>Microgadus proximus</i>	96, 180, 269, 330, 366, M	96, 180, 269, 330, 366,	40, 269, 279, 330, BD
Topsmelt <i>Atherinops affinis</i>	not found 96, 358, 366	not found 177	rare 247
Jacksmelt <i>Atherinopsis californiensis</i>	not found 119	not found 119	not found 119
Threespine stickleback <i>Gasterosteus aculeatus</i>	96, 366, 427	96, 366, 427	40, 248, 279, 427, BD
Striped bass <i>Morone saxatilis</i>	not found 96, 358, 366	not found 177	not found BD
Kelp bass <i>Paralabrax clathratus</i>	not found 264	not found 264	not found BD
Barred sand bass <i>Paralabrax nebulifer</i>	not found 264	not found 264	not found BD
White seabass <i>Atractoscion (=Cynoscion) nobilis</i>	not found 96, 366	not found 77, 96, 366	not found BD
White croaker <i>Genyonemus lineatus</i>	not found 96, 366	not found 77, 96, 366	not found BD
Shiner perch <i>Cymatogaster aggregata</i>	96, 340, 366, 446, M	96, 340, 366, 446	40, 279, 446, BD
Arrow goby <i>Clevelandia ios</i>	65, 96, 366, 437	65, 177, 366, 437	rare BD
Pacific sand lance <i>Ammodytes hexapterus</i>	269, 358, BZ	269, 358, BZ	40, 269, 279, BD
Lingcod <i>Ophiodon elongatus</i>	19, 82, 93, 269	19, 82, 93, 269	rare 279, AA
Pacific staghorn sculpin <i>Leptocottus armatus</i>	19, 96, 269, 366, BZ, M	19, 96, 269, 366, BZ	40, 203, 269, 279, BD
California halibut <i>Paralichthys californicus</i>	not found 96, 366	not found 77, 96, 366	not found BD
Diamond turbot <i>Hypsopsetta guttulata</i>	not found 96, 366	not found 77, 96, 366	not found BD
English sole <i>Pleuronectes vetulus</i>	252, 269, 334	252, 269, 334	40, 269, 279, BD
Starry flounder <i>Platichthys stellatus</i>	19, 96, 269, 366, M, U	19, 96, 269, 366	40, 204, 269, 279, BD

Numbers correspond to references listed in Appendix 5, References, pp. 219 - 240.

Letters correspond to individuals listed in Appendix 4, Personal Communications, pp. 216 - 218.

Appendix 3 (continued). Table of references and personal communications.

Common/Scientific Name	Nehalem Bay	Tillamook Bay	Netarts Bay
Blue mussel <i>Mytilus edulis</i>	AI 360	71, 148, 201, 360, 361, AI	71, 150, 201, 217, 360, 361, 399, AI
Pacific oyster <i>Crassostrea gigas</i>	not found 239, AI	56, 63, 71, 239, 316, AI	56, 63, 71, 217, 239, 316, 399, AI
Horseneck or gaper clam <i>Tresus capax</i>	rare 146, AI	131, 148, 172, 332, AI	150, 172, 217, 332, 399, AI
Pacific gaper <i>Tresus nuttali</i>	not found 172, 245, AI	rare 131, 148, 172, AI	71, 217, 317, 399, AI
California jackknife clam <i>Tagelus californianus</i>	not found AI	not found 0	not found AI
Pacific littleneck clam <i>Protothaca staminea</i>	146, 172, 245, 332, AI	131, 172, 245, 332, AI	150, 172, 217, 245, 332, 399, AI
Manila (Japanese) clam <i>Venerupis japonica</i>	not found 146, 172, 245, AI	73, 131, 172, 245, 332, AI	150, 172, 217, 245, 332, 399, AI
Eastern softshell clam <i>Mya arenaria</i>	146, 172, 245, 310, AI	148, 172, 245, 310, AI	150, 172, 217, 245, 310, 399, AI
Geoduck <i>Panope abrupta</i>	not found 172, 245, AI	not found 172, 245	rare 172, 245, AI
Bay shrimp <i>Crangon franciscorum</i>	175, 181, 219, 447	175, 181, 219, 447, AI	175, 181, 219, 447, P
Dungeness crab <i>Cancer magister</i>	146, AI	148, AI	150, 217, 399, AI, Q
Leopard shark <i>Triakis semifasciata</i>	not found AV	not found 39, 131	not found Q
White sturgeon <i>Acipenser transmontanus</i>	AV, BD	rare 39, 131	not found Q
Green sturgeon <i>Acipenser medirostris</i>	rare AV	rare 39, 131	not found Q
American shad <i>Alosa sapidissima</i>	rare 39, 131, 146, AV	rare 39, 131, 148	rare 217, 399, Q
Pacific herring <i>Clupea pallasii</i>	39, 131, 146, 298, AV, N	39, 90, 131, 298, N	150, 217, 298, 399, N, Q
Northern anchovy <i>Engraulis mordax</i>	131, 269, 298, AV	39, 131, 269, 298	217, 399, Q
Deepbody anchovy <i>Anchoa compressa</i>	not found 264	not found 264	not found 264
Slough anchovy <i>Anchoa delicatissima</i>	not found 264	not found 264	not found 264
Cutthroat trout <i>Oncorhynchus clarki</i>	39, 131, 146, 154, 227, 402, AV	39, 131, 148, 154, 155, 402	154, 155, 217, 399, 402, Q
Pink salmon <i>Oncorhynchus gorbuscha</i>	not found AV	not found 39, 131	not found 217, 399, Q
Chum salmon <i>Oncorhynchus keta</i>	146, 227, AV	39, 131, 290, 422, K	76, 399, BH, Q
Coho salmon <i>Oncorhynchus kisutch</i>	146, 227, 430, AV	39, 131, 148, 422, 430, K	150, 217, 227, Q
Steelhead <i>Oncorhynchus mykiss</i>	227, AV	39, 131, 227, 422	rare 227, 399, Q
Sockeye salmon <i>Oncorhynchus nerka</i>	not found AV	not found 39, 131, K	not found Q
Chinook salmon <i>Oncorhynchus tshawytscha</i>	280, AV	39, 131, 280, 430, K	rare Q
Surf smelt <i>Hypomesus pretiosus</i>	39, 131, 269, 298	39, 131, 269, 298	269, 298, 399, Q
Longfin smelt <i>Spirinchus thaleichthys</i>	rare AV	rare 39, 131	not found 399, Q
Eulachon <i>Thaleichthys pacificus</i>	not found 0	not found 39, 131	not found 399, Q
Pacific tomcod <i>Microgadus proximus</i>	39, 131	39, 131, 148, 269, 298	269, 298, 399, Q
Topsmelt <i>Atherinops affinis</i>	rare AV	39, 131	150, 217, 399, Q
Jacksmelt <i>Atherinopsis californiensis</i>	not found 119	not found 39, 131	not found 217, 399, Q
Threespine stickleback <i>Gasterosteus aculeatus</i>	39, 131, 427	39, 131, 427	399, 427, Q
Striped bass <i>Morone saxatilis</i>	not found AV	not found 39, 131	not found 217, 399, Q
Kelp bass <i>Paralabrax clathratus</i>	not found 146	not found 39, 131	not found 217, 399, Q
Barred sand bass <i>Paralabrax nebulifer</i>	not found 146	not found 39, 131	not found 217, 399, Q
White seabass <i>Atractoscion (=Cynoscion) nobilis</i>	not found 146	not found 39, 131	not found 217, 399, Q
White croaker <i>Genyonemus lineatus</i>	not found 146	not found 39, 131	not found 217, 399, Q
Shiner perch <i>Cymatogaster aggregata</i>	146, 446	39, 131, 148, 446	399, 446, Q
Arrow goby <i>Clevelandia ios</i>	not found	rare 39, 131	not found 217, 399, Q
Pacific sand lance <i>Ammodytes hexapterus</i>	39, 131, 269, 298, 330	39, 131, 269, 298, 330	269, 298, 330, 399, Q
Lingcod <i>Ophiodon elongatus</i>	not found 146	39, 131, 148	150, 217, 399, Q
Pacific staghorn sculpin <i>Leptocottus armatus</i>	39, 131, 146, 203, 269	39, 131, 148, 203, 269	116, 203, 269, 298, 399, Q
California halibut <i>Paralichthys californicus</i>	not found 146	not found 39, 131	not found Q
Diamond turbot <i>Hypsopsetta guttulata</i>	not found 119	not found 39, 131	not found 119
English sole <i>Pleuronectes vetulus</i>	39, 131, 298	39, 131, 298	217, 298, 399, Q
Starry flounder <i>Platichthys stellatus</i>	39, 131, 146, 204, 298	39, 131, 148, 204, 298	150, 298, 399, Q

Numbers correspond to references listed in Appendix 5, References, pp. 219 - 240.

Letters correspond to individuals listed in Appendix 4, Personal Communications, pp. 216 - 218.

Appendix 3 (continued). Table of references and personal communications.

Common/Scientific Name	Siletz River	Yaquina Bay	Alsea River
Blue mussel <i>Mytilus edulis</i>	rare 147, 384, AI	71, 152, 201, 360, 361, AI	rare 143, AI
Pacific oyster <i>Crassostrea gigas</i>	not found 384, AI	56, 63, 71, 239, 316, 421, AI	not found 419, AI
Horseneck or gaper clam <i>Tresus capax</i>	not found 147, 384, AI	44, 152, 172, 332, AI	172, 332, AI
Pacific gaper <i>Tresus nuttali</i>	not found 147, 384, AI	rare 152, 172, AI	not found 143, 172, AI
California jackknife clam <i>Tagelus californianus</i>	not found AI	not found AI	not found AI
Pacific littleneck clam <i>Protothaca staminea</i>	not found 147, 172, 245, 332, AI	74, 172, 238, 245, 332, AI	rare 143, 172, 245, 332, AI
Manila (Japanese) clam <i>Venerupis japonica</i>	not found 335, AI	rare 172, AI	not found 172, AI
Eastern softshell clam <i>Mya arenaria</i>	rare 147, 172, 245, AI	152, 172, 245, 310, AI	143, 172, 245, 310, AI
Geoduck <i>Panope abrupta</i>	not found 245, 384, AI	not found 172, 245, AI	not found 172, 245, AI
Bay shrimp <i>Crangon franciscorum</i>	175, 181, 219, 447	218, 219, W	175, 218, 219
Dungeness crab <i>Cancer magister</i>	147, 336, 384, AI	30, C3, 152, W, AI	143, 336, 419, AI
Leopard shark <i>Triakis semifasciata</i>	not found CE	not found 31, 32, 278, N, W, CE	not found CE
White sturgeon <i>Acipenser transmontanus</i>	rare N, CE	152, N, AO	rare N, CE
Green sturgeon <i>Acipenser medirostris</i>	rare 384, CE	rare 152, W, AO	rare N, CE
American shad <i>Alosa sapidissima</i>	rare 147, 384, CE	152, 278, N, CE	143 N, CE
Pacific herring <i>Clupea pallasii</i>	147, 384, N, CE	30, 31, 278, 298, 385, N	143, 298, N, CE
Northern anchovy <i>Engraulis mordax</i>	384, N, CE	30, 31, 32, 278, 298, N, CE	143, N, CE
Deepbody anchovy <i>Anchoa compressa</i>	not found 264	not found 264	not found 264
Slough anchovy <i>Anchoa delicatissima</i>	not found 264	not found 264	not found 264
Cutthroat trout <i>Oncorhynchus clarki</i>	147, 154, 155, 384, 402, CE	152, 154, 155, 278, 421, CE	154, 155, CE
Pink salmon <i>Oncorhynchus gorbuscha</i>	rare CE	rare 30, 31, 278, CE	rare CE
Chum salmon <i>Oncorhynchus keta</i>	20, 364, 384, G, CE	20, 278, 364, CE	20, 364, 419, CE
Coho salmon <i>Oncorhynchus kisutch</i>	147, 364, 384, 430, CE	152, 278, 364, 421, 430, CE	364, 419, 430, CE
Steelhead <i>Oncorhynchus mykiss</i>	364, 384, CE	278, 364, 421, CE	13, 68, 364, CE
Sockeye salmon <i>Oncorhynchus nerka</i>	rare CE	not found 278, CE	not found CE
Chinook salmon <i>Oncorhynchus tshawytscha</i>	147, 280, 364, 384, 430, CE	278, 280, 364, 430, CE	280, 430, CE
Surf smelt <i>Hypomesus pretiosus</i>	147, 269, 298, 384, CE	30, 31, 278, 298, CE	278, 298, N
Longfin smelt <i>Spirinchus thaleichthys</i>	not found 384, CE	278, 298, W, CE	rare N, CE
Eulachon <i>Thaleichthys pacificus</i>	not found 384, CE	not found N, W, CE	not found N, CE
Pacific tomcod <i>Microgadus proximus</i>	147, 269, 298, 384, CE	32, 152, 298, 330, W, CE	143, 298, N, CE
Topsmelt <i>Atherinops affinis</i>	not found 384, CE	30, 31, 278, 298, 347, W, CE	278, 347, N, CE
Jacksmelt <i>Atherinopsis californiensis</i>	not found 147, 384, CE	rare 32, 33	not found 143, CE
Threespine stickleback <i>Gasterosteus aculeatus</i>	384, 427, CE	30, 31, 278, 427, W, CE	30, 31, 278, 427
Striped bass <i>Morone saxatilis</i>	rare 384, CE	rare N, CE	not found 143, CE
Kelp bass <i>Paralabrax clathratus</i>	not found 384, CE	not found 30, 31, 278, 298, W, CE	not found 143, CE
Barred sand bass <i>Paralabrax nebulifer</i>	not found 384, CE	not found 30, 31, 278, 298, CE, W	not found 143, CE
White seabass <i>Atractoscion (=Cynoscion) nobilis</i>	not found 384, CE	not found 30, 31, 278, 298, W, CE	not found 143, CE
White croaker <i>Genyonemus lineatus</i>	not found 384, CE	not found 30, 31, 32, 278, 298, W, CE	not found 143, CE
Shiner perch <i>Cymatogaster aggregata</i>	147, 384, 446, N, CE	30, 31, 278, 446, 449, CE, W	30, 31, 143, 446, CE
Arrow goby <i>Clevalandia ios</i>	not found 384, CE	278, W	not found N, CE
Pacific sand lance <i>Ammodytes hexapterus</i>	147, 269, 298, 330, 384	278, 298, 330, N	298, 330, N
Lingcod <i>Ophiodon elongatus</i>	not found 384, CE	32, 152, 278, 298, W, CE	rare N, CE
Pacific staghorn sculpin <i>Leptocottus armatus</i>	147, 203, 384, CE	30, 31, 32, 152, 278, 298, N, W, CE	30, 31, 143, 203, 278, 298, N, CE
California halibut <i>Paralichthys californicus</i>	not found 384	not found 30, 31, 32, W	not found 143, CE
Diamond turbot <i>Hypsopsetta guttulata</i>	not found 119	not found 119	not found 119
English sole <i>Pleuronectes vetulus</i>	384, 442, CE	31, 32, 32, 38, 298, 335, 442, N, W, CE	30, 31, 32, 38, 298, 335, 442, N, W, CE
Starry flounder <i>Platichthys stellatus</i>	39, 131, 147, 384, CE	30, 31, 32, 152, 278, 298, N, W, CE	143, 298, CE

Siletz River

Yaquina Bay

Alsea River

Numbers correspond to references listed in Appendix 5, References, pp. 219 - 240.

Letters correspond to individuals listed in Appendix 4, Personal Communications, pp. 216 - 218.

Appendix 3 (continued). Table of references and personal communications.

Common/Scientific Name	Siuslaw River	Umpqua River	Coos Bay
Blue mussel <i>Mytilus edulis</i>	71, 151, 201, 360, 361, 418, AI, BE	AI 323	71, 145, 201, 337, 360, 361, AI
Pacific oyster <i>Crassostrea gigas</i>	not found 418, AI, BE	323, AI, AR	56, 63, 71, 239, 316, 429, AI
Horseneck or gaper clam <i>Tresus capax</i>	151, 172, 245, 332, 418, AI, BE	rare 323, AI	44, 145, 172, 332, 337, 429, AI
Pacific gaper <i>Tresus nuttalli</i>	not found 151, 172, AI	not found 149, 323, AI	rare 145, 172, 337, 429, AI
California jackknife clam <i>Tagelus californianus</i>	not found AI	not found AI	not found AI
Pacific littleneck clam <i>Protothaca staminea</i>	rare 151, 172, 245, 332, 418, AI	not found 149, 172, 245, AI	74, 145, 172, 245, 332, 337, AI
Manila (Japanese) clam <i>Venerupis japonica</i>	not found 151, 172, 418, AI	not found 149, 172, 245, 323, AI	145, 172, 184, 332, 429, AJ
Eastern softshell clam <i>Mya arenaria</i>	151, 172, 245, 310, AI, BE	149, 172, 245, 310, 323, AI, AR	145, 172, 245, 310, 429, AI
Geoduck <i>Panope abrupta</i>	not found 172, 245, AI	not found 172, 245, AI	not found 172, 245, 337, 429, AI
Bay shrimp <i>Crangon franciscorum</i>	175, 197, 218, 219	175, 218, 219, AR	41, 175, 218, 219, 337, H
Dungeness crab <i>Cancer magister</i>	151, 197, 336, AI, BE	149, 323, 336, AI, AR	145, 336, 337, 429, AI, BJ
Leopard shark <i>Triakis semifasciata</i>	not found BE	not found AR	not found 337, BJ
White sturgeon <i>Acipenser transmontanus</i>	rare BE	AR	91, 337, BJ
Green sturgeon <i>Acipenser medirostris</i>	rare BE	127, 149, 200, 228, 277, AR	91, 145, 337, BJ, H
American shad <i>Alosa sapidissima</i>	151, 197, 364, BE	127, 200, 228, 364, 418, AR	91, 193, 277, 337, 429, BJ
Pacific herring <i>Clupea pallasii</i>	151, 197, 298, BE	149, 200, 277, 298, 323, AR, N	91, 145, 193, 277, 298, 337, 429, N, BJ
Northern anchovy <i>Engraulis mordax</i>	197, BE	42, 200, 277, AR, N	91, 298, 337, N, BJ
Deepbody anchovy <i>Anchoa compressa</i>	not found 264	not found 264	not found 264
Slough anchovy <i>Anchoa delicatissima</i>	not found 264	not found 264	not found 264
Cutthroat trout <i>Oncorhynchus clarki</i>	53, 154, 155, 197, BE	149, 200, 277, 154, 155, AR	145, 154, 155, 337, 429, AB, BJ
Pink salmon <i>Oncorhynchus gorbuscha</i>	not found 151, 197, BE	not found 277, 323, AR	rare 91, 337, BJ
Chum salmon <i>Oncorhynchus keta</i>	20, 197, 364, 418, BE	rare 20, 228, 277, AR	193, 429, AB, BJ, H
Coho salmon <i>Oncorhynchus kisutch</i>	151, 197, 364, 430, BE	127, 200, 228, 277, 323, 430, AR	91, 193, 337, 429, 430, AB, BJ
Steelhead <i>Oncorhynchus mykiss</i>	68, 197, 418, BE	127, 200, 228, 323, AR	91, 193, 337, 429, BJ
Sockeye salmon <i>Oncorhynchus nerka</i>	not found BE	not found AR	not found BJ
Chinook salmon <i>Oncorhynchus tshawytscha</i>	197, 280, 364, 430, BE	200, 228, 277, 280, 323, 418, 430, AR	91, 193, 280, 337, 429, 430, AB, BJ
Surf smelt <i>Hypomesus pretiosus</i>	197, 298, BE	200, 277, 598, 323, AR	91, 193, 298, 337, H, AB, BJ
Longfin smelt <i>Spirinchus thaleichthys</i>	rare 197, BE	rare 200, 277, AR	91, 193, 337, AB, BJ
Eulachon <i>Thaleichthys pacificus</i>	rare 197, BE	200, 277, 323, AR	rare 91, 193, 337, 429, BJ
Pacific tomcod <i>Microgadus proximus</i>	151, 197, BE	149, 200, 323, 330, AR	145, 330, H, BJ
Topsmelt <i>Atherinops affinis</i>	151, 197, 278, 347, BE	200, 277, 323, 347, AR	41, 91, 193, 337, 347, 429, H, AB, BJ
Jacksmelt <i>Atherinopsis californiensis</i>	not found 151, 197, BE	not found 149, 200, 277, AR	91, 145, 193, AB, BJ
Threespine stickleback <i>Gasterosteus aculeatus</i>	197, 427, BE	200, 277, 427, AR	91, 193, 427, AB, BJ
Striped bass <i>Morone saxatilis</i>	197, 253, 276, BE	127, 200, 228, 253, 276, 277, 323, AR	91, 193, 253, 276, 277, 337, 407, 409, 429, BJ
Kelp bass <i>Paralabrax clathratus</i>	not found 151, 197	not found 149, 200, 277, 323	not found 91, 193, 337, BJ
Barred sand bass <i>Paralabrax nebulifer</i>	not found 151, 197	not found 149, 200, 277, 323	not found 91, 193, 337, BJ
White seabass <i>Atractoscion (=Cynoscion) nobilis</i>	not found 151, 197	not found 149, 200, 277, 323	rare 91, 193, 337, BJ
White croaker <i>Genyonemus lineatus</i>	not found 151, 197	not found 149, 200, 277, 323	rare 91, 193, 337, BJ
Shiner perch <i>Cymatogaster aggregata</i>	151, 197, 446, BE	42, 200, 277, 446, AR	41, 91, 193, 337, H, AB, BJ
Arrow goby <i>Clevelandia ios</i>	rare 197, BE	rare 200, 277, 323, AR	91, 116, 182, 193, 337, H, AB
Pacific sand lance <i>Ammodytes hexapterus</i>	197, 298, 330, BE	42, 200, 277, 298, 330, AR	91, 193, 298, 330, 337, H, AB, BJ
Lingcod <i>Ophiodon elongatus</i>	rare 197, 151, BE	116, 149, 200, 298, 323, AR	91, 145, 193, 337, AB, BJ, H
Pacific staghorn sculpin <i>Leptocottus armatus</i>	151, 197, 203, 298, BE	42, 200, 203, 277, 298, AR	91, 145, 193, 203, 337, H, AB, BJ
California halibut <i>Paralichthys californicus</i>	not found 197	not found 200	not found 337
Diamond turbot <i>Hypsopsetta guttulata</i>	not found 119	not found 119	not found 119
English sole <i>Pleuronectes vetulus</i>	38, 197, 335, 442, BE	38, 42, 200, 277, 323, 335, 442, AR	38, 91, 193, 335, 337, 442, H, AB, BJ
Starry flounder <i>Platichthys stellatus</i>	151, 197, 298, BE	42, 149, 200, 277, 298, 323, AR	91, 145, 193, 298, 337, 429, AB, BJ

Siuslaw River

Umpqua River

Coos Bay

Numbers correspond to references listed in Appendix 5, References, pp. 219 - 240.

Letters correspond to individuals listed in Appendix 4, Personal Communications, pp. 216 - 218.

Appendix 3 (continued). Table of references and personal communications.

Common/Scientific Name	Rogue River	Klamath River	Humboldt Bay
Blue mussel <i>Mytilus edulis</i>	rare AI, BW	not found AU, BS, CJ	351 86
Pacific oyster <i>Crassostrea gigas</i>	not found AI, BW	not found AU, BS, CJ	27, 56, 71, 316, 351, 375, 428, X, CL
Horseneck or gaper clam <i>Tresus capax</i>	not found AI	not found AU, BS, CJ	242, 243, 271, 351, 400, 440, 441, X, CL
Pacific gaper <i>Tresus nuttali</i>	not found AI, BW	not found AU, BS, CJ	80, 229, 351, 400, X, CL
California jackknife clam <i>Tagelus californianus</i>	not found AI	not found AU, BS, CJ	rare 271, 351
Pacific littleneck clam <i>Protothaca staminea</i>	not found AI, BW	not found AU, BS, CJ	74, 156, 317, 332, 351, 400, X, CL
Manila (Japanese) clam <i>Venerupis japonica</i>	not found AI	not found AU, BS, CJ	271, 332, 351, X, CL
Eastern softshell clam <i>Mya arenaria</i>	not found AI, BW	not found AU, BS, CJ	351, 357, X, CL
Geoduck <i>Panope abrupta</i>	not found AI, BW	not found AU, BS, CJ	rare 351, X, CL
Bay shrimp <i>Crangon franciscorum</i>	rare BW	rare AU, BS, CJ	175, 199, 218, 219, 351, 374
Dungeness crab <i>Cancer magister</i>	AI, BW	AU, BS, CJ	164, 339, 351, 370, D, CH, CL
Leopard shark <i>Triakis semifasciata</i>	not found BW	not found AU, BS, CJ	165, 370, D, CL
White sturgeon <i>Acipenser transmontanus</i>	BW	78, 138, 415, 416, AU, BS, CJ	rare 165, D, CL
Green sturgeon <i>Acipenser medirostris</i>	322, BW	78, 138, 415, 416, AU, BS, CJ	138, 165, 370, CL, D
American shad <i>Alosa sapidissima</i>	322, BW	78, 138, 415, 416, AU, BS, CJ	rare 165, D, CL
Pacific herring <i>Clupea pallasii</i>	322, BW	AU, BS, CJ	26, 116, 318, 319, 432, D, CB, CL
Northern anchovy <i>Engraulis mordax</i>	322, BW	AU, BS, CJ	116, 165, 339, 370, 432, CH, CL, D
Deepbody anchovy <i>Anchoa compressa</i>	not found 264	not found 264	not found 264
Slough anchovy <i>Anchoa delicatissima</i>	not found 264	not found 264	not found 264
Cutthroat trout <i>Oncorhynchus clarki</i>	144, 154, 155, 257, 322, 410, BW	78, 98, AU, BS, CJ	rare 165, D, CH, CL
Pink salmon <i>Oncorhynchus gorbuscha</i>	rare 322, BW	rare 78, AU, BS, CJ	not found 165, D, CL
Chum salmon <i>Oncorhynchus keta</i>	rare 20, BW	rare 78, 415, 416, AU, BS, CJ	rare 165, D, CH, CL
Coho salmon <i>Oncorhynchus kisutch</i>	257, 322, 408, 430, BW	78, 415, 416, AU, BS, CJ	138, 165, 271, D, CH, CL
Steelhead <i>Oncorhynchus mykiss</i>	88, 120, 233, 322, BW	78, 214, 415, 416, AU, BS, CJ	25, 165, D, CH
Sockeye salmon <i>Oncorhynchus nerka</i>	not found BW	not found 415, 416, AU, BS, CJ	not found D, CH, CL
Chinook salmon <i>Oncorhynchus tshawytscha</i>	87, 88, 233, 257, 280, 333, 430, BW	78, 415, 416, AU, BS, CJ	165, 271, D, CH, CL
Surf smelt <i>Hypomesus pretiosus</i>	322, BW	AU, BS, CJ	116, 165, 339, 370, 454, D, CL, CH
Longfin smelt <i>Spirinchus thaleichthys</i>	not found 322, BW	AU, BS, CJ	116, 165, 339, 370, 454, CL, D
Eulachon <i>Thaleichthys pacificus</i>	rare 322, BW	138, AU, BN, BS, CJ	rare 165, 454, D, CH, CL
Pacific tomcod <i>Microgadus proximus</i>	BW	not found AU, BS, CJ	116, 165, 339, 370, D, BT, CH, CL
Topsmelt <i>Atherinops affinis</i>	not found BW	rare AU, BS, CJ	67, 94, 116, 165, 370, D, BT, CL
Jacksmelt <i>Atherinopsis californiensis</i>	not found BW	not found AU, BS, CJ	67, 116, 165, 370, D, CH, CL
Threespine stickleback <i>Gasterosteus aculeatus</i>	427, BW	427, AU, BS, CJ	67, 165, 370, 427, D, CL
Striped bass <i>Morone saxatilis</i>	not found BW	rare AU, BS, CJ	rare 165, D, CH, CL
Kelp bass <i>Paralabrax clathratus</i>	not found BW	not found AU, BS, CJ	not found 165
Barred sand bass <i>Paralabrax nebulifer</i>	not found BW	AU, BS, CJ	not found 165
White seabass <i>Atractoscion (=Cynoscion) nobilis</i>	not found BW	AU, BS, CJ	rare 116, 165, D, CH, CL
White croaker <i>Genyonemus lineatus</i>	not found BW	not found AU, BS, CJ	116, 165, 271
Shiner perch <i>Cymatogaster aggregata</i>	322, BW	AU, BS, CJ	12, 165, 339, 363, 370, D, CH, CL
Arrow goby <i>Clevelandia ios</i>	not found 322, BW	not found AU, BS, CJ	116, 165, 351, 370, D, CH, CL
Pacific sand lance <i>Ammodytes hexapterus</i>	not found 322, BW	not found AU, BS, CJ	116, 165, 330, 339, 370, D, CH, CL
Lingcod <i>Ophiodon elongatus</i>	not found 322, BW	not found AU, BS, CJ	116, 165, 263, 339, 370, D, CH, CL
Pacific staghorn sculpin <i>Leptocottus armatus</i>	116, 203, 322, BW	AU, BS, CJ	67, 116, 165, 339, 351, 370, D, BT, CL
California halibut <i>Paralichthys californicus</i>	not found BW	not found AU, BS, CJ	not found 165
Diamond turbot <i>Hypsopsetta guttulata</i>	not found 119	not found 119	not found 119
English sole <i>Pleuronectes vetulus</i>	rare BW	rare AU, BS, CJ	67, 267, 268, 339, 370, D, CH, CL
Starry flounder <i>Platichthys stellatus</i>	144, 322, BW	AU, BS, CJ	67, 116, 165, 339, 351, 370, D, CH, CL

Rogue River

Klamath River

Humboldt Bay

Numbers correspond to references listed in Appendix 5, References, pp. 219 - 240.

Letters correspond to individuals listed in Appendix 4, Personal Communications, pp. 216 - 218.

Appendix 3 (continued). Table of references and personal communications.

Common/Scientific Name	Eel River	Tomales Bay	Central San Francisco / Suisun / San Pablo Bays
Blue mussel <i>Mytilus edulis</i>	313 270	179, 361	451 CM
Pacific oyster <i>Crassostrea gigas</i>	not found 313, 270	27, 35, 36, 375, CF	rare 281, CM
Horseneck or gaper clam <i>Tresus capax</i>	not found 313	rare? 168, 383	not found 168, 205, 451, CM
Pacific gaper <i>Tresus nuttali</i>	not found 313, 270	81, 135	rare 451, CM
California jackknife clam <i>Tagelus californianus</i>	not found 313, 270	not found 128, 168, 331	rare 128, 331, 451, CM
Pacific littleneck clam <i>Protothaca staminea</i>	not found 313	128, 135, 304, 305, 355	rare 128, 135, 205, 355, 451, CM
Manila (Japanese) clam <i>Venerupis japonica</i>	not found 313	57, 73, 128, 135	57, 205, 451, BC, CM
Eastern softshell clam <i>Mya arenaria</i>	313	128, 135	126, 205, 281, 451, BC, CM
Geoduck <i>Panope abrupta</i>	not found 270, 313	rare 128, 383	not found CM
Bay shrimp <i>Crangon franciscorum</i>	175, 218, 219, 313	175	60, 140, 175, 198, 358, B
Dungeness crab <i>Cancer magister</i>	313	309, 445	60, 83, 326, 406, B, CG
Leopard shark <i>Triakis semifasciata</i>	not found 270, 313	22, 23	109, 140, 178, 367, CA
White sturgeon <i>Acipenser transmontanus</i>	rare 138, BF, BR	rare 22	213, 265, 314, 321, 393, L, CD
Green sturgeon <i>Acipenser medirostris</i>	rare 138, BF, BR	rare 22	213, 265, 321, L, AX, CD
American shad <i>Alosa sapidissima</i>	48, 270, 313	rare 22	140, 207, 389, 391, 392, 394, AX, CD
Pacific herring <i>Clupea pallasii</i>	48, 270, 313, CB	174, 377, 379, 380, 381, 401	60, 140, 377, 379, 380, 381, 401, 435, B, CB
Northern anchovy <i>Engraulis mordax</i>	270, 313	22, 435	60, 115, 140, 195, 254, 259, 435, B
Deepbody anchovy <i>Anchoa compressa</i>	not found 264	not found 22, 264	not found 60, 140, 264
Slough anchovy <i>Anchoa delicatissima</i>	not found 264	not found 22, 264	not found 60, 140, 264
Cutthroat trout <i>Oncorhynchus clarki</i>	270, 313, AK	not found 138, 274	not found 138, 274
Pink salmon <i>Oncorhynchus gorbuscha</i>	not found 270, 313, BF	not found 22	rare 60, 138, 140
Chum salmon <i>Oncorhynchus keta</i>	313, BF	not found 22	rare 60, 138, 140
Coho salmon <i>Oncorhynchus kisutch</i>	20, 48, 138, 313, BF	22, 352, S	rare 60, 138, 140
Steelhead <i>Oncorhynchus mykiss</i>	48, 106, 270, 313	25, 352, S	138, 140, 259, 344, B, BV
Sockeye salmon <i>Oncorhynchus nerka</i>	not found 138, 313, BF	not found 22, 138	rare 60, 138, 140
Chinook salmon <i>Oncorhynchus tshawytscha</i>	48, 270, 313, 430, BF	22, 138, S	138, 140, 170, 211, 258, 325, 344, 425, J, CD
Surf smelt <i>Hypomesus pretiosus</i>	116, 313	22, 435	60, 140, 259, 435, B
Longfin smelt <i>Spirinchus thaleichthys</i>	116, 313, 454	rare 22	60, 140, 275, 321, 394, B, CD
Eulachon <i>Thaleichthys pacificus</i>	not found 270, 313	not found 22, 264, 292	not found 264, 292
Pacific tomcod <i>Microgadus proximus</i>	rare 48, 313	22	rare 60, 140, 259, 435, B
Topsmelt <i>Atherinops affinis</i>	313	22, 60, 64, 435	60, 259, B
Jacksmelt <i>Atherinopsis californiensis</i>	not found 313	22, 23, 79, 435	60, 79, 140, 435, B
Threespine stickleback <i>Gasterosteus aculeatus</i>	48, 313, 427	22	275, 427, 435, B
Striped bass <i>Morone saxatilis</i>	rare 48, 313	22	59, 62, 121, 140, 321, 345, 346, 362, 413, 414, AX, CD
Kelp bass <i>Paralabrax clathratus</i>	not found 313	not found 22	not found 60, 140, B
Barred sand bass <i>Paralabrax nebulifer</i>	not found 313	not found 22	not found 60, 140, 435, B
White seabass <i>Atractoscion (=Cynoscion) nobilis</i>	not found 313	rare 22	15, 60, 140, 259, 435, B
White croaker <i>Genyonemus lineatus</i>	not found 313	22	60, 115, 140, 157, 259, 435, B
Shiner perch <i>Cymatogaster aggregata</i>	12, 313, 363	22, 23, 353, 354	17, 60, 140, 259, B
Arrow goby <i>Clevlandia ios</i>	not found 313	22, 60, 311, 435	60, 115, 311, 435, B
Pacific sand lance <i>Ammodytes hexapterus</i>	rare 313	115, 435	15, 60, 115, 140, 259, 435, B
Lingcod <i>Ophiodon elongatus</i>	not found 313	22, 435	60, 140, 259, 435, B
Pacific staghorn sculpin <i>Leptocottus armatus</i>	116, 203, 313	22, 203	60, 140, 203, 435, B
California halibut <i>Paralichthys californicus</i>	not found 313	22, 435	115, 435, B
Diamond turbot <i>Hypsopsetta guttulata</i>	not found 119	22, 435	114, 140, 414, 435, B
English sole <i>Pleuronectes vetulus</i>	267, 268, 313	22, 435	60, 140, 435, B
Starry flounder <i>Platichthys stellatus</i>	116, 313	22, 435	60, 140, 321, 435, B

Numbers correspond to references listed in Appendix 5, References, pp. 219 - 240.

Letters correspond to individuals listed in Appendix 4, Personal Communications, pp. 216 - 218.

Appendix 3 (continued). Table of references and personal communications.

Common/Scientific Name	South San Francisco Bay	Elkhorn Slough	Morro Bay
Blue mussel <i>Mytilus edulis</i>	166, 205, 451, CM	168, 179, 289	179, 244
Pacific oyster <i>Crassostrea gigas</i>	rare 205, 281, CM	rare 49, 113	153, 244, CF
Horseneck or gaper clam <i>Tresus capax</i>	not found 168, 205, 451, CM	not found 241, 289	not found 128, 244
Pacific gaper <i>Tresus nuttalli</i>	rare 205, 451, CM	80, 81, 229	81, 244, R
California jackknife clam <i>Tagelus californianus</i>	not found 128, 331, 451, CM	rare 113, 289, 378	81, 244, R
Pacific littleneck clam <i>Protothaca staminea</i>	rare 128, 135, 205, 355, 451, CM	49, 113, 355, 378, CB	153, 244, 304, 355
Manila (Japanese) clam <i>Venerupis japonica</i>	57, 128, 205, 451, BC, CM	113, 128, 289, 378, CB	not found 128, 244
Eastern softshell clam <i>Mya arenaria</i>	126, 205, 281, 451, BC, CM	113, 289, 378	rare 244, R
Goosdick <i>Panope abrupta</i>	not found CM	rare 49, 241	153, R
Bay shrimp <i>Crangon franciscorum</i>	60, 175, 210, B, BP	not found 289	not found 244
Dungeness crab <i>Cancer magister</i>	60, 83, 406, B, BP, CG	rare 58, 110, O	34, 153, 244, AN
Leopard shark <i>Triakis semifasciata</i>	15, 97, 109, 178, CA	1, 10, 29, 404, O	105, 125
White sturgeon <i>Acipenser transmontanus</i>	15, 265, L, BP	rare 58, 221, 274, L	not found 125, 244
Green sturgeon <i>Acipenser medirostris</i>	15, 265, BP	not found 49, 58, 221, 274	not found 125, 244
American shad <i>Alosa sapidissima</i>	15, 207, 362, BP	rare 221, O	not found 187, 244
Pacific herring <i>Clupea pallasii</i>	60, 117, 377, 379, 380, 381, 401, 435, B, CB	29, 58, 110, 307, 377	34, 187
Northern anchovy <i>Engraulis mordax</i>	15, 60, 115, 254, 435, B, BP	29, 58, 110, AL, O	125, 187
Deepbody anchovy <i>Anchoa compressa</i>	not found 15, 60, 264	not found 58, 221, 264	not found 125, 187, 264
Slough anchovy <i>Anchoa delicatissima</i>	not found 15, 60, 264	not found 58, 221, 264	not found 125, 187, 264
Cutthroat trout <i>Oncorhynchus clarki</i>	not found 138, 274	not found 138, 274	not found 138, 274
Pink salmon <i>Oncorhynchus gorbuscha</i>	not found 15, 60	not found 58, 221	not found 34, 125, 187, 208, 244
Chum salmon <i>Oncorhynchus keta</i>	not found 15, 60	not found 58, 138, 221	not found 34, 125, 187, 208, 244
Coho salmon <i>Oncorhynchus kisutch</i>	rare 15, 60, 138	not found 58, 138, 220, 221	not found 34, 125, 187, 208, 244
Steelhead <i>Oncorhynchus mykiss</i>	rare 15, 60, B, BV	not found 58, 220, 221	rare 25, 352, AN, BK
Sockeye salmon <i>Oncorhynchus nerka</i>	rare 15, 60, 138	not found 58, 138, 220, 221	not found 34, 125, 187, 208, 244
Chinook salmon <i>Oncorhynchus tshawytscha</i>	15, 138, 425, J, CD	not found 58, 138, 220, 221	not found 34, 125, 187, 208, 244
Surf smelt <i>Hypomesus pretiosus</i>	15, 435, B, BP	rare 16, 58, 110, O	not found 34, 125, 187, 208, 244, AN
Longfin smelt <i>Spirinchus thaleichthys</i>	15, 17, 60, B, BP	not found 58, 220, 264, O	not found 34, 125, 187, 208, 244, 264, AN
Eulachon <i>Thaleichthys pacificus</i>	not found 292, 294	not found 264, 292	not found 264, 292
Pacific tomcod <i>Microgadus proximus</i>	rare 15, 435, B, BP	rare 58, 220, 221, O	rare 34, 125, 187, 208, 244
Topsmelt <i>Atherinops affinis</i>	60, 435, B, BP	58, 110, 324, 434, O, AL	34, 125, 187, 435
Jacksmelt <i>Atherinopsis californiensis</i>	60, 79, 435, B	16, 79, 110, 324, 435, O, AL	34, 79, 125, 187, 208, 244, 435, AN, BK
Threespine stickleback <i>Gasterosteus aculeatus</i>	15, 435, 450, B	18, 58, 209, 435, O	187, 244, AN
Striped bass <i>Morone saxatilis</i>	15, 61, 382, AX, CD	not found 58, 220, 221, O	not found 187, 244, AN
Kelp bass <i>Paralabrax clathratus</i>	not found 15, 60, 382	not found 58, 220, 221, O	not found 187, 244, AN
Barred sand bass <i>Paralabrax nebulifer</i>	not found 15, 60, 210, 382, 435, B	not found 58, 220, 221, O	not found 187, 244, AN
White seabass <i>Atractoscion (=Cynoscion) nobilis</i>	rare 15, 60, 115, BP	not found 58, 220, 221, O	rare 153, 187, 244, AN
White croaker <i>Genyonemus lineatus</i>	15, 60, 115, 157, 435, B, BP	58, 209, 236, O, AL	34, 153, 187, 208, 236, 244
Shiner perch <i>Cymatogaster aggregata</i>	15, 17, 60, 435, B, BP	14, 16, 28, 58, 209, O	125, 187, AN
Arrow goby <i>Clevelandia ios</i>	60, 311, 435, BP	16, 28, 47, 58, 311, 435, AL, O	47, 125, 187, 311, AN
Pacific sand lance <i>Ammodytes hexapterus</i>	rare 15, 210, 435, B, BP	58, O, AL	rare 34, 125, 187
Lingcod <i>Ophiodon elongatus</i>	rare 15, 435, B, BP	rare 58, 263, O	rare 34, 125, 187, 244, AN
Pacific staghorn sculpin <i>Leptocottus armatus</i>	15, 60, 203, 435, B, BP	16, 28, 58, 203, 209, O, AL	125, 187, 203
California halibut <i>Paralichthys californicus</i>	435, B, BP	10, 28, 29, 58, 110, 435, O	125, 187, 435
Diamond turbot <i>Hypsopsetta guttulata</i>	15, 114, 140, 435, B, BP	10, 58, 209, 435, O	34, 125, 187, 435, AN
English sole <i>Platyonectes vetulus</i>	15, 60, 210, 299, 435, B, BP	10, 28, 29, 58, O	34, 125, 187, AN
Starry flounder <i>Platichthys stellatus</i>	15, 60, 435, B, BP	10, 16, 28, 29, 58, O	34, 125, 187, AN

Numbers correspond to references listed in Appendix 5, References, pp. 219 - 240.
Letters correspond to individuals listed in Appendix 4, Personal Communications, pp. 216 - 218.

Appendix 3 (continued). Table of references and personal communications.

Common/Scientific Name	Santa Monica Bay	San Pedro Bay	Alamitos Bay
Blue mussel <i>Mytilus edulis</i>	371, F, AW	173, 371, F, AW	168, 272, 327, BU
Pacific oyster <i>Crassostrea gigas</i>	not found 128, 371	not found 128, 173, 371	not found 128
Horseneck or gaper clam <i>Tresus capax</i>	not found 128, 371	not found 128, 173, 371	not found 128, BU
Pacific gaper <i>Tresus nuttalli</i>	rare 128, 371	81, 128, 173, 371	rare BU
California jackknife clam <i>Tagelus californianus</i>	128, 371, AW	173, 371, AW, BU	AW, BU, BY
Pacific littleneck clam <i>Protothaca staminea</i>	304, 305, 355, 371, AW	173, 304, 355, 371, AW	329, 355, AW, BU
Manila (Japanese) clam <i>Venerupis japonica</i>	not found 128, 371	not found 128, 173, 371	not found 128, BU
Eastern softshell clam <i>Mya arenaria</i>	not found 128, 371	not found 128, 173, 371	not found 128
Geoduck <i>Panope abrupta</i>	not found 128	rare 128, 168	not found 168, 329
Bay shrimp <i>Crangon franciscorum</i>	not found 371	not found 173, 371	not found 329
Dungeness crab <i>Cancer magister</i>	not found 142	not found 142	not found 142
Leopard shark <i>Triakis semifasciata</i>	1, 122, 237, CC	1, 8, 66, 123, 189, 192, CC	rare 7, 212, A, AN
White sturgeon <i>Acipenser transmontanus</i>	not found 122, 237, CC	not found 8, 66, 123, 189, 192, CC	not found 7
Green sturgeon <i>Acipenser medirostris</i>	not found 122, 185, 237, CC	not found 8, 66, 123, 189, 192, CC	not found 7, 212
American shad <i>Alosa sapidissima</i>	Rare 6, 122, 185, 274, CC	rare 6, 8, 66, 123, 189, 192, 274	not found 7
Pacific herring <i>Clupea pallasii</i>	rare 377	rare 377	not found 7, 212, 377
Northern anchovy <i>Engraulis mordax</i>	6, 8, 45, 46, 196, 226, 237, 388, T, CC	6, 8, 45, 46, 196, 388, T, CC	6, 7, 45, 46, 388, A, AN
Deepbody anchovy <i>Anchoa compressa</i>	rare 237, CC	5, 6, 8, 192, 237, 371, 388	7, 176, A, AN
Slough anchovy <i>Anchoa delicatissima</i>	not found 237, CC	rare 8, 192, 230, 237, 371, CC	7, 176, A, AN
Cutthroat trout <i>Oncorhynchus clarki</i>	not found 138, 274	not found 138, 274	not found 138, 274
Pink salmon <i>Oncorhynchus gorbuscha</i>	not found 5, 185, 237, 373, AN	not found 5, 6, 185, 189, 237	not found 7, A, AN
Chum salmon <i>Oncorhynchus keta</i>	not found 5, 185, 237, 373, AN	not found 5, 6, 185, 189, 237	not found 7, A, AN
Coho salmon <i>Oncorhynchus kisutch</i>	not found 5, 185, 237, 373, AN	not found 5, 6, 185, 237	not found 7, A, AN
Steelhead <i>Oncorhynchus mykiss</i>	not found 25, 138, 274	not found 25, 138, 274	not found 25, 138, 274
Sockeye salmon <i>Oncorhynchus nerka</i>	not found 5, 185, 237, 373, AN	not found 5, 6, 185, 237	not found 7, A, AN
Chinook salmon <i>Oncorhynchus tshawytscha</i>	rare 5, 9, 138, 185, 237, 373	rare 5, 6, 9, 138, 185, 237	not found 7, A, AN
Surf smelt <i>Hypomesus pretiosus</i>	not found 5, 185, 237, 373	not found 5, 6, 185, 189, 237	not found 328
Longfin smelt <i>Spirinchus thaleichthys</i>	not found 185, 264	not found 185, 264, 274	not found 264, 274
Eulachon <i>Thaleichthys pacificus</i>	not found 264	not found 264	not found 264
Pacific tomcod <i>Microgadus proximus</i>	not found 185, 264	not found 185, 264	not found 264
Topsmelt <i>Atherinops affinis</i>	6, 123, 371, 372, CC	5, 8, 123, AN, CC	7, 231, 232, A, AN
Jacksmelt <i>Atherinopsis californiensis</i>	6, 79, 123, 371, 372, CC	79, 123, 185, 192, AN, CC	not found 7, 189, A, AN
Threespine stickleback <i>Gasterosteus aculeatus</i>	not found 188, AN	not found 185, AN, CC	not found 7, 189, A, AN
Striped bass <i>Morone saxatilis</i>	not found 188, AN	not found 185, AN, CC	not found 7, 189, A, AN
Kelp bass <i>Paralabrax clathratus</i>	8, 55, 62, 122, 123, 225, 286, 365, 373, 455, T, CC	55, 185, 192, 315, 365, 371, 388, 455, AN, CC	rare 7, 189, A, AN
Barred sand bass <i>Paralabrax nebulifer</i>	62, 122, 123, 135, 225, T, AH, CC	123, 135, 173, 192, 225, AH, CC	7, 212, 231, 232, A, AN
White seabass <i>Atractoscion (=Cynoscion) nobilis</i>	135, 273, 382, T, CC	8, 66, 185, 189, AN, CC	not found 7, 328, A, AN
White croaker <i>Genyonemus lineatus</i>	62, 89, 122, 157, 236, T, AH, CC	8, 173, 189, 192, 236, 237, 306, 371, 388, AN, CC	7, 236, A, AN
Shiner perch <i>Cymatogaster aggregata</i>	122, 185, 373, 371, 386, 387, T, AH, CC	8, 66, 192, 373, 386, 387, 388, CC	7, A, AN
Arrow goby <i>Clevlandia ios</i>	rare 62, 122, 371, CC	8, 173, 186, 231, 232, 371, CC	7, 231, 232, 240, A, AN
Pacific sand lance <i>Ammodytes hexapterus</i>	not found 185, 188, AN	not found 185, AN, CC	not found 7, A, AN
Lingcod <i>Ophiodon elongatus</i>	rare 62, 122, 123, 263	rare 123, 189, 263	not found 7, A, AN
Pacific staghorn sculpin <i>Leptocottus armatus</i>	rare 122, 203, 373, T, CC	rare 8, 189, T, CC	7, 231, 232, 405, A, AN
California halibut <i>Paralichthys californicus</i>	2, 62, 122, 167, 230, 435, T, CC	8, 66, 167, 189, 192, 230, 373, 387, 388, CC	7, 167, A
Diamond turbot <i>Hypsopsetta guttulata</i>	62, 122, 222, 373, 371, T, CC	8, 189, 192, 222, 387, 388, CC	7, 222, A
English sole <i>Pleuronectes vetulus</i>	2, 52, 62, 122, 206, 373, T, CC	8, 173, 231, 232, 371, 387, 388, T, CC	rare 7, A
Starry flounder <i>Platichthys stellatus</i>	not found 62, 122, 185, 373	8, 185, 387, 388, CC	not found 7, A

Numbers correspond to references listed in Appendix 5, References, pp. 219 - 240.

Letters correspond to individuals listed in Appendix 4, Personal Communications, pp. 216 - 218.

Appendix 3 (continued). Table of references and personal communications.

Common/Scientific Name	Anaheim Bay	Newport Bay	Mission Bay
Blue mussel <i>Mytilus edulis</i>	168, 272, 327, 329, BU	168, 272, 327, BY	AW
Pacific oyster <i>Crassostrea gigas</i>	not found 128	not found 128	not found 128
Horseneck or gaper clam <i>Tresus capax</i>	not found 329, BU	not found 348, 349, BY	not found 69, 99, 128, 282
Pacific gaper <i>Tresus nuttalli</i>	rare 329, BU	rare 348, 349, BU, BY	rare 69, 99, 282
California jackknife clam <i>Tagelus californianus</i>	329, AW, BU	348, 349, AW, BY	69, AW
Pacific littleneck clam <i>Protothaca staminea</i>	329, 355, AW, BU	348, 349, AW, BY	69, 99, 282
Manila (Japanese) clam <i>Venerupis japonica</i>	not found 128	not found 128, 348, 349, BY	not found 69, 99, 128, 282
Eastern softshell clam <i>Mya arenaria</i>	not found 128	not found 128	not found 128
Geoduck <i>Panope abrupta</i>	not found 329, 376	not found 348, 349	not found 69, 282
Bay shrimp <i>Crangon franciscorum</i>	not found 329, 376	not found BY	not found 282
Dungeness crab <i>Cancer magister</i>	not found 142	not found 142	not found 142
Leopard shark <i>Triakis semifasciata</i>	rare 212	rare 3, 190	rare 69, 282
White sturgeon <i>Acipenser transmontanus</i>	not found 212, 223	not found 3, 190	not found 69, 282
Green sturgeon <i>Acipenser medirostris</i>	not found 212, 223	not found 3, 190	not found
American shad <i>Alosa sapidissima</i>	not found 212, 223	not found 3, 21, 190, A, AN	not found 69, 282
Pacific herring <i>Clupea pallasii</i>	not found 212, 223, 376, 377, A, AN	rare 3, 21, 190, 377, A, AN	rare 69, 282, 377, Z, AC, AY, BL
Northern anchovy <i>Engraulis mordax</i>	102, 212, 231, 232, A, AN	4, 21, 111, 190, 443, A, AN	50, 255, 282, 369
Deepbody anchovy <i>Anchoa compressa</i>	102, 212, 231, 232, A, AN	3, 4, 176, 190, 443, A, AN	282, BL
Slough anchovy <i>Anchoa delicatissima</i>	rare 102, 212, 231, 232, A, AN	3, 4, 176, 190, 443, A, AN	282, BL
Cutthroat trout <i>Oncorhynchus clarki</i>	not found 138, 274	not found 138, 274	not found 138, 274
Pink salmon <i>Oncorhynchus gorbuscha</i>	not found 102, 212, 231, 232, A, AN	not found 3, 4, 190, A, AN	not found 69, 282, AM
Chum salmon <i>Oncorhynchus keta</i>	not found 102, 212, 231, 232, A, AN	not found 3, 4, 190, A, AN	not found 69, 282, AM
Coho salmon <i>Oncorhynchus kisutch</i>	not found 102, 212, A, AN	not found 3, 4, 190, A, AN	not found 69, 282, AM
Steelhead <i>Oncorhynchus mykiss</i>	not found 25, 138, 274	not found 25, 138, 274	not found 25, 138, 274
Sockeye salmon <i>Oncorhynchus nerka</i>	not found 102, 212, A, AN	not found 3, 4, 190, A, AN	not found 69, 282, AM
Chinook salmon <i>Oncorhynchus tshawytscha</i>	not found 102, 212, A	not found 3, 4, 190, A, AN	not found 69, 282, AM
Surf smelt <i>Hypomesus pretiosus</i>	not found 102, 212, A	not found 3, 4, 190, A, AN	not found 69, 282
Longfin smelt <i>Spirinchus thaleichthys</i>	not found 264, 274	not found 264, 274	not found 264, 274
Eulachon <i>Thaleichthys pacificus</i>	not found 264	not found 264	not found 264
Pacific tomcod <i>Microgadus proximus</i>	not found 264	not found 264	not found 264
Topsmelt <i>Atherinops affinis</i>	137, 212, 231, 232, 347, A, AN	3, 4, 137, 190, 347, 443, A, AN	69, 282, 347, AC, AM, AY, Z
Jacksnelt <i>Atherinopsis californiensis</i>	not found 188, 212, A, AN	rare 4, A, AN	79, 282, Z, AC, AY
Threespine stickleback <i>Gasterosteus aculeatus</i>	not found 188, 212, A, AN	not found 4, A, AN	not found 282, Z, AC, AY
Striped bass <i>Morone saxatilis</i>	rare 212, 320, A, AN	rare 21, 191, A, AN	69, 282, AC, Z
Kelp bass <i>Paralabrax clathratus</i>	rare 102, 212, A	rare 3, 4, 21, 190, 443, A, AN	69, 282, Z, AC, AM, AY
Barred sand bass <i>Paralabrax nebulifer</i>	212, 231, 232, A	3, 21, 190, 443, A, AN	69, 216, 282, Z, AC, AM, AY
White seabass <i>Atractoscion (=Cynoscion) nobilis</i>	rare 102, 212, 231, 232, A, AN	rare 3, 4, 21, 190, 443, A, AN	rare 69, 216, 282, Z, AC, AY
White croaker <i>Genyonemus lineatus</i>	102, 212, 231, 232, 236, A, AN	3, 4, 21, 190, 236, 443, A, AN	69, 236, 255, 282, 439, AC
Shiner perch <i>Cymatogaster aggregata</i>	293, A	3, 4, 21, 190, A, AN	69, 282, Z, AC, AY, Z
Arrow goby <i>Clevelandia ios</i>	231, 232, 240, A	4, 111, 443, A	47, 282, 311, 369, Z, AC, AY
Pacific sand lance <i>Ammodytes hexapterus</i>	not found 102, 212, 231, 232, A, AN	not found 3, 4, 21, 190, 443, A, AN	not found 282, Z, AC, AY
Lingcod <i>Ophiodon elongatus</i>	not found 102, 212, 231, 232, A, AN	not found 3, 4, 21, 190, 443, A, AN	not found 282, Z, AC, AY
Pacific staghorn sculpin <i>Leptocottus armatus</i>	231, 232, 405, A	rare 3, 21, 190, 443, A, AN	282, Z, AC, AY
California halibut <i>Paralichthys californicus</i>	167, 231, 232	3, 4, 21, 190, 443, A, AN	216, 255, 282, Z, AC, AM, AY
Diamond turbot <i>Hypsopsetta guttulata</i>	231, 232, 222, A	4, 190, 443, A, AN	69, 255, 282, Z, AC, AY
English sole <i>Pleuronectes vetulus</i>	rare 102, 212, A	rare 4, A, AN	rare 69, 282, Z, AC, AY
Starry flounder <i>Platichthys stellatus</i>	not found 102, 212, A	not found 4, 190, A, AN	not found 69, 282, Z, AC, AY

Numbers correspond to references listed in Appendix 5, References, pp. 219 - 240.

Letters correspond to individuals listed in Appendix 4, Personal Communications, pp. 216 - 218.

Appendix 3 (continued). Table of references and personal communications.

Common/Scientific Name	San Diego Bay	Tijuana Estuary
Blue mussel <i>Mytilus edulis</i>	50, AC, AW	456, BM
Pacific oyster <i>Crassostrea gigas</i>	not found 128	not found 128
Horseneck or gaper clam <i>Tresus capax</i>	not found 50, 128, 129, 130, 341, 342, 343, AC, BA	not found 128, 284, 456, BM
Pacific gaper <i>Tresus nuttalli</i>	rare 50, 130, 341, 342, 343, AC	rare 284, 456, BM
California jackknife clam <i>Tagelus californianus</i>	258, AC, AW	284, 456, BM
Pacific littleneck clam <i>Protothaca staminea</i>	50, 129, 130, 341, 342, 343, AC, BA	284, 456, BM
Manila (Japanese) clam <i>Venerupis japonica</i>	not found 50, 128, 129, 130, 341, 342, 343, AC, BA	not found 128, 284, 456, BM
Eastern softshell clam <i>Mya arenaria</i>	not found 128	not found 128
Geoduck <i>Panope abrupta</i>	not found 50	not found 456
Bay shrimp <i>Crangon franciscorum</i>	not found 50, 129, 130, AC	not found 284, 456, BM
Dungeness crab <i>Cancer magister</i>	not found 142	not found 142, 284, 456, BM
Leopard shark <i>Triakis semifasciata</i>	rare 129, 130, 235, 341, 342, 343	not found 285, 456
White sturgeon <i>Acipenser transmontanus</i>	not found 129, 130, 235, 341, 342, 343	not found 456
Green sturgeon <i>Acipenser medirostris</i>	not found 50, 129, 130, 235, 341, 342, 343	not found 456
American shad <i>Alosa sapidissima</i>	not found 50, 129, 130, 235, 341, 342, 343	not found 456
Pacific herring <i>Clupea pallasii</i>	rare 50, 377, AC	not found 456, BM
Northern anchovy <i>Engraulis mordax</i>	50, 129, 130, 255, 256, 341, 342, 343, AC	283, 456, BM
Deepbody anchovy <i>Anchoa compressa</i>	183, 255, 256, 341, 342, 343, AC	rare 283, 456, BM
Slough anchovy <i>Anchoa delicatissima</i>	129, 130, 255, 256, 341, 342, 343, AC	rare 283, 456, BM
Cutthroat trout <i>Oncorhynchus clarki</i>	not found 138, 274	not found 138, 274
Pink salmon <i>Oncorhynchus gorbuscha</i>	not found 129, 130, 183, 235, 302, 341, 342, 343	not found 283, 456, BM
Chum salmon <i>Oncorhynchus keta</i>	not found 129, 130, 183, 235, 302, 341, 342, 343	not found 283, 456, BM
Coho salmon <i>Oncorhynchus kisutch</i>	not found 129, 130, 183, 235, 302, 341, 342, 343	not found 283, 456, BM
Steelhead <i>Oncorhynchus mykiss</i>	not found 25, 138, 274	not found 25, 138, 274
Sockeye salmon <i>Oncorhynchus nerka</i>	not found 129, 130, 183, 235, 302, 341, 342, 343	not found 283, 456, BM
Chinook salmon <i>Oncorhynchus tshawytscha</i>	not found 129, 130, 183, 235, 302, 341, 342, 343	not found 283, 456, BM
Surf smelt <i>Hypomesus pretiosus</i>	not found 129, 130, 183, 235, 302, 341, 342, 343	not found 283, 456, BM
Longfin smelt <i>Spirinchus thaleichthys</i>	not found 264, 274	not found 264, 274
Eulachon <i>Thaleichthys pacificus</i>	not found 264	not found 264
Pacific tomcod <i>Microgadus proximus</i>	not found 264	not found 264
Topsmelt <i>Atherinops affinis</i>	129, 130, 183, 347, 341, 342, 343, AC	283, 284, 456, BM
Jacksmelt <i>Atherinopsis californiensis</i>	50, 79, 129, 130, 235, AC	not found 283, 284, 456, BM
Threespine stickleback <i>Gasterosteus aculeatus</i>	not found 50, 129, 130, 235, AC	not found 283, 284, 456, BM
Striped bass <i>Morone saxatilis</i>	not found 50, 129, 130, 235, 341, 342, 343, AC	not found 283, 284, 456, BM
Kelp bass <i>Paralabrax clathratus</i>	rare 129, 130, 183, 255, 256, 341, 342, 343, AC	rare 283, 284, 456, BM
Barred sand bass <i>Paralabrax nebulifer</i>	129, 130, 183, 235, 255, 256, 302, 341, 342, 343, AC	rare 283, 284, 444, 456, BM
White seabass <i>Atractoscion (=Cynoscion) nobilis</i>	rare 129, 130, 183, 235, 255, 256, AC, BM	rare 283, 284, 456, BM
White croaker <i>Genyonemus lineatus</i>	129, 130, 235, 236, 244, 255, 256, 341, 342, AC	283, 284, 456, BM
Shiner perch <i>Cymatogaster aggregata</i>	129, 130, 183, 341, 342, 343, AC	rare 283, 284, 456, BM
Arrow goby <i>Clevelandia ios</i>	47, 129, 130, 183, 255, 256, 282, 311, 341, 342, 343, AC	283, 284, BM
Pacific sand lance <i>Ammodytes hexapterus</i>	not found 129, 130, 183, 255, 256, 341, 342, 343, AC	not found 283, 284, 456, BM
Lingcod <i>Ophiodon elongatus</i>	129, 130, 183, 255, 256, 341, 342, 343, AC	not found 283, 284, 456, BM
Pacific staghorn sculpin <i>Leptocottus armatus</i>	129, 130, 183, 255, 256, 341, 342, 343, AC	283, 284, 456, BM
California halibut <i>Paralichthys californicus</i>	129, 130, 183, 216, 235, 255, 256, 302, 341, 342, 343, AC 343, AC	283, 284, 456, BM
Diamond turbot <i>Hypsopsetta guttulata</i>	129, 130, 183, 255, 256, 302, 341, 342, 343, AC	283, 284, 456, BM
English sole <i>Pleuronectes vetulus</i>	not found 129, 130, 183, 255, 256, 302, 341, 342, 343	not found 283, 284, 456, BM
Starry flounder <i>Platichthys stellatus</i>	not found 129, 130, 183, 255, 256, 302, 341, 342, 343, AC	not found 283, 284, 456, BM

San Diego Bay

Tijuana Estuary

Numbers correspond to references listed in Appendix 5, References, pp. 219 - 240.

Letters correspond to individuals listed in Appendix 4, Personal Communications, pp. 216 - 218.

Appendix 4. Personal Communications

Letter Code*	Name	Affiliation
A	Allen, L.	California State University, Northridge, CA.
B	Armor, C.	California Department of Fish and Game, Stockton, CA.
C	Armstrong, D.	University of Washington, Seattle, WA.
D	Barnhart, R.	U. S. Fish and Wildlife Service, Coop. Fish. Research Unit, Arcata, CA.
E	Baumgarner, R.	Washington Department of Fisheries, Brennon, WA.
F	Bay, S.	Southern California Coastal Water Research Project, Longbeach, CA.
G	Beidler, W.	Oregon Department of Fish and Wildlife, Newport, OR.
H	Bottom, D.	Oregon Department of Fish and Wildlife, Corvallis, OR.
I	Boyd, M	Humboldt State University, Arcata, CA.
J	Brandis, P.	U.S. Fish and Wildlife Service, Stockton, CA.
K	Brawn, K.	Oregon Department of Fish and Wildlife, Tillamook, OR
L	Brennon, J.	Moss Landing Marine Laboratories, Moss Landing, CA.
M	Brix, R.	Washington Department of Fisheries, Montesano, WA.
N	Butler, J.	Oregon Department of Fish and Wildlife, Newport, OR.
O	Cailliet, G.	Moss Landing Marine Laboratories, Moss Landing, CA.
P	Chapman, J.	Hatfield Marine Science Center, Newport, OR.
Q	Chung, A.	Oregon State University, Corvallis, OR.
R	Clogston, F.	California Polytechnic State University, San Luis Obispo, CA.
S	Cox, W.	California Department of Fish and Game, Sebastopol, CA.
T	Cross, J.	Southern California Coastal Water Research Project, Long Beach, CA.
U	Culver, B	Washington Department of Fisheries, Montesano, WA.
V	Dawley, E.	National Marine Fisheries Service, Hammond, OR.
W	DeBen, W.	U.S. Environmental Protection Agency, Newport, OR.
X	DeMartini, J.	Humboldt State University, Arcata, CA.
Y	Dinnel, P.	University of Washington, Seattle, WA.
Z	Donaho, C.	Sea World Res. Institute, San Diego, CA.
AA	Emmett, R.	National Marine Fisheries Service, Hammond, OR.
AB	Fisher, J.	Oregon State University, Corvallis, OR.
AC	Ford, R.	San Diego State University, San Diego, CA.
AD	Fresh, K.	Washington Department of Fisheries, Olympia, WA.
AE	Freymond, W.	Washington Department of Game, Olympia, WA.
AF	Gilbreath, L.	National Marine Fisheries Service, North Bonneville, WA.
AG	Galbreath, J.	Oregon Department of Fish and Wildlife, Clackamas, OR.
AH	Garrahan, P.	Occidental College, Vantuna Research Group, Los Angeles, CA.

* Letter code corresponds to Appendix 3, Table of References and Personal Communications, pp. 205-215.

Letter Code*	Name	Affiliation
AI	Gaumer, T.	Oregon Department of Fish and Wildlife, Newport, OR.
AJ	Goodwin, L.	Washington Department of Fisheries, Brennon, WA.
AK	Gerstung, E.	California Department of Fish and Game, Rancho Cordova, CA.
AL	Hayden, W.	Moss Landing Marine Laboratories, Moss Landing, CA.
AM	Hoffman, R.	National Marine Fisheries Service, Terminal Island, CA.
AN	Horn, M.	California State University, Fullerton, CA.
AO	Horton, H.	Oregon State University, Corvallis, OR.
AP	Hueckel, G.	Washington Department of Fisheries, Olympia, WA.
AQ	Hurlburt E.	Washington Department of Fisheries, Olympia, WA.
AR	Johnson, J.	Oregon Department of Fish and Wildlife, Reedsport, OR.
AS	Johnston, J.	Washington Department of Game, Bellingham, WA.
AT	King, S.	Oregon Department of Fish and Wildlife, Clackamas, OR.
AU	Kisanuki, T.	U.S. Fish and Wildlife Service, Arcaña, CA.
AV	Knispel, W.	Oregon Department of Fish and Wildlife, Seaside, OR.
AW	Knaggs, E.	California Department of Fish and Game, Sacramento, CA.
AX	Kohlhorst, D.	California Department of Fish and Game, Stockton, CA.
AY	Kramer, S.	National Marine Fisheries Service, La Jolla, CA.
BZ	Kreitman, G.	Washington Department of Fisheries, Olympia, WA.
BA	Lester, W.	Westec Services, Inc., San Diego, CA.
BB	Lock, J.	Washington Department of Game, Kalama, WA.
BC	McAllister, R.	California Department of Fish and Game, Monterey, CA.
BD	McCabe, G., Jr.	National Marine Fisheries Service, Hammond, OR.
BE	McCleod, J.	Oregon Department of Fish and Wildlife, Florence, OR.
BF	McLeod, D.	California Department of Fish and Game, Eureka, CA.
BG	McConnell, R.	National Marine Fisheries Service, Hammond, OR.
BH	McNeil, W.	Hatfield Marine Science Center, Newport, OR.
BI	Miller, B.	University of Washington, Seattle, WA.
BJ	Mullarkey, W.	Oregon Department of Fish and Wildlife, Charleston, OR.
BK	Nakumura, R.	California Polytechnic State University, San Luis Obispo, CA.
BL	Noah, M.	U.S. Corps of Engineers, Los Angeles, CA.
BM	Nordby, C.	San Diego State University, San Diego, CA.
BN	Orcutt, M.	Hoopa Valley Tribe, Hoopa, CA.
BO	Orrell, R.	Washington Department of Fisheries, Mount Vernon, WA.
BP	Pearson, D.	National Marine Fisheries Service, Tiburon, CA.
BQ	Penttila, D.	Washington Department of Fisheries, Seattle, WA.
BR	Preston, L.	California Department of Fish and Game, Eureka, CA.

* Letter code corresponds to Appendix 3, Table of References and Personal Communications, pp. 205-215.

Letter Code*	Name	Affiliation
BS	Pisano, M.	California Department of Fish and Game, Arcata, CA.
BT	Quirollo, L.	California Department of Fish and Game, Eureka, CA.
BU	Reish, D.	California State University, Long Beach, CA.
BV	Requel, P.	California Department of Fish and Game, Stockton, CA.
BW	Riikula, A.	Oregon Department of Fish and Wildlife, Gold Beach, OR.
BX	Scholls, A.	Washington Department of Fisheries, Brennon, WA.
BY	Seapy, R.	California State University, Fullerton, CA.
BZ	Simenstad, C. A.	University of Washington, Seattle, WA.
CA	Smith, S.	National Marine Fisheries Service, La Jolla, CA.
CB	Spratt, J.	California Department of Fish and Game, Monterey, CA.
CC	Stephens, J.	Occidental College, Vantuna Research Group, Los Angeles, CA.
CD	Stevens, D.	California Department of Fish and Game, Stockton, CA.
CE	Stewart, G.	Oregon Department of Fish and Wildlife, Newport, OR.
CF	Swartzell, P.	California Department of Fish and Game, Menlo Park, CA.
CG	Tasto, R.	California Department of Fish and Game, Menlo Park, CA.
CH	Toole, C.	University of California Cooperative Extension, Eureka, CA.
CI	Tufts, D.	Washington Department of Fisheries, Ocean Park, WA.
CJ	Tuss, C.	U.S. Fish and Wildlife Service, Arcata, CA.
CK	Walters, G.	National Marine Fisheries Service, Seattle, WA.
CL	Warner, R.	California Department of Fish and Game, Eureka, CA.
CM	Wooster, T.	California Department of Fish and Game, Yountville, CA.

* Letter code corresponds to Appendix 3, Table of References and Personal Communications, pp. 205-215.

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3. Allen, L. G. 1976. Abundance, diversity, seasonality and community structure of the fish populations of Newport Bay, California. M.A. Thesis, Calif. State Univ., Fullerton, 107 p.
4. Allen, L. G. 1982. Seasonal abundance, composition, and productivity of the littoral fish assemblage in upper Newport Bay, California. Fish. Bull., U.S. 80(4):769-790.
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* Number code corresponds to Appendix 3, Table of References and Personal Communications, pp. 205-215.

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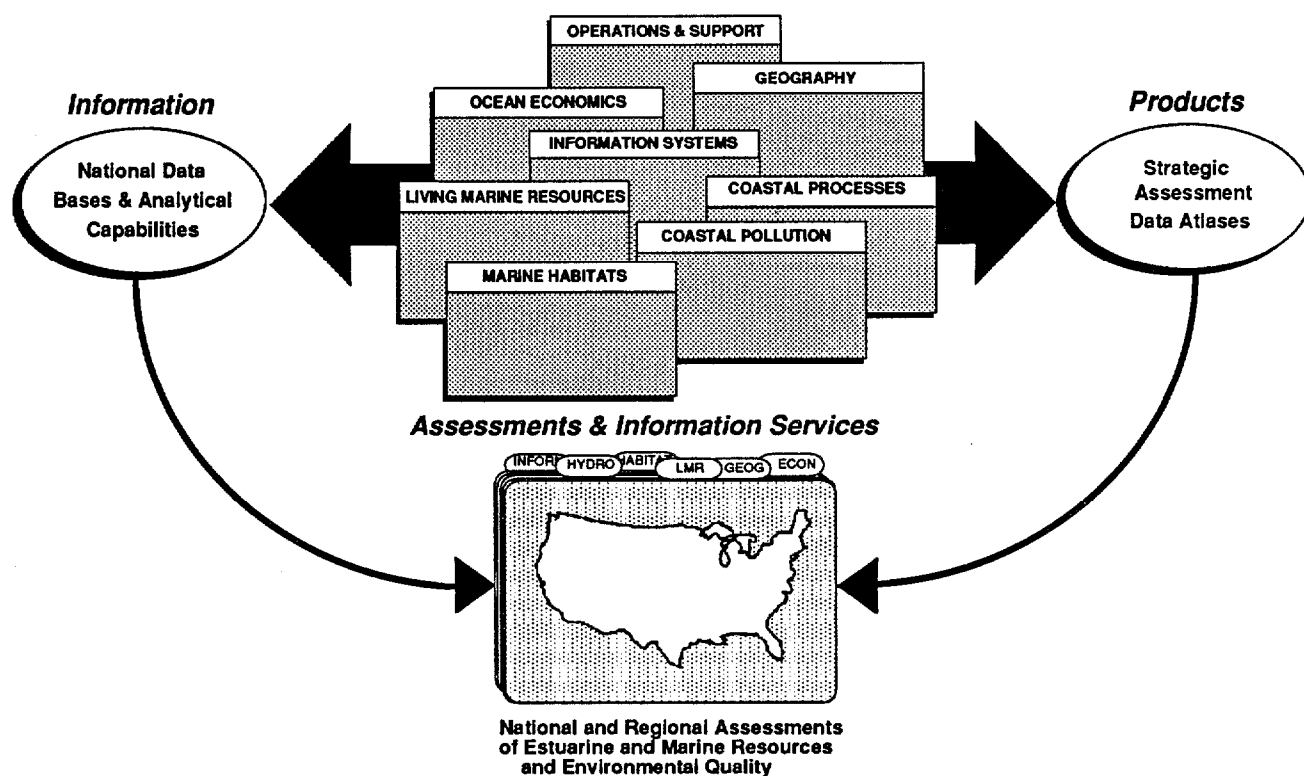
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NOAA's Program of Strategic Assessments

The major activities of the Strategic Assessment Program are focused on assembling information and providing assessment services required for decisionmaking about the estuarine and marine resources of the USA. The information and assessments that are developed help identify strategies for balanced conservation and use of these resources for maximum benefit to the Nation. Recent projects completed by the Branch include the *Bering, Chukchi, Beaufort Seas Strategic Assessment Data Atlas*, along with two *National Estuarine Inventory Data Atlases* and one pre-publication edition of the *West Coast of North America Data Atlas*. A continuing effort to expand and improve the National Estuarine Inventory (NEI)

has resulted in the publication of NEI supplement reports. Several data bases, including the Estuarine Living Marine Resources (ELMR) data base, are being completed (see inside front cover). Data and analytical capabilities are being made more accessible through improvements in the Computer Mapping and Analysis System (Cmas) and development of the Coastal Ocean Management, Planning, and Assessment System (COMPAS). Assessment reports examining pesticide use in estuarine drainage areas, susceptibility of estuaries to nutrients, and quality of coastal shellfishing waters are also being completed.

STRATEGIC ASSESSMENT PROGRAM



The Strategic Assessment Program assembles and analyzes information to generate atlas products and assessment services on the multiple uses of the Nation's coastal ocean resources.



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