STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FISH AND GAME
BUREAU OF MARINE FISHERIES

FISH BULLETIN NO. 68

Common Marine Fishes of California

By
PHIL M. ROEDEL

1948

Garibaldi, *Hypsypops rubicunda*

Photo by Al Johns for
Vernon M. Haden, San Pedro

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INTRODUCTION

PURPOSE

This bulletin is written with two objectives in mind. First, it is designed to provide authorized names for the more common marine fishes of California, in the hope that these names will be used in the fishing industry and by sportsmen. Second, it is designed to provide a ready reference from which the fisherman or the buyer can identify those species seen most often in the commercial and the sport catch. It is not presented as a treatise on our marine fishes, for it describes only a fraction of the species known from California. It is meant as a guide for any person interested in fish regardless of his technical background, so scientific terminology is avoided wherever possible.

SCOPE

There have been two other bulletins of this sort published by the California Division of Fish and Game. The first,[1] Number 28, was very broad in scope. It included both fresh-water and marine fishes, sharks, rays, and some invertebrates. The second,[2] Number 45, treated sharks and rays in considerably more detail. The present publication is concerned only with the "true" bony fishes caught in the ocean off California, including the anadromous species—those which enter fresh water to spawn.

By limiting this paper to marine fishes, we have been able to include a number of species which were not discussed in Bulletin 28. The criterion for selection was whether or not the fish in question was one appearing with reasonable frequency in either the sport or the commercial catch. Several fish of no importance either economically or as game fish come under this standard. They are, however, caught sufficiently often, usually by accident rather than design, to be the objects of interest and recurring questions as to their identity. It was not always easy to decide whether a given fish should be included, and no doubt some readers will wonder why one fish appears while another does not. The list as finally selected reflects the views of many interested people and is as representative as space would allow.

The format follows that of Bulletins 28 and 45, and descriptions have been taken almost bodily from the former in several cases. In a number of groups of fishes, studies made in the intervening years have brought out easier means of identification and the descriptive paragraphs have been changed accordingly. Color is often a difficult character to describe, for a given fish may change its color in life, undergo further changes on death, and then have these shades completely altered after freezing or preserving. In addition, many species are iridescent and two people looking at the same fish will see different tones. The color patterns given herein are those believed typical of the species shortly

[1] Walford, Lionel A. Handbook of common commercial and game fishes of California. Calif. Div. Fish Game, Fish Bull. No. 28, 181 pp., 137 figs., 1931.

[2] Walford, Lionel A. The sharks and rays of California. Calif. Div. Fish Game, Fish Bull. No. 45, 66 pp., 58 figs., 1935.

after capture. Descriptions of both physical appearance and color refer to adult specimens and cannot be relied upon for young fish.

Notes on the fishing season and fishing gear are drawn from records of the years 1941-1946 unless otherwise stated. The relative importance of the different species is subject to a great deal of variation. They have been ranked on the basis of 1946 catch records. Distribution records are given in general rather than specific terms in most instances. "Northern California" includes the area from the Oregon border south to Marin County; "Central California," that from Marin County south to Pt. Conception; and "Southern California," that from Pt. Conception to the Mexican border.

ACKNOWLEDGMENTS

The work and ideas of many people are incorporated in this bulletin. I have drawn freely from "Handbook of Common Commercial and Game Fishes of California" and am under especial obligation to its author, Dr. L. A. Walford. While nearly every member of the staff of the Bureau of Marine Fisheries has made some contribution, the help of Messrs. John E. Fitch, D. H. Fry, Jr., H. C. Godsil, Howard McCully, J. B. Phillips, and Wm. Ellis Ripley was particularly great. Mr. Fitch assisted in checking much of the manuscript, collected and prepared many of the specimens used for photographs, and supervised the work of the commercial photographer. Mr. Phillips reviewed the section on rockfish, Mr. McCully and Mr. Ripley that on flatfish and Mr. Godsil that on tunas. Mr. Fry and Mr. Leo Shapovalov, Bureau of Fish Conservation, reviewed the salmonid section, and Mr. Fred Tarp, Stanford University, that on salt-water perches. Mr. W. I. Follett, California Academy of Sciences, answered many questions with special reference to scientific nomenclature. To all of these men and to those others who gave freely of time and advice, I express my thanks.

Photographic credit is given beneath those pictures not taken from the files of the California State Fisheries Laboratory.

THE NAMING OF FISHES

COMMON NAMES

Under California state law, the Fish and Game Commission is empowered to determine the "common usage name of any variety." The need for these "official" common names is not always apparent, but a consistent terminology is vital to the work of the Bureau of Marine Fisheries. To follow the many fisheries of the State, it is of fundamental importance that the catch of each kind of fish be known. The same fish may have different vernacular names in different parts of the State and a name applied to one species in one region may be applied to something else in another region. For example, "tomcod" refers to *Microgadus proximus* in the north (and officially throughout the State) but in Southern California it most likely means *Genyonemus lineatus*, officially the kingfish. Further, a wide variety of common names is often applied to one species even in a relatively limited area. The king salmon offers a good illustration. It is known variously as chinook salmon, quinnat salmon, tyee salmon and Sacramento River salmon, to name a few. Obviously, good records can be obtained only if the names used mean the same fish to everyone, and the only way to gain this end is through the designation of official names. The policy has been to adopt the most widely-used name, or, if several were in equal use, the most descriptive. In a few cases, names have been coined, and some have been discarded because they were applied to a number of species.

It should be noted here that the common name does not necessarily show the true relationship of the fish. In fact, as often as not it indicates a false relationship. The jack mackerel is not a mackerel, the California pompano is not a pompano, the white sea bass is not a sea bass, the fish called sole are not soles—and this is far from a complete list. Actually, the jack mackerel belongs to the jack family as do the true pompanos, the California pompano is a butterfish, the white sea bass is a croaker, and most of our soles are flounders. This situation is not peculiar to fishes alone, for similar misnomers have been given many kinds of American animals. People settling in a new country tend to apply the names of familiar animals at home to species which resemble them, be the resemblance one of fact or fancy, and that is often what happened here.

Several official common names have been changed in this publication, in most cases because the new name was found to be firmly implanted in the vocabulary of fishermen and, oftimes, biologists. The substitution of "lingcod" for "Pacific cultus," is a case in point. Cultus, the Chinook jargon name, was adopted originally as more descriptive and less misleading, for the fish is not a ling nor yet a cod. However, lingcod had been in general use, lingcod it remained to everyone concerned, and henceforth lingcod it will be officially.

SCIENTIFIC NAMES

From the foregoing, it becomes evident that a common name cannot be depended upon to provide a term which will separate a given animal from any other or show the relationship of various kinds to each other. Herein lies the reason for and the value of scientific names. Scientific names are often regarded as unintelligible and consequently useless appendages designed by the scientist for no good reason except perhaps the confusion of the layman. They serve, however, definite and useful purposes. They indicate relationship through a classification system and they give each species a name which is reserved for it alone. It does not matter what language one speaks or in what tongue a book is written, *Genyonemus lineatus* always refers to what we call officially kingfish. The fact that in other parts of the world a kingfish may be something quite different or that our kingfish may be called tomcod or shiner or some other name in California does not matter. As long as we say or write *Genyonemus lineatus* there can be no question of what we mean, for no two members of the animal kingdom have the same scientific name.

The structure of the classification system is designed to show relationship. All living things belong to either the plant or the animal kingdom. This is the first very broad division. The animal kingdom in turn is broken into a number of large groups called phyla (singular, phylum), again on the basis of broad anatomical likenesses. Phylum Chordata, for example, includes all animals with backbones and some very primitive forms which do not have a backbone but which do possess certain structures in common with such diverse forms as mackerel, meadowlarks and men. The next major sub-group is the class, one of which includes all the bony fishes. Classes are divided into orders, orders into families, families into genera (singular, genus), and genera into species (both singular and plural), the basic unit in classification. In addition to these major units, various intermediate groups are often employed, such as sub-kingdoms, super-families and sub-species.

Classification is not a rigid structure but a changing thing which is altered as knowledged accumulates. Further, the various divisions are man-made, and biologists do not always agree as to the proper position of or the degree of relationship exhibited by the sundry groups of animals and plants. One man may think of three species as forming a single genus while another man may feel that the differences between them are great enough to warrant establishing two or even three separate genera. There is agreement on objectives and on many points of classification but often disagreement on how the observed differences and similarities should be interpreted.

The scientific name as it usually appears consists of two parts, the generic and the specific names in that order. Sometimes the name of the subspecies, if there is one, follows. The words are usually italicized with only the generic name beginning with a capital letter. Thus *Engraulis mordax* designates the northern anchovy; species *mordax* in genus *Engraulis*. There are, however, two known subspecies of this fish, and if we want to show that we are speaking of the ocean form as distinguished from the one found in San Francisco Bay we must write *Engraulis mordax mordax*. Often the name of a man, printed in Roman type, follows the scientific name. This is the person who first described the

species. When a date follows the name, it indicates the year in which he published the original description.

The naming of animals is subject to certain rules laid down by the International Commission on Zoological Nomenclature. With scientists working throughout the world, some confusion and duplication is inevitable. The rules provide how a name from the family level down is to be formed and a means of settling any disputes which may arise.

Names must be rendered in Latin or in latinized form. The generic name of the black perch, *Embiotoca*, for instance, is derived from two Greek words meaning "in life" or "living" and "a bringing forth" or "offspring," most appropriate for this fish which bears its young alive. This is characteristic of all the salt-water perches and is reflected in the family name, Embiotocidae. The specific name of the black perch, *jacksoni*, was given in honor of Mr. A. C. Jackson who was one of the first to call attention to this feature of its life history. The rather formidable generic name of the Pacific salmons, *Oncorhynchus*, means simply "hook snout," while the various specific names are derived from the Russian vernacular. These names are especially apt. They were chosen for that reason as forcible examples of the fact that scientific names do mean something when translated. Such appropriate names are the exception rather than the rule, though there is usually something about the animal which suggests the name—if it is not, as often happens, named in someone's honor or for the place in which it is found. We hope that this discussion will clarify both the reasons for and the meaning of scientific names.

LIST OF OFFICIAL COMMON NAMES

LIST OF OFFICIAL COMMON NAMES—Continued

Official common name	*Scientific name*	*Major page reference*
Perch, salt-water	Members of family Embiotocidae	76
Barred	*Amphistichus argenteus*	87
Black	*Embiotoca jacksoni*	77
Kelp	*Brachyistius frenatus*	85
Pacific white	*Phanerodon furcatus*	83
Pile	*Damalichthys vacca*	82
Pink	*Zalembius rosaceus*	84
Rainbow	*Hypsurus caryi*	78
Redtail	**Holconotus rhodoterus*	
Rubberlip	*Rhacochilus toxotes*	81
Shiner	*Cymatogaster aggregata*	80
Striped	*Taeniotoca lateralis*	79
Walleyed	*Hyperprosopon argenteum*	86
Pompano, California	*Palometa simillima*	74
Priestfish	*Sebastodes mystinus*	99
Queenfish	*Seriphus politus*	66
Rockfish	Species of *Sebastodes*	94
Black	*Sebastodes melanops*	98
Black-and-yellow	*Sebastodes chrysomelas*	105
China	*Sebastodes nebulosus*	104
Green-spotted	*Sebastodes chlorostictus*	102
Orange	*Sebastodes pinniger*	100
Starry	*Sebastodes constellatus*	103
Striped	*Sebastodes elongatus*	106
Vermilion	*Sebastodes miniatus*	101
Widow	*Sebastodes oralis*	108
Yellowtail	*Sebastodes flavidus*	97
Rockfish, channel	*Sebastolobus alascanus*	109
Sablefish	*Anoplopoma fimbria*	111
Salmon		
Chum	**Oncorhynchus keta*	
King	*Oncorhynchus tshawytscha*	34
Pink	**Oncorhynchus gorbuscha*	
Red	**Oncorhynchus nerka*	
Silver	*Oncorhynchus kisutch*	36
Sand dab	Species of *Citharichthys*	123
Sardine, Pacific	*Sardinops caerulea*	29
Sargo	*Anisotremus davidsonn*	75
Saury	*Cololabis saira*	38
Scad	**Species of Decapterus*	
Sculpin	*Scorpaena guttata*	110
Sculpin, staghorn	*Leptocottus armatus*	115
Sea bass		
Black	*Stereolepis gigas*	51
Shortfin	**Cynoscion parvipinnis*	
White	*Cynoscion nobilis*	67
Seatrout, greenling	*Hexagrammos decagrammus*	112
Señorita	*Oxyjulis californica*	93
Shad	*Alosa sapidissima*	31
Sheepshead, California	*Pimelometopon pulchrum*	92
Sierra	**Scomberomorus sierra*	
Skipjack	*Katsuwonus pelamis*	63
Smelt		
Jack	*Atherinopsis californiensis*	44
Surf	*Hypomesus pretiosus* and some other Osmerids	42
Top	*Atherinops affinis*	45

* Not illustrated or discussed in detail.

LIST OF OFFICIAL COMMON NAMES—Continued

* Not illustrated or discussed in detail.

NOTES ON FISHING GEAR

The major ocean commercial fisheries of the State employ three basic types of fishing gear. These are the *round haul net,* the *trawl,* and *hook and line.* The greatest tonnage of fish is caught in *round haul nets:* those which are set in a circle about a school of fish to form a vertical curtain, after which the bottom is closed and the entrapped fish concentrated in a small portion of the net by hauling in on one or both ends. There are several types, such as the *purse seine,* the *ring net,* the *lampara,* and the *bait net,* with many modifications, but all operate on the same general principle. The simplest type, the *lampara,* has a bag of fine mesh at the center and wings of coarser mesh. The wings are pulled in by hand and the fish concentrated in the bag. The most complex type is the *purse seine.* In this net, the bag is normally at one end and the bottom is closed off by pulling the "purse line" which runs through a series of rings attached to its bottom. It is a large and heavy net, hauled with help from a power winch. There are all sorts of gradations between these extremes. Relatively few of the "pure" lampara types are still in use—except as bait nets—for most of the small round haul nets now have at least some rings.

The bluefin tuna, sardine and jack mackerel fisheries use the purse seine type almost entirely. Much of the Pacific mackerel catch is made by the purse seine fleet, which also fishes Mexican waters for yellowfin tuna and skipjack, and, less intensively, barracuda and yellowtail.

The *trawl* (drag net) is employed in the flatfish and rockfish fisheries of Northern and Central California. This is a net in the form of a funnel, with a bag at the narrow end, which is dragged on or near the bottom. In California, the *otter trawl* is the type in current use. The mouth of this net is kept open by two boards (otter-or trawl-boards) attached to the towlines which run from each side of the net to the vessel. They are attached in such a manner that they flare apart when pulled through the water and may be made fast close to the mouth of the net or at some distance from it. The *balloon trawl* is a modification designed to skim over rather than drag on the bottom and is used extensively in the rockfish fishery. *Paranzella trawls* (pulled by two boats) and *beam trawls* (in which the mouth of the net is held open by a beam across the opening) are not used at present in California's offshore fisheries.

There are many methods of fishing with *hook and line.* The most important application of this ancient technique by California fishermen is in the yellowfin tuna-skipjack fishery. The large tuna bait boats carry quantities of live bait with which to chum up the tuna, which are then caught on pole and line with barbless feathered hooks. This type of fishing *(striker fishing)* is employed to some extent by smaller local boats, especially those after barracuda. *Set lines* and *hand lines* supply part of the market catch, and the ocean-caught salmon and most of the albacore is taken by *trolling*—pulling a line with an artificial lure or bait behind a moving boat.

There are several other kinds of gear which do not fall in these main categories. *Harpoons,* for example, are used to take broadbill swordfish. Pacific mackerel are sought by many small-boat fishermen who catch them in *scoops.* The scoop is a long-handled dip net or brail with a deep, mesh bag. The mackerel are attracted with ground bait and caught in the scoop as they rush for this chum. Two kinds of *entangling nets* are used in several market fisheries. These are the *gill net* and the *trammel net.* The gill net consists of a single curtain of webbing hung vertically in the water. Its meshes are large enough to permit only the head of a fish of the desired size to pass through, catching it by the gill covers. The trammel net consists of two or three curtains, one of fine mesh hanging slack and one or two of coarse mesh hanging taut on one or both sides of the fine mesh. A fish striking the fine mesh pushes on through the large mesh on the far side and becomes entrapped in a pocket. These are the more important fishing techniques now employed in California. Neither gear nor methods are unchanging, and we can expect as much variation in the future as we have experienced in the past.

A GLOSSARY OF TECHNICAL TERMS IN FREQUENT USE

ABDOMINAL: With reference to the belly.

ADIPOSE FIN: A fleshy fin-like structure without rays or spines on the back of some fishes behind the dorsal fin.

ANAL FIN: The unpaired fin on the midline of the under surface of the body back of the vent.

ANTERIOR: To the front. Opposite of posterior.

BARBEL: A fleshy projection usually about the mouth. Found on the lower jaw of some of our fishes.

CANINE TEETH: Large, conical teeth.

CAUDAL FIN: The tail fin. Often referred to as "the caudal".

CAUDAL PEDUNCLE: That portion of the body behind the base of the last anal ray and to which is attached the caudal fin.

COMPRESSED: Flattened from side to side.

CORSELET: A patch of scales just behind the base of the pectoral fin in some fishes.

DEPTH: The greatest vertical distance through the body exclusive of the fins.

DORSAL: (1) The upper part of the body, the back. (2) The dorsal fin.

DORSAL FIN: The unpaired fin(s) on the midline of the back (except the adipose fin, if present).

FINLETS: Small unconnected fins following the dorsal and anal fins in some fishes. Unlike the adipose fin in having rays and not being fleshy.

GILL: The breathing apparatus of fishes.

GILL ARCH: The bony structure to which the gill rakers and filaments are attached.

GILL COVER: The bony cover protecting the gills.

GILL FILAMENT: The slender, soft, red structures on the outer side of each gill arch.

GILL OPENING: The external opening leading to the gills.

GILL RAKERS: The bony, tooth- or comb-like protuberances on the opposite side of the gill arch from the gill filaments.

GILL SLITS: The openings between gill arches. There may or may not be a small slit or pore behind the fourth gill arch.

HEAD LENGTH: The distance from the tip of the snout to the hind edge of the gill cover.

KEEL: A ridge along the side of the tail or caudal peduncle of some fishes.

LATERAL LINE: A series of pores along the side of the body forming what looks like a dotted line. Absent in some fishes and multiple in others.

LATERAL LINE, DORSAL BRANCH: An extra branch of the lateral line running back from the head, usually near the dorsal fin, found on some fishes.

MAXILLARIES: The main bones of the upper jaw.

OPERCLE: The principal and hind-most bone of the gill cover.

PALATINES: A pair of bones in the roof of the mouth which extend out and back from the vomer.

PECTORAL FINS: The first or uppermost of the paired fins.

PELVIC FINS: *See* ventral fins.

PERITONEUM: The lining of the abdominal cavity.

POSTERIOR: Behind. Opposite of anterior.

PREMAXILLARIES: The paired bones forming the front of the upper jaw.

PREOPERCLE: The bone of the gill cover in front of the opercle.

PYLORIC CAECA: Appendages in the form of blind sacs, connected with the alimentary canal at the junction of the stomach, which are found in some fishes.

RAY: Herein, the supporting rods of a fin which appear to be composed of many small segments placed end to end. Never stiff or sharp and sometimes branched. Often called "soft rays". *See* spine.

SCALY APPENDAGE: A triangular projection formed from a scale and found just above the base of the ventral fin in some fishes.

SNOUT: The part of the head in front of the eyes. Its length is measured from the tip of the upper jaw to the front of the eye.

SOFT DORSAL: The part of the dorsal fin which is supported by rays.

SPINE: (1) The unsegmented, usually hard and sharp, rods which support parts of fins. (2) Any sharp projecting point.

SPINY DORSAL: The part of the dorsal fin which is supported by spines.

THORACIC: With reference to the chest region.

VENT: The opening at the end of the digestive tract.

VENTRAL: The lower part of the body. Opposite of dorsal.

VENTRAL FINS: The pair of fins below or behind the pectoral fins. Also called pelvic fins.

VIVIPAROUS: Giving birth to live young.

VOMER: A bone in the roof of a fish's mouth just behind the middle of the upper jaw.

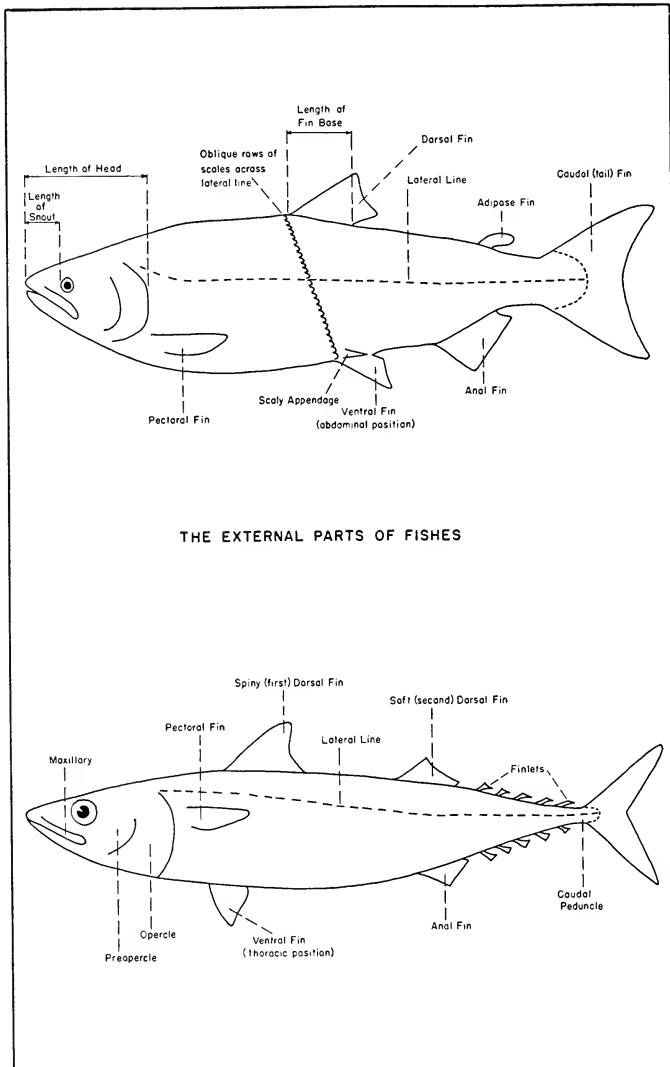

Length of Fin Base
Dorsal Fin
Oblique rows of scales across lateral line
Length of Head
Length of Snout
Lateral Line
Caudal (tail) Fin
Adipose Fin
Scaly Appendage
Ventral Fin (abdominal position)
Anal Fin
Pectoral Fin
THE EXTERNAL PARTS OF FISHES
Spiny (first) Dorsal Fin
Soft (second) Dorsal Fin
Pectoral Fin
Lateral Line
Maxillary
Finlets
Caudal Peduncle
Anal Fin
Opercle
Ventral Fin (thoracic position)
Preopercle

FIGURE 1

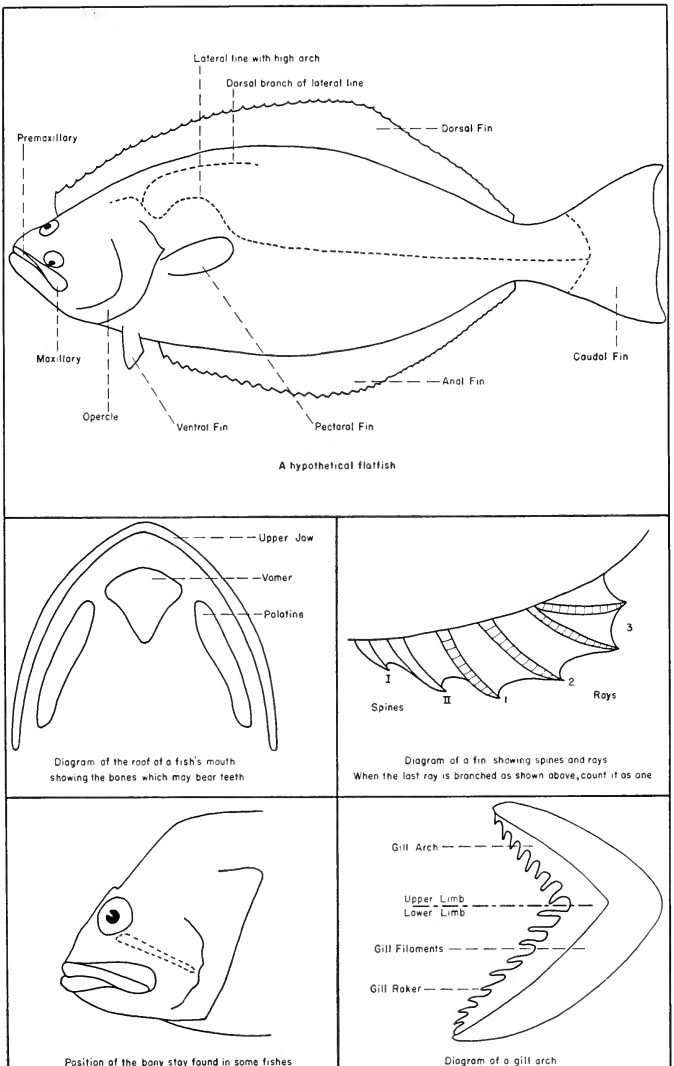

Lateral line with high arch
Dorsal branch of lateral line
Premaxillary
Dorsal Fin
Maxillary
Caudal Fin
Anal Fin
Opercle
Ventral Fin
Pectoral Fin
A hypothetical flatfish
Upper Jaw
Vomer
Palatine
Diagram of the roof of a fish's mouth showing the bones which may bear teeth
I
II
1
2
3
Spines
Rays
Diagram of a fin showing spines and rays
When the last ray is branched as shown above, count it as one
Position of the bony stay found in some fishes
Gill Arch
Upper Limb
Lower Limb
Gill Filaments
Gill Raker
Diagram of a gill arch

FIGURE 2

A KEY TO SOME ADULT MARINE FISHES OF CALIFORNIA

This key is designed only as an aid in identifying the more common marine fishes found in the sport and commercial catch of California. It is by no means complete, though it does include a few species not discussed in the text.

The characters used are those of adult fish, and colors, when mentioned, refer to those evident in freshly-caught specimens.

Terms are defined in the Glossary (page 14) and anatomical parts are illustrated in Figures 1 and 2 (pages 16-17).

SECTION A

1a. Mouth a sucking disc, no jaws. Hagfish or lamprey.[1]
1b. Mouth normal, jaws well-developed.
  2a. External gill openings 5 to 7. Shark or ray.[1]
  2b. External gill opening single.
    3a. Eye on each side of head.
      4a. Ventral fins present.
        5a. Ventral fins abdominal (attached back of the middle of the pectoral fins with the pectoral fins lying against the side. Section B (page 18).
        5b. Ventral fins thoracic (attached in front of the middle of the pectorals). Section C (page 19).
      4b. Ventral fins absent. Section D (page 23).
    3b. Both eyes on same side of head. Section E (page 24).

SECTION B

Fish With the Ventral Fins Attached Back of the Middle of the Pectoral Fins and With an Eye on Each Side of the Head

1a. Gill cover fleshy; no hard bones. Ratfish, *Hydrolagus colliei* (not illustrated).[1]
1b. Gill cover and body with hard bones.
  2a. No adipose fin.
    3a. Dorsal fin single.
      4a. Dorsal followed by finlets. Saury, *Cololabis saira* (page 38).
      4b. Dorsal not followed by finlets.
        5a. Pectoral fin enlarged to form an organ of flight. California flying fish, *Cypselurus californicus* (page 40).
        5b. Pectoral fin not so enlarged.
          6a. Both jaws greatly prolonged to form a snipe-like beak. California needlefish, *Tylosurus exilis* (page 39).
          6b. Jaws not so prolonged.
            7a. Lateral line present (do not confuse with a silvery or colored stripe).
              8a. Throat with a bony plate. Tenpounder, *Elops affinis* (Not illustrated. Not found in the Pacific off California but does occur in the lower Colorado River and in the Salton Sea).
              8b. No such bony plate. Bonefish, *Albula vulpes* (not illustrated).
            7b. No lateral line.
              9a. Mouth very large; maxillary extends almost to edge of gill cover.
                10a. Head length greater than depth of body. Northern anchovy, *Engraulis mordax* (page 32).
                10b. Head length little if any greater than depth of body.
                  11a. Length of anal base scarcely greater than head length. Slough anchovy, *Anchoa delicatissima* (not illustrated).

[1] See Walford, L. A. *The Sharks and Rays of California.* Calif. Div. Fish and Game, Fish Bull. 45, 1935.

11b. Length of anal base considerably greater than head length. Deep-bodied anchovy, *Anchoa compressa* (page 33).

9b. Mouth not unusually large; maxillary does not extend beyond eye.

12a. Ventrals attached entirely behind dorsal.
Round herring, *Etrumeus orthonops* (not illustrated).

12b. Ventrals attached partly or entirely under dorsal.

13a. Head length much less than depth of body.
Shad, *Alosa sapidissima* (page 31).

13b. Head length not notably less than depth of body.

14a. Gill cover with low oblique ridges.
Pacific sardine, *Sardinops caerulea* (page 29).

14b. No such ridges.
Pacific herring, *Clupea pallasii* (page 30).

3b. Two dorsal fins.

15a. Lateral line present (do not confuse with a silvery or colored streak).
Barracuda, *Sphyraena argentea* (page 55).

15b. No lateral line.

16a. Anal fin with 2 or 3 spines at its front.
Mullet, *Mugil cephalus* (page 54).

16b. Anal fin with 1 spine at its front.

17a. Mouth with teeth.

18a. Teeth in bands, not forked.
Jack smelt, *Atherinopsis californiensis* (page 44).

18b. One row of forked teeth (must be examined with a magnifying glass).
Top smelt, *Atherinops affinis* (page 45).

17b. No teeth in the mouth
Grunion, *Leuresthes tenuis* (page 43).

2b. Adipose fin present.

19a. Scaly appendage above ventral fin base.

20a. Anal fin with 9 to 12, rarely 13, rays (last ray may be branched at base but is counted as 1); lining of mouth never dark.
Trout, genus *Salmo* (page 37).

20b. Anal fin with 13 or more (rarely 12) rays; lining of mouth dark at least in patches in adults.

21a. More than 170 oblique rows of scales across lateral line; large black blotches on back and tail.
Pink salmon, *Oncorhynchus gorbuscha* (not illustrated; see page 34).

21b. Less than 170 rows of scales across the lateral line; variable black spotting.

22a. More than 100 pyloric caeca.

23a. Anal fin with 15 to 19 rays; definite black spots on back and both lobes of tail.
King salmon, *Oncorhynchus tshawytscha* (page 34).

23b. Anal fin with 13 or 14 (rarely 12, 15-17) rays; no defined spots on back and tail.
Chum salmon, *Oncorhynchus keta* (not illustrated; see page 34).

22b. Fewer than 100 pyloric caeca.

24a. More than 30 gill rakers on the first arch; finely speckled with black on back and tail.
Red salmon, *Oncorhynchus nerka* (not illustrated; see page 34).

24b. Under 30 gill rakers on the first arch; black spots on back and upper lobe of tail.
Silver salmon, *Oncorhynchus kisutch* (page 36).

19b. No scaly appendage above ventral fin base.
True smelt, family Osmeridae (pages 41 and 42).

SECTION C

Fish With the Ventral Fins Attached in Front of the Middle of the Pectoral Fins and With an Eye on Each Side of the Head

1a. Ventral fins completely joined. Maxillary greatly extended.
Mudsucker, *Gillichthys mirabilis* (page 116).

1b. Ventral fins separate.

2a. Ventral fins with more or less than 5 rays.
3a. Ventral fins with more than 5 rays and a more or less evident spine.
4a. Barbel on the lower jaw; 3 separate dorsal fins and 2 separate anal fins.
Tomcod, *Microgadus proximus* (page 47).
4b. No barbel; 2 dorsal fins, the second deeply notched; a single deeply notched anal fin.
Hake, *Merluccius productus* (page 46).
3b. Ventral fin with less than 5 rays; spine present or absent.
5a. Upper jaw prolonged into a sword.
Striped marlin, *Makaira mitsukurii* (page 64).
5b. Upper jaw not prolonged into a sword.
6a. A narrow bone extends just under the skin from below the eye back across the cheek. Large, antler-like spine on preopercle.
Staghorn sculpin, *Leptocottus armatus* (page 115).
6b. There is no such bone.
7a. Body with many luminous organs.
Midshipman, genus *Porichthys* (page 117).
7b. Body without luminous organs, scaled; tail forked.
Kelpfish, *Heterostichus rostratus* (page 118).
2b. Ventral fins definitely with 1 spine and 5 rays.
8a. A narrow bone extends just under the skin from below the eye back across the cheek.
9a. Anal fin with 11 or less rays; no slit after the fourth gill.
10a. Dorsal spines 15 or more.
Channel rockfish, *Sebastolobus alascanus* (page 109).
10b. Less than 15 dorsal spines.
11a. Dorsal spines 12. Sculpin, *Scorpaena guttata* (page 110).
11b. Dorsal spines 13 (rarely 14). Rockfish, genus *Sebastodes* (page 94).
9b. Anal fin with 12 or more rays; definite slit behind the fourth gill.
12a. Body scaleless, the skin smooth; 11 dorsal spines.
Cabezone, *Scorpaenichthys marmoratus* (page 114).
12b. Body uniformly scaled.
13a. Well-separated dorsal fins; 2 nostrils on each side of snout.
Sablefish, *Anoplopoma fimbria* (page 111).
13b. Dorsal fin continuous, notched; 1 nostril on each side of snout, a pore above it.
14a. One lateral line; the jaws with strong canine teeth.
Lingcod, *Ophiodon elongatus* (page 113).
14b. Several lateral lines; jaws without canine teeth.
Greenling seatrout, *Hexagrammos decagrammus* (page 112).
8b. There is no such bone.
15a. Soft dorsal and anal fins followed by 4 or more finlets.
16a. Spiny and soft dorsals widely separated; about 30 distinct wavy vertical bars on the sides.
Pacific mackerel, *Pneumatophorus diego* (page 58).
16b. Spiny and soft dorsals joined or almost joined.
17a. Lower part of the sides with 4 or 5 dark horizontal stripes.
Skipjack, *Katsuwonus pelamis* (page 63).
17b. No stripes on the lower part of the sides.
18a. Upper part of the sides with several dark stripes.
19a. Stripes oblique; 15 or more gill rakers on the lower limb of the first arch. California bonito, *Sarda lineolata* (page 62).
19b. Stripes horizontal; 10 or less gill rakers on the lower limb of the first arch. Mexican bonito, *Sarda velox* (not illustrated).
18b. No such stripes present.
20a. Spiny dorsal much longer than head; sides with bronze spots.
Sierra, *Scomberomorus sierra* (not illustrated).
20b. Spiny dorsal shorter than head; no such spots on sides.
21a. Pectoral long, extending beyond the anal insertion.
22a. Vent round; ventral surface of liver striated.
Albacore, *Thunnus germo* (page 59).
22b. Vent oval; faint marginal striations on ventral surface of liver.
Big-eye tuna, *Parathunnus mebachi* (not illustrated).

21b. Pectoral short, rarely reaching to anal insertion.
23a. Vent round, pectoral not reaching beyond the 11th or 12th dorsal spine; ventral surface of liver striated.
Bluefin tuna, *Thunnus thynnus* (page 60).
23b. Vent oval, pectoral reaching past the insertion of the soft dorsal, ventral surface of liver plain.
Yellowfin tuna, *Neothunnus macropterus* (page 61).
15b. Either no finlets or only one after soft dorsal and anal fins.
24a. Lateral line with bony shields along all or part of its length.
25a. Shields along entire length; no definite finlet.
Jack mackerel, *Trachurus symmetricus* (page 57).
25b. Shield along back portion only; a single detached finlet.
Sead, genus *Decapterus* (not illustrated).
24b. Lateral line without bony shields.
26a. A low ridge-like keel runs along the caudal peduncle.
Yellowtail, *Seriola dorsalis* (page 56).
26b. No keel on the caudal peduncle.
27a. Anal fin with 3 spines in front (may be difficult to see; scrape the front of the fin if in doubt).
28a. Anal fin with 16 or less soft rays.
29a. Sides with 6-8 definite horizontal stripes.
30a. Stripes blackish; eye moderate, less than $\frac{1}{3}$ the head length; pectoral fins do not reach to tips of ventral (both fins extended).
Striped bass, *Roccus saxatilis* (page 52).
30b. Stripes orange-brown; eye large, about $\frac{1}{3}$ head length; pectoral fins reach to ventral tips.
Big-eye bass, *Xenistius californiensis* (page 53).
29b. Sides not so striped.
31a. Teeth present on the vomer.
32a. More spines than rays in the 2 dorsal fins which touch but are scarcely united; longest spine shorter than longest ray.
Black sea bass, *Stereolepis gigas* (page 51).
32b. More rays than spines in the 2 dorsal fins, which are definitely connected by a membrane; longest spine as long as or longer than the longest ray.
33a. Third, 4th and 5th dorsal spines about the same length.
Kelp bass, *Paralabrax clathratus* (page 48).
33b. Third dorsal spine longer than the rest.
34a. Heavily covered with dark spots; about 90 scales along the lateral line.
Spotted sand bass, *Paralabrax maculato-fasciatus* (page 50).
34b. Lightly, if at all, spotted; about 70 scales along the lateral line.
Sand bass, *Paralabrax nebulifer* (page 49).
31b. No teeth on vomer.
35a. Dorsal with 9 (rarely 10) spines; body very slender, black blotch at base of caudal.
Señorita, *Oxyjulis californica* (page 93).
35b. Dorsal with 11 or more spines; body not slender; no blotch at caudal base.
36a. Teeth large, canine, sloping obliquely forward.
Sheepshead, *Pimelometopon pulchrum* (page 92).
36b. Teeth small, not canine-like or noticeably sloped forward.
37a. Distinct black band across the body; teeth immovable, single-pointed.
Sargo, *Anisotremus davidsonii* (page 75).
37b. No black band across body; teeth freely moveable, each with 3 points.
Opaleye, *Girella nigricans* (page 90).
28b. Anal fin with 17 or more soft rays.

38a. Soft parts of dorsal and anal fins densely scaled.
Halfmoon, *Medialuna californiensis* (page 91).
38b. Soft parts of dorsal and anal fins not scaled.
Salt-water perch, family Embiotocidae (page 76).
39a. Color brilliant with horizontal stripes of red or orange and blue.
40a. Vent well beyond middle of body exeluding head and tail; 25 or less anal rays.
Rainbow perch, *Hypsurus caryi* (page 78).
40b. Vent before middle of body excluding head and tail; 27 or more anal rays.
Striped perch, *Taeniotoca lateralis* (page 79).
39b. Color variable, silver, dark or red but never striped horizontally.
41a. Cluster of enlarged scales between pectoral and ventral fins; color mostly brownish.
Black perch, *Embiotoca jacksoni* (page 77).
41b. No such cluster of scales.
42a. Fifth or 6th dorsal spine as high or higher than the first dorsal ray.
43a. Eye very large, about $\frac{2}{5}$ the head length; ventrals with black tips.
Walleyed perch, *Hyperprosopon argenteum* (page 86).
43b. Eye smaller, ventral not black-tipped.
44a. Scales large, less than 50 in a row along the lateral line.
45a. Color silvery with 3 vertical yellow stripes alternating with broken black bars on the sides.
Shiner perch, *Cymatogaster aggregata* (page 80).
45b. Color chiefly red or rose.
46a. A distinct chocolate-brown spot on the back.
Pink perch, *Zalembius rosaceus* (page 84).
46b. No such spot, back mostly olive.
Kelp perch, *Brachyistius frenatus* (page 85).
44b. Scales small; over 50 in a row along the lateral line.
47a. Eye rather large, about $\frac{1}{3}$ head, anal fin with black margin; no reddish tinge on caudal and ventral fins.
Salt-water perch, *Tocichthys ellipticus* (not illustrated).
47b. Eye smaller; no black margin on anal fin.
48a. Inky blotch on middle of anal fin.
Salt-water perch, *Hypocritichthys analis* (not illustrated).
48b. No such blotch; ventral, anal, and particularly the caudal fin reddish.
Redtail perch, *Holconotus rhodoterus* (not illustrated).
42b. First dorsal ray higher than 5th or 6th dorsal spines.
49a. Lips exceedingly enlarged and fleshy.
Rubberlip perch, *Rhacochilus toxotes* (page 81).
49b. Lips not notably enlarged.
50a. Tail deeply forked, caudal peduncle long and slender.
51a. First dorsal ray at least twice as high as last dorsal spine.
Pile perch, *Damalichthys vacca* (page 82).
51b. First dorsal rays less than twice as high as last dorsal spine.
52a. Ventral fins plain whitish.
Pacific white perch, *Phanerodon furcatus* (page 83).
52b Ventral fins tipped with blackish.
Salt-water perch, *Phanerodon atripes* (not illustrated).

50b. Tail moderately forked or simply curved inwardly; caudal peduncle short and thick.
53a. Sides with vertical brassy bars alternating with brassy spots or color entirely brassy.
Barred perch, *Amphistichus argenteus* (page 87).
53b. Body speckled with brown, sometimes forming vague bars; sometimes tinged with red; not brassy.
Salt-water perch, *Crossochir koelzi* (not illustrated).
27b. Anal fin with 1 or 2 spines at the front (may be difficult to see; scrape the front of the fin if in doubt).
54a. Lateral line ends under the soft part of the dorsal fin.
55a. Color chiefly dark brown.
Blacksmith, *Chromis punctipinnis* (page 88).
55b. Color chiefly bright orange.
Garibaldi, *Hypsypops rubicunda* (page 89).
54b. Lateral line ends at or on the caudal fin.
56a. Dorsal fin continuous; no notch between rays and spines.
Ocean whitefish, *Caulolatilus princeps* (page 73).
56b. Either a notch between spiny and soft portions of dorsal fin or two separate dorsal fins.
57a. Lower jaw extends to or beyond tip of snout.
58a. Dorsal fins 2, well-separated.
Queenfish, *Seriphus politus* (page 66).
58b. Dorsal fins 2, at least in contact.
59a. Pectoral fin more than $\frac{1}{2}$ the length of the head; no prominent canine-like teeth in upper jaw.
White sea bass, *Cynoscion nobilis* (page 67).
59b. Pectoral fin less than $\frac{1}{2}$ the length of the head; 1 or 2 prominent canine-like teeth in middle of upper jaw.
Shortfin sea bass, *Cynoscion parvipinnis* (not illustrated).
57b. Snout extends beyond tip of lower jaw.
60a. One short barbel at tip of lower jaw.
61a. Anal fin with 2 strong spines at front.
Yellowfin croaker, *Umbrina roncador* (page 68).
61b. Anal fin with 1 (rarely 2) weak spine at front.
California corbina, *Menticirrhus undulatus* (page 69).
60b. Either no barbel or several minute ones at tip of lower jaw.
62a. Large, thick spine at front of anal fin.
63a. Large black spot at base of pectoral fin; pectoral fin as long as head.
Spotfin croaker, *Roncador stearnsii* (page 70).
63b. No spot at base of pectoral; pectoral fin much shorter than head.
Black croaker, *Cheilotrema saturnum* (page 71).
62b. No enlarged spine at front of anal fin.
Kingfish, *Genyonemus lineatus* (page 72).

SECTION D

Fish Without Ventral Fins

1a. Pectoral fins absent. Moray, *Gymnothorax mordax* (page 121).
1b. Pectoral fins present.
2a. Upper jaw prolonged into a sword.
Broadbill swordfish, *Xiphias gladius* (page 65).
2b. Upper jaw not prolonged into a sword.
3a. Body eel-like. Blenny-eels (pages 119 and 120).
3b. Body not eel-like.

4a. Body short, deep, square-cut behind; high dorsal and anal fins set far back. Ocean sunfish, *Mola mola* (page 141).
4b. Body not distorted as above.
California pompano, *Palometa simillima* (page 74).

SECTION E

Fish With Both Eyes on the Same Side of the Head

1a. Dorsal and anal fins joined to caudal.
Tongue sole, *Symphurus atricaudus* (page 140).
1b. Dorsal and anal fins separate from caudal.
2a. Ventral fin of eyed side on belly ridge; ventrals thus not symmetrical.
3a. Pectoral fin of eyed side longer than head.
Sand dab, *Citharichthys xanthostigmus* (not illustrated).
3b. Pectoral fin of eyed side shorter than head.
4a. Lower eye longer than snout.
Sand dab, *Citharichthys sordidus* (page 123).
4b. Lower eye no longer than snout.
Sand dab, *Citharichthys stigmaeus* (not illustrated).
2b. Ventral fins symmetrical, one on either side of belly ridge.
5a. Lateral line with a high arch over the pectoral fin.
6a. Pectoral fin of the eyed side almost as long as or longer than head.
Fantail sole, *Xystreurys liolepis* (page 126).
6b. Pectoral fin on eyed side little more than half the head length.
7a. Lateral line with a dorsal branch.
Broadfin sole, *Lepidopsetta bilineata* (page 127).
7b. Lateral line without a dorsal branch.
8a. Maxillary reaches below or past hind border of lower eye.
9a. High bony ridge between eyes.
Bigmouth sole, *Hippoglossina stomata* (not illustrated).
9b. Space between eyes flat.
California halibut, *Paralichthys californicus* (page 124).
8b. Maxillary does not reach past middle of lower eye.
Pacific halibut, *Hippoglossus stenolepis* (page 125).
5b. Lateral line slightly curved or nearly straight over pectoral fin.
10a. Lateral line with a dorsal branch (examine both sides of body; it is sometimes difficult to see).
11a. First dorsal rays elongated, not connected by membrane for about half their length. Sand sole, *Psettichthys melanosticus* (page 128).
11b. First dorsal rays not as described above.
12a. Origin of 5 or more dorsal rays on blind side; high bony ridge between eyes.
13a. Origin of dorsal as low as corner of mouth; 9 or more rays on blind side. Curlfin turbot, *Pleuronichthys decurrens* (page 139).
13b. The 5 or 6 rays on the blind side do not extend down as far as the corner of the mouth.
14a. Ridge between eyes high, very sharp-edged; sharp, prominent spines at each end; mouth overhung by blunt spine.
Sharpridge turbot, *Pleuronichthys verticalis* (page 138).
14b. Ridge not as described above.
15a. Front of ridge with 2 short blunt spines.
Spotted turbot, *Pleuronichthys ritteri* (not illustrated).
15b. Spines at front of ridge little if at all developed.
C-O turbot, *Pleuronichthys coenosus* (not illustrated).
12b. Dorsal rays originate on body midline or with 1 or 2 slightly on one side; ridge between eyes moderate or absent.
16a. Body depth excluding fins about half the entire length including the tail. Diamond turbot, *Hypsopsetta guttulata* (page 137).
16b. Depth less than half entire length.
17a. Body and fins with scales.
Scaly-fin sole, *Isopsetta isolepis* (page 129).
17b. No scales on fins; those on body chiefly smooth to the touch.
English sole, *Parophrys vetulus* (page 130).

10b. Lateral line without dorsal branch.
18a. Dorsal and anal fins with alternate black and orange to whitish stripes.
Starry flounder, *Platichthys stellatus* (page 136).
18b. Fins not so marked.
19a. Pectoral fin on eyed side much longer than head.
Rex sole, *Glyptocephalus zachirus* (page 131).
19b. Pectoral fin on eyed side shorter than head.
20a. Gill opening extends well above pectoral base.
21a. Mouth very large, maxillary extending to or beyond hind border of lower eye.
Arrowtooth sole, *Atheresthes stomias* (page 132).
21b. Mouth moderate, maxillary extending to about middle of lower eye.
22a. Scales small, about 30 rows above lateral line.
Petrale sole, *Eopsetta jordani* (page 133).
22b. Scales large, about 20 rows above lateral line.
Slender sole, *Lyopsetta exilis* (page 134).
20b. Gill opening barely extends above pectoral base.
Dover sole, *Microstomus pacificus* (page 135).

DESCRIPTIONS AND ILLUSTRATIONS

FIGURE 3

PACIFIC SARDINE

Sardinops caerulea

Relationship: A true sardine, is belongs to the herring family, Clupeidae, which also includes the Pacific herring and the shad. Several close relatives are native to other parts of the world.

Distinguishing Characters: The single, short dorsal fin near the middle of the back; the absence of scales on the head; the absence of a lateral line; the mouth opening at the tip of the head, neither jaw projecting; the gill cover having low raised ridges running obliquely downward; the breast and belly not being drawn to a sharp, saw-toothed edge, although the scales have spines which can be felt when the finger is moved toward the head. **Length** to about 14 inches. **Color:** Dark green to blue above with many small dark spots, shading into bright silvery on the sides and below. Opalescent reflections above, the silvery part iridescent; a series of round black spots of varying degrees of distinctness often extends backward under the scales.

Distribution: Alaska south into the Gulf of California. Occurs in schools, sometimes mixed with Pacific and jack mackerel.

Fishing Season: Subject to state regulations, throughout the year. Most of the catch is landed during the fall and winter when there are no restrictions on canning or on reduction of specified amounts of whole fish.

Importance: By far the State's leading commercial species in terms of poundage for many years, and, until 1946, the leader in value as well. In 1946, second in value with most of the catch delivered at Los Angeles. Previously, Monterey and San Francisco were of equal or greater importance. Used primarily for canning, and for production of fish meal and oil. Up to 5 percent of the catch is used for dead or live bait (this mostly young fish), particularly by the tuna, mackerel and sport fisheries.

Fishing Gear: Round haul nets, chiefly purse seines. Small quantities are taken in gill nets.

Unauthorized Names: Pilchard, California sardine.

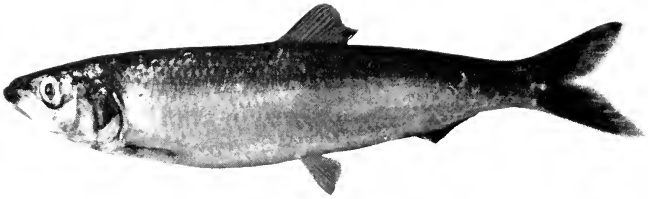


FIGURE 4

PACIFIC HERRING

Clupea pallasii

Relationship: Belongs to the herring family, Clupeidae, as do the Pacific sardine and the shad. Members of this family are found throughout the world and support many important fisheries.

Distinguishing Characters: The single, short dorsal fin near the middle of the back; the absence of scales on the head; the absence of a lateral line; the absence of ridges on the gill cover (separating it from the sardine); the breast and belly with low, sharp points but not drawn to a saw-tooth edge as in the shad. **Length** to about 18 inches. **Color:** Pinkish purple above, becoming silvery on the sides and below; sides without black spots.

Distribution: Alaska at least to the Mexican border; to Japan and China on the Asiatic side. A schooling fish.

Fishing Season: December into the late summer, with the great bulk of the catch landed from January through March. Taken chiefly in Humboldt, Tomales, San Francisco, Monterey and San Diego Bays.

Importance: Supports one of the State's minor fisheries, though it is one of the more important market species in the San Francisco region. Heaviest landings are made at San Francisco, followed by Eureka and Monterey. Most of the catch was sold fresh until 1947, when a considerable quantity was canned in Central California.

Fishing Gear: Gill nets, round haul nets, beach seines.

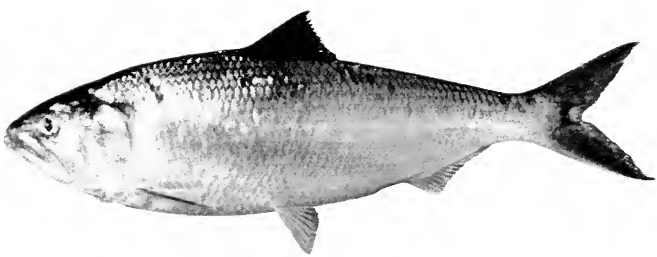


FIGURE 5

SHAD

Alosa sapidissima

Relationship: A member of the herring family, Clupeidae, as are the sardine and the herring. Introduced into California from the Atlantic Coast in 1871.

Distinguishing Characters: The single, short dorsal fin near the middle of the back; the absence of scales on the head; the absence of a lateral line; the deep body, which is drawn to a sharp saw-toothed edge on the breast and belly; the head length being much less than the body depth. **Length** to about 30 inches. **Color:** Deep bluish above, becoming silvery on the sides and below; a number of dark spots run along the back under the scales.

Distribution: Alaska to Southern California, not common south of Monterey Bay. In the Atlantic Ocean, from Newfoundland to Florida. An anadromous fish, ascending rivers to spawn.

Fishing Season: At present (1948) the commercial season extends from March 15th to May 31st, but only in a district comprising part of the upper San Francisco Bay, delta and river area. There is no closed sport season but bag limits are in effect part of the year. Consult fish and game laws.

Importance: A minor commercial species in California. Heaviest landings are made at Pittsburg. Most of the catch is sold fresh, although part is canned or, occasionally, smoked. The roe is sold fresh or canned.

Fishing Gear: Gill or trammel nets are the only legal commercial gear at this time (1948).

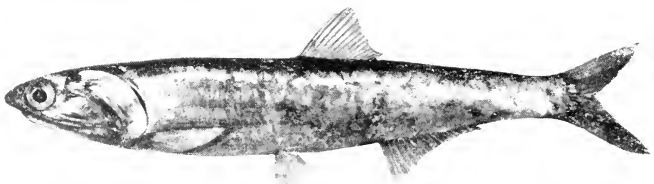


FIGURE 6

NORTHERN ANCHOVY

Engraulis mordax

Relationship: Belongs to the anchovy family, Engraulidae, as do the deep-bodied and slough anchovies. There are two subspecies of this fish. One, *Engraulis mordax mordax*, is found along the entire coast. The other, *Engraulis mordax nanus*, is a smaller, brackish water form found in San Francisco Bay.

Distinguishing Characters: The short single dorsal fin; the lack of a lateral line; the extremely large mouth, the maxillary extending almost to the edge of the gill cover; the head length being greater than the depth of the body (separating it from the deep-bodied and slough anchovies). **Length** to about 7 inches. **Color:** Metallic bluish or greenish above becoming silvery on the sides and belly.

Distribution: British Columbia to Cape San Lucas, Lower California. A schooling fish.

Fishing Season: Throughout the year, the bait fishery reaching a peak in the summer and the market fishery in the fall.

Importance: By far the most valuable of our anchovies, but not the object of a major fishery. Used largely as bait, both live and dead. The bait catch in 1946 was over 5,000,000 pounds compared with about 2,000,000 pounds delivered to the markets. The market catch is sold fresh for the most part though small amounts are salted. It was not canned to any extent until 1947 when considerable quantities were packed, especially at Monterey. Fished chiefly off Southern and Central California.

Fishing Gear: Round haul nets.

Unauthorized Name: California anchovy.

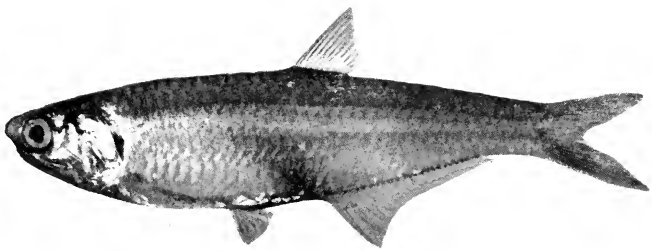


FIGURE 7 Photo by Al Johns for Haden & Carpenter, San Pedro

DEEP-BODIED ANCHOVY

Anchoa compressa

Relationship: A member of the anchovy family, Engraulidae, which includes two other California species, the northern and the slough anchovies.

Distinguishing Characters: The short, single dorsal fin; the lack of a lateral line; the extremely large mouth, the maxillary extending back almost to the edge of the gill cover; the deep, thin body, its depth about equalling the length of the head; the length of the base of the anal fin being much greater than the length of the head (in the slough anchovy, the length of the anal base about equals the head length). **Length** to about 6 inches. **Color:** Pale translucent green, a bright horizontal silvery band extending the length of the body and shading downward on the lower part of the side.

Distribution: Pt. Conception south into Lower California. A schooling fish.

Fishing Season: Not taken in sufficient quantity to show a seasonal trend. As a rule it is taken accidentally with other species.

Importance: Small amounts are used as live bait. Rarely appears in the market catch.

Fishing Gear: Round haul nets.

Unauthorized Name: Sprat.

PACIFIC SALMONS

Members of Genus *Oncorhynchus*

There are six species of Pacific salmon, five of them native to the northeast Pacific Ocean. Two of them, the **king** and **silver salmons,** are common in California and are described in more detail below. Two others, the **red** and the **chum salmons,** are rare visitors to our waters. The fifth species, the **pink salmon,** spawns irregularly in some Mendocino County streams but is of very minor importance both as a commercial and as a game fish in this State.

All the salmons are anadromous—that is, they spend part of their life in the ocean and then enter fresh water to spawn. During the time that these fish are in streams on their spawning migration, they undergo great changes in appearance and color. The changes are so pronounced that some people believe that the mature fish are not the same species as are found in the ocean. After spawning, Pacific salmon invariably die, differing in this respect from the trouts described on page 37.

KING SALMON

Oncorhynchus tshawytscha

Relationship: A member of the salmon and trout family, Salmonidae, as are the trouts and the other species of Pacific salmon.

Distinguishing Characters: The presence of an adipose fin; the dorsal fin composed of soft rays; the scaly appendage above the base of each ventral fin; there being less than 30 gill rakers on the first arch, about 135-155 oblique rows of scales crossing the lateral line, normally from 140-185 pyloric caeca (extreme recorded range 93-214), and 15 to 19 rays in the anal fin (the last ray is often branched at the base but is counted as one). The red salmon has more gill rakers, the pink salmon more oblique rows of scales, the silver salmon fewer pyloric caeca, while the chum salmon usually and the trouts always have fewer anal rays. These fish change greatly in appearance after they enter fresh water and become sexually mature. Figure 8 shows an ocean fish, a mature male, and a mature female. Reaches a maximum **weight** of over 100 pounds, but specimens over 50 pounds are uncommon and Sacramento River fish average only about 20 pounds. Mature fish, nearly always males, weighing as little as three or four pounds are common and are not unknown under a pound. **Color:** At sea: bluish to dark gray above becoming silvery on the sides and belly; black spots on the back and both lobes of the tail. Mature fish in streams: blackish with dark coloration on the sides of the head; the males, especially the larger fish, with dull red blotches.

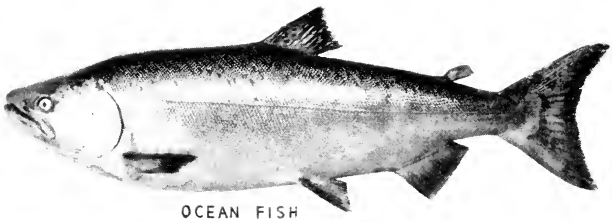
Distribution: At sea, from Southern California to Alaska and south on the Asiatic side to the Amur River on the mainland and Japan; rare in Southern California. Enters large streams to spawn; it is the only species of salmon in the Sacramento-San Joaquin system. Rarely enters streams south of San Francisco Bay.

Fishing Season: Consult fish and game laws for both commercial and sport regulations. Varies by districts.

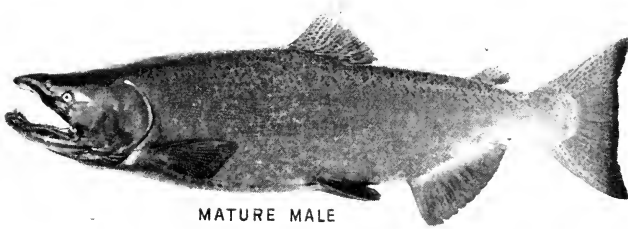
Importance: California's ninth fishery in poundage and fifth in value in 1946. (Catch figures include the silver salmon, which forms the smaller proportion of the catch). Once the leading fishery of the State and still one of the most important in Central and Northern California. The bulk of the catch is sold fresh, the balance being smoked, salted, cured or canned. One of our most desirable game fishes.

Fishing Gear: Trolling in the ocean; gill and trammel nets in part of the Sacramento-San Joaquin River system. Consult fish and game regulations. Sportsmen troll or use hook and line with various lures and baits.

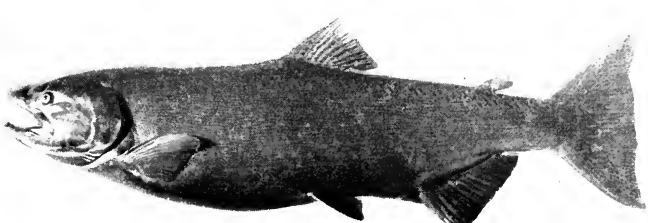
Unauthorized Names: Chinook salmon, quinnat salmon, tyee salmon, spring salmon, black salmon, dog salmon, chub salmon, silver salmon, hookbill, Sacramento River salmon, Columbia River salmon.



OCEAN FISH



MATURE MALE



MATURE FEMALE

FIGURE 8 Lower photos by D. H. Fry, Jr.

KING SALMON

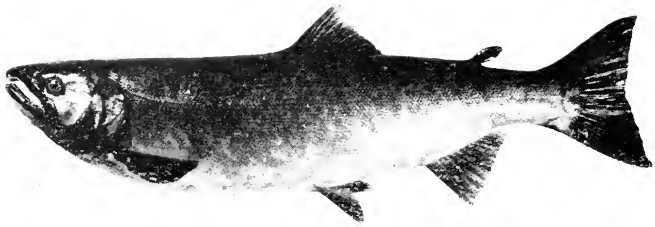


FIGURE 9

SILVER SALMON

Oncorhynchus kisutch

Relationship: A member of the salmon and trout family, Salmonidae, as are the trouts and the four other species of Northeast Pacific salmon, all of which have been taken in California.

Distinguishing Characters: The presence of an adipose fin; the dorsal fin composed of soft rays; the scaly appendage above the base of each ventral fin; the first arch with 19-25 gill rakers, (separating it from the red salmon which has 30 or more); the pyloric caeca numbering 45-83 (separating it from the king, pink, and chum salmons which have at least 93); the 13 or 14 (rarely 12, 15, 16, 17) anal rays (separating it from the trouts with normally 12 or fewer). Like the king salmon, these fish change in appearance when they enter fresh water and become mature. Reaches a maximum weight of 30 pounds but individuals over 15 pounds are rare. **Color:** At sea, metallic blue or blue green above becoming silvery on the sides and belly; small dark spots on the back, dorsal fin and upper lobe of the caudal fin. Mature males become mostly brick red and mature females a dull bronze.

Distribution: At sea from at least the Coronado Islands, Mexico, north to Alaska and south on the Asiatic side to Japan. Rare south of Monterey. Spawns in rivers and streams from Monterey Bay north but does not enter the Sacramento-San Joaquin system.

Fishing Season: Consult fish and game regulations. Varies by district.

Importance: Forms the smaller, but nevertheless sometimes important, part of the commercial salmon catch. A very desirable sport fish.

Fishing Gear: Troll lines. Sportsmen troll or use hook and line.

Unauthorized Names: Coho salmon, dog salmon, hookbill, silversides, jack salmon.

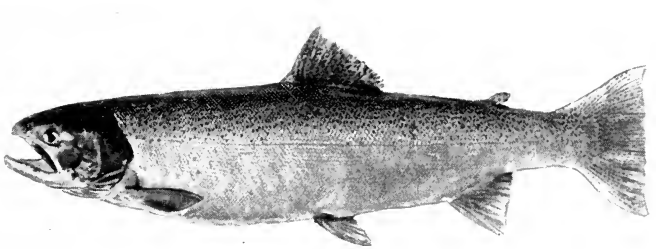


FIGURE 10 Photo by D. H. Fry, Jr.

STEELHEAD RAINBOW TROUT

Salmo gairdnerii

Relationship: A member of the salmon and trout family, Salmonidae. One of a closely related group of trouts the natural relationships of which have been greatly obscured in the course of fish cultural operations. Some individuals run to sea while others appear to form resident stream populations.

Distinguishing Characters: The presence of an adipose fin; the single dorsal fin composed of soft rays; the scaly appendage above the base of each ventral fin; a patch of teeth at the tip of the tongue but none on the back of the tongue; the relatively short anal fin with 9 to 12, rarely 13, rays (the last ray is often branched at the base but is counted as one); the white lining of the mouth. The salmons have 13 (rarely 12) or more anal rays and as adults at least some dark patches in the mouth. Reaches a maximum **weight** of about 30 pounds, though specimens of 20 pounds are rare and the average fish runs under 10 pounds. **Color:** At sea, steel blue above with bright silvery sides, usually with definite black spots on the head, body and unpaired fins. Gradually assumes the coloration of a stream rainbow trout after entering fresh water.

Distribution: From Alaska south at least to the Mexican border. Enters practically all suitable California coastal streams to spawn (the steelhead, unlike the Pacific salmons, does not die after spawning).

Fishing Season: Illegal to take commercially. Consult fish and game regulations for the sport season, which varies in different parts of the State.

Importance: A highly esteemed game fish, but not sought to any extent in the ocean. Steelhead caught commercially in other states may be sold in California subject to the rules of the Fish and Game Commission.

Fishing Gear: Hook and line with various baits and lures.

Unauthorized Names: Salmon trout, half pounder, summer salmon, hardhead.

CUTTHROAT TROUT

This species, *Salmo clarkii*, also has a sea run form, which is not as widely distributed in California as is the steelhead rainbow. It is found in many of our inland waters but occurs in the ocean only off the northern part of the State, entering the streams of Del Norte and Humboldt Counties. The cutthroat usually but not always has a red dash under each side of the lower jaw and has teeth on the back of the tongue as well as at its tip.

FIGURE 11 Photo by Al Johns for Vernon M. Haden, San Pedro

SAURY

Cololabis saira

Relationship: The only member of the saury family, Scomberesocidae, found in the Pacific.

Distinguishing Characters: The dorsal and anal fins set far back on the body, each followed by a series of finlets; the small ventral fins which are well back of the pectorals, almost midway between snout and tip of tail. **Length** generally under 10 inches; reported to reach 14 inches. **Color:** Deep blue to dark green above; sides silvery, the scales tipped with blue or green; belly silvery; base of pectoral bright blue; fins colorless except that the rays are dark on the dorsal and caudal.

Distribution: A schooling fish of the open ocean found from Lower California to Alaska and south off Asia to Japan.

Fishing Season: Not the object of a fishery at the present time.

Importance: None. A small amount was canned experimentally at Monterey in 1947.

Fishing Gear: Occasionally taken in round haul nets.

Unauthorized Names: Skipper, garfish.

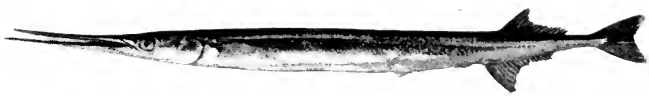


FIGURE 12

CALIFORNIA NEEDLEFISH

Tylosurus exilis

Relationship: The only member of the needlefish family, Belonidae, found in California.

Distinguishing Characters: The dorsal and anal fins set well back on the body; the narrow jaws which are greatly prolonged into a snipe-like beak; the slender, almost round body; the ventral fins placed far behind the pectorals. **Length** to about three feet. **Color:** Green above becoming silvery below; a bluish band runs horizontally along the side of the body.

Distribution: Central California south at least to Cedros Island, central Lower California. Reported only twice from north of Pt. Conception, once in Monterey Bay and once off San Francisco.

Fishing Season: Taken throughout the year but not in sufficient quantity to show any seasonal trends.

Importance: Of no importance as either a commercial or a game fish, it is caught only accidentally.

Fishing Gear: Incidentally in round haul nets or on hook and line.

Unauthorized Names: Garfish, billfish.

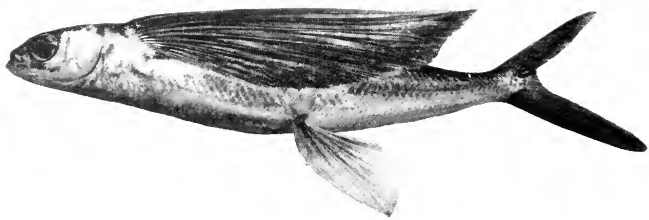


FIGURE 13

CALIFORNIA FLYING FISH

Cypselurus californicus

Relationship: A member of the flying fish family, Exocoetidae, of which it is the common California representative.

Distinguishing Characters: The single dorsal fin; the greatly enlarged wing-like pectoral fins. **Length** to about 18 inches. **Color:** Deep blue on the back and sides becoming abruptly silvery on the belly.

Distribution: Pt. Conception south perhaps as far as Cape San Lucas, Lower California. Found in schools.

Fishing Season: Taken mostly in the late spring and summer.

Importance: Very small quantities are delivered to the Los Angeles fresh fish markets. Used to some extent as bait for swordfish, marlin and tuna.

Fishing Gear: Gill nets, round haul nets.

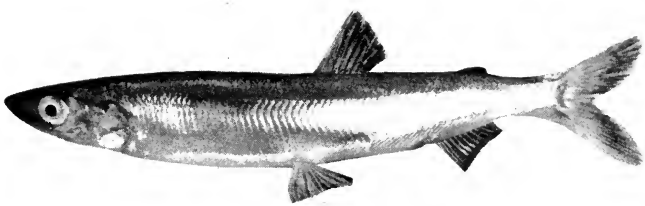


FIGURE 14

WHITEBAIT

Members of Family Osmeridae

Relationship: Several members of the true smelt family, Osmeridae, are found in California. All of them are called "whitebait" when they are small (as are the young of some other fishes) but two species comprise the bulk of the catch. These are *Spirinchus starksi* and *Allosmerus attenuatus* (illustrated above). The smelts are unusually difficult to distinguish as separate species. Another true smelt, the surf smelt, is shown on page 42.

Distinguishing Characters: The small adipose fin; the single dorsal fin composed of soft rays; the absence of a scaly appendage above the base of the ventral fin. *Allosmerus* has a few canine-like teeth on the vomer and 15 to 17 anal rays. *Spirinchus* has a number of smaller, evenly uniserial teeth which are not canine-like on the vomer, and pectoral fins which are shorter than the head. Both have rather large mouths, the maxillary reaching at least to the back edge of the pupil. **Length** to about 9 inches. **Color:** Pale greenish, almost colorless, a silvery stripe along the side.

Distribution: Varies with the species. *Spirinchus* is found from Monterey Bay north into Washington and *Allosmerus* from San Francisco Bay to the Straits of Juan de Fuca.

Fishing Season: Throughout the year with maximum landings in the spring and summer.

Importance: The total "whitebait" catch is of minor significance. *Spirinchus* is the most important constituent though *Allosmerus* also enters the catch in considerable quantity. Small amounts of young fish of other species comprise the balance. Landed chiefly in the Eureka region and sold entirely in the fresh fish markets. Used to some extent as bait by commercial and sport fishermen.

Fishing Gear: Taken in the surf both commercially and by sportsmen with dip nets or small hand seines.

Unauthorized Names: Smelt, surf smelt, frittura, small fry, perlin.

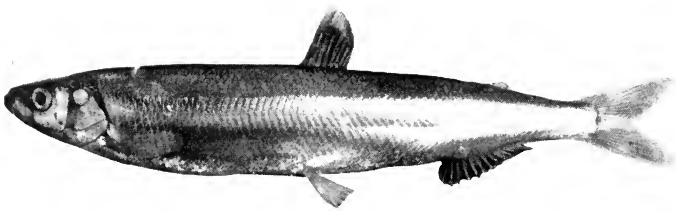


FIGURE 15

SURF SMELT

Hypomesus pretiosus

Relationship: A member of the true smelt family, Osmeridae. Several other species occur in California. (*See* page 41.)

Distinguishing Characters: The small adipose fin; the dorsal fin composed of soft rays; the absence of scales on the head; the absence of a scaly appendage above the base of the ventral fin; the minute teeth; the maxillary not reaching beyond the middle of the pupil. **Length** to about 10 inches. **Color:** Pale greenish, becoming silvery on the sides and below.

Distribution: Central California northward to southern Alaska.

Fishing Season: Caught throughout the year, with larger landings during the summer.

Importance: A minor commercial species. The true smelts comprise about 10-15 percent of the State "smelt" catch and are landed chiefly at San Francisco. The young of this species are taken to some extent and form a portion of the "whitebait" catch. Used as bait by commercial and sport fishermen.

Fishing Gear: Small round haul nets, gill nets. Caught in the surf with dip nets or small hand seines.

Unauthorized Names: Surf fish, nightfish, perlin, silver smelt.

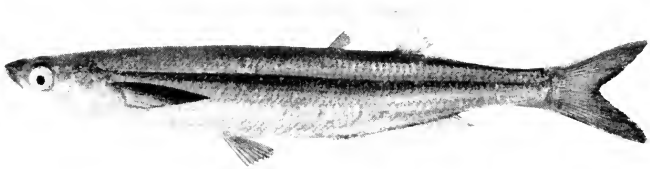


FIGURE 16

GRUNION

Leuresthes tenuis

Relationship: A member of the silverside family, Atherinidae, as are the jack and top smelts.

Distinguishing Characters: The lack of the lateral line; the silvery stripe along the side; the two separate dorsal fins, the first composed of weak spines, the second of soft rays; the single spine at the front of the anal fin; the absence of teeth in the mouth (separating it from the jack and top smelts); the capability of the front of the upper jaw (premaxillary) of being drawn out for a considerable distance to form a tube; the front of the first dorsal fin being back of the vent. **Length** to about 7 inches. **Color:** Green or grayish green above, silvery below; a bright silvery band tinged with blue and bordered above with violet extends the length of the body.

Distribution: Central California to central Lower California; uncommon north of Pt. Conception. Comes on the beaches to spawn during the high tides at the full and dark of the moon from March through August.

Fishing Season: Taken irregularly by commercial fishermen. Currently (1948) may not be taken during April and May. Consult fish and game laws.

Importance: Of minor commercial significance, it forms perhaps 2 percent of the statewide "smelt" catch. Because of its remarkable spawning habits, it is of great interest to amateur fishermen, who catch large numbers on the beaches during the open portion of the spawning season.

Fishing Gear: Round haul nets. Illegal to catch in the surf or on the beach except with the hands.

Unauthorized Names: Smelt, little smelt, least smelt.

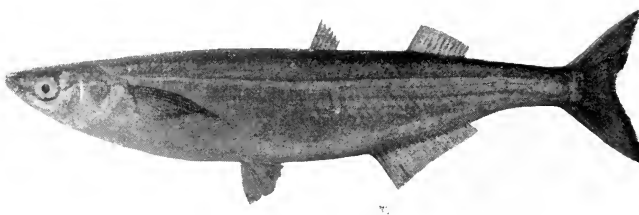


FIGURE 17

JACK SMELT

Atherinopsis californiensis

Relationship: A member of the silverside family, Atherinidae, together with the top smelt and the grunion. Not a true smelt (*see* pages 41 and 42).

Distinguishing Characters: The absence of a lateral line; the silvery stripe along the side; the two small separate dorsal fins, the first composed of weak spines, the second of soft rays; the single spine at the front of the anal fin; the small unforked teeth set in bands (separating it from the top smelt and grunion); the front of the spiny dorsal fin being in front of the vent; the even jaws. **Length** to about 18 inches. **Color:** Grayish green to green above, with a bluish tinge; the sides and belly silvery; a metallic band tinged with blue and edged above with bright blue extends the length of the body.

Distribution: Northern Oregon to central Lower California. Occurs in schools, often with top smelt. Usually found within a few miles of shore.

Fishing Season: Throughout the year.

Importance: The leading commercial species, forming about 70 percent of the State's "smelt" catch. Heaviest landings are made at San Francisco, where it comprises about 40 percent of the total "smelt" catch, followed by Monterey and Los Angeles where it makes up about three-fourths of the catch. (These percentages are from a survey made in 1935.) Sold entirely in the fresh fish markets. Used in very small quantities as live bait.

Fishing Gear: Lampara nets, gill nets, circle gill nets. Sport, with baited hooks or with snag lines after chumming heavily.

Unauthorized Names: Smelt, silverside, California smelt, horse smelt, blue smelt.

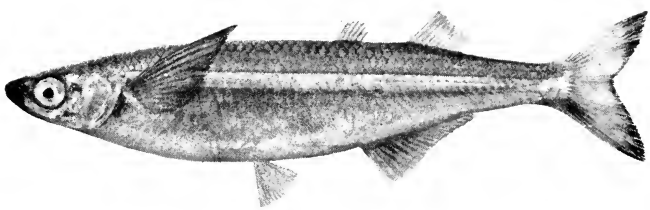


FIGURE 18

TOP SMELT

Atherinops affinis

Relationship: A member of the silverside family, Atherinidae, which also includes the grunion and jack smelt. Several subspecies are recognized. Not a true smelt.

Distinguishing Characters: The absence of a lateral line; the silvery stripe along the side; the two separate dorsal fins, the first composed of weak spines, the second of rays; the single spine at the front of the anal fin; the tip of the upper jaw projecting very slightly over the tip of the lower; the forked teeth set in a single band in the jaws (separating it from the jack smelt and the grunion); the front of the first dorsal fin being over the vent. **Length** to about 12 inches. **Color:** Blue-gray to clear green above, becoming silvery below; a bright silver band bordered above with bright blue or purple extends the length of the body.

Distribution: Northern Oregon south at least to Magdalena Bay, Lower California. A schooling fish, often in company with jack smelt.

Fishing Season: Throughout the year.

Importance: A minor commercial species, it forms about 15 percent of the state-wide and 40 percent of the San Francisco "smelt" catch according to a survey made in 1935.

Fishing Gear: Lampara nets, gill nets, circle gill nets. Sport, with baited hooks or with snag lines after heavy chumming.

Unauthorized Names: Smelt, little smelt, least smelt, rainbow smelt, bay smelt.

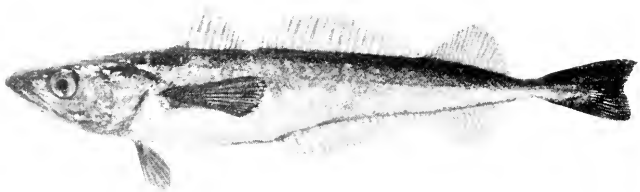


FIGURE 19

HAKE

Merluccius productus

Relationship: The only member of the hake family, Merlucciidae, found on our coast.

Distinguishing Characters: The two separate dorsal fins, the first short and composed of spines; the long second dorsal and anal fins which are deeply notched toward the tail; the large mouth, the lower jaw protruding; the lack of a barbel on the lower jaw; the loosely-attached scales. **Length** to about three feet. **Color:** Metallic blackish or silvery gray above shading to silvery below; lining of mouth and opercles black.

Distribution: Alaska south and into the Gulf of California.

Fishing Season: Not taken in sufficient quantity to show a seasonal trend.

Importance: Of negligible commercial importance. Landed almost entirely in Northern and Central California and sold fresh. Not liked by sportsmen.

Fishing Gear: Trawl nets, hook and line.

Unauthorized Names: Whitefish, haddock, butterfish, mellusa, melusette.

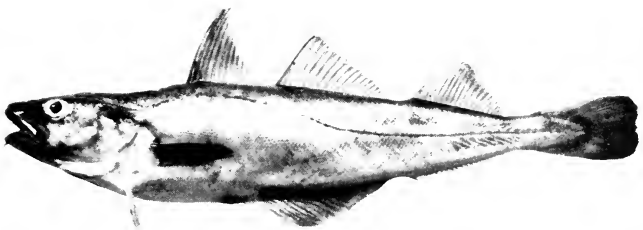


FIGURE 20

TOMCOD

Microgadus proximus

Relationship: The only species of the codfish family, Gadidae, caught commercially on the California coast. The larger codfish of northern seas, the pollack and the haddock, belong to the same family.

Distinguishing Characters: The three separate dorsal fins and two separate anal fins; the upper jaw extending beyond the lower; the barbel under the tip of the lower jaw. **Length** to about a foot. **Color:** Olive or brownish above becoming white or silvery on the sides and belly; fins dusky.

Distribution: Central California to Alaska.

Fishing Season: No seasonal trend shown by the extremely small landings.

Importance: Of no commercial importance, the total landings from 1941 through 1946 being under a ton. A minor game fish in Central California; esteemed as a food fish by some sportsmen.

Fishing Gear: Drag nets; hook and line.

Unauthorized Name: Piciata.

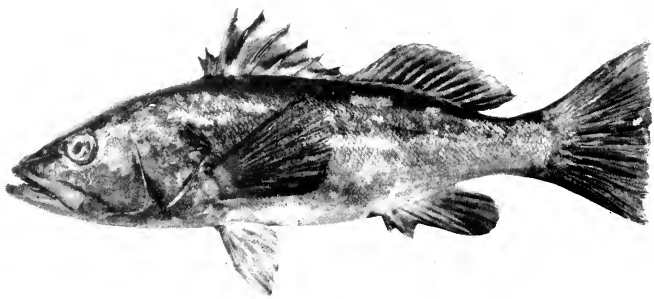


FIGURE 21

KELP BASS

Paralabrax clathratus

Relationship: A member of the sea bass family, Serranidae, together with the black sea bass, striped bass, sand bass and spotted sand bass.

Distinguishing Characters: The deep notch between the spiny and soft portions of the dorsal fin; the longest dorsal spines being longer than the soft rays; the third and fourth dorsal spines of about the same length (separating it from the sand and spotted sand bass); the three spines at the front of the anal fin; the presence of vomerine teeth. **Length** to about 20 inches. **Color:** Dark gray, brownish, or greenish gray above, the upper part of the side mottled and barred with broad blotches of brownish or dark gray; lower part of the sides and underparts silvery tinged with yellow; fins tinged with yellow.

Distribution: Central California to Cape San Lucas, most abundant around kelp beds. Uncommon north of Pt. Conception.

Fishing Season: Throughout the year with heaviest landings usually in the summer. Part of the catch is made in Mexican waters.

Importance: A minor commercial species, it forms the bulk of the "rock bass" catch. Landed chiefly at Los Angeles, followed by San Diego and Santa Barbara. One of the more important market fishes in Southern California. It is a very desirable game species, and is taken in large numbers by sportsmen. The sport catch of "rock bass" was more than double the commercial in 1946 and only the barracuda sport catch equalled it in number of fish caught.

Fishing Gear: Chiefly hook and line; also entangling nets, round haul nets. Most of the sport catch is made using live bait.

Unauthorized Names: Rock bass, sand bass, cabrilla.

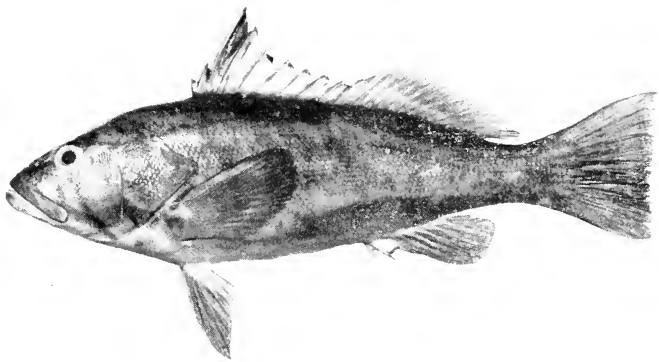


FIGURE 22 Photo by Al Johns for Haden & Carpenter, San Pedro

SAND BASS

Paralabrax nebulifer

Relationship: A member of the sea bass family, Serranidae, as are the black sea bass, striped bass, kelp bass and spotted sand bass.

Distinguishing Characters: The broadly connected spiny and soft portions of the dorsal fin, the third dorsal spine which is conspicuously longer than the rest (separating it from the kelp bass); the three spines at the front of the anal fin; the presence of teeth on the vomer; about 70 scales in a row along the lateral line. **Length** to about 20 inches. **Color:** Greenish gray, with traces of irregular vertical dusky bands on the side of the body; under parts white or pale gray; cheek and region below the eye with small round golden or yellowish brown spots, which fade as the fish grows older.

Distribution: Central California to Magdalena Bay, Lower California; not common north of Pt. Conception. Found mostly over a sandy bottom or in bays.

Fishing Season: Throughout the year, reaching a peak in the summer.

Importance: Of slight significance commercially, it makes up a small proportion of the "rock bass" catch. A desirable sport species but of less importance than is the kelp bass.

Fishing Gear: Chiefly hook and line; also entangling nets, round haul nets.

Unauthorized Names: Rock bass, kelp bass, Johnny verde.

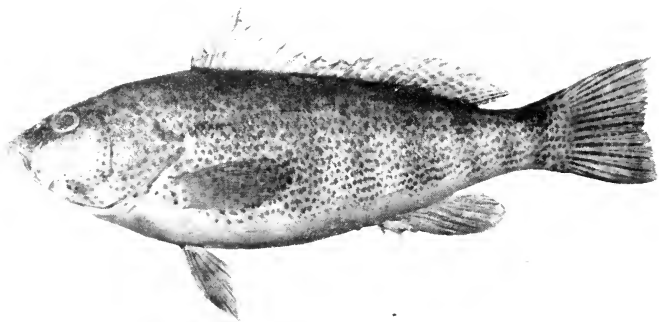


FIGURE 23 Photo by Al Johns for Haden & Carpenter, San Pedro

SPOTTED SAND BASS

Paralabrax maculato-fasciatus

Relationship: A member of the sea bass family, Serranidae, as are the black sea bass, striped bass, kelp bass and sand bass.

Distinguishing Characters: The spiny and soft portions of the dorsal fin being connected, with the third spine appreciably longer than the rest; the three spines at the front of the anal fin; the presence of vomerine teeth; the presence of about 90 scales in a row along the lateral line; the small brownish spots which cover the head, fins, and body except for the belly (separating it from the sand and kelp basses). **Length** to about 18 inches. **Color:** Greenish or olive brown above becoming whitish below; 6 or 7 vague dusky bars extend down the sides from the back, and a dark streak runs down and back across the cheek from the eye. Spotted as described above.

Distribution: Southern California south to Mazatlan, Mexico and into the Gulf of California. Most common in bays and lagoons.

Fishing Season: Not take in sufficient quantity to show a seasonal trend.

Importance: Of no commercial importance. Caught occasionally by sportsmen.

Fishing Gear: Hook and line.

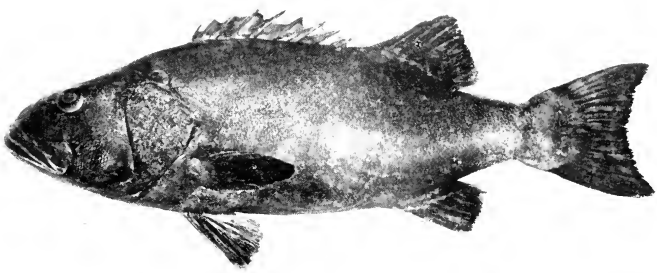


FIGURE 24 Photo by Al Johns for Vernon M. Haden, San Pedro

BLACK SEA BASS
Stereolepis gigas

Relationship: Belongs to the sea bass family, Serranidae, as do the striped, kelp, sand and spotted sand basses.

Distinguishing Characters: The two dorsal fins with more spines (normally 11) than rays (normally 10); the dorsal spines shorter than the dorsal rays in the adult; the pectoral fins reaching beyond the ventral fins in the adult; the presence of teeth on the vomer. **Length** to seven feet or more and weight to 500 or 600 pounds. **Color:** Dark brown to blackish above, somewhat paler below. **Young:** The young are very different in both shape and color. In specimens about an inch long the spiny dorsal is higher than the soft, the body is nearly as deep as it is long, and the ventrals are longer than the pectorals. The body is brick red with distinct brownish or blackish spots. As the fish grows it gradually takes on the typical adult appearance.

Distribution: Central California at the Farallon Islands south to Magdalena Bay, Lower California. Uncommon north of Pt. Conception. A bottom fish usually found close to shore.

Fishing Season: Throughout the year.

Importance: A minor Southern California market species. The great bulk of the catch is made in Lower California waters with heaviest landings at Los Angeles. A popular game fish.

Fishing Gear: Hook and line; set lines.

Unauthorized Names: Jewfish, giant bass.

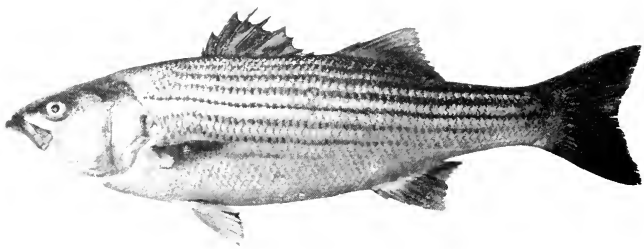


FIGURE 25

STRIPED BASS

Roccus saxatilis

Relationship: A member of the sea bass family, Serranidae, which includes the black sea bass and the kelp, sand, and spotted sand basses. Introduced from the Atlantic coast in 1879.

Distinguishing Characters: The two dorsal fins; the three spines in front of the anal fin; the presence of vomerine teeth; the series of seven or eight horizontal blackish stripes along the sides; the pectoral fins not reaching back beyond the tips of the ventrals; the relatively small eye which is much less than one-third as long as the head. (The latter two characters separate the striped bass from the big-eye bass with which it is sometimes confused in Southern California). **Weight** to over 60 pounds in California, but averages 10 pounds or less. **Color:** Striped as described above; steel blue to olive-green above becoming silvery on the sides and belly; everywhere with brassy reflections.

Distribution: Southern California to the Columbia River; uncommon south of Monterey Bay. In the Atlantic Ocean from the Gulf of St. Lawrence to the Gulf of Mexico. Ascends streams to spawn.

Fishing Season: Sport, throughout the year, subject to bag and size limits. Closed to commercial fishing since 1935. Consult fish and game regulations.

Importance: An extremely popular sport fish in Central California.

Fishing Gear: Hook and line.

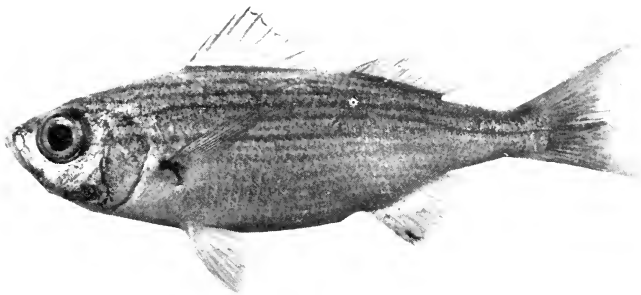


FIGURE 26 Photo by Al Johns for Haden & Carpenter, San Pedro

BIG-EYE BASS

Xenistius californiensis

Relationship: The only member of family Xenichthyidae found in California. Not a true bass.

Distinguishing Characters: The two dorsal fins; the three spines in front of the anal fin; the series of six to eight orange brown horizontal stripes on the sides; the pectoral fins reaching back past the tips of the ventral fins; the very large eye which is almost equal to one-third of the length of the head (the last two characters separate it from the striped bass with which it is sometimes confused in Southern California). **Length** to about a foot. **Color:** Blue to green with iridescent reflections above, become silvery on the sides and belly; striped as described above; tail fin orange brown, ventrals white, other fins tinged with orange brown.

Distribution: Southern California south along the Mexican coast and into the Gulf of California. Recorded once from Monterey Bay.

Fishing Season: Taken irregularly by sportsmen, chiefly in the spring and summer.

Importance: Not fished commercially. A minor game fish, caught mostly off San Diego County.

Fishing Gear: Hook and line.

FIGURE 27

MULLET

Mugil cephalus

Relationship: The only member of the mullet family, Mugilidae, found in California.

Distinguishing Characters: The two well-separated dorsal fins, the first composed usually of four slender spines; the minute teeth; the absence of a lateral line; the very broad space between the eyes which is almost one-half the length of the head; the large scales. **Length** to about 2½ feet. **Color:** Deep olive-gray on the back becoming silvery on the sides and belly; distinct dark stripes along each row of scales on the sides and back.

Distribution: Warm seas throughout the world; from Central California to Chile on our coast. Not common north of Los Angeles County. A schooling fish, usually found in bays and lagoons along the coast; also occurs in the lower Colorado River and the Salton Sea.

Fishing Season: Throughout the year in the ocean. Taken commercially only under permit at specified times in the Salton Sea.

Importance: A good food fish but not the object of a heavy fishery in California.

Fishing Gear: Beach seines, gill nets, dip nets. Contrary to popular belief, they can be taken on a fly rod with either bait or a fly.

FIGURE 28

BARRACUDA

Sphyraena argentea

Relationship: The only member of the barracuda family, Sphyraenidae, found in California waters.

Distinguishing Characters: The slender, cigar-shaped body; the pointed lower jaw which extends beyond the upper; the strong, unequal teeth; the two well-separated dorsal fins, the first composed of spines, the second of one spine and soft rays; the presence of a lateral line. **Length** to about four feet and weight to 10 or 12 pounds. **Color:** Brownish with a blue tinge to metallic blackish gray above; silvery to whitish on the sides and underparts; tail yellowish.

Distribution: Alaska south into the Gulf of California but not common north of Pt. Conception. Occurs in schools.

Fishing Season: Reaches a peak in Southern California during the spring and summer, falling off to almost nothing in the winter. Taken throughout the year in Mexico with lightest landings during the California season. About half of the 1946 commercial catch was made in Mexico.

Importance: One of the most important market species at Los Angeles and San Diego. Sixteenth in both price and volume among the State's commercial fishes in 1946. Sold fresh almost exclusively; small amounts are occasionally smoked or canned. One of our most desirable game fishes; it was the leading Southern California sport species in total poundage and about equal to "rock bass" in total numbers caught in 1946. The reported sport catch exceeded the commercial in California waters.

Fishing Gear: Gill nets, poles and live bait, troll lines. Illegal to take in round haul nets in California; purse seines are used in Mexican waters. Sportsmen usually fish with live bait from boats and from barges and piers. Also caught by jigging or trolling with feather or bone jigs and with plugs.

Unauthorized Names: Scoots, scooters, snake.

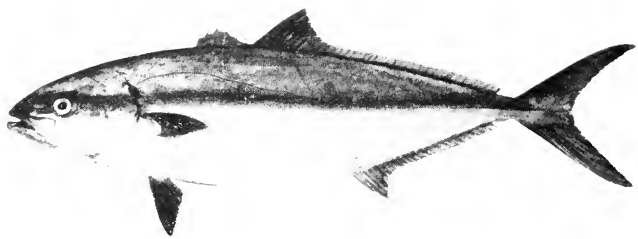


FIGURE 29

YELLOWTAIL

Seriola dorsalis

Relationship: A member of the jack family, Carangidae, which includes the jack mackerel, the scad and many tropical species as well.

Distinguishing Characters: The two dorsal fins, the first composed of spines which are less than half the height of the first soft rays; the blunt low keel on either side of the caudal peduncle; the absence of shields along the lateral line. **Weight** in California generally under 15 pounds; a record specimen from Guadalupe Island, Mexico, weighed 80 pounds and was nearly five feet long. **Color:** Metallic blue to green above, a brassy horizontal stripe along the sides from eye to tail; silvery below.

Distribution: Central California south along the Mexican coast and into the Gulf of California. Rare north of Pt. Conception. A schooling fish.

Fishing Season: Throughout the year, with the great bulk of the catch taken in Mexican waters. Most abundant in California in the summer and early fall.

Importance: California's fifteenth fishery in volume and seventeenth in value in 1946. Landed chiefly at Los Angeles and San Diego. Most of the Mexican catch is canned. A very popular game fish.

Fishing Gear: In California, both commercial and sport fishermen use hook and line, generally with live bait. Round haul nets are illegal in California but most of the Mexican catch is taken in purse seines.

Unauthorized Name: Amberjack.

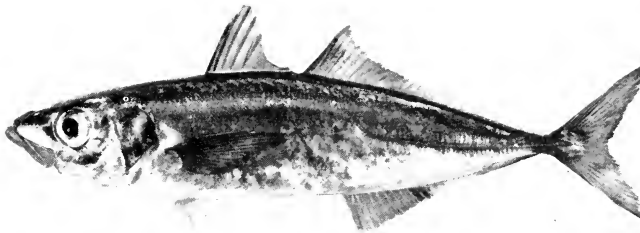


FIGURE 30

JACK MACKEREL

Trachurus symmetricus

Relationship: A member of the jack family, Carangidae, which also includes the yellowtail and the scad. Not a true mackerel.

Distinguishing Characters: The two dorsal fins which are close together and about the same height; the bony shields along the entire length of the lateral line which bends down abruptly just above the vent; the lack of a distinctly separate finlet after the dorsal and anal fins. (The scad has a separate finlet after the dorsal and anal fins. It is not common in California.) **Length:** There is a record of a specimen 22 inches long which weighed four pounds. **Color:** Iridescent green above, sometimes with a bluish luster, often mottled with lighter and darker shades; silvery on the sides and belly.

Distribution: Northern California south at least into Mexican waters. Has been reported from the Galapagos Islands and Chile but these records are now thought to refer to another species. Uncommon in Northern California. A schooling fish, often occurring with Pacific mackerel or sardines.

Fishing Season: Throughout the year, but with maximum landings during the fall and winter.

Importance: Not the object of an intensive fishery until 1947. In previous years, it was taken incidentally, for the most part, by the sardine purse seine fleet. Ranked eighth in poundage but only eighteenth in value among our fisheries in 1946, when somewhat over half the catch was delivered at Los Angeles and the balance at Monterey. Prior to 1946 and again in 1947 nearly all the catch was made in Southern California waters. Used almost entirely for canning.

Fishing Gear: Round haul nets, chiefly purse seines, and accidentally on lines or in scoops. Occasionally taken by sportsmen.

Unauthorized Names: Horse mackerel, Spanish mackerel, jackfish, saurel.

FIGURE 31

PACIFIC MACKEREL

Pneumatophorus diego

Relationship: The only member of the mackerel family, Scombridae, in California waters. Very similar species are found in other parts of the world.

Distinguishing Characters: The five (sometimes four or six) finlets which follow the second dorsal and anal fins; the rather high first dorsal fin which is separated widely from the much lower second dorsal; the small scales which are easily lost; the two very small keels on each side of the tail; the series of about 30 wavy dark streaks which run vertically down the back to just below the lateral line. **Length:** Usually under 20 inches, though there is record of a 25-inch specimen which weighed over 6¼ pounds. **Color:** Dark green to blue above with metallic reflections, shading into iridescent silvery on the sides and below; wavy bars as described above.

Distribution: Gulf of Alaska southward to Cape San Lucas and into the Gulf of California. Not common north of Monterey Bay. Occurs in large schools, sometimes mixed with sardines or jack mackerel.

Fishing Season: Taken throughout the year with the bulk of the catch landed from September through December.

Importance: California's third fishery in volume and eighth in value in 1946. Used almost entirely for canning. Most of the catch is delivered at Los Angeles Harbor and at Newport Beach. Not considered a desirable game fish, though large numbers are caught by Southern California sportsmen; it ranked fifth in number caught and sixth in weight among the State's ocean sport fisheries in 1946.

Fishing Gear: Mackerel scoops, round haul nets; small quantities with striker poles, set lines, hook and line, gill nets. Will strike on all types of baits and lures.

Unauthorized Names: Blue mackerel, greenback mackerel, striped mackerel, American mackerel.

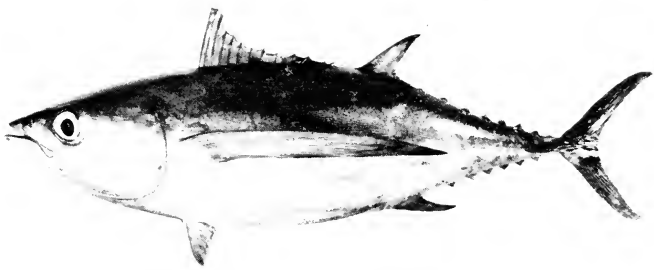


FIGURE 32

ALBACORE

Thunnus germo

Relationship: Belongs to the tuna family, Thunnidae, as do the bluefin and yellowfin tunas.*

Distinguishing Characters: The seven or eight finlets following both the second dorsal and anal fins; the very long pectoral fins which extend beyond the front of the anal fin; the round vent; the back and lower edges of the preopercle meeting at an angle; the entire ventral surface of the liver striated with blood vessels. Said to reach a **weight** of 80 pounds, though fish in the commercial catch usually weigh less than 40 pounds. The elongated pectoral differentiates the albacore from the bluefin and, generally, the yellowfin tuna. Further, the yellowfin has an oval vent and an unmarked liver. **Color:** Dark steel blue above, silvery on the sides and underparts.

Distribution: From Alaska to Central Lower California, and through the temperate Pacific to Hawaii and Japan. A schooling fish.

Fishing Season: Chiefly from July through September.

Importance: Considered the best of the tunas for canning and the only one which can be labeled "white meat tuna." The State's seventh fishery in volume and fourth in value in 1946. Landed mostly at Los Angeles and San Diego. First in general popularity among Southern California sportsmen and fourth in their total catch (poundage) in 1946.

Fishing Gear: Hook and line with live bait, feather jigs; troll lines with feather or bone lures. Most of the sport catch is taken with live bait.

Unauthorized Name: Long-finned tuna.

* The big-eye tuna, **Paranthunnus mebachi,** which is taken occasionally in the eastern Pacific, bears a superficial resemblance to the albacore. It differs in having an oval vent and faint marginal striations on the ventral surface of the liver.

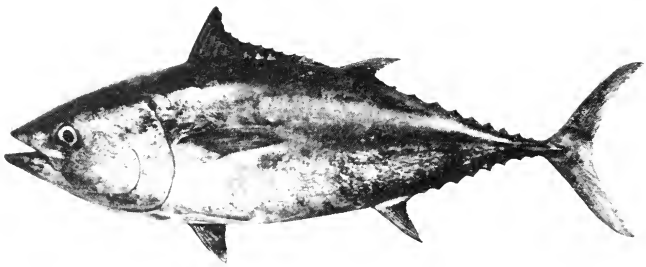


FIGURE 33

BLUEFIN TUNA

Thunnus thynnus

Relationship: Belongs to the tuna family, Thunnidae, which also includes the yellowfin tuna and the albacore.

Distinguishing Characters: The series of finlets following both the dorsal and anal fins, usually eight after the dorsal and seven after the anal; the short pectoral fin which extends normally only to the eleventh or twelfth dorsal spine and is shorter than the head; the round vent; the rounded edges of the gill covers; the entire ventral surface of the liver striated radially with blood vessels. Reaches a **weight** of about 250 pounds in California waters. Atlantic bluefin reach 1,600 pounds and a length of about 14 feet. May generally be distinguished from the albacore, yellowfin and big-eye tunas by the relatively short pectoral fin. Further, the vent is oval in the latter two species. **Color:** Deep blue above; silvery on the sides and belly; the belly with irregular white spots. Lacks the golden yellow band along the sides and the black edging of the finlets found on the yellowfin tuna when caught.

Distribution: On our coast from the Columbia River to Guadalupe Island, Mexico; not common north of Pt. Conception. As far as is known at present, it belongs to the same species as is found in other parts of the world. A schooling fish.

Fishing Season: Usually reaches a peak between May and August. Only very occasional catches are made during the winter months. Fished in both California and Mexican waters.

Importance: Sixth in the State in poundage and value during 1946. Los Angeles is the leading port of landing, followed by San Diego. A prized game fish.

Fishing Gear: Purse seines (commercial); hook and line (sport).

Unauthorized Name: Leaping tuna.

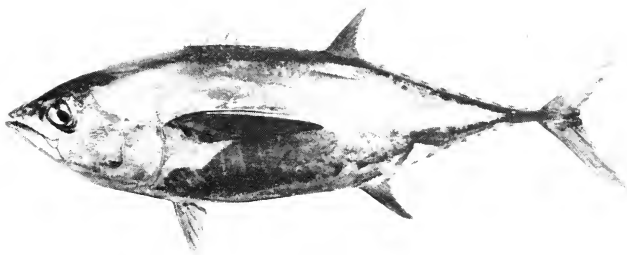


FIGURE 34

YELLOWFIN TUNA

Neothunnus macropterus

Relationship: A member of the tuna family, Thunnidae, together with the albacore and the bluefin tuna.*

Distinguishing Characters: The finlets, usually eight, following both the second dorsal and anal fins; the pectoral fin which reaches normally beyond the front of the second dorsal fin, but not beyond the front of the anal fin; the oval or tear-shaped vent; the back and lower edges of the preopercle meeting at an angle; the unmarked ventral liver surface of uniform color. Reaches a **weight** of 450 pounds though California specimens rarely exceed 125 pounds. In both the albacore and the bluefin tuna, the vent is round, and the ventral surface of the liver is radially striated. **Color:** Metallic dark blue above, shading into silvery gray below. When first caught, there is generally a golden yellow, irridescent band along the side. Fins tinged with yellow; the finlets usually lemon yellow edged with black. Belly marked with transverse white bars with irregular white dots or blotches between, especially in younger fish.

Distribution: In the eastern Pacific, from Pt. Conception south to Peru; spans the Pacific to Hawaii and Japan. Occurs in schools.

Fishing Season: Taken throughout the year with heaviest landings usually in the summer and fall. Almost all commercial fishing occurs south of the Mexican border. Found off Southern California during the summer and fall.

Importance: Second in poundage and first in value among California's fisheries in 1946. Most of the catch is delivered at San Diego, the balance at Los Angeles. Used almost entirely for canning. One of the most desirable game fish in Southern California.

Fishing Gear: Hook and line with live bait; feather jigs; purse seines. Sport, with live bait or trolling.

* The big-eye tuna, **Parathunnus mebachi**, occasionally enters the catch and may be confused with the yellowfin. It has, however, faint marginal striations on the ventral surface of the liver and a more enlongated pectoral fin.

FIGURE 35

CALIFORNIA BONITO

Sarda lineolata

Relationship: A member of the family Cybiidae, of which it is the only common California representative. The sierra *(Scomberomorus sierra)* belongs to this family, while another species of bonito is found in southern Lower California.

Distinguishing Characters: The series of six to eight finlets which follow the dorsal and anal fins; the oblique dark stripes on the back above the lateral line which distinguish it from all our other tuna-like fishes; there being 15 or more gill rakers on the lower limb of the first arch (there are 10 or less in the Mexican bonito). Reaches a **weight** of 25 pounds and a **length** of 40 inches. **Color:** Blue to violet above with greenish reflections and a metallic luster, shading into silvery below; stripes on the back as described above; young with vague darker vertical bars.

Distribution: From Vancouver Island south into Lower California at least as far as Magdalena Bay; not common north of Pt. Conception. A schooling fish.

Fishing Season: Throughout the year. In recent years, a large proportion of the catch has been made in Mexican waters.

Importance: The State's fourteenth fishery in poundage and thirteenth in value in 1946. Heaviest landings are normally made at Los Angeles with most of the balance delivered to San Diego. Used almost entirely for canning, it is considered the least desirable of the tuna-like fishes. The pack cannot be labeled "tuna." A desirable sport fish, although caught in small quantity.

Fishing Gear: Hook and line with live bait; purse seines. Usually taken by sportsmen with live bait though it readily takes a trolled lure.

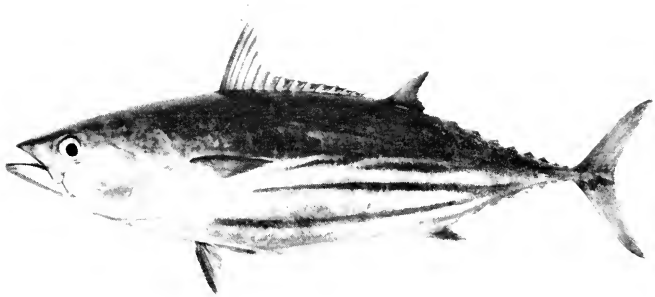


FIGURE 36

SKIPJACK

Katsuwonus pelamis

Relationship: Belongs to the skipjack family, Katsuwonidae, of which it is the only common California representative.

Distinguishing Characters: The series of finlets following both the dorsal and anal fins, usually eight after the dorsal and seven after the anal; the absence of scales except in the region of the pectoral fin (corselet); the four or five dark oblique stripes along the sides and belly which distinguish it from all our other tuna-like fishes. **Length** rarely exceeds two feet, though there is a record of a three foot, 43-pound specimen. **Color:** Blue to violet above, becoming dull after the fish dies; silvery on the sides and below; stripes as described above.

Distribution: In the eastern Pacific, from Vancouver Island to the coast of South America (rare north of Pt. Conception); spans the Pacific to Hawaii and Japan. A schooling fish.

Fishing Season: Throughout the year. Most of the catch is made off Mexico and Central America where skipjack and yellowfin tuna form a single fishery. Most abundant in California during August and September.

Importance: Fourth in poundage and third in value among California fisheries in 1946, with San Diego the leading port and Los Angeles second. Used entirely for canning. One of the more desirable sport fishes, it is taken in moderate quantity.

Fishing Gear: Hook and line with live bait; purse seines. Most of the sport catch is taken with live bait or by trolling.

Unauthorized Name: Striped tuna.

FIGURE 37

STRIPED MARLIN

Makaira mitsukurii

Relationship: A member of the spearfish family, Istiophoridae. A number of other species are found in different parts of the world and some ichthyologists believe that several kinds occur in California. The sailfish belongs to the same family.

Distinguishing Characters: The prolonged upper jaw with the "sword" rounded rather than flattened and sharp-edged as it is in the broadbill swordfish; the long first dorsal fin which extends almost the entire length of the back; the presence of ventral fins; the two small keels on either side of the base of the tail. **Size:** In 1947, the average weight of marlin caught off Southern California was about 150 pounds. The record fish for rod-and-reel, caught in 1931, weighed 692 pounds and was 13 feet five inches long. **Color:** Purplish blue above shading into silvery below, the back crossed with about 15 vertical light blue stripes.

Distribution: Pt. Conception south into Mexico. Thought to be the same species as is found off Japan and Hawaii.

Fishing Season: From June or July to November or December.

Importance: A highly prized game fish but not the object of a heavy sport fishery because of the high cost of private boat charter and specialized fishing tackle. Illegal to buy or sell since 1937.

Fishing Gear: May be taken only with hook and line.

Unauthorized Names: Swordfish, spearfish, spikefish, sailfish.

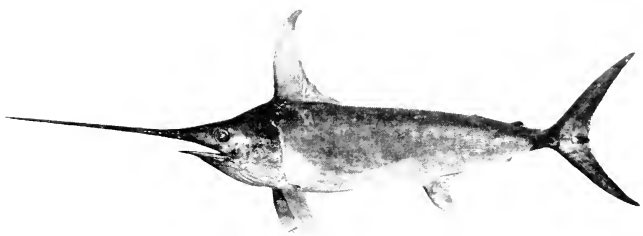


FIGURE 38

BROADBILL SWORDFISH
Xiphias gladius

Relationship: The sole member of the true swordfish family, Xiphiidae.

Distinguishing Characters: The greatly prolonged upper jaw, the sword flattened and sharp-edged rather than rounded as it is in the marlins; the high, short first dorsal fin; the absence of ventral fins; the single wide keel on each side at the base of the tail. **Size:** Reported to reach 15 feet in length and a weight of over 1,000 pounds. California specimens usually run from 300 to 500 pounds. **Color:** Generally dusky, purplish to almost black above becoming paler on the sides and below.

Distribution: Warm and temperate seas throughout the world. On our coast, not reported from north of Pt. Conception until 1947 when specimens were taken off Central California and Oregon.

Fishing Season: Uusually from May to December, with maximum landings between August and October. Part of the catch is made in Mexican waters.

Importance: Relatively minor in terms of poundage though it is considered a fine food fish. Of far less importance as a game fish than is the striped marlin.

Fishing Gear: Harpoons, hook and line. No other gear is legal.

FIGURE 39

QUEENFISH

Seriphus politus

Relationship: A member of the croaker family, Sciaenidae, in which are also classed our yellowfin, spotfin and black croakers, California corbina, kingfish and white sea bass.

Distinguishing Characters: The large lower jaw which projects slightly beyond the tip of the upper; the two widely separated dorsal fins (separating it from all our other croakers); the lack of a barbel on the lower jaw; the base of the anal fin being almost equal in length to the base of the second dorsal; the two weak spines at the front of the anal fin; the lack of vomerine teeth. **Length** to about a foot. **Color:** Bluish above shading into silvery on the sides and underparts; fins yellowish; base of pectorals dusky.

Distribution: Central California south to central Lower California. Less common north of Pt. Conception. Occurs in schools, often with kingfish and other species. Prefers shallow water and sandy bottoms; found also in bays and sloughs.

Fishing Season: Throughout the year, probably with larger landings in the winter and spring.

Importance: Of minor significance as a market fish. Included with the kingfish in catch records, it forms a small percentage of the "kingfish" catch. Appreciable quantities are used as live bait. It is generally thought far less desirable than sardines or anchovies, though it is considered excellent for some species. Not a desirable sport fish. Landed chiefly at Los Angeles.

Fishing Gear: Taken commercially chiefly with bait nets. Taken by sportsmen mostly from piers or from boats in shallow water with hook and line, jigging with multiple hooks and a shiner, or with live or dead bait.

Unauthorized Names: Kingfish, herring, tomcod, shiner, sea trout.

FIGURE 40

WHITE SEA BASS
Cynoscion nobilis

Relationship: Not a true sea bass, but a member of the croaker family, Sciaenidae, together with the yellowfin, spotfin and black croakers, the California corbina, the queenfish and the kingfish. Closely related to the weakfish of the Atlantic coast, the Mexican corbina, the totuava, and the shortfin sea bass.

Distinguishing Characters: The lower jaw projecting slightly beyond the tip of the upper; the two dorsal fins being at least in contact with each other; the lack of a barbel on the lower jaw; the pectoral fin being more than one-half the length of the head (separating it from the shortfin sea bass); the base of the second dorsal being much longer than the base of the anal fin; the absence of teeth on the vomer; the two weak spines at the front of the anal fin. Reaches a **length** of four feet and a weight of 80 pounds, but specimens of as much as 60 pounds are rare. **Color:** Bluish gray to steely blue above, frosted silvery to whitish below; inner base of the pectoral with a dusky spot. Young with three to six cross bars. Back and sides with very small dark points.

Distribution: Alaska south to the Gulf of California, becoming less common north of Pt. Conception and uncommon north of San Francisco.

Fishing Season: Throughout the year, with heaviest landings during the summer and fall months. A small portion of the catch is made in Mexican waters.

Importance: The most important croaker in California. Landed mostly in Southern California with greatest poundage in 1946 in the Santa Barbara region. A valuable market fish and second only to albacore in general popularity as a sport fish in Southern California.

Fishing Gear: Gill nets, hook and line. Illegal to take with purse seines or other round haul nets in California waters.

Unauthorized Name: Sea trout.

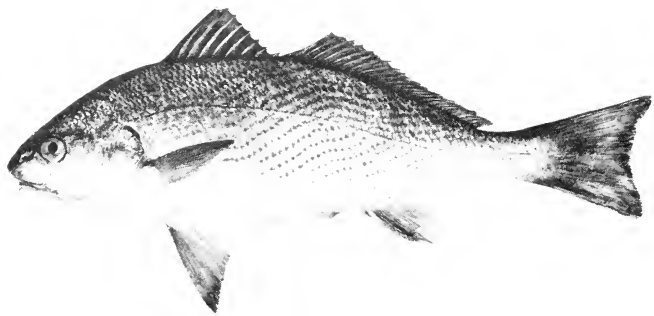


FIGURE 41

YELLOWFIN CROAKER

Umbrina roncador

Relationship: Is in the croaker family, Sciaenidae, to which also belong the California corbina, the spotfin and black croakers, the queenfish, kingfish, and white sea bass.

Distinguishing Characters: The tip of the snout projecting beyond the tip of the lower jaw; the spiny and soft dorsal fins being connected by a low membrane; the single, short barbel at the tip of the lower jaw (separating it from our other croakers except the corbina); the two strong spines at the front of the anal fin (separating it from the corbina); the lack of vomerine teeth. Reaches a **length** of about 16 inches and a weight of up to five pounds. **Color:** Metallic grayish or greenish with brassy and golden reflections shading into silvery below; back and sides with many wavy, deep olive lines extending upward and backward following the rows of scales; fins mostly yellow, the dorsals darker.

Distribution: Pt. Conception south into the Gulf of California; perhaps very rarely north to San Francisco. Usually found in shallow water over a sandy bottom, often in the surf or in bays and sloughs.

Fishing Season: Throughout the year, but reaching a peak in the late summer.

Importance: Illegal to take with nets since 1909 or to buy or sell since 1915. A prized sport fish.

Fishing Methods: Taken by sportsmen in the surf, from piers and boats in the ocean, and in bays. Usually caught with cut bait, though live bait, especially anchovies, is also considered excellent.

Unauthorized Name: Surf fish.

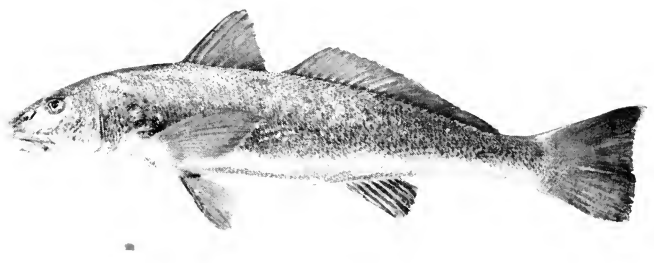


FIGURE 42

CALIFORNIA CORBINA

Menticirrhus undulatus

Relationship: A member of the croaker family, Sciaenidae, which also includes the yellowfin, spotfin and black croakers, the queenfish, kingfish, and white sea bass. The whiting of the Atlantic coast belongs to the same genus.

Distinguishing Characters: The tip of the snout projecting beyond the tip of the lower jaw; the spiny and soft dorsals being connected by a low membrane; the short fleshy barbel at the tip of the lower jaw (separating it from our other croakers except the yellowfin); the single weak spine at the front of the anal fin (two spines may sometimes be found) contrasted with the two strong spines of the yellowfin croaker; the somewhat flattened, long body with large pectoral fins; the lack of vomerine teeth. Reaches a **length** of 18 or 20 inches and has been reported to reach a weight of eight pounds. **Color:** Sooty gray to steel blue on the back with metallic reflections, shading into gray on the sides and white below; dark points in the center of each scale form wavy lines running upward and backward along the sides and back (often indistinguishable on the back because of the dark ground color); fins dusky.

Distribution: Point Conception south into the Gulf of California; perhaps rarely north of Point Conception. A bottom fish found usually on sandy beaches along the coast, but also in shallow bays.

Fishing Season: Best in the summer, though these fish are taken throughout the year.

Importance: Illegal to take with nets since 1909 or to buy or sell since 1915. The most popular game surf fish in Southern California.

Fishing Methods: Taken almost entirely in the surf, using sand crabs, mussels, clams, or pile worms as bait.

Unauthorized Names: California whiting, corvina, surf fish.

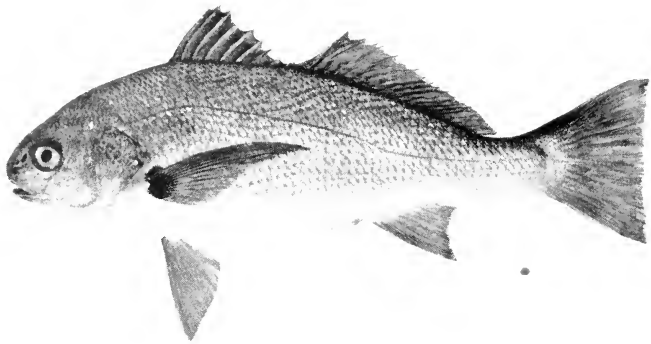


FIGURE 43

SPOTFIN CROAKER

Roncador stearnsii

Relationship: A member of the croaker family, Sciaenidae, as are the California corbina, yellowfin and black croakers, queenfish, kingfish, and white sea bass.

Distinguishing Characters: The two dorsal fins which are connected but have a deep notch between them; the lack of a barbel on the lower jaw; the two stout spines at the front of the anal fin; the tip of the snout projecting beyond the tip of the lower jaw; the first dorsal fin which has less than 12 spines (usually 10); the pectoral fin being about as long as the head; the large black spot at the base of the pectorals, which separates it from our other croakers; the lack of teeth on the vomer. **Length** to perhaps three feet and weight up to 12 pounds. **Color:** Grayish silvery with a bluish luster or metallic steel gray above, becoming silvery below; sometimes distinctly golden or brassy. Inconspicuous wavy lines follow the rows of scales upward and backward; a large black spot at the pectoral base.

Distribution: Southern California from Point Conception southward; probably ranges into Lower California.

Fishing Season: Throughout the year, but reaching a definite peak in the late summer.

Importance: Illegal to take with nets since 1909 or to buy or sell since 1915. A very popular sport fish, especially among surf fishermen.

Fishing Methods: Taken chiefly in the surf, but also in bays and from piers, boats and barges, using sand crabs, mussels, clams, etc., as bait.

Unauthorized Names: Spot, surf fish, golden croaker.

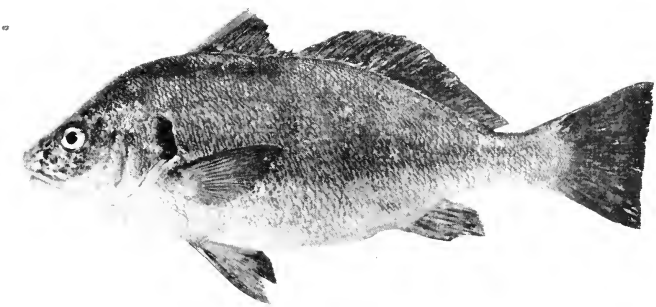


FIGURE 44

BLACK CROAKER

Cheilotrema saturnum

Relationship: A member of the croaker family, Sciaenidae, which also includes the yellowfin croaker, spotfin croaker, corbina, queenfish, kingfish, white sea bass, and many other species found elsewhere in the world.

Distinguishing Characters: The tip of the snout projecting beyond the tip of the lower jaw; the two dorsal fins which are connected, but have a deep notch between them; the lack of a barbel on the lower jaw; the spiny dorsal with less than 12 spines (9 or 10 as a rule); the pectoral fin being shorter than the head; the jet black edge of the opercle (separating it from our other croakers); the two stout spines at the front of the anal fin; the lack of vomerine teeth. **Length** to about 15 inches. **Color:** Bluish or dusky to blackish with coppery reflections above; silvery below dusted with dark specks; a vague pale band usually runs across the body from the front of the second dorsal to the ventral fins; fins dusky; edge of opercle black.

Distribution: Point Conception south along the Mexican coast and into the Gulf of California; rather rare. Commercial rockfish fishermen report that they catch them fairly often on set lines in moderately deep water.

Fishing Season: Taken irregularly by sport fishermen.

Importance: Illegal to buy or sell since 1933. Rarely taken by sportsmen though it is a good table fish.

Fishing Gear: Hook and line, chiefly from piers and in bays and sloughs.

Unauthorized Names: Chinese croaker, surf fish, black perch, blue bass, black bass.

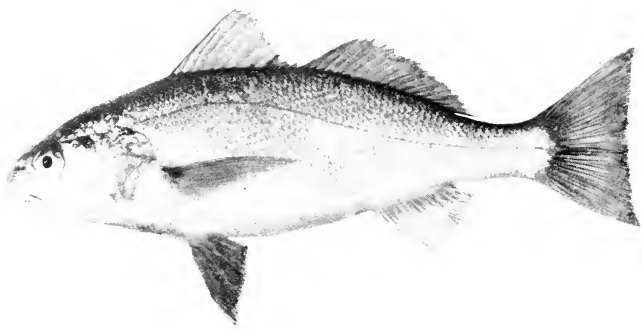


FIGURE 45

KINGFISH

Genyonemus lineatus

Relationship: A member of the croaker family, Sciaenidae, together with the yellowfin, spotfin and black croakers, queenfish, California corbina and white sea bass.

Distinguishing Characters: The tip of the snout projecting beyond the tip of the lower jaw; the presence of several very small barbels on the chin; the two dorsal fins which are connected but have a deep notch between them; the two weak spines at the front of the anal fin; the first dorsal fin with 12 to 15 spines; the lack of vomerine teeth. Reaches a **length** of a little over a foot and a weight of about 1¼ pounds. **Color:** Silvery with a brassy luster, becoming lighter below; faint wavy lines follow the rows of scales backward and upward; fins, except the ventrals, normally yellowish; a small black spot at the upper, inner corner of the pectoral base.

Distribution: Vancouver Island south to central Lower California; rare north of San Francisco. A schooling fish, often in company with queenfish and other species.

Fishing Season: Throughout the year, with maximum landings at Monterey in the summer and fall and at Los Angeles in the late winter and spring.

Importance: A market species of minor importance. Since 1943, heaviest landings have been made in the Monterey region, replacing the Los Angeles region which formerly reported the greatest catch. Used to a small extent as live bait in Southern California. Not considered a game fish, though it is caught in huge quantities by sport fishermen in Southern California. The recorded catch in 1946 showed it to rank sixth in number taken among the State's ocean sport species.

Fishing Gear: Small round haul nets, gill nets, accidentally in drag nets, and, in small quantity, by hook and line. Taken by sportsmen on hook and line with all types of bait and lures.

Unauthorized Names: Tomcod, shiner, herring, white croaker, carbinette, chenfish.

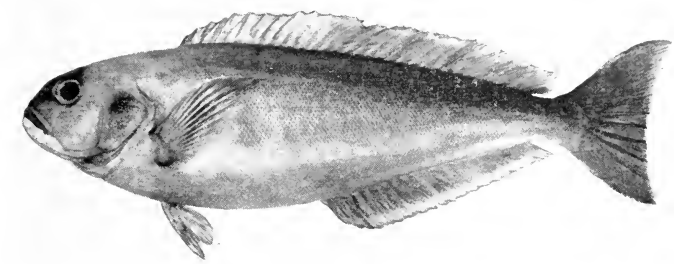


FIGURE 46

OCEAN WHITEFISH

Caulolatilus princeps

Relationship: The only California member of the blanquillo family, Branchiostegidae. Not a close relative of the freshwater whitefish, which is related to the salmons.

Distinguishing Characters: The long, rather even dorsal fin without a notch between the spines and rays; the long anal fin with two spines in front; the absence of teeth on the roof of the month. **Length** to about 40 inches. **Color:** Warm brown above and on the sides, shading into paler below; fins tinged with yellow or green; pectoral fins bluish with a yellowish streak in the center; the dorsal and anal fins with a blue streak near the edge. Occasional specimens are almost entirely yellow.

Distribution: Central California south into Lower California; also recorded from the Galapagos Islands and Peru; generally along rocky coasts. Not common north of Point Conception.

Fishing Season: Throughout the year, with landings usually greatest in the winter and least in the summer and fall. A varying proportion of the catch is made off Lower California.

Importance: A minor market species in Southern California. Considered a good sport fish and taken in some quantity along the Santa Barbara and Ventura County coasts as well as at the Channel Islands.

Fishing Gear: Hook and line with cut or live bait; set lines.

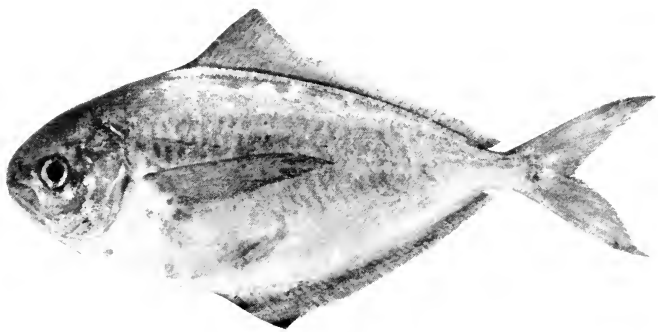


FIGURE 47

CALIFORNIA POMPANO

Palometa simillima

Relationship: Not a true pompano, but a member of the butterfish family, Stromateidae, of which it is the only California species. The true pompanoes belong to the jack family, Carangidae, which is represented in California by the yellowtail and the jack mackerel.

Distinguishing Characters: The deep, thin body; the absence of ventral fins; the long, low, dorsal and anal fins, of about the same length and shape. **Length** to 10 or 11 inches. **Color:** Dull green shading into bright silvery below, the whole fish gleaming with iridescence.

Distribution: British Columbia south at least to central Lower California.

Fishing Season: Caught irregularly throughout the year.

Importance: A minor species in terms of total catch, but is considered a delicacy and brings a very high price. In 1946, Santa Cruz landings were slightly greater than those at Los Angeles, though in previous years most of the catch was delivered at the latter port. Sold entirely in the fresh fish markets. Sought by a few sportsmen.

Fishing Gear: Small round haul nets. Sportsmen use very small hooks and cut bait.

Unauthorized Name: Butterfish.

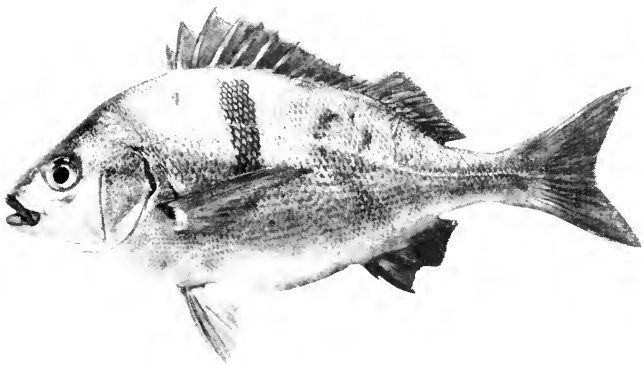


FIGURE 48

SARGO

Anisotremus davidsonii

Relationship: Belongs to the grunter family, Haemulidae. One other member of this family has been reported from California.

Distinguishing Characters: The absence of teeth on the vomer; the fine, single-pointed, unmoveable teeth on the jaws; the anal fin with three spines and 10 or 11 soft rays; the dorsal fin with 11 or 12 spines; the dark vertical band which runs across the body; the dark spot on and above the base of the pectoral fin. **Length** to a foot or more. **Color:** Entirely metallic silvery; iridescent with a grayish tinge above, plain silvery below; back, head and sides sometimes with vague dark blotches; band and spot as described above; caudal, soft dorsal and anal fins with a yellowish tinge.

Distribution: Point Conception south into central Lower California.

Fishing Season: Irregular, but caught particularly in the summer and fall. Taken incidentally with other species.

Importance: Forms a minor proportion of the Southern California "perch" catch. Caught occasionally by sportsmen.

Fishing Gear: Accidentally in round haul nets or on hook and line.

Unauthorized Names: Perch, black croaker, china croaker, blue bass.

SALT-WATER PERCH
Family Embiotocidae

Relationship: These fish are not true perches, but form a distinct family, Embiotocidae. About 18 salt-water and one fresh-water species are found in California. Their general similarity in appearance makes some of them quite difficult to distinguish as separate species.

Distinguishing Characters: The oval or oblong and compressed body; the absence of teeth on the vomer; the anal fin with three spines and 15 or more soft rays; the single dorsal fin with not more than 11 spines (excepting the fresh-water species which has 16 to 18). All of the fish in this family bear live young. The several species range in **length** from 6 to about 18 inches. **Color:** Varies with the species; most are silvery, though some are brightly colored.

Distribution: Alaska south into Lower California, each species having its own distribution within this range. Two species are known from Japan. These fish, other than the fresh-water form, typically inhabit bays or shallow inshore water off both rocky and sandy coasts. One species is normally found in moderately deep water.

Fishing Season: Taken by sportsmen throughout the year. Currently (1948) closed to commercial fishing from May 1st to July 15th. Consult fish and game laws.

Importance: The object of a state-wide but minor commercial and sport fishery, with different species predominating in different districts. Rather important as sport fish in Central and Northern California along rocky coasts, in bays, and especially in the surf. Heaviest commercial landings were made at San Francisco and Los Angeles in 1946. The Southern California "perch" catch includes as well landings of halfmoon, opaleye, sargo, garibaldi and blacksmith.

Fishing Gear: Round haul nets; gill nets; beach seines; hook and line with clams, mussels, pile worms, cut fish, etc., as bait. Most of the Eureka and San Francisco region catches are made with beach seines. In Monterey Bay, small round haul nets and both drift and set gill nets are used. Almost all of the Southern California catch is taken in small round haul nets. Accidentally taken in trawls and in purse seine catches of other fish.

Unauthorized Names: Perch, surf fish, surf perch.

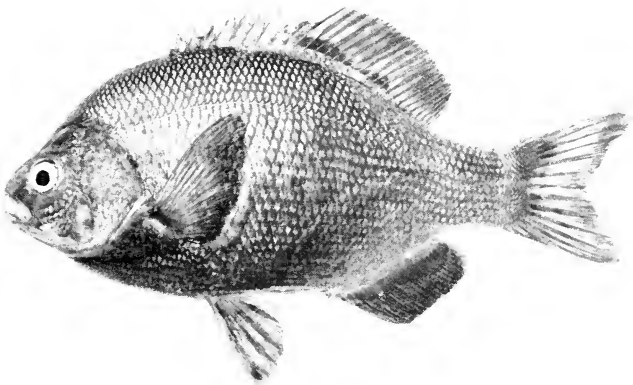


FIGURE 49

BLACK PERCH

Embiotoca jacksoni

Relationship: A member of the salt-water perch family, Embiotocidae.

Distinguishing Characters: *See* page 76. The cluster of enlarged scales between the pectoral and ventral fins; the rather thick, reddish-brown lips; the dorsal spines which are shorter than the dorsal rays. **Length** to about 14 inches. **Color:** Highly variable; shades of brown usually predominate, tinged with blue, green, red or yellow. Sometimes a smoky blue. Specimens almost entirely orange have been seen. Anal and ventral fins often orange to red, the anal at times barred with blue; lips often yellow to bright orange.

Distribution: Central California south to central Lower California.

Fishing Season: All year, except for the closed commercial season.

Importance: A minor constituent of the salt-water perch catch.

Fishing Gear: *See* page 76.

Unauthorized Names: Surf fish, bay perch, pogie, blue perch.

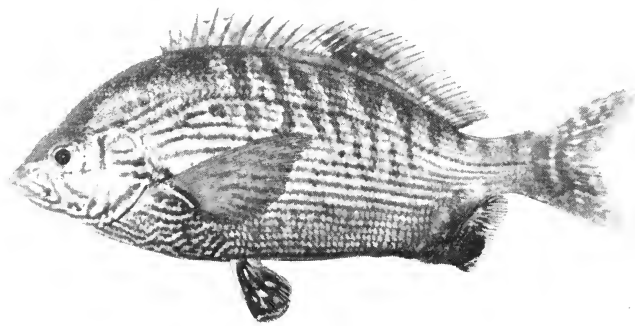


FIGURE 50

RAINBOW PERCH

Hypsurus caryi

Relationship: A member of the salt-water perch family, Embiotocidae.

Distinguishing Characters: *See* page 76. The very long abdomen, with the vent behind the origin of the soft portion of the dorsal fin; the moderately forked tail; the longest dorsal spine being about three-fourths the length of the first dorsal ray; the anal fin with about 24 soft rays. **Length** to about a foot. **Color:** Striped horizontally with red, orange and blue; irregular streaks of orange and sky blue on the head; fins brightly colored, chiefly shades of orange; a blackish blotch on the soft dorsal and anal fins. The vivid colors fade soon after death.

Distribution: The coast of California but not common south of Santa Barbara County. Found mostly off rocky shores.

Fishing Season: All year excepting the closed commercial season.

Importance: Forms a small proportion of the salt-water perch catch.

Fishing Gear: *See* page 76.

Unauthorized Names: Striped perch, bugara.

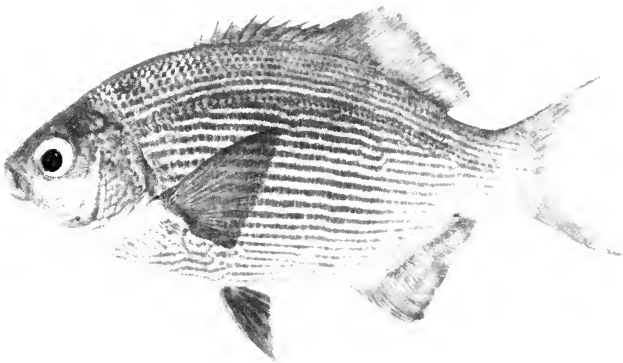


FIGURE 51

STRIPED PERCH

Taeniotoca lateralis

Relationship: One of the salt-water perches belonging to family Embiotocidae.

Distinguishing Characters: *See* page 76. The highest dorsal spine being about half of the height of the first soft ray; the inwardly curved (but not forked) tail; the anal fin with about 31 soft rays. **Length** to about 15 inches. **Color:** Striped horizontally with dull orange and blue along the rows of scales, finely speckled with black above; the head with several blue spots and streaks. The bright colors start to fade soon after death.

Distribution: Alaska south into central Lower California. Uncommon in Southern California, but abundant farther north, especially along rocky coasts.

Fishing Season: All year excepting the closed commercial season.

Importance: Caught in fair quantity in Central California. It was one of the two leading species at Monterey according to a survey made in 1935.

Fishing Gear: *See* page 76.

Unauthorized Names: Blue perch, rainbow perch, squawfish, crugnoli.

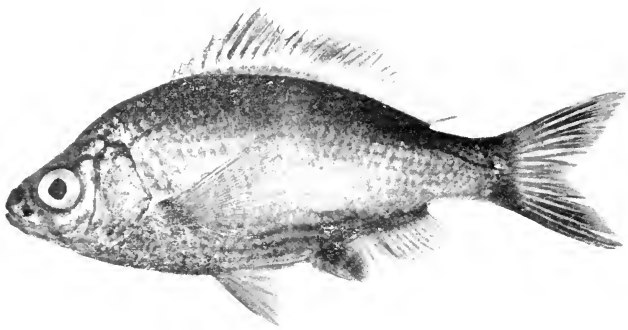


FIGURE 52 Photo by Al Johns for Haden & Carpenter, San Pedro

SHINER PERCH

Cymatogaster aggregata

Relationship: A member of the salt-water perch family, Embiotocidae.

Distinguishing Characters: *See* page 76. The relatively high spiny portion of the dorsal fin, the highest spine longer than the highest ray; the large scales (less than 50 in a row along the lateral line); the slender caudal peduncle; the moderately forked tail. **Length** to about 6 inches. **Color:** Silvery with the back dusky; the sides with a series of broken vertical bars formed by clusters of dark points on the scales; between these bars are three light yellow bars. The males are nearly black in the spring.

Distribution: Alaska south into northern Lower California. Common along sandy shores and in bays.

Fishing Season: All year except in the closed commercial season.

Importance: A minor constituent of the State's "perch" catch.

Fishing Gear: *See* page 76.

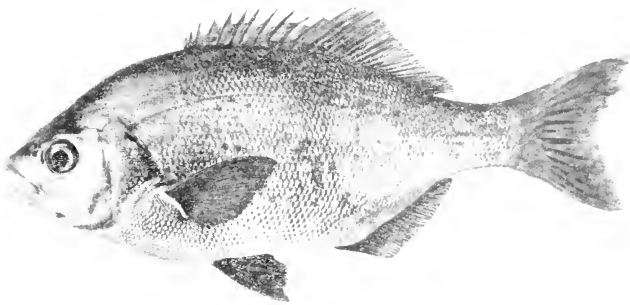


FIGURE 53

RUBBERLIP PERCH

Rhacochilus toxotes

Relationship: A member of the salt-water perch family, Embiotocidae.

Distinguishing Characters: *See* page 76. The exceedingly thick lips; the spiny portion of the dorsal being lower than the soft, with the last spine about one-half to two-thirds the length of the first ray. **Length** to 18 inches. **Color:** Silvery, the back with a blueish or purplish tinge or overlaid with smoky blackish; the scales sometimes tipped with blackish on the sides and belly; pectoral fins yellowish; the ventral, dorsal and anal fins tipped with black or dusky; lips white or pink.

Distribution: Central and Southern California.

Fishing Season: All year excepting the closed commercial season.

Importance: One of the two leading commercial species in the San Francisco area. Forms about one quarter of the State's "perch" catch according to a survey made in 1935.

Fishing Gear: *See* page 76.

Unauthorized Names: Pile perch, porgee, alfione, niggerlip.

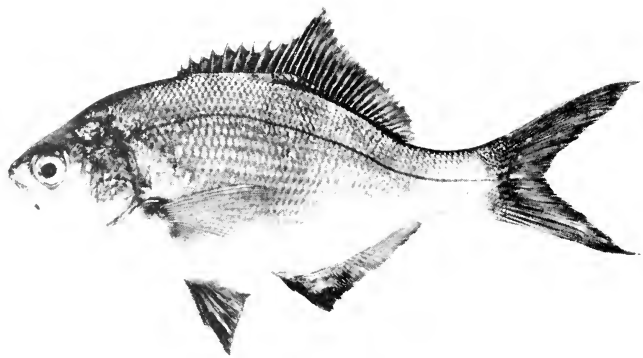


FIGURE 54

PILE PERCH

Damalichthys vacca

Relationship: A member of the salt-water perch family, Embiotocidae.

Distinguishing Characters: *See* page 76. The deeply forked tail; the sharply elevated first dorsal rays which are about twice as long as the last dorsal spine. **Length** to about 16 inches. **Color:** Somewhat blackish or brownish with a silver luster above, becoming silvery on the sides and belly; at times with dark blotches on the back and sides; fins dusky. Some specimens are almost entirely silvery.

Distribution: Alaska to northern Lower California. Common along sandy shores.

Fishing Season: All year excepting the closed commercial season.

Importance: A moderately important commercial species, especially in the Monterey Bay fishery.

Fishing Gear: *See* page 76. Seen fairly often in purse seine catches of sardines.

Unauthorized Names: Split-tail perch, white perch, porgee, forktail perch.

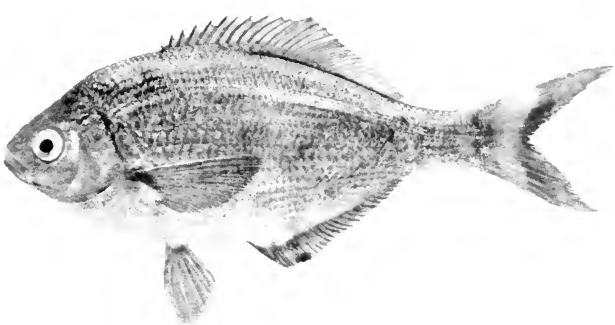


FIGURE 55

PACIFIC WHITE PERCH

Phanerodon furcatus

Relationship: Belongs to the salt-water perch family, Embiotocidae. Another member of this genus, *Phanerodon atripes*, is found off Central and Southern California.

Distinguishing Characters: The deeply forked tail; the slender dorsal spines, the last the longest and almost if not as high as the first ray; the body which tapers back to a long and slender caudal peduncle. **Length** to about a foot. **Color:** Silvery with a dark hue above; the anal fin usually with a dusky spot; the ventral fins plain (in *Phanerodon atripes* the ventral fins are tipped with black). Often dusky or with a rosy-orange cast when alive, turning silvery shortly after death.

Distribution: Vancouver Island to Southern California. Common along sandy coasts.

Fishing Season: All year except the closed commercial season.

Importance: The most important commercial species in the State. It dominates the Southern California catch and is one of the two or three leading Central California species. A survey made in 1935 showed that it comprised about 40 percent of the total "perch" catch.

Fishing Gear: *See* page 76. Seen quite frequently in trawl catches and in purse seine loads of sardines.

Unauthorized Names: Split-tail perch, forktail perch, white surf fish.

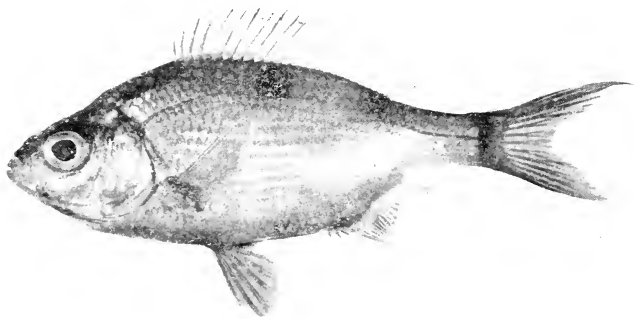


FIGURE 56 Photo by Al Johns for Haden & Carpenter, San Pedro

PINK PERCH

Zalembius rosaceus

Relationship: A member of the salt-water perch family, Embiotocidae.

Distinguishing Characters: *See* page 76. The spiny portion of the dorsal fin being higher than the soft portion; the total number of dorsal and anal rays less than 40 (the number is over 40 in all other species discussed except the kelp perch); the rather deep head which is not pointed; the rather large scales (under 50 in a row along the lateral line); the deeply forked tail. **Length** to about eight inches. **Color:** Rose-red with silver reflections. Two distinct chocolate-colored spots on the back, the first and larger below the forepart of the soft portion of the dorsal, the second below the end of the soft dorsal.

Distribution: Central and Southern California, typically in deeper water than any of the other species. Rarely found in shallow water but common in depths of from 15 to 50 or more fathoms.

Fishing Season: All year except the closed commercial season.

Importance: Rarely enters the commercial perch catch. Seen rather often in purse seine loads of other fish where it arouses interest because of its bright color.

Fishing Gear: *See* page 76. Accidentally in purse seines.

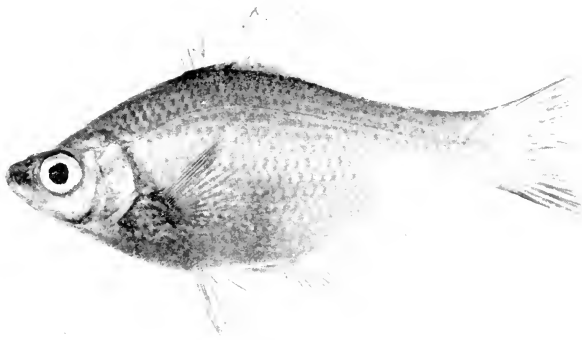


FIGURE 57 Photo by Al Johns for Haden & Carpenter, San Pedro

KELP PERCH

Brachyistius frenatus

Relationship: A salt-water perch belonging to family Embiotocidae.

Distinguishing Characters: *See* page 76. The spiny portion of the dorsal fin being as high as the soft; the total number of dorsal and anal rays less than 40; the relatively large scales (about 40 in a row along the lateral line); the slender, pointed head; the rather deeply-forked tail. **Length** to about eight inches. **Color:** Dark olive or greenish brown above with a small dark spot at the base of each scale; bright copper red below, a blue spot on each scale; fins reddish.

Distribution: British Columbia south into Lower California, chiefly along rocky coasts in the kelp.

Fishing Season: All year excepting the closed commercial season.

Importance: Of very minor commercial importance. Frequently seen in marine gardens where its bright color makes it notable.

Fishing Gear: *See* page 76.

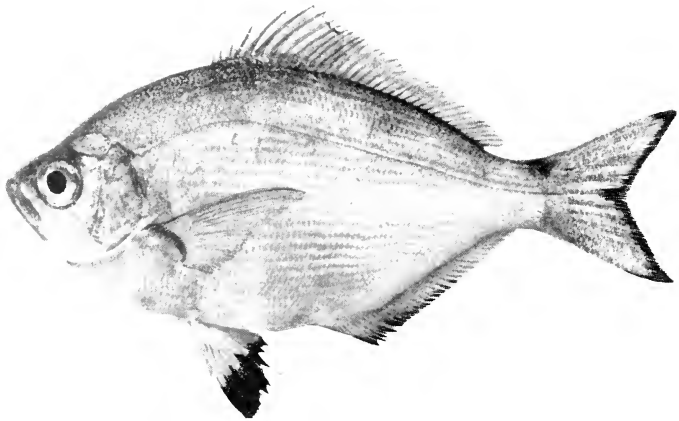


FIGURE 58

WALLEYED PERCH

Hyperprosopon argenteum

Relationship: A member of the salt-water perch family, Embiotocidae. Another species, *Tocichthys ellipticus*, closely resembles it, but does not have black-tipped ventral fins.

Distinguishing Characters: *See* page 76. The black-tipped ventral fins; the very large eye which is about two-fifths the length of the head; the longest dorsal spine being higher than the soft rays; the mouth when closed paralleling the outline of the lower surface of the head. **Length** to about a foot. **Color:** Steel blue above becoming silvery on the sides and belly; sides with faint bars which fade soon after death; pectoral fins tipped with black.

Distribution: Straits of Juan de Fuca south into Lower California. Common along sandy beaches.

Fishing Season: All year excepting the closed commercial season.

Importance: One of the more important commercial species, particularly at Monterey. A survey made in 1935 showed that this species made up about 5 percent of the State's "perch" catch, was one of the two leading species at Monterey and comprised about 10 percent of the Southern California landings.

Fishing Gear: *See* page 76.

Unauthorized Names: Silver perch, surf fish.

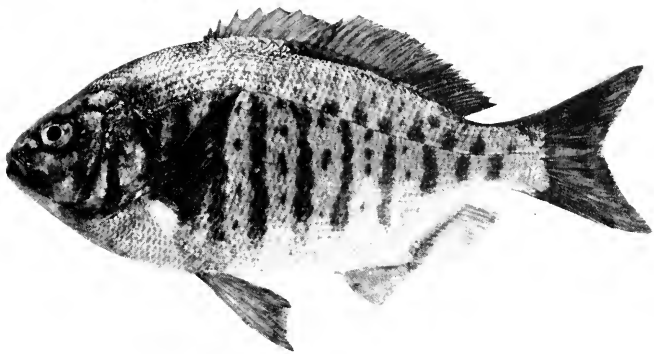


FIGURE 59

BARRED PERCH

Amphistichus argenteus

Relationship: A member of the salt-water perch family, Embiotocidae.

Distinguishing Characters: *See* page 76. The dorsal spines which are only about three-fourths the height of the dorsal rays; the anal fin which appears to be divided into two sets of rays; the series of brassy-olive vertical bars alternating with a series of spots which are normally found on the sides. **Length** to about 16 inches. **Color:** Silver, tinged with bluish or grayish above; plain silvery on the sides and belly; usually barred and spotted as described above. Occasionally a uniform brassy olive above and silvery below, sometimes with a few silvery streaks on the sides.

Distribution: Central and Southern California, common along sandy coasts.

Fishing Season: All year excepting the closed commercial season.

Importance: Forms a small proportion of the "perch" catch. Caught in considerable numbers by surf fishermen, it is one of the leading sport species in the family.

Fishing Gear: Gill nets, round haul nets, hook and line.

Unauthorized Names: Sand perch, surf perch, silver perch.

Note: Two fairly close relatives of this fish are also rather important sport species. One, the redtail perch, **Holconotus rhodoterus**, ranges from the vicinity of San Francisco north to the Straits of Juan de Fuca. Its sides are more or less barred with reddish or brownish and the caudal and anal fins are bright reddish. The longest dorsal spines are longer than the dorsal rays. The other, **Crossochir koelzi**, has about the same distribution as the barred perch. It is speckled, sometimes faintly barred, with brown; the sides and belly may be tinged with red.

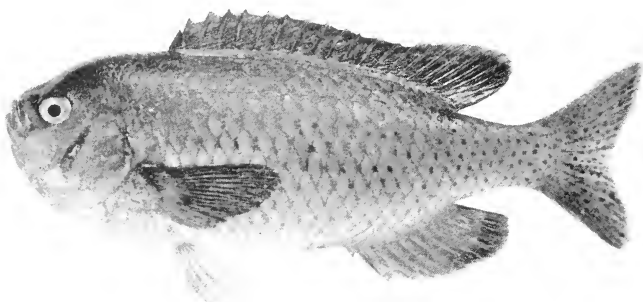


FIGURE 60

BLACKSMITH

Chromis punctipinnis

Relationships: A member of the demoiselle family, Pomacentridae, as is the garibaldi. This family is well represented in more tropical waters but no other species occur in California.

Distinguishing Characters: The single dorsal fin with about 13 spines and usually 12 rays; the lack of teeth on the vomer and palatines; the two spines at the front of the anal fin; the lateral line ending under the soft part of the dorsal fin. **Length** to 10 inches or more. **Color:** Dark slate above becoming lighter on the underparts, everywhere tinged with blue or violet; fins blue black; small dark brown or blackish spots on the back, the soft portion of the dorsal fin, and the caudal fin.

Distribution: Pt. Conception to central Lower California, chiefly in the kelp around rocks.

Fishing Season: None. Taken incidentally with other species.

Importance: Forms a very small proportion of the Southern California "perch" catch. Caught occasionally by sportsmen.

Fishing Gear: Accidentally in round haul nets and on hook and line.

Unauthorized Names: Black perch, blue perch, kelp perch, rock bass.

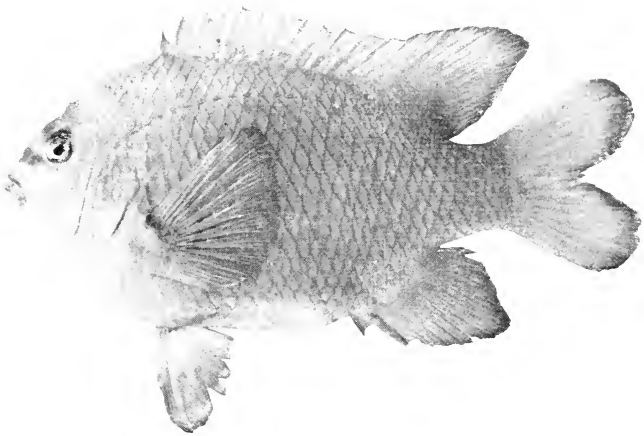


FIGURE 61

GARIBALDI

Hypsypops rubicunda

Relationship: A member of the demoiselle family, Pomacentridae, as is the blacksmith.

Distinguishing Characters: The bright orange color; the single dorsal fin with about 12 spines and 16 rays; the lack of teeth on the vomer and palatines; the two spines at the front of the anal fin; the lateral line ending under the soft part of the dorsal fin. **Length** to about 14 inches. **Color:** Uniform bright orange; the young with many bright blue spots.

Distribution: Pt. Conception south into northern Lower California, around rocky shores.

Fishing Season: None. Taken incidentally with other species.

Importance: Of negligible importance both as a market and as a sport fish. Commercial landings are included in the Southern California "perch" catch. It is one of the most brilliantly colored fish in California waters and is well known to visitors at marine gardens.

Fishing Gear: Incidentally in round haul nets or on hook and line.

Unauthorized Names: Garibaldi perch, ocean goldfish.

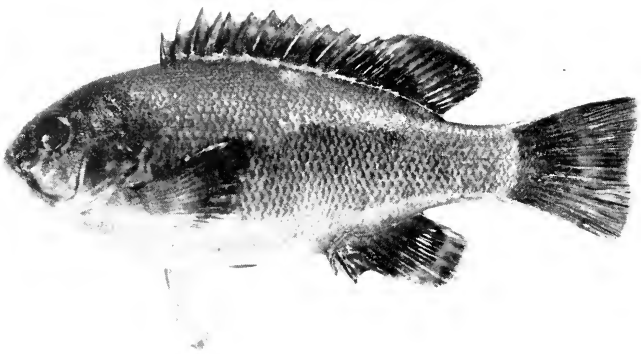


FIGURE 62

OPALEYE

Girella nigricans

Relationship: The only member of family Girellidae found in California. Many other species are found elsewhere in the Pacific.

Distinguishing Characters: The anal fin with three spines and usually 12 soft rays; the absence of teeth on the vomer (there are minute teeth on the palatines at each side of the roof of the mouth); the two bands of teeth on the jaws, the outer narrow and the inner broad; those in the outer band with three points and attached to the membrane only, so that they are freely movable. **Length** to about 17 inches. **Color:** Greenish, becoming paler below; eye opalescent blue; young with a whitish blotch on either side of the back.

Distribution: Central California south to Cape San Lucas, Lower California, around rocky shores. The young are common in tide pools.

Fishing Season: Usually taken irregularly with other species.

Importance: A minor constituent of the Southern California "perch" catch. Unimportant as a sport fish.

Fishing Gear: Round haul nets; hook and line.

Unauthorized Names: Black perch, green perch, blue-eyed perch, bluefish, Catalina perch, button perch, blue bass, greenfish.

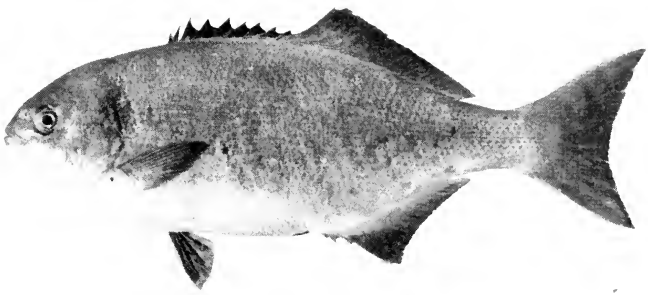


FIGURE 63

HALFMOON

Medialuna californiensis

Relationship: The only member of family Scorpidae in our waters.

Distinguishing Characters: The soft portions of the dorsal and anal fins which are so covered with scales that the rays are hidden; the spiny and soft portions of the dorsal fin being connected, with the spines shorter than the first soft rays; the anal fin with three spines and usually 19 or 20 soft rays. **Length** to about a foot. **Color:** Slaty black with a bluish luster, becoming whitish or mottled below.

Distribution: Pt. Conception to central Lower California, usually along rocky shores.

Fishing Season: Caught irregularly throughout the year.

Importance: Forms about 30 percent of the Southern California "perch" catch, according to a survey made in 1935. Taken in relatively small numbers by sportsmen.

Fishing Gear: Small round haul nets, hook and line, gill nets.

Unauthorized Names: Blue perch, blue bass, medialuna.

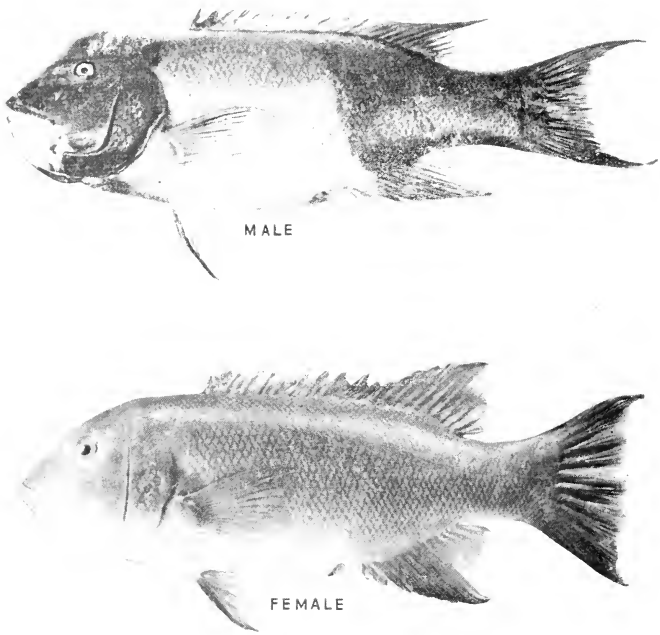


FIGURE 64 Photo by Al Johns for Haden & Carpenter, San Pedro

CALIFORNIA SHEEPSHEAD

Pimelometopon pulchrum

Relationship: A member of the wrasse family, Labridae, as are three other California species, one of them the señorita.

Distinguishing Characters: The large, canine-like teeth which slope obliquely forward; the three spines at the front of the anal fin; the single dorsal fin with about 11 or 12 stout spines which are shorter than the soft rays. **Length** to about three feet and weight to about 20 pounds. A very prominent fatty hump develops on the forehead of the male during the breeding season. **Color:** Male—head, posterior half of body, dorsal, anal and caudal fins jet or purplish black; the rest of the body usually crimson, sometimes shading to blackish; lower jaw white. Female—dull red to rose, sometimes with blackish areas, or, rarely, all black. Young—rose to crimson.

Distribution: Monterey Bay to the Gulf of California, usually near rocky shores or around kelp beds.

Fishing Season: Throughout the year, with landings heaviest in the winter and lightest in the summer. A small portion of the catch is made in Mexican waters.

Importance: A minor commercial fish, with Los Angeles and Santa Barbara the leading ports of landing. Used extensively as lobster bait. Taken in considerable quantity by sportsmen particularly at Santa Catalina Island.

Fishing Gear: Hook and line. Caught incidentally in lobster traps.

Unauthorized Names: Redfish, fathead, humpy.

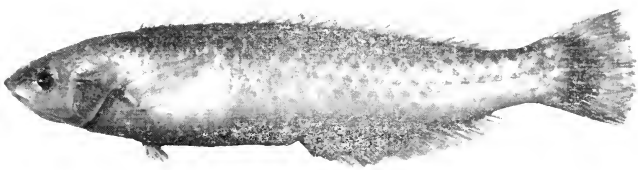


FIGURE 65 Photo by Al Johns for Vernon M. Haden, San Pedro

SENORITA

Oxyjulis californica

Relationship: Belongs to the wrasse family, Labridae, as does the sheepshead.

Distinguishing Characters: The absence of teeth on the vomer; the anal fin with three spines and normally 13 soft rays; the single dorsal fin usually with nine weak spines; the small, sharp, canine-like teeth which project forward; the slender body. **Length** to about seven inches. **Color:** Brown above, the centers of the scales orange-brown, cream color below; streaks of brownish and bluish on the sides of the head; a large black spot at the base of the caudal fin.

Distribution: Central California south into Lower California; common inshore and around kelp.

Fishing Season: Not the object of a fishery.

Importance: Caught fairly often by sport and commercial fishermen but not sought by either.

Fishing Gear: Accidentally in round haul nets and on hook and line.

Unauthorized Name: Kelpfish.

ROCKFISH

Species of *Sebastodes*

Relationship: These fish belong to the rockfish family, Scorpaenidae, which includes as well the sculpin and the channel rockfish. There are about 60 species of rockfish on the Pacific coast of North America and at least 50 of these are found in California. They are very similar in general appearance and are consequently unusually difficult to distinguish as separate species. Those illustrated in the following pages include the most common and distinctive forms.

Distinguishing Characters: The bony support which extends back from the lower part of the eye across the cheek just under the skin; the body covered with scales; the deeply notched dorsal fin which has 13 strong, sharp spines; the thirteenth being longer than the twelfth and more closely attached to the soft than to the spiny portion of the fin; the three strong sharp spines at the front of the anal fin; the absence of a slit behind the fourth gill. The space between the eyes varies with the species from convex to concave. Spines on top of the head are very strong in some species, moderate in others and obsolete in still others. All rockfish bear live young which are, however, far less developed at birth than are the salt-water perches. **Color:** Varies greatly according to species from black and brown to red, yellow and orange, but usually with at least some bright coloration.

Distribution: From at least as far south as the Gulf of California north to Alaska and south on the Asiatic side to southern Japan. Each species has its own distribution within this general range.

Fishing Season: Throughout the year, with variations from month to month apparently a matter of economic demand rather than availability.

Importance: The leading market fishery in the State, it ranked ninth in total poundage and value among all California fisheries in 1946. Sold almost entirely in the fresh fish markets; there has been a very limited amount canned in California. Heaviest landings have been made in the Eureka region since 1943, followed by Monterey, San Francisco, and Santa Barbara. The leading Central California ocean sport fishery in volume. Fourth in number caught and fifth in poundage among the State's ocean sport fisheries in 1946.

Fishing Gear: Taken commercially chiefly in balloon trawls since 1943, but also by setlines and hand lines. The Southern California catch is made exclusively on hook and line. Sportsmen use hook and line with cut bait, preferably sardine, or with silvery metal lures.

Unauthorized Name: Rock cod.

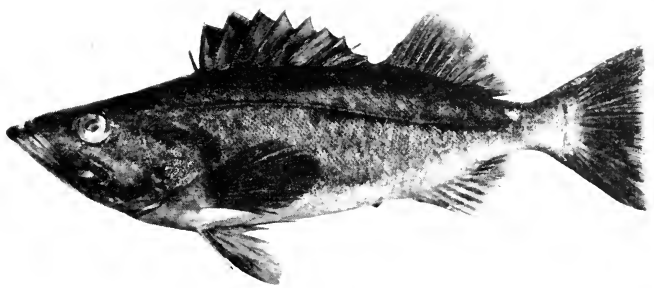


FIGURE 66

BOCACCIO

Sebastodes paucispinis

Relationship: A member of the rockfish family, Scorpaenidae.

Distinguishing Characters: *See* page 94. The broad, convex space between the eyes; the absence of spines on the top of the head; the greatly projecting lower jaw; the white or silvery peritoneum; the anal fin which has normally nine soft rays. Reaches a **length** of 35 inches and a weight of 18 pounds. **Color:** Olivaceous to dusky brown above, shading into dull orange reddish on the sides and to pale pink to white below; everywhere flushed with red; sometimes with black blotches on the body.

Distribution: Southern California to British Columbia, less common in the northern portion of the range.

Fishing Season: Throughout the year.

Importance: One of the most important rockfish in the State, particularly in Central and Southern California. Minor in Northern California.

Fishing Gear: Trawls, lines.

Unauthorized Names: Rock cod, grouper, salmon grouper.

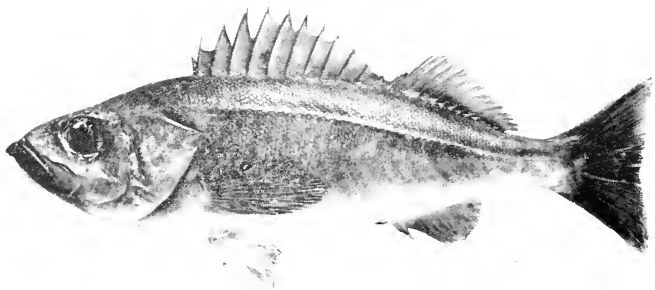


FIGURE 67

CHILIPEPPER

Sebastodes goodei

Relationship: A member of the rockfish family, Scorpaenidae.

Distinguishing Characters: *See* page 94. The broad convex space between the eyes; the absence of spines on top of the head; the projecting lower jaw; the white peritoneum with small, scattered black dots; the anal fin with normally eight soft rays, the last spine being about one-half the height of the first soft ray. **Length** to about 22 inches. **Color:** Pinkish red above shading into pink below; a narrow clear pink stripe extends the length of the lateral line.

Distribution: From about Magdalena Bay, Lower California, north at least to Ft. Bragg. Most common in Southern and Central California.

Fishing Season: Throughout the year.

Importance: With the bocaccio, the most important Central California rockfish. Minor in Northern California. One of the three leading Southern California species.

Fishing Gear: Trawls, lines.

Unauthorized Name: Red rock cod.

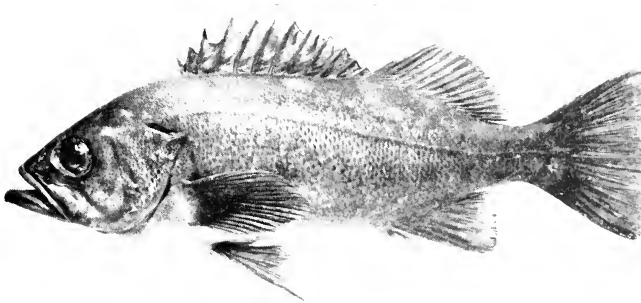


FIGURE 68 Photo by J. B. Phillips

YELLOWTAIL ROCKFISH
Sebastodes flavidus

Relationship: A member of the rockfish family, Scorpaenidae. Another species, *S. serranoides*, resembles it very closely. It is less common and is associated more with kelp.

Distinguishing Characters: *See* page 94. The convex space between the eyes; the absence of spines on top of the head; the projecting lower jaw; the anal fin with eight (rarely seven) soft rays (*S. serranoides* has nine, rarely eight, soft rays); the white peritoneum. Reaches a **length** of about two feet. **Color:** Grayish-brown above shading to white below; sides finely spotted with yellow. Somewhat inconspicuous light blotchings on back. Caudal fin yellow, other fins dusky-yellow. Young specimens have a black blotch on spinous dorsal membrane between eighth and twelfth spines (*S. serranoides* is blackish-olive on head and back with dark specks on body less conspicuous; light blotches along dorsal base more conspicuous and the caudal fin dark olive-yellow).

Distribution: Vancouver Island south into Lower California.

Fishing Season: Throughout the year.

Importance: Forms a fair proportion of the rockfish catch of the State. One of the six or seven leading species. *S. serranoides* is not as important.

Fishing Gear: Trawls, lines.

Unauthorized Names: Yellowtail rock cod, gialota.

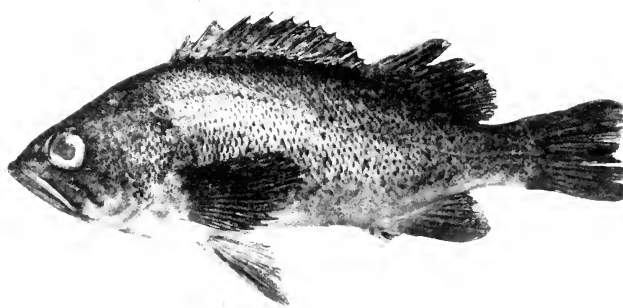


FIGURE 69 Photo by J. B. Phillips

BLACK ROCKFISH
Sebastodes melanops

Relationship: A member of the rockfish family, Scorpaenidae. Closely resembles the priestfish (opposite page).

Distinguishing Characters: *See* page 94. The broad convex space between the eyes; the absence of spines on top of the head; the anal fin which normally has eight soft rays, rarely seven or nine; the maxillary which extends to the hind border of eye; the white peritoneum. **Length** to about 20 inches. **Color:** Very dark, almost black above becoming paler on sides and dirty white below; fins dark; membrane of spinous dorsal spotted with black on lower portion. (This membrane is not spotted in the yellowtail rockfish or the priestfish).

Distribution: Pt. Conception to Alaska.

Fishing Season: Throughout the year.

Importance: One of the leading species in the State. Though it is of very minor importance in Central California, landings at Eureka are second only to the orange rockfish.

Fishing Gear: Trawls, lines.

Unauthorized Names: Black rock cod, black bass, bluefish, cherna, nero.

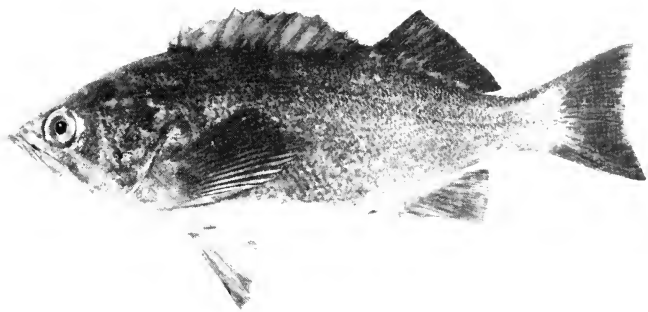


FIGURE 70

PRIESTFISH

Sebastodes mystinus

Relationship: A member of the rockfish family, Scorpaenidae. Another species, the black rockfish (opposite page), resembles it very closely.

Distinguishing Characters: *See* page 94. The broad convex space between the eyes; the absence of spines on top of the head; the spines of the dorsal fin lower than the soft rays; the anal fin with normally nine soft rays; the maxillary which extends to the hind border of the pupil; the black peritoneum (the peritoneum is white in the black rockfish). **Length** to about 20 inches. **Color:** Slaty or bluish black above, becoming paler below and white on the belly; back and sides often vaguely blotched with lighter and darker shades; fins all blackish.

Distribution: Southern California to Alaska, usually in rather shallow water.

Fishing Season: Throughout the year.

Importance: Of minor commercial importance, but probably the most important sport species.

Fishing Gear: Hook and line, trawls.

Unauthorized Names: Black rockfish, bluefish, black rock cod, blue perch, nervi, black snapper, black bass, neri.

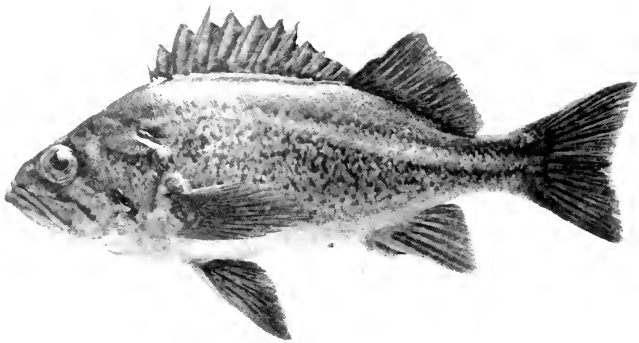


FIGURE 71 Photo by J. B. Phillips

ORANGE ROCKFISH

Sebastodes pinniger

Relationship: Belongs to the rockfish family, Scorpaenidae. Closely resembles the vermilion rockfish (opposite page).

Distinguishing Characters: *See* page 94. Chiefly orange in color; scales on the under side of the lower jaw smooth to the touch (in the vermilion rockfish, which is somewhat redder in color, the underside of the lower jaw is rough to the touch); the pale peritoneum; three pairs of low spines above the eye and one pair back of the eyes on top of the head; the slightly convex space between the eyes; the lower jaw projecting slightly and having a knob at the tip. **Length** to about 30 inches. **Color:** Olive gray blotched with orange red or orange yellow above, becoming nearly white below; an occasional specimen may have an inky, black blotch anywhere on body; three bright orange stripes radiate from the eye; fins generally bright orange. In young specimens there is usually a black blotch on the membrane of the spiny dorsal between the seventh and tenth spines; lips and lining of mouth pale red with dusky or black mottling.

Distribution: Northern Lower California to northern British Columbia.

Fishing Season: Throughout the year.

Importance: The most important species in the State in recent years. Dominates the catch at Eureka, but is of lesser importance in Central California.

Fishing Gear: Trawls, lines.

Unauthorized Names: Red rock cod, codalarga, filione.

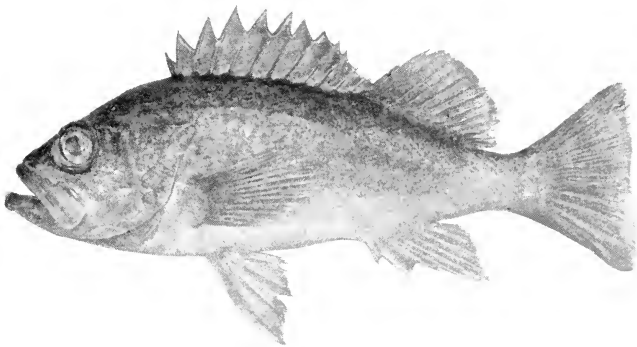


FIGURE 72

VERMILION ROCKFISH
Sebastodes miniatus

Relationship: A member of the rockfish family, Scorpaenidae. Closely resembles the orange rockfish (opposite page).

Distinguishing Characters: *See* page 94. Chiefly vermilion or brick red in color; the scales on the under side of the lower jaw rough to the touch (they are smooth in the orange rockfish); the white peritoneum; the slightly convex space between the eyes; the three pairs of low spines above the eyes and one pair back of the eyes on top of the head; the lower jaw which projects slightly and has a knob at the tip. **Length** to about three feet. **Color:** Vermilion above shading to pink on the sides and light red below with black dots on back and sides which give a dusky tone; three obscure orange stripes radiating from the eye; fins vermilion, the dorsal gray at the base; lips and lining of the mouth red.

Distribution: Vancouver Island south to Southern California.

Fishing Season: Throughout the year.

Importance: One of the more important commercial species, it is one of three leading species in Southern California.

Fishing Gear: Lines, trawls.

Unauthorized Names: Red rock cod, salmon grouper, red snapper, barracho, barrachon, racha.

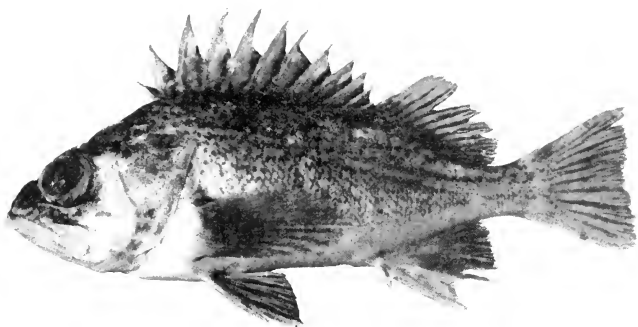


FIGURE 73 Photo by J. B. Phillips

GREEN-SPOTTED ROCKFISH

Sebastodes chlorostictus

Relationship: A member of the rockfish family, Scorpaenidae.

Distinguishing Characters: *See* page 94. The irregular yellowish-green spots on the back and base of the dorsal fin; the broad, slightly concave space between the eyes; the six pairs of spines on top of the head, one pair well back of the eyes; the knob at the tip of the lower jaw, which does not project beyond the upper; the black peritoneum. **Length** to about 15 inches. **Color:** Flesh pink vaguely mottled with rose above becoming pink or whitish below; scales tipped with yellowish green above the back and with yellow or orange on the lower part of the side; fins pink, the membranes washed with yellow; three to five irregular pink blotches on the back.

Distribution: Central California to central Lower California, usually in rather deep water.

Importance: Of minor importance, though often seen in the markets.

Fishing Gear: Trawls, lines.

Unauthorized Names: Red rock cod, bolina, chucklehead, cernie, chinafish.

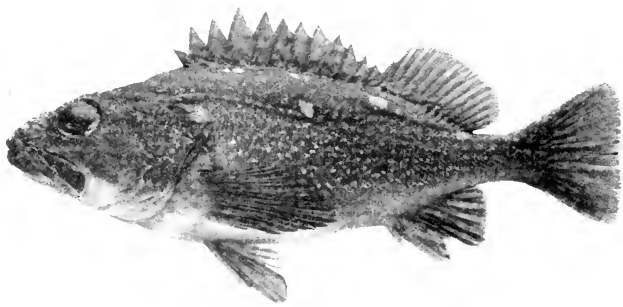


FIGURE 74 Photo by J. B. Phillips

STARRY ROCKFISH

Sebastodes constellatus

Relationship: A member of the rockfish family, Scorpaenidae.

Distinguishing Characters: *See* page 94. The body covered with many small pale dots; the narrow concave space between the eyes; the three to five whitish pink blotches on the sides (these are found also on two other fairly common species, *S. rosaceus* and the green-spotted rockfish, *S. chlorostictus*); the white peritoneum. **Length** to about 15 inches. **Color:** Orange to vermilion, shading into yellowish on the sides and becoming white or pink below; back sometimes with brownish blotches; spots and blotches as described above.

Distribution: Central California to central Lower California, usually in rather deep water.

Fishing Season: Throughout the year.

Importance: A minor commercial species.

Fishing Gear: Lines, trawls.

Unauthorized Names: Spotted rock cod, chinafish, scacciatale, red rock cod.

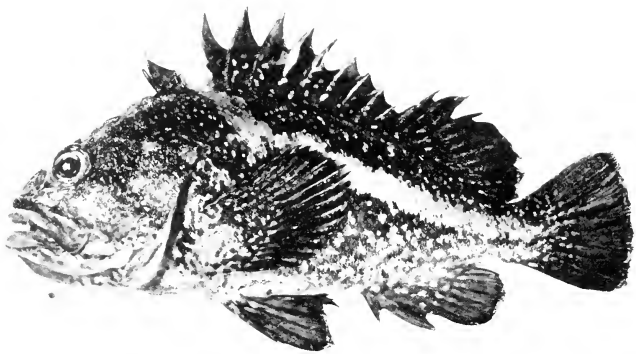


FIGURE 75

CHINA ROCKFISH

Sebastodes nebulosus

Relationship: A member of the rockfish family, Scorpaenidae.

Distinguishing Characters: *See* page 94. The broad, irregular yellow band which runs obliquely from the membrane between the third and fourth dorsal spines to the lateral line and then along the lateral line to the tail. **Length** to about 16 inches. **Color:** Blackish to blue-black, everywhere speckled with yellowish or whitish spots which are sometimes tinged with blue; a yellow stripe as described above.

Distribution: Point Conception north to Alaska in water of moderate depth.

Fishing Season: Throughout the year.

Importance: Of minor importance in terms of poundage though it is a desirable species and commands a good price. Landed both in Central and Northern California.

Fishing Gear: Trawls, lines.

Unauthorized Names: Cefalutano, gopher, gopher rock cod.

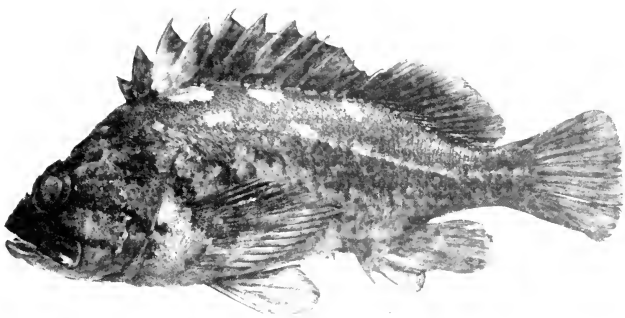


FIGURE 76 Photo by J. B. Phillips

BLACK-AND-YELLOW ROCKFISH

Sebastodes chrysomelas

Relationship: A member of the rockfish family, Scorpaenidae. Another common species, *S. carnatus*, resembles this fish very closely.

Distinguishing Characters: *See* page 94. The concave space between the eyes; the five pairs of strong spines above the eyes; the lower jaw not projecting; the broad pectoral fin with thick rays. **Length** to about 15 inches. **Color:** Dark, olive-brown to black above, tinged with yellow, shading to yellow below. Back and sides with a number of yellow, irregular areas. Four of these clear areas occur as follows: Below third and fourth dorsal spines and extending up onto the membrane between the spines, below the membrane between the seventh and eighth spines, below the notch between the spinous and soft portions of the dorsal fin and below the end of the soft dorsal. Fins colored like neighboring parts. Obscure dark stripes radiate from eye. (The general color of *S. carnatus* is yellowish brown and the blotches, which are similarly placed, are pinkish.)

Distribution: The coast of California in water of moderate depth. (*S. carnatus* is found in shallower water from Central California south.)

Fishing Season: Throughout the year.

Importance: One of the most highly esteemed rockfish of Central California, but not taken in any quantity.

Fishing Gear: Lines, trawls.

Unauthorized Names: Gopher, gopher rock cod.

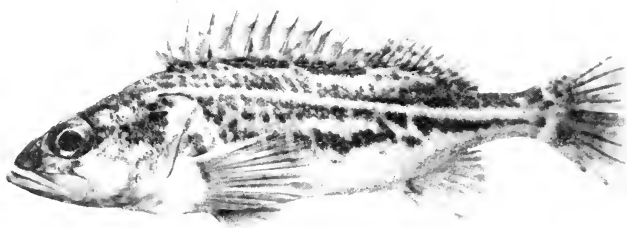


FIGURE 77 Photo by J. B. Phillips

STRIPED ROCKFISH

Sebastodes elongatus

Relationship: A member of the rockfish family, Scorpaenidae.

Distinguishing Characters: *See* page 94. The four horizontal irregular green bands which run the length of the body, joining to form two near the tail, separated by a pale pink stripe extending along the lateral line; the narrow concave space between the eyes; the slender body; the three pairs of spines on top of the head. Reaches a **length** of about a foot. **Color:** Green suffused with pink or red becoming white below; striped as described above.

Distribution: Lower California north to British Columbia.

Fishing Season: Throughout the year.

Importance: Forms a minor proportion of the rockfish catch.

Fishing Gear: Lines, trawls.

Unauthorized Names: Red rock cod, serena, rainha, reina, strawberry rock cod.

FIGURE 78 Photo by J. B. Phillips

TREEFISH

Sebastodes serriceps

Relationship: A member of the rockfish family, Scorpaenidae. Two other species, *S. rubrivinctus* and *S. nigrocinctus* resemble it in having vertical bands of color.

Distinguishing Characters: *See* page 94. The vertical black bands across the body; the narrow concave space between the eyes; the strong, thick ridges and blunt spines on top of head; the lower jaw not projecting. **Length** to about 14 inches. **Color:** Dark olive or blackish above shading to yellowish below; six to seven black bands on the sides, and two others running down and back from the eye; tinged with red on front and lower part of head. (In the Spanish flag, *S. rubrivinctus*, the ground color is pink or rosy and the broad vertical bars are crimson; in *S. nigrocinctus*, the ground color is bright red and there are about five vertical black bars overlaid with red.)

Distribution: Central California south into central Lower California.

Fishing Season: Throughout the year.

Importance: Of very minor significance.

Fishing Gear: Lines, trawls.

Unauthorized Names: Gopher, gopher rock cod.

FIGURE 73 Photo by J. B. Phillips

WIDOW ROCKFISH

Sebastodes ovalis

Relationship: A member of the rockfish family, Scorpaenidae. Another species, *S. entomelas*, closely resembles it and is called by the same name.

Distinguishing Characters: *See* page 94. The rather wide, somewhat convex space between the eyes; the five pairs of low spines on top of the head, one near the nostrils, three above the eyes, and one on top of the head behind the eyes (all except those near the nostrils low, weak and difficult to see); the rather small mouth, the lower jaw projecting beyond the upper; the second anal spine being notably longer than the third (in *S. entomelas* it is about equal to or shorter than the third); the black peritoneum. **Length** to about 14 inches. **Color:** Dusky, olive-tan above becoming creamy or whitish below, everywhere tinged with reddish or pink; back, sides, and membrane of the dorsal fin covered with many small round, black spots. (*S. entomelas* lacks these spots.)

Distribution: Central and Southern California, normally in rather deep water.

Fishing Season: Throughout the year.

Importance: Taken in less quantity than *S. entomelas*, from which it is not separated in the markets. The total catch of widow rockfish is of minor importance.

Fishing Gear: Lines, trawls.

Unauthorized Names: Widow rock cod, widow, zipola, viuva.

FIGURE 80 Photo by Al Johns for Haden & Carpenter, San Pedro

CHANNEL ROCKFISH

Sebastolobus alascanus

Relationship: A member of the rockfish family, Scorpaenidae, which includes as well the sculpin and the rockfish of genus *Sebastodes*. This species has a close relative *(S. altivelis)* found in deep water which is rarely taken.

Distinguishing Characters: The bony support extending from below the eye back across the cheek just under the skin; the absence of a slit behind the fourth gill; the fully-scaled body; the three anal spines; the deeply-notched dorsal fin with 15 to 17 spines; the prolonged lower rays of the pectoral fin; the large head with conspicuous rows of spines; the slender body. Reaches a **length** of about two feet. **Color:** Bright red; a dark blotch or blotches on the spiny portion of the dorsal fin; other fins with black markings. Some irregular deeper red to blackish spots on body.

Distribution: Southern California to the Bering Sea, usually in from 100 to 300 fathoms.

Fishing Season: No definite season; caught incidentally with other species as a rule.

Importance: Of minor commercial significance. Included in the "rockfish" catch.

Fishing Gear: Usually taken on set lines in deep water incidentally with sablefish.

Unauthorized Names: Channel cod, fagiano, scorpion, deep sea red rock cod.

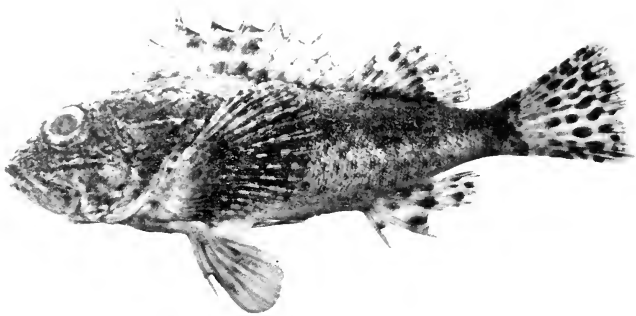


FIGURE 81 Photo by Al Johns for Haden & Carpenter, San Pedro

SCULPIN

Scorpaena guttata

Relationship: Not a true sculpin, but a member of the rockfish family as are the channel rockfish and the rockfish of genus *Sebastodes*. True sculpins are shown on pages 114 and 115.

Distinguishing Characters: The bony support extending from below the eye back across the cheek just under the skin; the absence of a slit behind the fourth gill; the fully-scaled body; the 12 sharp spines on the dorsal fin; the three spines at the front of the anal fin; the many spines on top of the head and on the opercle. **Length** to about 17 inches. **Color:** Generally reddish above, mottled with reddish brown, olive, gray or purple and becoming bright pink below; upper parts with many small round brownish or olive spots; ventral fins plain pinkish or reddish, other fins marked with dark brown.

Distribution: Central California south into the Gulf of California. Common in bays, and along the shore.

Fishing Season: Throughout the year, usually reaching a peak in late spring and summer.

Importance: Of minor commercial significance with heaviest landings in the Los Angeles region. Sold entirely in the fresh fish markets. Considered a desirable species by sportsmen, it ranked seventh in number caught in the ocean during 1946.

Fishing Gear: Hook and line, set lines. Taken by sportsmen chiefly off breakwaters, piers and barges. These fish should be handled with care, as the spines can inflict extremely painful wounds.

Unauthorized Names: Scorpion, bullhead.

FIGURE 82

SABLEFISH

Anoplopoma fimbria

Relationship: A member of the skilfish family, Anoplopomatidae, of which it is the only California representative.

Distinguishing Characters: The bony support which extends from the lower part of the eye across the cheek just under the skin; the presence of a slit behind the fourth gill; the two separate dorsal fins, the first being composed of spines, the second of soft rays; the two pairs of nostrils; the small scales which cover the body; the anal fin with three spines and 15 to 19 soft rays. Reaches a **length** of over three feeet and a weight of 40 to 50 pounds. (There is a report of an Alaskan specimen weighing 126 pounds with the viscera removed.) **Color:** Blackish, dark gray or greenish gray on the back and sides, becoming paler below; lining of gill cover and peritoneum blackish.

Distribution: Southern California to Alaska.

Fishing Season: Throughout the year, with the smallest catches usually made during the winter months.

Importance: One of the more important market species in California. In 1946, heaviest landings were made in the Eureka region, followed by Monterey and San Francisco. Taken in small quantities in Southern California. Sold chiefly in the fresh fish markets; 5 to 10 percent of the catch is smoked and small amounts are sometimes salted. The liver and viscera have a high vitamin content.

Fishing Gear: Set lines, trawl nets.

Unauthorized Names: Deep sea trout, coalfish, skilfish, black cod, butterfish, candlefish, blue cod, bluefish, coal cod.

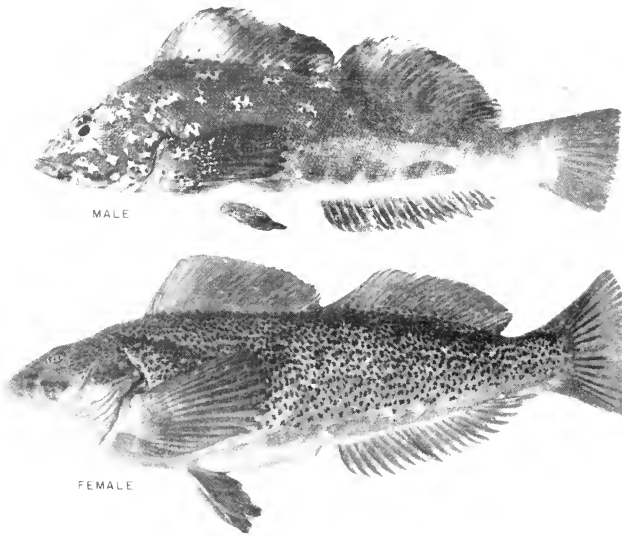


FIGURE 83

GREENLING SEATROUT

Hexagrammos decagrammus

Relationship: Not a trout, but a member of the greenling family, Hexagrammidae. Long called "seatrout" in California though it is usually referred to as "greenling" in the Pacific Northwest.

Distinguishing Characters: The bony support which extends back from the lower fore part of the eye across the cheek just under the skin; the long dorsal fin with about 21 spines; the absence of canine teeth in the mouth; the five lateral lines; the two pairs of fleshy flaps on the top of the head. Another species, *Hexagrammos superciliosus*, which is often caught in Northern California, is distinguished by the single pair of large fringed flaps on the head over the eye. **Length** to about 20 inches. **Color:** Brownish or grayish of various shades, the males sometimes tinged with bluish or coppery, the females sometimes with a slate-blue ground color; head and fore parts of the males with rather large sky-blue spots, each surrounded by a ring of small rusty spots; back, sides and head of the females rather closely and uniformly covered with round, reddish brown spots.

Distribution: Kodiak Island to Pt. Conception.

Fishing Season: Taken irregularly all year.

Importance: Very rarely enters the commercial catch. A desirable sport fish.

Fishing Gear: Hook and line, set and long lines, accidentally in trawls.

Unauthorized Names: Rock trout, rockfish, bluefish.

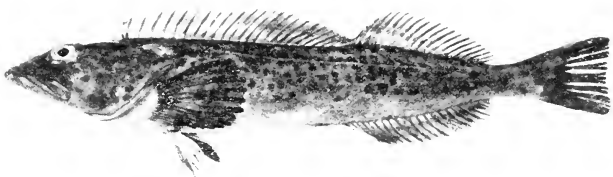


FIGURE 84

LINGCOD

Ophiodon elongatus

Relationship: The only member of family Ophiodontidae. Not a true cod.

Distinguishing Characters: The bony support which extends back from the lower part of the eye across the cheek just under the skin; the long, deeply notched dorsal fin; the large, canine-like teeth; the two large fleshy flaps over the eyes; the body covered with small scales; the single lateral line. **Length** to over four feet and weight up to 70 pounds. **Color:** Extremely variable, associated with habitat. Ranges from dark bluish or greenish brown above with darker blotches outlined in orange or pale blue, to lighter brown or tan with spots and blotches of brown, green, orange, or yellowish; gray green or turquoise to whitish below. Flesh turquoise green to whitish (the green color is not harmful).

Distribution: Alaska south at least to the Mexican border.

Fishing Season: Throughout the year, with no defined season.

Importance: A market fish of moderate importance with heaviest 1946 landings in the Eureka region, followed by San Francisco and Monterey. The entire catch is sold fresh. A leading Central California sport fish, it ranked tenth in number caught and eighth in poundage among all the State's ocean sport fisheries in 1946.

Fishing Gear: Otter trawls, set lines, long lines, hook and line. Taken by sportsmen from boats or rocky shores, with cut sardines or jigs.

Unauthorized Names: Cultus cod, greenling, cod, blue cod, bluefish, white cod, buffalo cod, leopard cod, codfish, green cod, bacalao, card, testoni, Pacific cultus.

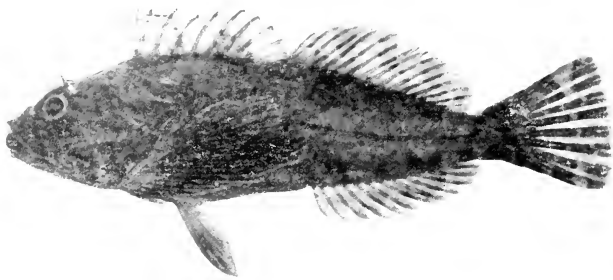


FIGURE 85 Photo by Al Johns for Haden & Carpenter, San Pedro

CABEZONE

Scorpaenichthys marmoratus

Relationship: The only commercially important member of the sculpin family, Cottidae, found in California. A number of species of small fish belong to this family, among them the staghorn sculpin (opposite page).

Distinguishing Characters: The broad, bony support which extends from the lower part of the eye across the cheek just under the skin; the dorsal fin with normally 11 spines; the scaleless body, the skin having a wrinkled appearance; the anal fin composed of thick, soft rays but no spines; the presence of a fleshy flap on the middle of the snout and a pair of longer ones just back of the eyes; the stout spine just before the eye; the broad mouth with many small, sharp teeth. Reaches a **length** of 30 inches and a weight of 20 to 25 pounds. **Color:** Extremely variable; dark brown, reddish, or green above, becoming paler below and turquoise green or whitish on the belly; vaguely mottled and blotched with darker and paler shades, often everywhere sparsely spotted with yellowish or reddish; lining of mouth and flesh a translucent turquoise green.

Distribution: Northern British Columbia to Southern California.

Fishing Season: Caught irregularly throughout the year.

Importance: Of negligible commercial significance, with maximum landings in Central California. An important Central California game fish. The 1946 sport catch was appreciably greater than the commercial.

Fishing Gear: Hook and line, with cut bait or jigs.

Unauthorized Names: Bullhead, blue cod, sculpin, blue garnet, marbled sculpin, bull cod.

FIGURE 86 Photo by Al Johns for Vernon M. Haden, San Pedro

STAGHORN SCULPIN

Leptocottus armatus

Relationship: A member of the sculpin family, Cottidae, which includes almost one-tenth of California's marine fishes. Excepting this species and the cabezone, sculpins are small fishes of no commercial importance. Some of them are very abundant in tide pools.

Distinguishing Characters: The ventral fins with one spine and four rays (the spine may be so closely attached to the first ray that it can be found only by dissection); the bony support extending from the lower part of the eye back across the cheek just under the skin; the scaleless body; the large, antler-like spine on the preopercle. **Length** to about a foot. **Color:** Back, mottled olive-gray, green or brown; sides brassy, bordered below by yellow; belly white. Spiny dorsal with a black spot toward its end; soft dorsal and anal fins with gray or green bars; pectoral fins barred with yellow and black.

Distribution: Alaska to northern Lower California. Common close to shore and in bays; enters brackish and perhaps fresh water.

Fishing Season: Caught occasionally throughout the year.

Importance: A moderately important bait fish, particularly in bays. Of no significance as either a market or game fish though it is caught fairly often by sportsmen.

Fishing Gear: Hook and line.

Unauthorized Names: Armed sculpin, armed cabezone, bullhead.

FIGURE 87 Photo by Al Johns for Haden & Carpenter, San Pedro

MUDSUCKER

Gillichthys mirabilis

Relationship: The only commercially important member of the goby family, Gobiidae, in California.

Distinguishing Characters: The united ventral fins; the huge mouth with the maxillary greatly developed, extending back to the base of the pectorals in the adult. (The young have small mouths and large eyes.) **Length** to at least eight inches. **Color:** Olive above, speckled, mottled or barred with darker shades, becoming lighter below.

Distribution: Central California to central Lower California. Common in Southern California bays and sloughs.

Fishing Season: Taken throughout the year.

Importance: Large quantities are used as bait, particularly by inland sport fishermen. It is extremely hardy, and can live for several days in fresh water.

Fishing Gear: Traps.

Unauthorized Name: Long-jawed goby.

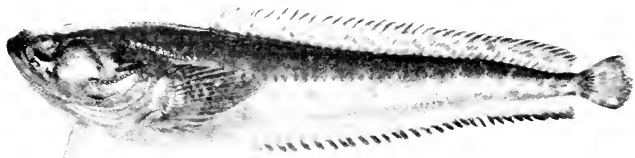


FIGURE 88 Photo by Al Johns for Haden & Carpenter, San Pedro

MIDSHIPMAN

Species of *Porichthys*

Relationship: These fish are members of the toadfish family, Batrachoididae. Two very similar species occur in California, *Porichthys notatus* and *Porichthys miriaster* (shown above).

Distinguishing Characters: The numerous luminous organs or photophores arranged in rows on the body and head (these look like small shiny spots); the two dorsal fins, the first very small, composed of two short spines; the ventral fins with one spine and two rays. **Length** to about 15 inches. **Color:** Deep bronze with purplish or bluish reflections above, paler on the sides, and becoming golden yellow below *or* entirely bronze, darker above. Anal fin margined with dusky or black in adult *miriaster;* somewhat dusky in *notatus* but usually without dark margin.

Distribution: *P. notatus*, Alaska to the Gulf of California in both shallow and deep water; in deeper water, avoiding bays and shoals, south of Pt. Conception. *P. miriaster*, Southern California south into Lower California, usually inshore and in bays.

Fishing Season: None. Not the object of a fishery.

Importance: Of no importance as a commercial or game fish, but seen fairly often in catches of other species.

Fishing Gear: Caught accidentally in round haul nets.

Unauthorized Names: Singing fish, bullhead.

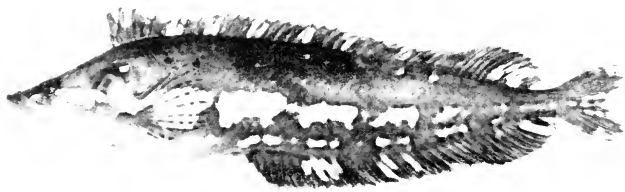


FIGURE 89 Photo by Al Johns for Vernon M. Haden, San Pedro

KELPFISH

Heterostichus rostratus

Relationship: A member of one of the blenny families, Clinidae. Several species of small fish belong to this family, some of which are common in tide pools.

Distinguishing Characters: The ventral fins which have one spine and three rays and which are inserted in advance of the pectoral fins; the long dorsal fin with many more spines than rays; the projecting lower jaw; the forked tail. **Length** to about 16 inches. **Color:** Highly variable, the shades ranging from brown, green or purplish to blackish; usually barred or blotched, sometimes uniform.

Distribution: British Columbia south into Lower California. A common inshore form around kelp.

Fishing Season: Not the object of a fishery.

Importance: None. Caught fairly frequently by both sport and commercial fishermen.

FIGURE 90

BLENNY-EEL

Cebidichthys violaceus

Relationship: One of the northern blennies, belonging to family Cebidichthyidae. Not a true eel.

Distinguishing Characters: The absence of ventral fins; the single lateral line with short branches; the pectoral fins which are longer than the eye; the very long dorsal fin with both spines and soft rays; the anal fin with two spines at the front; the short head which often has a fleshy hump on top. **Length** to about 30 inches. **Color:** Dull green or brownish green, mottled, and becoming paler below. Sides often with scattered orange or reddish spots in life.

Distribution: The coast of California. Common in the intertidal zone in the northern and central part of the State. Reported only twice from south of Santa Barbara County.

Fishing Season: Throughout the year, subject to bag and size limits in some places. Consult fish and game laws.

Importance: Rarely enters the commercial catch. A minor sport fish.

Fishing Gear: A specially made stick with a baited hook at the end; hook and line; accidentally in trawls.

FIGURE 91

BLENNY-EEL

Xiphister mucosus

Relationship: One of the northern blennies, belonging to family Stichaeidae in which are also classed a number of small tide-pool fishes. Not a true eel and not a close relative of the moray.

Distinguishing Characters: The absence of ventral fins; the four lateral lines, each with a series of cross-branches; the tiny pectoral fins which are scarcely if any longer than the eye; the absence of spines on the anal fin and of rays on the extremely long dorsal fin; the small, well-imbedded scales which cover the body. **Length** to about 20 inches. **Color:** Blackish green becoming paler below, sometimes with yellowish blotches in older fish; two prominent olive brown streaks edged with black radiate back from the eye.

Distribution: Alaska to Central California, common in the intertidal zone.

Fishing Season: Taken throughout the year subject to size and bag limits in part of the State. See fish and game laws.

Importance: Rarely enters the commercial catch. A minor sport fish in Central and Northern California.

Fishing Gear: Hook and line; a specially made stick with a hook on the end. Caught incidentally in trawls.

FIGURE 92 Photo by Al Johns for Haden & Carpenter, San Pedro

MORAY

Gymnothorax mordax

Relationship: The only California member of the moray family, Muraenidae. A number of related species are known, chiefly from warm seas of the Western Hemisphere.

Distinguishing Characters: The lack of both pectoral and ventral fins; the leathery, scaleless skin; the dorsal and anal fins reduced to low fleshy ridges; the well-developed jaws with sharp teeth. **Length** to about five feet. **Color:** Dark brown, mottled and spotted with lighter shades; throat and sometimes belly with dark horizontal streaks.

Distribution: Pt. Conception south into central Lower California, in rocky places.

Fishing Season: None. Caught incidentally throughout the year.

Importance: Occasionally sold in very small quantities. It is an extremely ferocious fish and consequently an unwelcome catch.

Fishing Gear: Accidentally on hook and line and in traps.

Unauthorized Names: Conger eel, marina, muraena, moray eel.

FLATFISHES

Members of Order Heterosomata

Relationship: All flatfish belong to one or another of the several families comprising the order Heterosomata. The commercial species of California are members of either the flounder family, Pleuronectidae, or the turbot family, Bothidae. Most of the fish called sole and turbot in California, the starry flounder and the Pacific halibut are in the flounder family, while the sand dabs, the California halibut and the fantail and bigmouth soles are in the turbot family. The only "true" sole ever seen in the commercial catch, the tongue sole, is of no economic importance.

Distinguishing Characters: Flatfish, except when they are very young, are at once distinguished by having both eyes on the same side of the head. They are hatched with an eye on each side, but one soon migrates and the fish take on their typical adult form. The eyed side of the body is colored and the blind side white or nearly white. Turbots (Bothidae) typically have the eyes on the left side, while flounders (Pleuronectidae) typically have them on the right. However, three of our common species, the California halibut, the fantail sole and the starry flounder, may have the eyes on either the right or the left side.

SOLE

Relationship: None of the species sold under this name in California is a true sole. They have, however, been called sole for many years, and the name was officially adopted because of this long-standing common usage. All the important commercial species belong to the flounder family, Pleuronectidae. Two minor species, the fantail and bigmouth soles, belong to family Bothidae.

Fishing Season: Throughout the year with fluctuations in catch apparently due to economic rather than biological factors.

Importance: Soles ranked twelfth in total poundage and fourteenth in value in 1946, supporting one of the most important market fisheries in the State. The entire catch was sold fresh until 1947 when part of the Central California catch was canned. Eureka is the leading port of landing, followed by San Francisco. Monterey and Santa Barbara handle a small percentage of the catch.

Fishing Gear: Primarily otter trawls; some hook and line.

TURBOT

Relationship: The California turbots do not belong to the true turbot family (Bothidae) but to the flounder family, Pleuronectidae. As with sole, the name was adopted officially because of common usage.

Fishing Season: Irregularly throughout the year.

Importance: Of minor commercial importance, forming a small proportion of the State's flatfish catch. Eureka, San Francisco and Santa Barbara are the chief ports of landing.

Fishing Gear: Otter trawls; some hook and line.

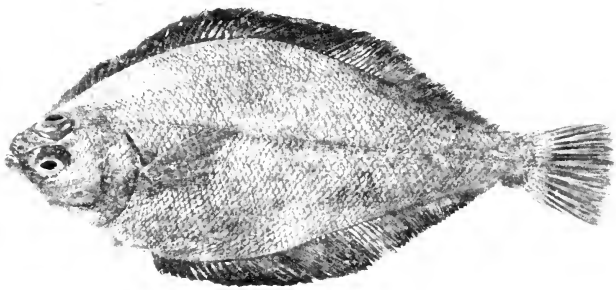


FIGURE 93

SAND DAB

Citharichthys sordidus

Relationship: A member of family Bothidae. (*See* page 122.)

Distinguishing Characters: *See* page 122. The unsymmetrical ventral fins, that on the eyed side being attached to the ridge of the abdomen; the nearly straight lateral line; the lack of a dorsal branch to the lateral line; the large, loosely attached scales; the lower eye being longer than the snout; the length of the pectoral on the eyed side being less than the length of the head. Eyes on the left side of the body. **Length** to a foot or more; weight to two pounds. **Color:** Various shades of tan or brown, sometimes spotted or blotched with dull orange or black.

Distribution: Alaska to Lower California.

Fishing Season: Throughout the year.

Importance: Forms about a tenth of the State's flatfish catch. Marketed fresh and considered a delicacy. Landed chiefly at San Francisco and Eureka.

Fishing Gear: Otter trawls. Taken on special set lines in Southern California.

Unauthorized Name: Soft flounder.

Note: Two other species of sand dab are found in California but are of minor importance. One **Citharichthys stigmaeus,** ranges along the entire coast. Its lower eye is no longer than the snout and its pectoral fin is shorter than the head. The other, **Citharichthys xanthostigmus,** occurs in Southern and Lower California and is distinguished by the pectoral fin which is longer than the head.

FIGURE 94

CALIFORNIA HALIBUT

Paralichthys californicus

Relationship: Belongs to family Bothidae. (*See* page 122.)

Distinguishing Characters: *See* page 122. The high arch in the lateral line over the pectoral fin; the lack of a dorsal branch to the lateral line; the large jaws which are about equally developed on both sides; the moderately strong sharp teeth; the maxillary which reaches to or beyond the hind border of the lower eye; about 100 scales in the lateral line; the pectoral fin on the eyed side being about one-half the length of the head; the small eyes with a rather wide, flat area between them. Eyes on either the right or the left side of the body. **Length** to three feet and weight to 60 pounds. **Color:** Greenish or grayish brown, sometimes mottled with darker and lighter shades, sometimes with small vague whitish spots, especially in young fish.

Distribution: Central California south into the Gulf of California.

Fishing Season: Taken throughout the year, with heaviest California catches usually made in the early months of the year. Heaviest Mexican catches are usually landed in the late summer and fall.

Importance: Eighteenth in poundage and fifteenth in value among California's fisheries in 1946. About a third of the catch was taken in Mexican waters. Heaviest local catches have been made in the Santa Barbara area in recent years. One of the most desirable sport species in Southern California, it ranked third in total sport catch in 1946.

Fishing Gear: Trammel nets, hook and line, otter trawls. Sportsmen generally use live bait, fishing from boats, barges and piers.

Unauthorized Names: Halibut, chicken halibut, bastard halibut, southern halibut, Monterey halibut, alabato.

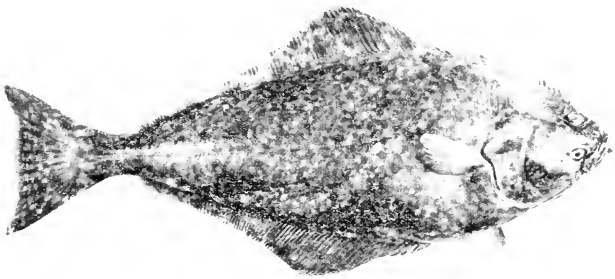


FIGURE 95

PACIFIC HALIBUT

Hippoglossus stenolepis

Relationship: A member of family Pleuronectidae. (*See* page 122.)

Distinguishing Characters: *See* page 122. The high arch in the lateral line over the pectoral fin; the lack of a dorsal branch to the lateral line; the jaws about equally developed on the blind and eyed sides; the strong teeth; the maxillary not reaching past the middle of the lower eye; the pectoral fin on the eyed side being about one-half the length of the head; 150 or more scales in the lateral line. Eyes normally on the right side though specimens are sometimes found with eyes on the left. Reaches a **length** of nearly nine feet and a weight of about 500 pounds. **Color:** Nearly uniform dark brown, often with vague paler blotches.

Distribution: Central California north to the Bering Sea; to northern Japan on the Asiatic side. Reported once from Santa Rosa Island.

Fishing Season: Subject to the rules of the International Fisheries Commission.

Importance: Of minor importance in California in terms of total poundage and value but one of the more desirable market fish. Landed chiefly at Eureka, in smaller quantity at San Francisco.

Fishing Gear: Long lines; illegally in otter trawls. Rarely caught by sportsmen.

Unauthorized Names: Halibut, right halibut, genuine halibut, real halibut, alabato, northern halibut.

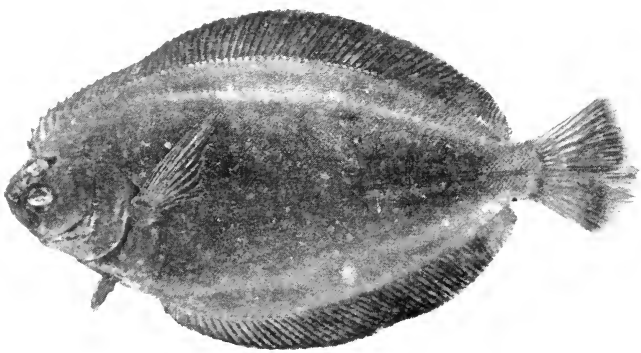


FIGURE 96

FANTAIL SOLE

Xystreurys liolepis

Relationship: A member of family Bothidae. (*See* page 122.)

Distinguishing Characters: *See* page 122. The abrupt, high arch in the lateral line over the pectoral fin; the lack of a dorsal branch to the lateral line; the jaws which are about equally developed on the blind and eyed sides but have more teeth on the blind side; the maxillary which extends to below the middle of the lower eye; the rounded caudal fin; the pectoral fin on the eyed side being almost as long as or longer than the head. Eyes on either the left or the right side. **Length** to about 15 inches. **Color:** Brownish and olive mottled with darker occasionally with many gray and reddish brown blotches; distinct large, round, black blotches sometimes present; fins with dark blotches, the pectoral on the eyed side with oblique bars.

Distribution: Pt. Conception south into the Gulf of California; possibly north to Central California.

Fishing Season: Throughout the year.

Importance: Of negligible commercial importance.

Fishing Gear: Otter trawls, hook and line.

Unauthorized Name: Long-finned flounder.

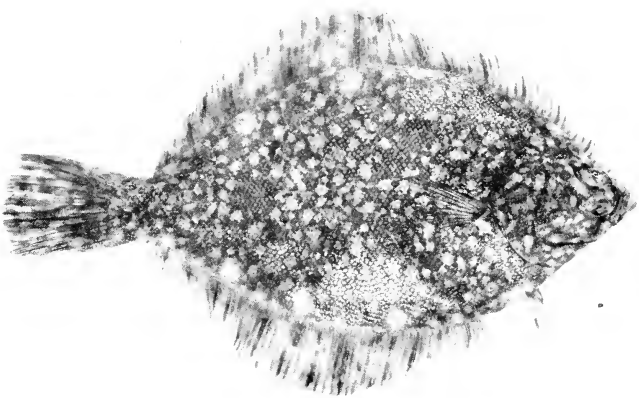


FIGURE 97

BROADFIN SOLE
Lepidopsetta bilineata

Relationship: A member of family Pleuronectidae. (*See* page 122.)

Distinguishing Characters: *See* page 122. The abrupt high arch in the lateral line over the pectoral fin; the lateral line having a dorsal branch; the jaws and teeth being better developed on the blind side; the small mouth, the maxillary extending to below the fore part of the lower eye; the pectoral fin on the eyed side being shorter than the head. Eyes on the right side. Reaches a **length** of 18 or 20 inches and a weight of five or six pounds. **Color:** Dark brown, with vague paler blotches, mottled and spotted with darker and lighter shades; dorsal, anal and caudal fins with dark blotches or bars; blind side white to yellowish.

Distribution: Southern California to the Bering Sea; south on the Asiatic side to Japan. Rare in Southern California.

Fishing Season: Throughout the year.

Importance: Forms a very minor part of the sole catch in California.

Fishing Gear: Otter trawls, some hook and line.

Unauthorized Names: Double-lined flounder, rock sole, flounder.

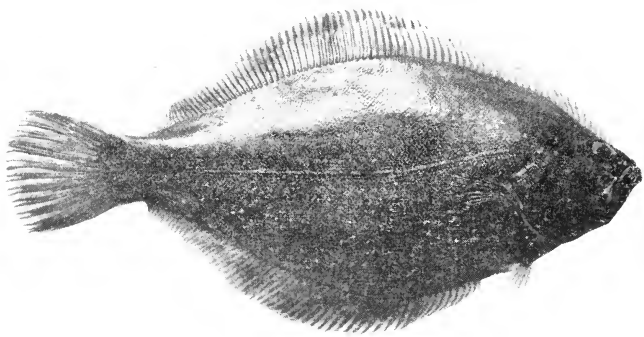


FIGURE 98

SAND SOLE

Psettichthys melanosticus

Relationship: A member of family Pleuronectidae. (*See* page 122.)

Distinguishing Characters: *See* page 122. The lateral line being slightly curved over the pectoral fin but not highly or abruptly arched; the presence of a dorsal branch to the lateral line; the first few rays of the dorsal fin which are elongated and not connected by a membrane for about half of their length; the jaws and teeth being about equally developed on both sides; the maxillary which extends to or almost to a point below the middle of the lower eye; the small eyes; the wide space between the eyes; the pectoral fin which is shorter than the head; the rounded caudal fin. Eyes on the right side. Reaches a **length** of 20 inches and a weight of four to five pounds. **Color:** Brownish, vaguely mottled with darker, everywhere speckled with dark brown or black.

Distribution: Alaska to Southern California; uncommon south of Pt. Conception.

Fishing Season: Throughout the year.

Importance: Forms a minor proportion of the sole catch in California.

Fishing Gear: Otter trawls, some hook and line.

Unauthorized Names: Fringe sole, spotted flounder.

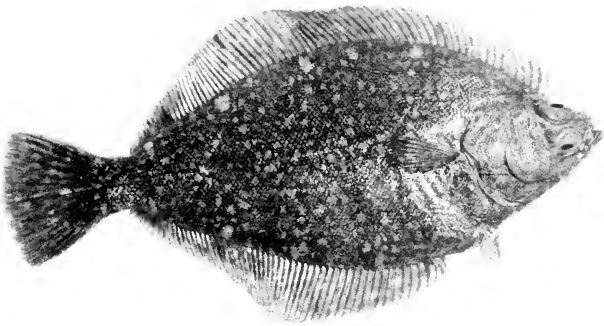


FIGURE 99

SCALY-FIN SOLE

Isopsetta isolepis

Relationship: A member of family Pleuronectidae. (*See* page 122.)

Distinguishing Characters: *See* page 122. The lateral line which curves upward over the pectoral fin but does not have a high arch; the dorsal branch of the lateral line; the jaws and teeth which are better developed on the blind side; the maxillary extending to a point below the fore part of the lower eye; the rough scales on the eyed side of the body, head and fins (90 or less along the lateral line); the narrow flat space between the eyes. Eyes on the right side. **Length** to about 18 inches. **Color:** Brownish or grayish mottled and blotched with darker and sometimes with lighter.

Distribution: Southern California to Alaska, rare south of Pt. Conception.

Fishing Season: Throughout the year.

Importance: Forms a minor proportion of the sole catch in California.

Fishing Gear: Otter trawls, some hook and line.

Unauthorized Names: Scaly-fin flounder, butter sole, Bellingham sole.

FIGURE 100

ENGLISH SOLE

Parophrys vetulus

Relationship: A member of family Pleuronectidae. (*See* page 122.)

Distinguishing Characters: *See* page 122. The lack of a high arch in the lateral line over the pectoral fin; the long dorsal branch of the lateral line; the long, rather pointed jaws, stronger on the blind side and with teeth chiefly on the blind side; the maxillary extending to below the fore part of the lower eye; the smooth scales on the eyed side, with about 90 or more along the lateral line; the ridge in the narrow space between the eyes. Eyes on the right side. Reaches a **length** of about 21 inches. **Color:** Pale brownish to brown; the dorsal and anal fins tipped with darker. Blind side light yellow to white.

Distribution: Alaska south at least to the Mexican border.

Fishing Season: Throughout the year.

Importance: Forms by far the largest proportion of the sole catch.

Fishing Gear: Otter trawls, some hook and line.

Unauthorized Names: Common sole, California sole, pointed-nosed sole.

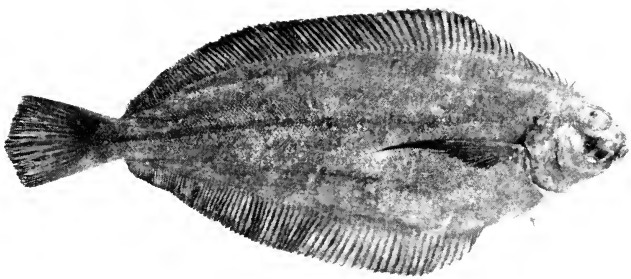


FIGURE 101

REX SOLE

Glyptocephalus zachirus

Relationship: A member of family Pleuronectidae. (*See* page 122.)

Distinguishing Characters: *See* page 122. The nearly straight lateral line which has no dorsal branch; the small mouth with the jaws and teeth better developed on the blind side; the maxillary which extends to below the front of the lower eye; the very long pectoral fin on the eyed side (that on the blind side is not extended). Eyes on the right side. **Length** to about 18 inches. **Color:** Uniform light brown on the eyed side; the fins darker brown or dusky.

Distribution: Southern California north to the Bering Sea; not common to the south.

Fishing Season: Throughout the year.

Importance: One of the more important of the smaller flatfishes both in poundage and desirability. Landed chiefly in the Eureka region.

Fishing Gear: Otter trawls, some hook and line.

Unauthorized Name: Long-finned sole.

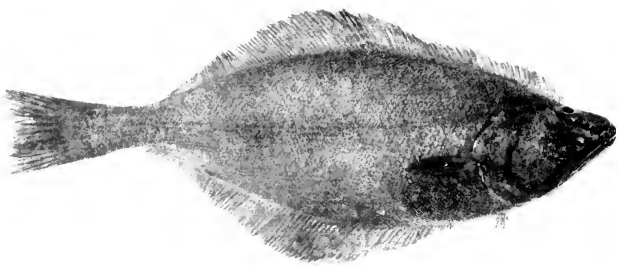


FIGURE 102

ARROWTOOTH SOLE

Atheresthes stomias

Relationship: Belongs to family Pleuronectidae. (*See* page 122.)

Distinguishing Characters: *See* page 122. The lack of an abrupt, high arch in the lateral line over the pectoral fin; the lack of a dorsal branch to the lateral line; the large mouth, the maxillary reaching to or behind the hind edge of the lower eye; the jaws which are about equally developed on both sides with most of the teeth arrow-shaped in adults; the inwardly curved caudal fin. Eyes on the right side. **Length** to about 30 inches. **Color:** Brown to olive-brown; blind side white with fine black dots.

Distribution: Central California to the Bering Sea.

Fishing Season: Throughout the year.

Importance: Forms a minor proportion of the sole catch in California.

Fishing Gear: Otter trawls, some hook and line.

Unauthorized Names: Arrow-toothed halibut, long-jawed flounder.

FIGURE 103

PETRALE SOLE

Eopsetta jordani

Relationship: A member of family Pleuronectidae. (*See* page 122.)

Distinguishing Characters: *See* page 122. The lateral line which curves only slightly over the pectoral fin and has no dorsal branch; the moderately large mouth with jaws and teeth about equally developed on both sides; the maxillary which extends to below the middle of the lower eye; the small scales, there being about 30 rows between the lateral line and the dorsal fin at the widest part of the body and about 88 to 100 along the lateral line; the pectoral fin being shorter than the head. Eyes on the right side. Reaches a **length** of about 20 inches and a weight of six to eight pounds. **Color:** Brown or olive-brown, sometimes with vague paler blotches.

Distribution: Alaska south at least to the Mexican border.

Fishing Season: Throughout the year.

Importance: The second most important of the soles in poundage; considered one of the finest.

Fishing Gear: Otter trawls, some hook and line.

Unauthorized Names: Brill, Jordan's flounder, English sole, California sole, round-nosed sole.

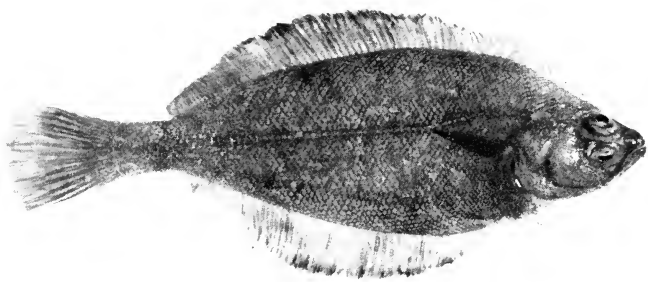


FIGURE 104

SLENDER SOLE

Lyopsetta exilis

Relationship: A member of family Pleuronectidae. (*See* page 122.)

Distinguishing Characters: *See* page 122. The lack of an abrupt, high arch in the lateral line over the pectoral fin; the lack of a dorsal branch to the lateral line; the moderately large mouth with jaws and teeth about equally developed on the blind and eyed sides; the maxillary extending to below the middle of the lower eye; the large loosely attached scales, there being about 20 rows between the lateral line and the dorsal fin at the widest part of the body, and 75 or less along the lateral line; the pectoral fin being shorter than the head. Eyes on the right side. Reaches a **length** of about a foot. **Color:** Pale brown with dark points forming edgings on each scale; the blind side pale orange-yellow to white; fins dusky.

Distribution: Alaska south at least to the Mexican border.

Fishing Season: Throughout the year.

Importance: Forms a minor proportion of the sole catch in California.

Fishing Gear: Otter trawls, some hook and line.

Unauthorized Names: Slender flounder, rough sole.

FIGURE 105 Photo by J. B. Phillips

DOVER SOLE

Microstomus pacificus

Relationship: A member of family Pleuronectidae. (*See* page 122.)

Distinguishing Characters: *See* page 122. The nearly straight lateral line which has no dorsal branch; the opercular opening which barely reaches above the base of the pectoral fin; the maxillary reaching to under the fore part of the lower eye; the small mouth, with the jaws better developed on the blind side and few if any teeth on the eyed side; the caudal fin being about two-thirds the length of the head and the pectoral fin being shorter than the head. Secretes large amounts of slime. Eyes on the right side. **Length** to about two feet. **Color:** Shades of brown sometimes with blotches of lighter or darker shades.

Distribution: Alaska to Southern California.

Fishing Season: Throughout the year.

Importance: Not taken commercially in California until 1947. Landed at Eureka in moderate quantity during 1947.

Fishing Gear: Otter trawls.

Unauthorized Names: Slippery sole, slime sole, Chinese sole.

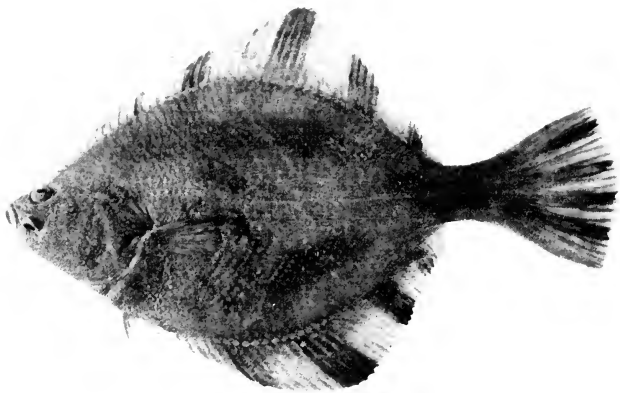


FIGURE 106 Photo by J. B. Phillips

STARRY FLOUNDER

Platichthys stellatus

Relationship: A member of family Pleuronectidae. (*See* page 122.)

Distinguishing Characters: *See* page 122. The black bars on the dorsal, anal and caudal fins; the lack of an abrupt, high arch in the lateral line over the pectoral fin; the lack of a dorsal branch to the lateral line; the jaws and teeth better developed on the blind side; the maxillary extending to below the fore part of the lower eye; the rough, scattered plates formed of scales which cover the body. Eyes on either the left or the right side. Reaches a **length** of three feet and a weight of 20 pounds, although the usual market sizes are much smaller. **Color:** Dark brown to black with vague blotchings; fins striped with black, orange to whitish between.

Distribution: Southern California to Alaska; south on the Asiatic side to Japan and Korea. Enters brackish and fresh water, at times moving some distance up streams.

Fishing Season: Throughout the year.

Importance: One of the more important commercial flatfishes. Except for the California halibut, the most important flatfish for sportsmen, especially in bays.

Fishing Gear: Otter trawls, hook and line.

Unauthorized Names: Great flounder, rough jacket, flounder.

FIGURE 107

DIAMOND TURBOT

Hypsopsetta guttulata

Relationship: A member of family Pleuronectidae. (*See* page 122.)

Distinguishing Characters: *See* page 122. The lack of a high abrupt arch in the lateral line over the pectoral fin; the long dorsal branch of the lateral line which extends back more than half way along the body; the small mouth, with the jaws better developed on the blind side and with few, if any, of the small teeth on the eyed side; the maxillary extending to below the fore part of the lower eye; the dorsal fin starting on the midline of the body; the lack of a high spiny ridge between the eyes; the depth of the body being about half of the entire length, including the tail. Eyes on the right side. **Length** to about 18 inches and weight to about four pounds. **Color:** Dark greenish brown to brown, mottled with paler shades.

Distribution: Northern California south into the Gulf of California, most commonly in bays and sloughs.

Fishing Season: Throughout the year.

Importance: Of negligible commercial importance. Caught by sport fishermen in Southern California bays.

Fishing Gear: Hook and line.

Unauthorized Name: Diamond flounder.

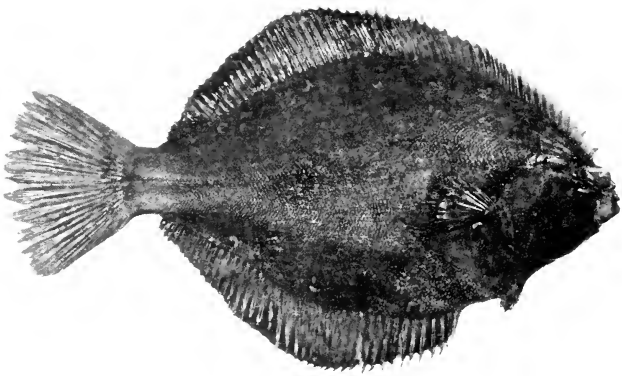


FIGURE 108

SHARPRIDGE TURBOT

Pleuronichthys verticalis

Relationship: A member of family Pleuronectidae. (*See* page 122.)

Distinguishing Characters: *See* page 122. The lack of a high abrupt arch in the lateral line over the pectoral fin; the long dorsal branch of the lateral line; the first five or six dorsal rays originating on the blind side but not extending down to a level with the corner of the mouth; the high, narrow, bony ridge between the eyes with sharp and prominent spines at either end; the blunt spine in front of the lower eye which overhangs the mouth; several smaller blunt spines around the upper eye; the small mouth, with jaws better developed on the blind side and with no teeth on the eyed side; the maxillary extending to below the fore part of the lower eye. Eyes on the right side. Reaches a length of about 10 inches. **Color:** Brown on brownish irregularly mottled and blotched with darker; scattered pale spots on the body.

Distribution: Northern California, at least to Pt. Reyes, south into the Gulf of California.

Fishing Season: Throughout the year.

Importance: Of minor commercial importance.

Fishing Gear: Otter trawls; some hook and line.

Unauthorized Name: Sharpridge flounder.

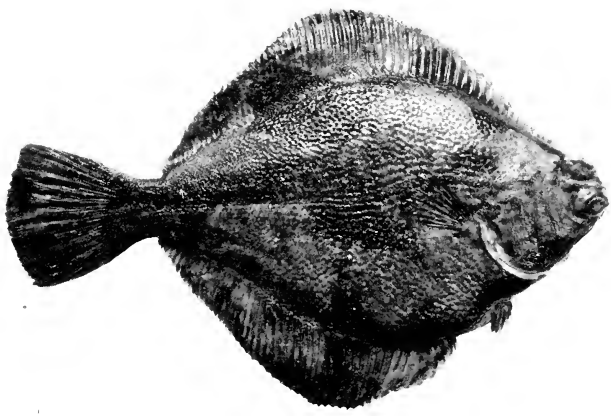


FIGURE 109

CURLFIN TURBOT

Pleuronichthys decurrens

Relationship: A member of family Pleuronectidae. (*See* page 122.)

Distinguishing Characters: *See* page 122. The lateral line which lacks a high abrupt arch over the pectoral fin but has a long dorsal branch which extends back to about the middle of the body; the dorsal fin which originates on the blind side on a level with the corner of the mouth with at least the first nine of the dorsal rays on the blind side; the high, narrow, bony ridge between the eyes with a blunt, bony spine at either end; a bony prominence in front of each eye and two or three behind the upper eye; the small mouth with jaws and teeth better developed on the blind side; the maxillary extending to below the fore part of the lower eye. Eyes on the right side. **Length** to about a foot. **Color:** Yellowish brown to dark brown vaguely mottled with brownish and grayish, fins dark.

Distribution: Southern California north to Alaska.

Fishing Season: Throughout the year.

Importance: The most important turbot in Central and Northern California.

Fishing Gear: Otter trawls, some hook and line.

Unauthorized Name: California turbot.

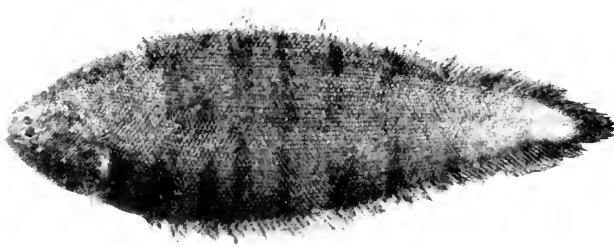


FIGURE 110 Photo by Al Johns for Vernon M. Haden, San Pedro

TONGUE SOLE

Symphurus atricaudus

Relationship: A true sole, it belongs to family Cynoglossidae, of which it is the only California representative.

Distinguishing Characters: *See* page 122. The body tapering to a point posteriorally, the dorsal and anal fins joining the caudal fin; the absence of a lateral line; the small twisted mouth; the small, close-set eyes. Eyes on the left side of the head. Reaches a **length** of six inches. **Color:** Brownish with dark vertical bars extending from the dorsal and anal fin bases toward the center of the body.

Distribution: Central California (Monterey Bay) south into Lower California. Rare north of Pt. Conception.

Fishing Season: None. Taken incidentally through the year.

Importance: Of no commercial importance, though taken occasionally with other species.

Fishing Gear: Accidentally in drag nets or on hook and line.

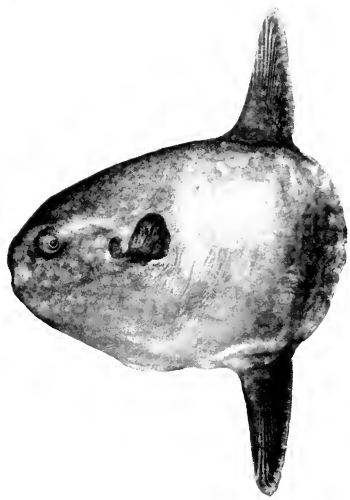


FIGURE 111

OCEAN SUNFISH

Mola mola

Relationship: The only member of the headfish family, Molidae, commonly found on the Pacific Coast.

Distinguishing Characters: The short, deep, flattened body; the high dorsal and anal fins set back near the tail; the lack of ventral fins. Reported to reach a **length** of 10 feet and a weight of about a ton. Specimens seen in California waters are usually less than three feet in length. **Color:** Dark gray above, becoming grayish brown with silvery reflections on the sides and dusky below; a grayish band along the bases of the dorsal, anal and caudal fins.

Distribution: Temperate and tropical seas throughout most of the world; north to Alaska on our coast. Sporadically abundant off California.

Fishing Season: None. Not the object of a fishery.

Importance: Of interest because of its bizarre shape and because of the tremendous size it attains. Considered a delicacy by some.

Fishing Gear: Sometimes caught accidentally in purse seines.

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* No. 1. Report on Fish Conditions, 1913; 48 pp., 3 figs.

* No. 2. The Scientific Investigation of Marine Fisheries, as Related to the Work of the Fish and Game Commission in Southern California. By Will F. Thompson. 1919; 27 pp., 4 figs.

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