

Notes on fishes from the Gulf of Nicoya, Costa Rica

by

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From March 1951 through March 1953, I fished for the market in Puntarenas and collected more than 500 fish specimens and 70 species for the Field Museum of Natural History. This paper concerns information on life histories, migrations, habits and ecology of marine fishes. Of particular interest are notes on blacktip, hammerhead and bonnethead sharks; sawfish, stingrays and mantas; sea catfishes, floating clingfish, crevalle jack, corbina, sierra and Pacific bonito.

Fifty-five fish species are discussed in phylogenetic order, in accordance with BAILEY *et al.* (1). The reader is referred to BUSSING (4) for freshwater fishes and BUSSING (5) for marine fish families with some vernacular Spanish names.

The Gulf of Nicoya is estuarine, with extensive areas of shallow mud bottom. Tidal currents are strong. The difference between high and low tides is 7 feet for neaps and 11 feet for springs.

For the purposes of this paper the inner Gulf waters are northwestward of a hypothetical line drawn southwestward from Puntarenas along the north coast of San Lucas Island, where the Gulf narrows, to the coast of Nicoya. Most of these waters are less than 10 fathoms. Fishes characteristic of the inner Gulf were bonnethead sharks, guitarfish, stingrays, eagle rays, ladyfish, anchovies, marine catfishes, toadfish, snooks, groupers, jacks, grunts, corbina and mullets.

The outer Gulf south of Puntarenas is open to the ocean and the water is clearer. Typical fishes were hammerhead sharks, mantas, thread herring, jacks, snappers and sierra.

Chart H. O. 1034, West coast of Costa Rica, Golfo de Nicoya, has been consulted. Some chart names do not agree with names in local usage. Place names like Berrugate Island, Canjel and Corozal near the Peninsula of Nicoya can be found on other Government maps.

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1. *Branchiostoma californiense* Gill "lancelet"

September 3, 1952. Two seined along sand bar at low tide in upper Puntarenas Estero near Pitahaya. October 4, 1952, one seen jumping out of wet sand during morning ebbing tide on north beach at Cedros Island. All three lancelets about 2 inches in length.

2. *Ginglymostoma cirratum* (Bonnaterre) "nurse shark" "gata"

June 21, 1951. Seen near rocks at low tide in morning near Punta Jiñote, Caballo Island. On October 5, one close to 10 ft long hooked on set line at dawn north of Cedros Island. Another about three feet long caught on hand line. Taste of meat similar to clams. March 11, 1952, a small specimen fell off the hook at Bocana, Chira Island.

3. *Carcharhinus limbatus* (Valenciennes) "blacktip shark" "tiburón"

The blacktip is the most common shark of moderate size in the Gulf of Nicoya. We caught 46 from 20 to 125 lb on set and handlines.

Most shark stomachs were empty. On March 30, 1952 at Cedros Island, a 90 lb shark had in its stomach a three pound catfish, *Arius* sp.

Females with embryos were caught on the following dates:

May 6, 1952. North of San Lucas Is.: 4 embryos full term, 18 inches each from 6 ft shark.

Sept. 19, 1952. Cedros Island: 1 male embryo from 6 ft shark, several small embryos with yolk sacs.

Dec. 1, 1952 Cedros Island: 3 embryos from 6 ft shark.

Dec. 2, 1952. Cedros Island: 3 embryos from 6 ft shark (both at FMNH).

Jan. 14, 1953. Ballenas Bay: 4 developed embryos from a 7 ft shark.

4. *Carcharhinus leucas* (Müller & Henle) "bull shark" "tiburón"

September 25, 1952, 3:30 PM, on incoming tide, 100 yds off north beach of Cedros Island (female, 9 ft, 2 in, 400 lbs), the largest shark caught during this study.

5. *Carcharhinus* sp. "bay shark"? "tiburón"

January 26, 1952. At Punta Morales near shore in shallow water about 2 fathoms, a 100 lb female with 2 embryos in one horn of the uterus and 4 in the other. The largest embryo was 19 inches T. L. All embryos had yolk sac remains but the yolks had been absorbed. On April 22, another similar shark of about 50 lb was caught off Las Cortesas Islands close to shore. These sharks had pointed snouts and uniform gray body color without dark fin tips. Both were caught in the morning. Perhaps this is the "bay shark" described in GILBERT (7, p. 47).

6. *Rhizoprionodon longurio* (Jordan & Gilbert) "Pacific sharpnose shark"

This species is the most common small shark in the Gulf of Nicoya. They occur almost everywhere, including the mouth of the Tempisque River and are seldom more than 3 ft in length. More than 30 caught, weighing from 5 to 10 lb. On March 11, 1952 at Chira Bocana, a 3 ft female had five embryos with unabsorbed yolk sacs.

7. *Galeocerdo cuvier* (Peron & LeSueur) "tiger shark" "tigre"

August 18, 1952, 3:00 AM in the channel west of Cedros Island, a tiger shark struck a jack head two hours after flood tide. It was 8 ft long and coughed up a 3 ft iguana. On September 27 north of Cedros, I caught a dead hammerhead shark 9 ft long with one ventral fin missing. Two hooks farther along the set line was a live 8 ft female tiger shark whose stomach contained the hammerhead's ventral fin in a partial state of digestion.

8. *Mustelus* sp. "smoothhound"

March 1, 1951, near mouth of Río Grande de Tárcoles, between Punta Caldera and Punta Herradura, one specimen 11 inches long.

9. *Sphyrna mokarran* (Ruppell) "great hammerhead" "martillo"

September 5, 1951. Cedros Island, female 72 inches long, 61 lb. More than 20 hammerheads from 17 to 150 lb, and up to 8 ft were caught.

On occasion, hammerhead sharks in the Gulf of Nicoya swim into shallow water less than four feet deep in day time, as verified April 10 and October 22, 1952.

All the hammerheads were caught in the vicinity of Cedros Island near the outer Gulf, except for one caught south of Punta Pescuezo, eastern Caballo Island on April 25, 1952 and another north of San Lucas Island on May 6, 1952.

10 *Sphyrna media* Springer "bonnethead" "cornuda"

The bonnethead shark has a light reddish brown skin when it is alive, in contrast to the gray of the hammerhead. Of more than 15 bonnetheads caught only one small one, 2 ft long, came from Cedros, the remainder were either caught at river mouths or in waters of the inner Gulf from Punta Jiñote, Caballo to Chira Island. They were caught on the same grounds as the corbina, *Cynoscion reticulatus*. Adults were 3 to 5 ft long, and recently born young were 8 inches.

Two baby bonnet head sharks were caught in the following localities: Río Grande de Tárcoles from a shrimp trawl on March 1, 1951, and the inner mangrove channel at Punta Morales on February 13, 1952.

11. *Dasyatis longus* (Garman) "stingray" "raya"

May 15, 1952, upper Puntarenas Estero, seven seen swimming in close proximity and two caught south of Bejuco Island and Punta Morales; common in Gulf of Nicoya.

12. *Urotrygon asterias* (Jordan & Gilbert) "raya"

March 1, 1951, Río Grande de Tárcoles Bay, several brought up in shrimp trawl net with discs about 12 inches wide, some were giving birth.

13. *Aetobatus narinari* (Euphrasen) "spotted eagle ray" "gavilán"

Seen on calm days jumping out of water, particularly north of Chira Island.

14. *Manta hamiltoni* (Newman) "Pacific manta" "manta"

February 22, 1953, six large mantas close to one ton in weight swimming at the surface near Aves Island, in the afternoon. On other days, I had seen one or two mantas; and sometimes, one would jump completely out of water. BREDER and ROSEN (2) reported from the literature great numbers of gravid females in the Red Sea in March. We saw three small mantas, possibly young of the year, south of San Lucas Island on August 6, 1952.

15. *Elops affinis* Regan "machete" "macabí"

January 15, 1952, juveniles, about 10 inches long, seined from salt ponds at Chira Island.

16. *Albula vulpes* Linnaeus "bonefish"

October 30, 1952, one 12 inches long in a nylon gill net west of Cedros, the only one seen during the study period.

17. *Gymnothorax dovii* (Günther) "moray eel" "morena"

April 29, 1951, two moray eels about 2 ft in length caught by hook and line on rocky bottom off Punta Jiñote, Caballo Island. They had thin, light-mottled, dark brown streaks on the body, with a black spot near the gill opening.

18. *Opisthonema libertate* (Günther) "thread herring" "gallera"

October 30, 1952, caught in nylon gill net in Cedros Channel; found occasionally in stomachs of crevalle jacks and sierra mackerels; common in the Gulf.

19. *Cetengranlis mysticetus* (Günther) "anchoveta" "bocona"

Although formerly common in the Gulf of Nicoya, I seined none of

this species of anchovy from 1951 to 1953. Tuna boats from Panama, however, carried the anchoveta in their bait tanks. Puntarenas fishermen obtained their live bait from the tuna boats.

Other species of anchovies were still abundant in the Gulf. PETERSON (12) gives the history of the decline of this species in the Gulf of Nicoya.

20. *Synodus scituliceps* Jordan & Gilbert "lizardfish" "picuda"

September 3, 1952, three small lizardfish seined at low tide near a sand bar in Puntarenas Estero and on March 1, 1951, in shrimp trawl off Río Grande de Tárcoles.

21. *Arius furthii* Steindachner "sea catfish" "cuminata"

April 22, 1951, Punta Jiñote, Caballo Island, a 2 lb, 20 inch female with eggs as large as $\frac{1}{2}$ inch in diameter in the ovaries. This catfish was the species most frequently caught on handlines.

MEEK and HILDEBRAND (11) reported eggs in the mouth of a male *Netuma* (*Arius*) *platypogon* Gunther. Of *N. elattura*, they reported a male, 325 mm in length, with 31 eggs, each about 12 mm in diameter, in its mouth. They collected fishes in the Gulf of Panama from January to May, 1911 and January to March, 1912.

22. *Sciadeichthys troscheli* (Gill) "sea catfish" "bagre"

December 10, 1951, a large 30 lb catfish caught at dawn in the Río Jesús María, just above the river mouth. Two others, about 1 lb each, caught later in the same place.

23. *Batrachoides* sp. "toadfish" "perro"

January 14, 1952, four caught on hook and line during ebb tide off Punta Gavilana, Chira Island and one in fish pot in Puntarenas Estero. Also occasionally caught in the upper Gulf near Sombrero Island.

24. *Gobiesox milleri* Briggs "clingfish" "chupapiedra"

On July 16, 1951, I found a dark brown clingfish on a submerged stick at low tide near the beach before sunset about 50 yards from the nearest rocks east of Punta Jiñote, Caballo Island. The specimen is 32 mm in standard length and is the holotype of the species (UMMZ 162460). Of more than 100 specimens seen, few were more than 20 mm in standard length; the holotype was by far the largest fish.

The habits of this clingfish are unusual. I found all my specimens on floating cans or sticks, often in calm water rather than on rocks near shore in heavy surf. They were abundant; I often found one or two attached to five

gallon paint cans which I used for overnight buoys on my shark set lines at Cedros island. Several others caught on north Cedros Beach, on Sept. 5, 1951 and in 1952, on Sept. 9, Sept. 14 and Oct. 4. One collected off north beach of Negritos Afuera, Dec. 11., 1952.

25. *Hyporhamphus unifasciatus* (Ranzani) "halfbeak" "balajú"

September 1, 1952, two seined just west of the mouth of Río Pitahaya, Puntarenas Estero.

26. *Hemirhamphus saltator* Gilbert & Starks "longfin halfbeak"

September 7, 1952, two seined at north Cedros beach.

27. *Fodiator acutus* (Valenciennes) "sharpchin flyingfish"

December 10, 1952, three juveniles seined on the north beach of Negritos Afuera Island.

28. *Cypselurus callopterus* (Günther) "flyingfish" "gorrión"

September 11, 1952, one small juvenile seined near north Cedros beach. December 10, 12 more juveniles seined near the north beach of Negritos Afuera Island.

29. *Tylosurus fodiator* Jordan & Gilbert "needlefish" "agujón"

On March 30, 1951, one specimen 3 ft long caught north of Sail Rock at 8:50 AM. On September 29, 1952, a 3.5 ft female caught south of Aves Island in the late afternoon with large white eggs about $\frac{1}{4}$ inch in diameter in the ovary.

Small needlefish seined occasionally near shore. One juvenile caught west of mouth of Río Pitahaya, Puntarenas Estero on September 1, and three juveniles seined near north Cedros beach on September 18, 1952.

30. *Oxyzygonectes dovii* (Günther) "white-eyed killyfish" "ojo blanco"

January 15, 1952, several seined in a salt pond near the Bocana of Chira Island. These fishes are considered to be good live bait for corbina. BRITTAN (3, p. 123) has a photograph of this species.

31. *Poeciliopsis turrubarensis* (Meek)

February 17, 1952, several seined in Puntarenas Estero at low tide. More were seined again on March 4. The February fishes were identified by Dr. Robert R. Miller of the University of Michigan. On September 3, 30 seined in the Estero and are now at the Field Museum. See Fig. 6 in BUSSING (4).

32. Family Atherinidae "Siversides"

Common in the Gulf of Nicoya and Puntarenas Estero.

33. *Centropomus* sp. "snook" "robalo"

September 3, 1952, five seined near Río Pitahaya. Local fishermen told me about spearing snook at night using lights. Another method at Quepos involved the use of wood decoys carved to look like a snook. The decoy was placed in the water, and the fisherman waited with a spear until a live snook swam alongside the decoy. Small snooks less than one pound were called "gualaje" in the Gulf of Nicoya.

34. *Epinephelus itajara* (Lichtenstein) "jewfish" "mero"

December 9, 1961, a 50 lb jewfish was caught on hook and line at Río Cuarros where it joins the Río Jesús María. The area was surrounded by tall red mangroves over 60 feet high. On February 14, 1953, a 12.5 lb jewfish was caught at low tide off a rocky point on the north side of Cedros Island; and one 13 lb, from Punta Jiñote, Caballo on May 16, 1951.

35. *Epinephelus analogus* Gill "spotted cabrilla" "venado"

May 16, 1951, small grouper with red-brown spots and deep body caught off Punta Jiñote, Caballo.

36. *Alphestes multiguttatus* (Günther) "spotted hamlet"

February 26, 1953, one caught on handline near rocks east of the beach on the north side of Tolinga Island (called "Tortugas" by natives).

37. *Diplectrum pacificum* Meek & Hildebrand

September 9, 1952, one seined near the north beach of Cedros.

38. *Rypticus nigripinnis* Gill "soapfish" "jaboncillo"

October 1952, one in mud on Danforth anchor in Puntarenas Estero.

39. *Caranx hippos* (Linnaeus) "crevalle jack" "jurel"

This was the most frequently caught jack in the Gulf of Nicoya. A total of 425 jacks, weighing from 1 to 13 lbs were caught on trolling lines from June 15, 1951 through March 20, 1953. Of the total, 315 were caught after January 1, 1953, especially near Aves Island (296).

While no spawning run of jacks was seen, the following near-ripe specimens were examined:

November 12, 1952; Caldera 10.5 lb, 25 inches; near-ripe male with large testes.

November 28, 1952; Sail Rock; one female with one ovary three times the size of the other.

November 30, 1952; Sail Rock; near-ripe female with left ovary enlarged.

The largest jack (13 lb, 27 inch fork length) was a female with undeveloped ovaries about stage II, caught east of Caballo Island on July 15, 1951.

Crevalle jacks occasionally drive bait near shore along rocky points during the slack of high water spring tides. At Punta Jiñote, Caballo and Cedros Islands, the thrashing of jacks in calm shallow water could be heard at a distance. The commotion seldom lasted more than one minute.

40. *Caranx caballus* (Günther) "green jack" "cojinuda", "bonito"

Only occasional green jacks were caught trolling, particularly when sailing in the afternoon northwest from Cedros to Punta Paquera, Nicoya. The largest, about 5 lb, was caught south of Sail Rock at 6:30 AM on January 15, 1953.

41. *Gnathodon speciosus* (Forsk.) "jurel"

January 13, 1953, one 10 lb jack caught near Isla Blanca, Nicoya, trolling at 6:30 AM. The head had a steep anterior profile. The body was green above with fine black dots and lighter below.

42. *Nematistius pectoralis* (Gill) "roosterfish" "gallo"

December 2, 1952 and February 26, 1953, 21 and 15 lbs, respectively, off Sail Rock.

43. *Coryphaena hippurus* Linnaeus "dolphin" "dorado"

January 18, 1953, a 3 lb dolphin caught off Sail Rock at dawn. On December 10, 1952, several juveniles about 2 inches long caught under driftwood in ebbing tide off a small beach at the northeast end of Negritos Afuera Island.

44. *Lutjanus novemfasciatus* (Gill) "snapper" "pargo roquero"

February 7, 1952, one 7 lb brown-banded snapper caught on day of strong north winds in Cedros Channel. This snapper has brown and white bands on the body. The species identification is uncertain.

45. *Lutjanus colorado* Jordan & Gilbert "snapper" "pargo colorado"

February 7, 1952 Cedros Channel, one near mangroves, 3 lb.

46. *Lobotes pacificus* Gilbert "triple tail" "berrugate"

Three adults: May 16, 1951, off Caballo Island; January 4, 1952, between Sombrero and Venado Islands; and April 21, 1952, near Las Cortesas

Islands. They measured one foot or more in length. On August 21, 1951, a bright yellow tripletail was seen near shore at Las Corcoras Island. On December 10, 1952, a small juvenile was caught at Negritos Afuera Island.

47. *Anisotremus dovii* (Günther) "grunt" "cotón"

The cotón is a black-banded grunt which we caught on a number of occasions in shallow water over rock bottom off Punta Jiñote, Caballo Island. They seldom exceeded 10 inches in length.

48. *Cynoscion reticulatus* (Günther) "corvina" "corbina", "corbina"

The corbina is the most valuable market fish in the Gulf of Nicoya. A small corbina, 2 lb or less, is called an "aguada".

On April 3^o 1951, 25 corbinas from 16 to 40 inches T. L. were caught in the mouth of a mangrove-lined tidal river near Canjel. Only 3 fish had recognizable small ovaries; the others had undeveloped gonads. On May 14 and 15, 13 more were caught with undeveloped gonads. On August 23, off the Bocana de Chira Island, a large corbina, 42 inches T. L. had large developed ovaries.

On January 16, 1952 at Chira Island, a shrimp trawler caught 85 corvinas at night from 11 to 16 inches T. L. Some of the fishes were still croaking. All the males had running milt, and all the females had flowing transparent eggs. All had empty stomachs, except one with a few remains.

MEEK and HILDEBRAND (11) described the corbina as "reddish brown above, silvery below; back and sides with dark brown streaks and reticulations". A live corbina reflects pink on the back in sunlight.

49. *Kyphosus elegans* (Peters) "chub" "vieja"

December 28, 1951, a dark-colored 12 inch female with moderately developed yellow ovaries trolled off Cedros Island. The stomach was full of brown algae which had turned green in the intestine.

50. *Chaetodipterus zonatus* (Girard) "spadefish"

January 14, 1953, a school of about 100 spadefish about 1 ft each in length were seen circling around on the surface just west of Sail Rock at 4 PM. Their dorsal fins were sticking out of water. Juveniles around 2 inches long were seined at Cedros Island on November 1, 1952 and one at Pitahaya on September 3, 1952.

51. *Mugil curema* Cuvier & Valenciennes "white mullet" "lisa"

Mullet, common in the Gulf of Nicoya, are given size names by fishermen; less than 6 inches, often with an isopod in the mouth, are called "llave"; from 6 to 12 inches, "real"; and over 12 inches, "palmera".

52. *Sphyaena ensis* Jordan & Gilbert "sennet" "barracuda"

April 27, 1952, a 15 inch sennet trolled near Punta Morales. On October 15, 1952 and February 9, 1953 (20 and 16 inches, respectively) trolled north of Cedros Channel.

53. *Scomberomorus sierra* Jordan & Starks "sierra" "macarela"

Although similar in appearance to the Spanish mackerel, *S. maculatus*, the sierra mackerel is a distinct species (BAILEY *et al.*, 1; MAGO LECCIA, 10). The latter found that the sierra had 47 to 49 vertebrae, in contrast to 52 to 53 in the Spanish mackerel. The sierra is a larger fish; of 271 sierra caught from the Gulf of Nicoya, 50 weighed more than 5 lb each and measured more than 25 inches in length. In Florida, KLIMA (9) found that only 3 out of 122 *S. maculatus* weighed more than 6 lb and that all measured less than 27 inches. The largest sierra measured 40 inches (38 inch fork) and weighed more than 12 lb.

S. sierra is closer to *S. regalis* than *S. maculatus* in respect to the number of vertebrae (47 to 49) and the total gill raker count.

Some 25 sierra had near ripe ovaries or testes from late August to the end of November. All large sierra, from 6 to 12 lb, were more frequently caught from August through December. On September 9, 1952, 5 young, from $\frac{3}{4}$ to 1 inch long were seined near shore at Cedros Channel.

Sierra bit better at dawn than in the evening, whereas jacks bit better in the evening. The best single trolling catch of sierra was 16 on October 23, 1952 south of Negritos Afuera Island; 14 from 6 to 7 AM and 2 from 7 to 7:30 AM. The best tide for fishing seemed to be after high water slack, just before the ebb. A cloudy sky in the morning was a help because a hot bright sun soon stopped the fish from biting. There was no apparent connection with moon phase and better fishing.

The best fishing area for sierra was south of Negritos Afuera, east to Sail Rock. Only an occasional single sierra was caught in the inner Gulf around Caballo Island.

54. *Sarda chiliensis* (Cuvier)? "Pacific bonito" "bonito"

February 5, 1953, school of several hundred seen swimming back and forth rapidly and breaking water after small fishes near shore in Cedros Island, west channel. They were about 20 inches each in length, green on the back with lengthwise black stripes and silver on the abdomen. In a short time, they disappeared from the channel. I had not seen them before and did not see them again.

MEEK and HILDEBRAND (11) said that *S. velox* (a possible synonym) "were abundant in the Panama market for a short time during the middle of January 1912, and then suddenly disappeared and were not seen again." This time interval of less than one month from Panama to Costa Rica is suggestive

of an annual northward migration of the bonito which is known from Chile to California (FITCH, 6; JORDAN *et al.*, 8).

55. *Euthynnus pelamis* (Linnaeus) "skipjack tuna" "bonito"

November 30, 1952, a small skipjack about 2 lb caught south of Negritos Afuera Island around 7 AM. On January 13, 1953, 7 trolled north of Isla Blanca after 6:30 AM. No skipjack were caught or seen in the Inner Gulf of Nicoya north of Puntarenas or even Sail Rock in the outer Gulf.

DISCUSSION

In the alphabetical list of Spanish vernacular names, the following fishes are, for the sake of brevity, not discussed in the phylogenetic text: bobo, boca chula, china, chinita, coliamarilla, frijol, guavina, hoja, lenguado, palmito, peseta and sierra. All these fishes occur commonly in the Gulf of Nicoya. Boca chula, coliamarilla and china were small croakers caught in a shrimp trawl at Río Grande de Tárcoles Bay. Frijol (a grunt) was occasionally caught bottom fishing off Punta Jiñote, Caballo Island; and chinitas were seined in Puntarenas Estero. Bobos, guavinas, hojas, lenguados, and pesetas were characteristic of shallow mud bottoms. "Sierra" referred to either *Trachinotus* spp. or *Oligoplites* spp. and not to *Scomberomorus sierra*. *Oligoplites saurus* was common. A two pound *O. mundus* was caught off Cedros Island on February 11, 1953. Labrids such as *Bodianus diplotaenia* and *Halichoeres* sp. were collected at Tolinga Island, one of the "Tortugas" islands.

Other fishes seen or collected included sea robins, scorpionfishes, *Seriola* sp., *Abudefduf marginatus*, *Chaetodon humeralis*, blennies, *Gobionellus* sp., *Alutera scripta*, *Canthigaster punctatissimus*, *Pristis zephyreus*, *Rhinobatus* sp., *Opisthopterus dovii*, *Bagre pinnimaculatus*, *Syngnathus* sp., *Thunnus albacares*, *Balistes verres*, *Sphoeroides annulatus*, *Euthynnus lineatus*.

SPANISH VERNACULAR NAMES OF GULF OF NICOYA FISHES

aguada	small corbina	<i>Cynoscion reticulatus</i>
agujón	needlefish	<i>Tylosurus fodiator</i>
alguacil	sea catfish	<i>Bagre pinnimaculatus</i>
atún	yellowfin tuna	<i>Thunnus albacares</i>
bagre	sea catfish	<i>Sciaeleichthys troscheli</i>
balajú	halfbeak	<i>Hemirhamphus saltator</i>
barracuda	sennet	<i>Sphyaena ensis</i>
berrugate	tripletail	<i>Lobotes pacificus</i>
bobo	threadfin	<i>Polydactylus</i> sp.
boca chula	croaker	<i>Umbrina xanti</i>
bocona	anchoveta	<i>Cetengraulis mysticetus</i>
bonito	green jack	<i>Caranx caballus</i>

honito	bonitos	<i>Euthynnus</i> spp. & <i>Sarda chiliensis</i>
chanchó	triggerfish	<i>Balistes verres</i>
china	croaker	<i>Stellifer</i> spp.
chinita	grunt	<i>Pomadasys</i> spp.
cojinuda	green jack	<i>Caranx caballus</i>
coliamarilla	croaker	<i>Bairdiella</i> sp.
corbina	corbina	<i>Cynoscion reticulatus</i>
cornuda	bonnethead shark	<i>Sphyrna media</i>
cotón	grunt	<i>Anisotremus dovii</i>
cuminata	sea catfish	<i>Arius furthii</i>
dorado	dolphin	<i>Coryphaena hippurus</i>
espada, peje de	sawfish	<i>Pristis zephyreus</i>
frijol	grunt	<i>Haemulon steindachneri</i>
gallera	thread herring	<i>Opisthonema libertate</i>
gallo	roosterfish	<i>Nematistius pectoralis</i>
gata	nurse shark	<i>Ginglymostoma cirratum</i>
gorrión	flyingfish	Exocoetidae
gualaje	small snook	<i>Centropomus</i> spp.
guavina	goby	<i>Bathygobius</i> sp.
gavilán	eagle ray	<i>Aetobatus narinari</i>
hoja, peje de	flounder	Pleuronectiformes
jaboncillo	soapfish	<i>Rypticus nigripinnis</i>
jurel	crevalle jack	<i>Caranx hippos</i>
lenguado	tonguefish	Cynoglossidae
lisa	mullet	<i>Mugil curema</i>
lleve	small mullet	<i>Mugil curema</i>
macabí	ladyfish	<i>Elops affinis</i>
macarela	sierra	<i>Scomberomorus sierra</i>
manta	manta	<i>Manta hamiltoni</i>
martillo	hammerhead shark	<i>Sphyrna mokarran</i>
mero	jewfish	<i>Epinephelus itajara</i>
morena	moray eel	<i>Gymnothorax dovii</i>
ojo blanco	white-eyed killy	<i>Oxyzygonectes dovii</i>
palmera	large mullet	<i>Mugil</i> sp.
palmito	gerrids	Gerridae (Bussing, 1969)
pargo colorado	snapper	<i>Lutjanus colorado</i>
pargo roquero	snapper	<i>L. novemfasciatus</i>
peseta	moonfish	<i>Vomer declivifrons</i>
perro	toadfish	<i>Batrachoides</i> sp.
raya	stingray	<i>Dasyatis longus</i>
real	mullet 6 to 12"	<i>Mugil</i> sp.
robalo	snook	<i>Centropomus</i> spp.
sierra	leatherjack	<i>Oligoplites saurus</i>
sierra	pompano	<i>Trachinotus culveri</i>
sardina plástica	herring	<i>Odontognathus panamensis</i>
timboril	puffer	<i>Spherooides</i> spp.
tiburón	shark	Carcharinidae
tigre	tiger shark	<i>Galeocerdo cuvier</i>
venado	spotted grouper	<i>Epinephelus analogus</i>
vieja	chub	<i>Kyphosus elegans</i>

LITERATURE CITED

1. BAILEY, R. M., *et al.*
1970. *A list of common and scientific names of fishes from the United States and Canada*. 3d ed. Amer. Fish. Soc., Spec. Publ. No. 6, Washington, D. C.
2. BREDER, C. M., JR., & D. E. ROSEN
1966. *Modes of reproduction in fishes*. Amer. Mus. Nat. Hist., New York, 941 pp.
3. BRITTAN, M.
1966. A small collection of shore fishes from the west coast of Costa Rica. *Ichthyologica*, 37: 121-134.
4. BUSSING, W. A.
1966. New species and new records of Costa Rican freshwater fishes with a tentative list of species. *Rev. Biol. Trop.*, 14: 205-249.
5. BUSSING, W. A.
1969. *Familias de peces marinos costarricenses y de aguas continentales*. Univ. de Costa Rica. Ser. Cienc. Nat. No. 6, San José, Costa Rica. 39 pp.
6. FITCH, J. E.
1958. *Offshore fishes of California*. Calif. Dept. of Fish and Game, Sacramento. 80 pp.
7. GILBERT, P. W.
1963. *Sharks and survival*. D. C. Heath & Co., Boston. 578 pp.
8. JORDAN, D. S., B. W. EVERMAN, & H. W. CLARK
1930. *Check list of the fishes and fishlike vertebrates of North and Middle America north of the northern boundary of Venezuela and Colombia*. Rep. U. S. Comm. Fish., 1928 App. X, iiiv + 670 pp.
9. KLIMA, E. F.
1959. *Aspects of the biology and the fishery for Spanish mackerel, Scomberomorus maculatus (Mitchill), of southern Florida*. Fla. St. Bo. Conserv. Tech. Ser. 27. 39 pp.
10. MAGO LECCIA, F.
1958. The comparative osteology of the Scombroid fishes of the genus *Scomberomorus* from Florida. *Bull. Mar. Sci. Gulf Caribb.*, 8: 299-341.
11. MEEK, S. E., & S. F. HILDEBRAND
1923-1928. *Marine fishes of Panama*. Field Mus. of Nat. Hist., Chicago. 3 vol.
12. PETERSON, C. L.
1956. Observations on the taxonomy, biology and ecology of the Engraulid and Clupeid fishes in the Gulf of Nicoya, Costa Rica. *Bull. Inter-Amer. Trop. Tuna Comm.* 1: 139-280.