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Red Snappers of the Carolina Coast

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A valuable recreational headboat[1] fishery operating from North Carolina and South Carolina ports takes large quantities of fishes typical of Caribbean reefs and banks. The bulk of the catch is provided by porgies, groupers, grunts, and snappers. Of these, snappers, especially red snappers, are considered the greatest trophies. Red snappers are renowned because they are usually large, are very game fighters, and are among the finest of all fish on the table. The term red snapper in the recreational fishery includes four different fishes all belonging to the family Lutjanidae: red snapper, *Lutjanus campechanus* (Fig. 1) silk snapper, *L. vivanus* (Fig. 2); blackfin snapper, *L. buccanella* (Fig. 3); and the vermilion snapper, *Rhomboplites aurorubens* (Fig. 4). Three others, the yellowtail snapper, *Ocyurus chrysurus*, the wenchman, *Pristopomoides aquilonaris*, and cubera snapper, *Lutjanus cyanopterus*, occasionally appear in headboat catches, but are not important in the fishery.

Snappers are related to the porgies (*Sparidae*) and grunts (*Pomadasyidae*) and are distinguished from the latter families by presence of teeth on the vomer in the roof of the mouth. Snappers are carnivorous, usually bottom-dwelling fishes that are represented by approximately 250 species distributed throughout the tropical and subtropical regions of the world's oceans. About 15 species occur in the western Atlantic. The presence of snappers, and other tropical reef fishes, as far north as Cape Hatteras (lat. ≈ 35°N) is permitted primarily by two factors: 1) numerous areas of rocky substrate on the outer Continental Shelf and along the shelf break, and 2) year-round warm water resulting from the influence of the Gulf Stream.

Recreational fishermen on headboats, private, and charter vessels catch red snappers by fishing on the bottom in depths ranging from 13 to 80 fathoms. Sinkers varying from 8 to 50 ounces are used along with 5/0 to 9/0 hooks. In deeper water, electric reels are often used to reduce the labor of fishing. The usual bait is cut squid, although chunks or whole fish seem slightly more effective for taking large snappers and groupers.

In this paper, we wish to describe briefly the four red snappers of the Carolina coast, their life histories, and salient aspects of the Carolina fishery for these species. These and other species appearing in the fishery are currently under investigation by the Bottom Fishery Task, Atlantic Estuarine Fisheries Center, National Marine Fisheries Service, NOAA, Beaufort, N.C.

RED SNAPPER

The red snapper is the most valuable of the snappers in commerce and recreation. It is known off North Carolina and South Carolina as the "genuine" or "real American" red snapper, and sometimes erroneously as the mutton snapper. This red snapper is easily distinguished from the other red snappers of the Carolina shelf. It differs from the vermilion snapper in being much more deep-bodied, not as streamlined, and in lacking irregular golden lines on the sides. The silk, or yelloweye snapper, has a bright yellow iris while that of the red snapper is red. The blackfin snapper has a prominent black spot at the base of the pectoral fin which is absent or much reduced on the red snapper.

The red snapper is found from North Carolina south to Key West, around the entire Gulf Coast to the Campeche Banks. A closely related species, the Caribbean red snapper, *Lutjanus purpureus*, occupies the shelf areas bordering the Caribbean southeastward to Brazil. Neither the red snapper nor the

Clockwise from lower left are Gene R. Huntsman, Charles S. Manooch III, Churchill B. Grimes, and Robert L. Dixon, all of the Atlantic Estuarine Fisheries Center, National Marine Fisheries Service, NOAA, Beaufort, NC 28516. Dixon's 168-lb warsaw grouper was taken off Beaufort on 8 April 1975.

[1]Boats which charge by the individual, thus on a "head" basis.

Caribbean red snapper are reported from the Bahamas.

Adult red snapper occupy moderate depths on the Outer Continental Shelf (OCS). Off North Carolina and South Carolina they are usually found at depths of 25 to 50 fathoms (46-91 m) over both high and low relief hard bottom. In the Gulf of Mexico the species is reported from 18 to 80 fathoms (33-146 m), but is most abundant at about 40 fathoms. In this area, red snapper apparently move into shallower water during the warmer months and offshore in winter. Adult red snapper occupy rough-bottom, reef-type habitats; juveniles may occur on a smooth bottom. Red snapper sampled from headboats in the Carolina recreational fishery have ranged in weight from 1.9 to 35 pounds and in length from 13.7 to 35.7 inches. The average red snapper landed weighed approximately 17 pounds. Most of the red snapper taken are large, and catches of small ones (<5 pounds) are unusual. Catches of red snapper off the Carolinas are so irregular that it is difficult to ascertain whether or not they move inshore seasonally.

Red snapper are opportunistic bottom feeders, taking a wide variety of invertebrates and fishes. Tunicates, coelenterates, crabs, shrimps, and small fish are important foods, but as they grow larger, fish are eaten more often.

Spawning both in the Gulf of Mexico and off the Carolinas appears to extend through the warmer months. Researchers in the Gulf of Mexico report females as small as 10 inches (255 mm) and males as small as 9 inches (230 mm) with maturing gonads. Off Texas, young red snapper are trawled frequently in shallow water of about 13 fathoms (24 m). Off the Carolinas juveniles have occurred very infrequently in about 5 fathoms (11 m).

Age and growth data on Carolina fishes have not yet been analyzed; however, the literature provides some information from the Gulf. Red snapper (in the Gulf of Mexico) reportedly attain a length of about 8 inches (200 mm) after 1 year of life, and grow about 2.5 to 4.0 inches (62-100 mm) per year for the next several years. The species attains lengths of 40 inches (1 m) or more and a weight of 35-40 pounds (16-18 kg).

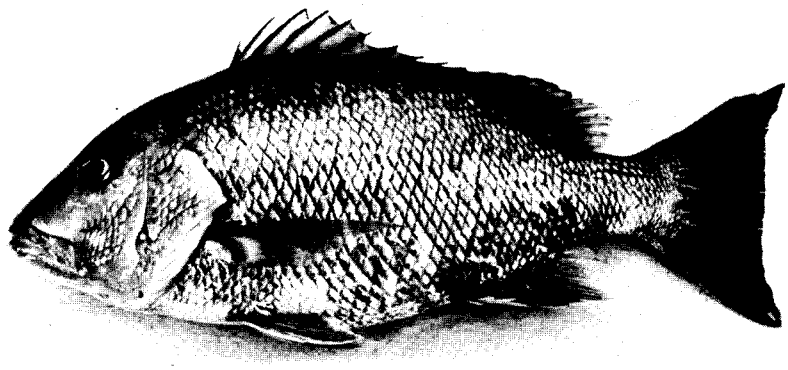

Figure 1.—Adult red snapper, *Lutjanus campechanus*, Onslow Bay, N.C., approximately 13 pounds and 28 inches (total length).

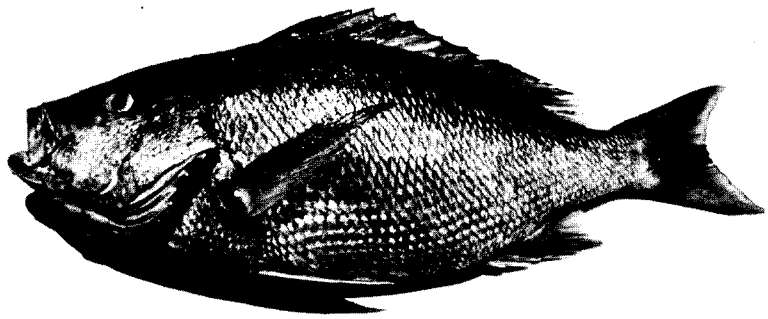

Figure 2.—Adult silk snapper, *Lutjanus vivanus*, Onslow Bay, N.C., approximately 11 pounds and 26 inches (total length).

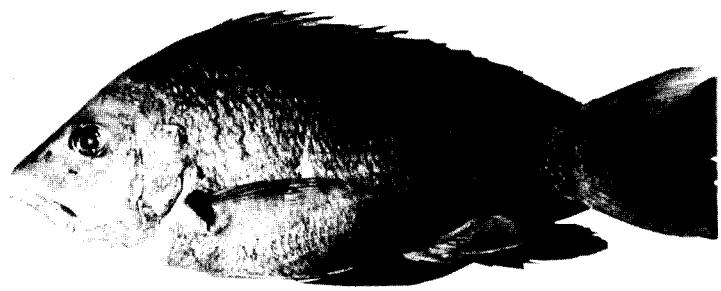

Figure 3.—Adult blackfin snapper, *Lutjanus buccanella*, Onslow Bay, N.C., approximately 9 pounds and 24 inches (total length).

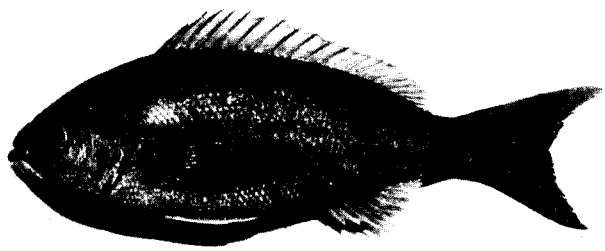

Figure 4.—Adult vermilion snapper, *Rhomboplites aurorubens*, Onslow Bay, N.C., approximately 2 pounds and 16 inches (total length).

SILK SNAPPER

The silk snapper is known as yelloweye from the Carolinas and as the day snapper, day red snapper, long-fin snapper, pargo de la alto, and West Indian snapper elsewhere. It makes an important contribution to the Carolina headboat catch and appears as frequently as the true red snapper. The yelloweye easily separates the silk snapper from its close relatives, the

red snapper and the blackfin snapper, each of which possesses a red iris. It is easily distinguished from the vermilion snapper which is characterized by a more streamlined body shape and deeply forked tail.

The silk snapper commonly occurs in the western Atlantic from northern South America to North Carolina. It is well distributed in the Gulf of Mexico and Caribbean and is also found in Bermuda waters. The silk snapper generally occurs in waters somewhat deeper than either the red snapper or the vermilion snapper. Off Bermuda the species is common in 70 to 85 fathoms (128-156 m) during the day but shallower at night. In the Bahamas it is caught at the edge of the Gulf Stream in waters 83 to 133 fathoms (151-243 m) deep. Headboat catch records indicate that ideal habitat off the Carolinas is rough bottom at 30 to 70 fathoms (55-128 m). Experimental fishing aboard the NMFS vessel *Onslow Bay* substantiates this with best catches at 40 to 55 fathoms (75-100 m). An earlier report states that the species occurs in water ranging from 30 to 120 fathoms (55-219 m) off North Carolina, and exploratory trawling in the 1960's off North Carolina revealed concentrations at the shelf edge at 30 to 50 fathoms (55-91 m). Silk snapper may be taken over both rough and relatively smooth bottom. Researchers in the Gulf report that silk snapper are the only species of *Lutjanus* caught on mud bottom in deep water. There they are commonly found on smooth, flat bottom above the shelf break at 40 fathoms (73 m).

The silk snapper is caught on hook and line by recreational and commercial fishermen throughout the southeastern United States, Gulf of Mexico, and Caribbean. Fish and squid are preferred baits, generally fished in waters 30 to 60 fathoms (55-110 m) deep. Although they attain a length of 3 feet (900 mm) and a weight of 40 pounds (17 kg), the average silk snapper caught off the Carolinas weighs between 10 and 11 pounds (4.5-5 kg) and is approximately 26 inches (660 mm) long. Individuals in the 15- to 25-pound (7-11 kg) range are fairly common. Silk snapper can be caught year-round off North Carolina and South Carolina.

Like other lutjanids, the silk snapper feeds on a variety of fishes and invertebrates. Cursory inspection of stomach contents from fish collected in North Carolina waters revealed fish, crustaceans, and mollusks in the diet. Silk snapper collected off the Virgin Islands feed primarily on fish, shrimp, and crabs.

Spawning occurs from the late spring through summer. Earlier work off North Carolina suggests that silk snapper spawn from late May to late June in deep water. Spent females have been collected as early as the first week of June. Observations made from our research indicate the silk snapper spawns throughout the summer in North Carolina waters. Ripe females were collected in June, July, and August from 1972 to 1974. The smallest individuals indicating reproductive development were a 9.4-inch (240 mm) female and a 10.6-inch (270 mm) male.

No information is available on age, growth, and mortality. This phase of the life history is currently under investigation.

BLACKFIN SNAPPER

The blackfin snapper can be distinguished from all other snappers by the jet-black base and axil of the pectoral fins and the absence of a black spot below the anterior part of the soft dorsal fin.

Blackfin snapper are recorded from North Carolina, Bermuda, and the Gulf of Mexico through the Antilles to northeast Brazil. Their usual habitats are the Continental Shelf edge or live-bottom areas in depths from 5 to 120 fathoms (9-219 m), though most occur below the shelf edge from 45 to 80 fathoms (82-146 m).

Exploratory trawling in the 1960's revealed blackfins to be rare off the coast of the southeastern United States and only seven have been reported from headboat catches in North Carolina and South Carolina between May 1972 and June 1975. However, blackfins are rarely recognized by headboat crews, and are probably more numerous than is apparent.

The blackfin is a medium-sized snapper; the few individuals sampled by the authors averaged 9.2 pounds (4.2 kg) and 24.7 inches (627 mm). Very large (20-30 pounds; 9-14 kg) blackfin have been seen in commercial catches made near Cape Hatteras. Length and weight data for specimens from the Virgin Islands substantiate the medium size range of the species compared with the other two lutjanids discussed previously. The blackfin snapper ranged from 7.1 to 21.2 inches (180-540 mm) fork length with most of the specimens in the 12.2- to 17.7-inch (310-450 mm) range. A study 4 years later in the same area produced similar results. Forty-two percent of the fish examined were between 15.7 and 19.3 inches (400-490 mm) fork length.

Like most lutjanids, the blackfin is a bottom-foraging species. Fish examined from the Caribbean fed primarily on isopods and fish. Other food items were shrimp, spiny lobster, crabs, octopus, and squid.

No information is available on the reproductive biology of the blackfin snapper from the Carolinas. Ripe fish were taken from oceanic banks near Jamaica in all seasons, but peak spawning reportedly occurs in April, and September to October. Researchers believe peak spawning occurs in April. Blackfin were found to be sexually mature at standard lengths of 12-16 inches (300-400 mm).

VERMILION SNAPPER

The vermilion snapper is the most frequently occurring snapper along the coasts of North and South Carolina. The species is also known as beeliner, chubhead, California red, mingo snapper, night snapper, mutton snapper, and bastard snapper. In Spanish, it is the cunaro (Venezuela) or the cagon de lo algo (Cuba).

The species is one of the smaller members of the family, attaining a maximum size of about 24 inches (610 mm) and just over 6 pounds (2.7 kg). The body is vermilion above and paler below with faint darker lines extending forward and down from the dorsal fin base. Below the lateral line there are narrow yellow streaks, some longitudinal, others oblique. The dorsal fin is rosy with a yellow margin. The pectoral fin is yellowish also, but the anal fin is pale basally, becoming rosy distally. The ventral fins are rosy and the caudal fin is vermilion, often with a faint black margin. Among Atlantic snappers, the streamlined body form and deeply forked caudal fin is shared only with the yellowtail snapper (*Ocy-*

urus chrysurus). However, they are easily distinguishable on a basis of coloration. The yellowtail possesses a distinct yellow mid-lateral stripe which includes most of the caudal peduncle and all of the caudal fin. Also, adult yellowtail are not common north of Florida.

The vermilion is distributed from the Carolinas and Bermuda through the Gulf of Mexico and West Indies to southeastern Brazil. They occur in offshore waters of about 50 fathoms (91 m) and are normally associated with broken rock and reef-type substrate. They are abundant in deep waters (50 fathoms; 91 m) off northern Florida in both the Atlantic and Gulf of Mexico. Along the Carolina coast they are abundant over rough bottom at and near the Continental Shelf break. In southern Raleigh Bay and northern Onslow Bay, N.C., their occurrence is concentrated at depths from 35 to 70 fathoms (64-128 m). They are less abundant on inshore scattered rock and reef outcroppings where adults have been seen collected as shallow as 14 fathoms (26 m). Farther south, in southern Onslow Bay, N.C., and Long Bay, N.C. and S.C., hard bottom areas are more scattered over the Continental Shelf. Here, vermilion snapper appear more abundant than in the north, frequently occurring in 18 to 35 fathoms (33-64 m). Juveniles have been observed on artificial reefs in 10 fathoms (18 m).

The vermilion snapper is, by a vast margin, the most frequently angled snapper of the Carolinas. In 1972 and 1973 North Carolina and South Carolina headboats landed 80,844 and 83,640 vermilion snapper as compared to 2,187 and 3,982 for red, silk, and blackfin snappers combined. In 1972 the vermilion ranked third behind red porgy, *Pagrus pagrus*, and white grunt, *Haemulon plumeri*, as the most frequently caught species. In 1973 vermilion snapper eclipsed the white grunt and became second in number. In 1972 the average weight of fish caught inshore (14-30 fathoms; 25-55 m) was 1.8 pounds (0.82 kg) as contrasted with 2.87 pounds (1.2 kg) for those caught offshore (30-70 fathoms; 55-128 m). In the North and South Carolina recreational fishery, vermilion snapper are successfully caught using either squid or fish as bait, although they seem to prefer squid.

In contrast to previously discussed fish, vermilion snapper are foragers in the water column. Their diet consists of various marine larval forms (e.g., zoea, mysis, phyllosoma, and postlarval shrimp), small adult crustacea (e.g., copepods, amphipods, euphausids, and decapod shrimps), small squid, pelagic gastropods, small fishes, and polychaetes. A diet of distinctly pelagic species with streamlined shape indicates a more pelagic existence than exhibited by other members of the family.

Our studies have shown the vermilion snapper to spawn from late April or May through September. Most adult females appear to reproduce first in their fourth season at a total length of about 13.8-15.7 inches (350-400 mm). Females produce large numbers of small pelagic eggs. The smallest mature females may produce about 150,000 eggs while the largest spawn about 1.5 million per season.

Determination of ages from annual rings on otoliths indicate the species to be relatively slow growing. The largest fish, just over 23 inches (600 mm) total length, are about 10 years old. Although males and females appear to grow at equal rates, females live longer. We have seen no males older than 8 years.

Vermilion snapper are apparently not migratory. However, larger and older fish do occur more frequently offshore (30-70 fathoms; 55-128 m) which could indicate offshore movement by larger adults to preferred habitat. They are always associated with rock or reef substrate where they probably remain in a moderately restricted area of perhaps several square miles. Schools or aggregations are strongly indicated in that solitary individuals are seldom caught. Recording depth-finder traces show moderate size aggregations of what we believe are vermilion snapper extending up several (1-4) fathoms above the substrate.

There are four species of red snappers which account for significant portions of the catch of North Carolina and South Carolina headboats. The vermilion snapper is the most frequently landed while the true red, silk, and blackfin snappers appear less often. With the exception of the vermilion snapper, the life histories of these species off the Carolinas are not well known but are currently under investigation by the National Marine Fisheries Service Center at Beaufort, N.C.

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