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Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (South Florida)

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Fish and Wildlife Service
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BLACK, RED, AND NASSAU GROUPERS

by

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Vicksburg, MS 39180

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PREFACE

This species profile is one of a series on coastal aquatic organisms, principally fish, of sport, commercial, or ecological importance. The profiles are designed to provide coastal managers, engineers, and biologists with a brief comprehensive sketch of the biological characteristics and environmental requirements of the species and to describe how populations of the species may be expected to react to environmental changes caused by coastal development. Each profile has sections on taxonomy, life history, ecological role, environmental requirements, and economic importance, if applicable. A three-ring binder is used for this series so that new profiles can be added as they are prepared. This project is jointly planned and financed by the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service.

Suggestions or questions regarding this report should be directed to one of the following addresses.

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Slidell, LA 70458

or

U.S. Army Engineer Waterways Experiment Station
Attention: WESER-C
Post Office Box 631
Vicksburg, MS 39180

CONVERSION TABLE

Metric to U.S. Customary

Multiply	*By*	*To Obtain*
millimeters (mm)	0.03937	inches
centimeters (cm)	0.3937	inches
meters (m)	3.281	feet
meters (m)	0.5468	fathoms
kilometers (km)	0.6214	statute miles
kilometers (km)	0.5396	nautical miles
square meters (m^2)	10.76	square feet
square kilometers (km^2)	0.3861	square miles
hectares (ha)	2.471	acres
liters (l)	0.2642	gallons
cubic meters (m^3)	35.31	cubic feet
cubic meters (m^3)	0.0008110	acre-feet
milligrams (mg)	0.00003527	ounces
grams (g)	0.03527	ounces
kilograms (kg)	2.205	pounds
metric tons (t)	2205.0	pounds
metric tons (t)	1.102	short tons
kilocalories (kcal)	3.968	British thermal units
Celsius degrees (^oC)	1.8(^oC) + 32	Fahrenheit degrees

U.S. Customary to Metric

inches	25.40	millimeters
inches	2.54	centimeters
feet (ft)	0.3048	meters
fathoms	1.829	meters
statute miles (mi)	1.609	kilometers
nautical miles (nmi)	1.852	kilometers
square feet (ft^2)	0.0929	square meters
square miles (mi^2)	2.590	square kilometers
acres	0.4047	hectares
gallons (gal)	3.785	liters
cubic feet (ft^3)	0.02831	cubic meters
acre-feet	1233.0	cubic meters
ounces (oz)	28350.0	milligrams
ounces (oz)	28.35	grams
pounds (lb)	0.4536	kilograms
pounds (lb)	0.00045	metric tons
short tons (ton)	0.9072	metric tons
British thermal units (Btu)	0.2520	kilocalories
Fahrenheit degrees (^oF)	0.5556 (^oF - 32)	Celsius degrees

CONTENTS

ACKNOWLEDGMENTS

We are grateful for the useful references contributed by C. S. Manooch III of the National Marine Fisheries Service, and for his thorough review. S. Bortone of the University of West Florida also reviewed the manuscript. E. Snell and R. Vaught of the National Marine Fisheries Service provided catch data and pertinent literature respectively. B.E. Luckhurst also made available useful literature. J. Iversen reviewed the general draft and made numerous useful comments. G. A. Maury prepared the cover and Figure 1. V.R. Restrepo, E. Lahman, J.F. Carranza, and I. Paez kindly assisted with word processing and greatly facilitated the completion of this report.

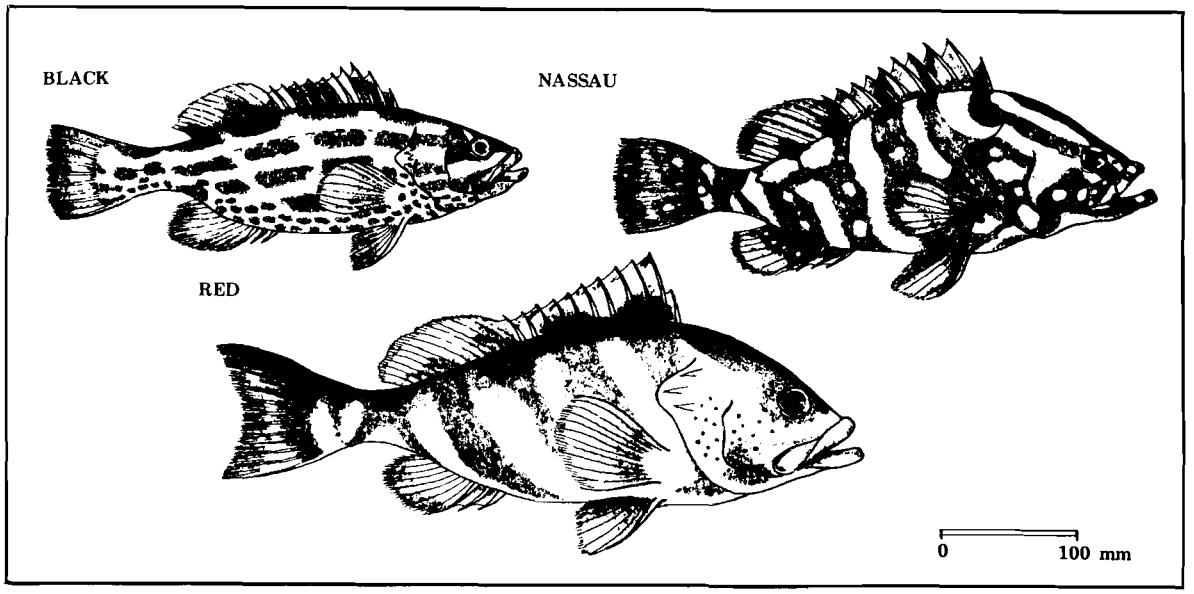

Figure 1. Black, red, and Nassau groupers.

BLACK, RED, AND NASSAU GROUPERS

NOMENCLATURE/TAXONOMY

Scientific name.....Mycteroperca bonaci Poey, 1860
Preferred common name....Black grouper
Other common names...Marbled rockfish, black rockfish, snider grouper, carbarita, junefish (Figure 1)

Scientific name.....Epinephelus morio Valenciennes, 1828
Preferred common name.....Red grouper (Figure 1)

Scientific name.....Epinephelus striatus Bloch, 1792
Preferred common name...Nassau grouper
Other common names.....Grouper, rockfish, hamlet (Figure 1)

Class.....Osteichthyes
Order.....Perciformes
Family.....Serranidae

REASONS FOR INCLUSION IN THE SERIES

Black, red, and Nassau groupers are actively sought by both commercial and sport fishermen throughout their geographic ranges. The red grouper is **one of the most abundant of the 17 species of grouper caught in Florida by commercial and recreational fishermen. The 1984 grouper landings for Florida totaled about 10 million lb, worth $14 million. The south Florida region (from Citrus around to Brevard Counties) contributed more than 8 million lb (81% of the total, worth more than $11 million (about 79% of the total). The 1984 Florida finfish landings were worth about $57.5 million, of which groupers contributed $14 million or nearly 25% of the total--making them the most valuable marine finfish group in Florida. However, despite their economic importance, available information on their life histories in the** south Florida region--particularly for black and Nassau groupers--is

grossly inadequate for effective management of the fishery. Beaumariage and Bullock (1976) wrote that fewer than two dozen pertinent studies had then been published on the biology of groupers, and that almost half of these were based on tagging programs that described movement patterns. According to these authors "This paucity of data exemplifies the need for similar life histories studies, if sound management policies are to be adopted...."

These three species of groupers are an important component of the highly diverse reef fish community, occupying positions near the top of the food webs. Their biology, ecology, and exploitation are integral components of coral reef fisheries and management of reef fisheries (Bohnsack 1982; Bannerot 1984). Any significant change in their numbers could affect the balance of reef ecosystems (May et al. 1979). Preservation of coral reefs is essential for the perpetuation of harvestable grouper populations.

In south Florida, ciguatera (poisoning from consumption of tropical fishes) is endemic. **Many of the reported cases from black grouper are really from incorrectly identified fish smuggled in from the Bahamas, where ciguatera is much more common (Jones Bohnsack, National Marine Fisheries Service, Miami, FL; pers. comm.). Life history data, especially on feeding habits, of the species implicated are needed to help prevent ciguatera. The toxin causes gastrointestinal, cardiovascular, and neurological disturbances resulting in prolonged disability and long and expensive recovery periods (de Sylva and Higman 1980; Poli 1982).**

GEOGRAPHIC RANGE

The black, red, and Nassau groupers range from New England and Bermuda to southeastern Brazil, including the Bahamas, Gulf of Mexico and all of the Caribbean (Böhlke and Chaplin 1968; Smith 1971; Fischer 1978), although the three species are rare north of Florida. Reports of these species north of the Carolinas are probably a result of larval transport by currents, as suggested by Thompson and Munro (1978) for other grouper species.

The black grouper is abundant in the Florida Keys (Randall 1968), in the Bahamas, and off Cuba and Venezuela (Cervigon 1966); it is reportedly rare in the eastern Gulf of Mexico (Smith et al. 1975), the Virgin Islands, Puerto Rico, and the Colombian Caribbean (Dahl 1971).

The red grouper is primarily a continental species, having the widest distribution of all western central Atlantic groupers (Roe 1976). It is found mostly in broad shelf areas; its center of abundance is in the Florida shelf and the eastern Gulf of Mexico (Moe 1969). It is also abundant in the Colombian Caribbean (Dahl 1971), and off northeastern Venezuela (Cervigon 1966), but uncommon in the West Indies (Randall 1968).

The Nassau grouper is primarily an insular species, very common in the West Indies (Randall 1968), the Bahamas (Böhlke and Chaplin 1968), southern Gulf of Mexico (Fischer 1978), and the Colombian Caribbean (Dahl 1971). In Venezuela, it is common in the Archipelago Los Roques but rare in northeastern islands such as Margarita, Coche, and Cubagua (Cervigon 1966). Red and Nassau groupers occur sympatrically in the Florida Keys (Figure 2), although their local distribution is essentially disjunct (Moe 1969).

MORPHOLOGY AND IDENTIFICATION AIDS

Morphological Characteristics

Smith (1971) provided the following morphological descriptions.

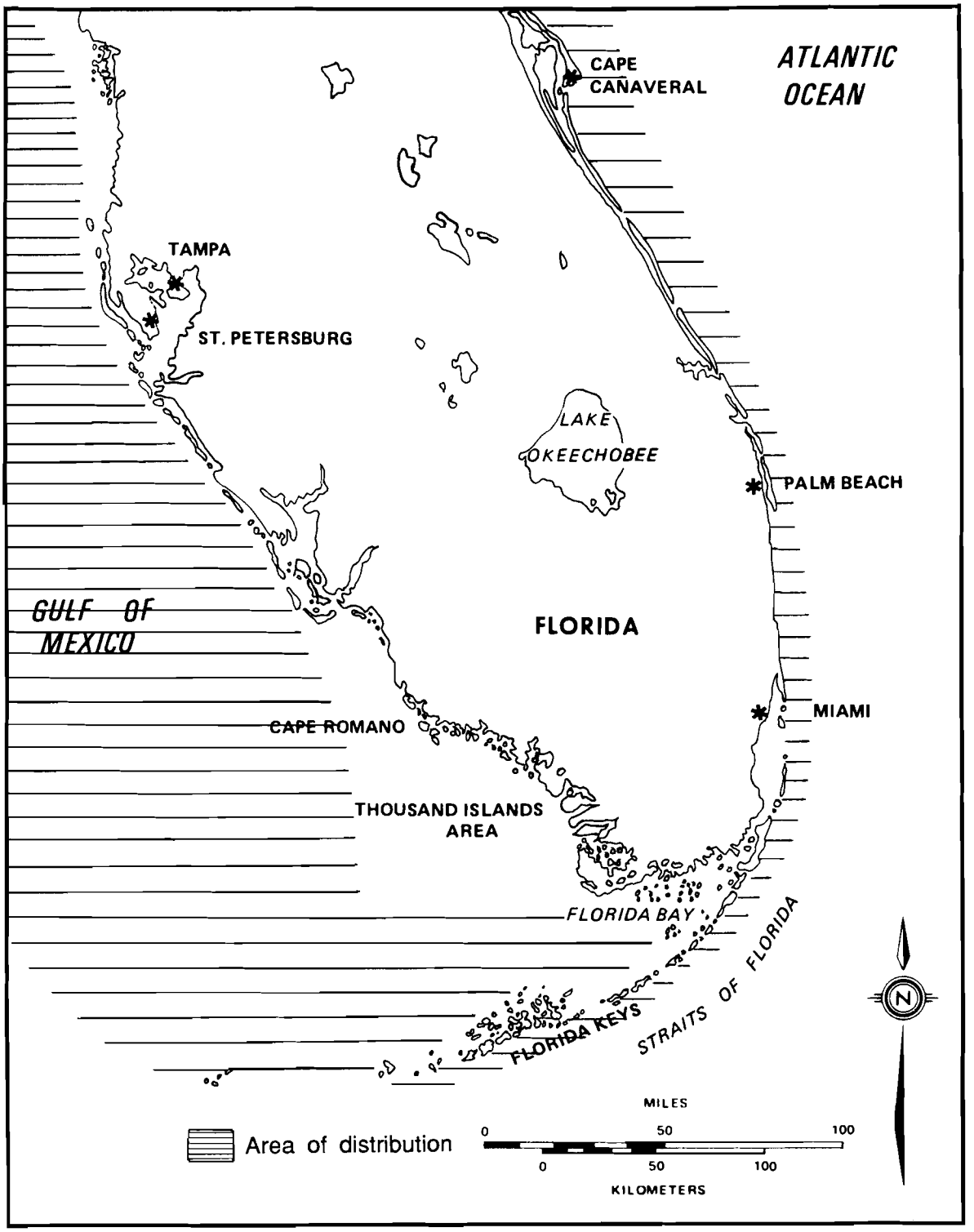

Figure 2. Approximate distribution of the black, red, and Nassau groupers in south Florida.

Black grouper. "Large species of Mycteroperca with robust body, relatively large scales, and rounded preopercle. Dorsal fin XI, 17; anal fin III, 12(13); pectoral fins 17; gill rakers 20-26. Posterior nostril not enlarged. Vertical fins without exserted rays. First three dorsal spines low, not forming an elevated lobe. Gill rakers are moderate in length. The exposed surface of the maxilla is scaled. The upper lip is broad, as wide as or wider than the shaft of the maxilla at the midpoint of the supramaxillary groove."

Red grouper. "Moderate-sized species of Epinephelus with large eyes, small scales, robust body. Nostrils subequal, posterior little larger than anterior. Dorsal fin XI, 16-17 with interspinous membrane not notched. Second dorsal spine longest. Vertical fins angulate in large fish. Anal fin III, 9; pectoral fins 17; gill rakers 23-25."

Nassau grouper. "Moderate-sized species of Epinephelus with large eyes, medium-sized scales, robust body. Nostrils subequal, posterior slightly enlarged, comma-shaped in adults. Dorsal fin XI, 16-17 with interspinous membranes notched; anal fin modally III, 8; pectoral fins 18; gill rakers 24-25. Vertical fins rounded."

Morphological Differences

Morphological differences among grouper species were cited by Fischer (1978).

Black grouper. This grouper can be distinguished from species of the genus Epinephelus by its more elongated body, which is not deepest at the origin of the dorsal fin, and in having 12, sometimes 13, soft anal-fin rays (8-9 in Epinephelus spp.). It differs from other species of Mycteroperca in having a gently rounded preopercle, with no definite lobe and only a slightly emarginated notch, and from other serranids in having the bases of the soft dorsal and anal fins covered by scales and thick skin.

Red grouper. This grouper can be distinguished from other species of the genus Epinephelus by its dorsal fin, in which the second spine is the longest and the interspinous membrane is not notched. In E. nigritus, E. flavolimbatus, E. mystacinus, and E. niveatus, the pelvic fins are longer than the pectoral fins and are inserted anterior to the pectoral-fin base, whereas in the red grouper the pelvic fins are shorter than the pectorals and are inserted slightly behind the ventral end of the pectoral fin base. The red grouper differs from Mycteroperca species in having a less elongated body, and in having nine soft anal-fin rays. The red grouper differs from other serranids in having a more robust body, having the bases of the dorsal and anal fins covered by scales and thick skin, and in having 11 dorsal fin spines.

Nassau grouper. This grouper can be distinguished from other species in the genus Epinephelus by the third spine of the dorsal fin which is longer than the second, and in having a slightly indented interspinous membrane. The caudal fin is slightly emarginated. In Nassau groupers the pelvic fins are shorter than the pectorals and are inserted below or behind the ventral end of the pectoral fin base. In E. mystacinus, E. nigritus, E. flavolimbatus, and E. niveatus, the pelvic fins are longer than the pectorals and are inserted anterior to the ventral end of the base of the pectoral fins. In addition, E. mystacinus has greatly enlarged, equal-sized posterior nostrils, whereas in the Nassau grouper the nostrils are subequal. The Nassau grouper can be distinguished from Mycteroperca spp. by its less elongated body and eight soft anal fin rays. Other serranid species have less robust bodies, soft dorsal and