
Atlantic, Gulf of Mexico, and Caribbean Reef Fisheries



Unit 8

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INTRODUCTION

Reef fishes include a variety of structure-associated species that reside on coral reefs, artificial structures, or other hard-bottom areas, and also tile-fishes that live in muddy bottom and Continental Shelf areas. Reef fishes occur from Cape Hatteras, North Carolina, through the Gulf of Mexico and Caribbean Sea in depths ranging from ~2 m to more than 200 m. Reef fish fisheries are extremely diverse, vary greatly by location and species, and are utilized by commercial, artisanal, and recreational fisheries for food, commerce, sport, and trophies. These fisheries operate from charter boats, head boats, private boats, and the shore, while using gears such as fish traps, hook and line, longlines, spears, trammel nets, bang sticks, and barrier nets.

Reef fish fisheries are associated closely with fisheries for other reef animals, including spiny lobster, conch, stone crab, corals, and live rock and ornamental aquarium species (see Unit 11, Southeast and Caribbean Invertebrate Fisheries). Non-consumptive uses of reef resources (e.g. ecotourism, sport diving, education, and scientific research) also are economically important and may conflict with traditional commercial and recreational fisheries. Although reef fishes have been caught for generations, dependable landings data for most areas did not begin to accrue until the late 1970's, when recreational fishing surveys were initiated. Fishery data collection remains difficult because there are diverse users and landings are made at many ports. Fishing pressure has increased over time along with growing human populations, greater demands for fishery products, and technological improvements

Photo above:
Bluestriped grunts peek out
from the shelter of a coral
reef.



Measuring a gray (mangrove) snapper during a NMFS Marine Recreational Fisheries Statistics Survey (MRFSS) in Florida.

(e.g. more efficient and less expensive gear, electronic fish finders, and navigational aids).

SPECIES AND STATUS

Although figures vary for individual species, reef fishes overall produce significant landings and values (Figures 8-1, 8-2, and 8-3). Recent average commercial and recreational catches (2004–06) for the U.S. Atlantic, Caribbean, and Gulf of Mexico have been about 24,253 metric tons (t) annually (Table 8-1), with dockside ex-vessel commercial revenue of \$68,124,000. In the U.S. South Atlantic and Gulf of Mexico, sport anglers make more than 20,000,000 angler-trips per year.

Many reef fishes are vulnerable to overfishing due to life-history characteristics such as slow growth, late maturity, ease of capture, large body size, and other factors. Many stocks with known status are currently considered overfished (Table 8-1). In most cases, the current and maximum sustainable yields are unknown, though for many species they are probably higher than current recent average yields would indicate due to overfishing (Table 8-1).

The South Atlantic Fishery Management Council (SAFMC), the Gulf of Mexico Fishery Management Council (GMFMC), and the Caribbean Fishery Management Council (CFMC) manage reef fish fisheries in the Southeast Region occurring within the U.S. Exclusive Economic Zone (EEZ; seaward of territorial waters out to 200 miles from shore). These three Councils have developed Fishery Management Plans (FMP) for reef fish fisheries that include a combined total of 117 reef fishes (excluding fish species collected for the marine aquarium trade). The territorial waters are managed by the eight coastal states of the region, the U.S. Virgin Islands, and the Commonwealth of Puerto Rico.

In the Gulf of Mexico, the Reef Fish Resources of the Gulf of Mexico FMP and its amendments contain numerous management measures for the 42 reef fish species within the management unit. These measures include the prohibition of fish traps, roller trawls, and powerheads on spearguns within designated stressed areas; minimum size and bag limits on many reef fishes; and data reporting requirements. For example, during 2008 there was a two-fish recreational daily bag limit for red snapper with a 1,111 t annual quota, and a com-

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Species/stock	Recent average yield (RAY) ¹	Current yield (CY) ²	Sustainable yield (MSY) ²	Stock level relative to B_{MSY}	Harvest rate	Stock status
South Atlantic						
Black sea bass	770	719	1,730	Below	Overfishing	Overfished
Gag	491	727	Unknown	Unknown	Overfishing	Appr. overfished
Goliath grouper ^{3,4}	0	0	Unknown	Below		
Nassau grouper ³	0	0	Unknown	Below	Not overfishing	Unknown
Red porgy	47	Unknown	450	Below	Not overfishing	Overfished
Red snapper	146	Unknown	Unknown	Unknown	Overfishing	Unknown
Snowy grouper	130	124	142	Below	Overfishing	Overfished
Tilefish	215	134	153	Near	Overfishing	Not overfished
Vermilion snapper	571	Unknown	Unknown	Unknown	Overfishing	Unknown
Wreckfish	71	Unknown	Unknown	Unknown	Not overfishing	Unknown
Amberjacks ⁵	382	Unknown	Unknown	Unknown		
Grunts ⁵	226	Unknown	Unknown	Unknown		
Other groupers ^{5,6,7}	489	Unknown	Unknown	Below		
Other porgies ⁵	989	Unknown	Unknown	Unknown		
Other sea basses ⁵	2	Unknown	Unknown	Unknown		
Other snappers ⁵	606	Unknown	Unknown	Unknown		
Other species ⁵	1,007	Unknown	Unknown	Unknown		
Subtotal, South Atlantic	6,142	6,420	7,691			
Caribbean						
Nassau grouper ³	0	Unknown	Unknown	Below	Overfishing	Overfished
Grunts	70	Unknown	Unknown	Unknown	Unknown	Unknown
Other groupers ^{5,6,7}	69	Unknown	Unknown	Unknown		
Snappers ^{5,6}	363	Unknown	Unknown	Unknown		
Other species ^{5,6}	432	Unknown	Unknown	Unknown		
Subtotal, Caribbean	934	934	934			
Gulf of Mexico						
Goliath grouper ³	0	0	Unknown	Unknown		
Nassau grouper ³	0	0	Unknown	Unknown	Not overfishing	Undefined
Red grouper	3,769	Unknown	Unknown	Unknown	Not overfishing	Not overfished
Red snapper	3,657	2,722	15,000	Below	Overfishing	Overfished
Vermilion snapper	1,069	Unknown	Unknown	Unknown	Not overfishing	Not overfished
Gray triggerfish	285	Unknown	Unknown	Unknown	Overfishing	Undefined
Amberjacks ^{5,6,7}	1,403	Unknown	Unknown	Unknown		
Shallow groupers ⁵	2,940	Unknown	Unknown	Unknown		
Other groupers ⁵	695	Unknown	Unknown	Unknown		
Other snappers ⁵	2,144	Unknown	Unknown	Unknown		
Other species ⁵	1,215	Unknown	Unknown	Unknown		
Subtotal, Gulf of Mexico	17,177	16,242	28,520			
Total	24,253	23,416	37,145			

Table 8-1

Productivity in metric tons (t) and status of Atlantic, Gulf of Mexico, and Caribbean reef fish fisheries resources.

¹2004–06 average.

²CY is overestimated, and MSY is probably greatly underestimated; although potential production estimates are not available for most species groups, many are probably overfished.

³A total fishing prohibition has been imposed on these species in all Federal waters, state waters of the South Atlantic and Gulf of Mexico, and territorial waters of the U.S. Virgin Islands.

⁴Status determinations for goliath grouper are for the South Atlantic and Gulf of Mexico combined; the stock is not overfishing and stock status is unknown.

⁵Harvest rate and stock status are not available for this stock.

⁶This multispecies stock grouping contains at least one species that individually is considered to be overfishing.

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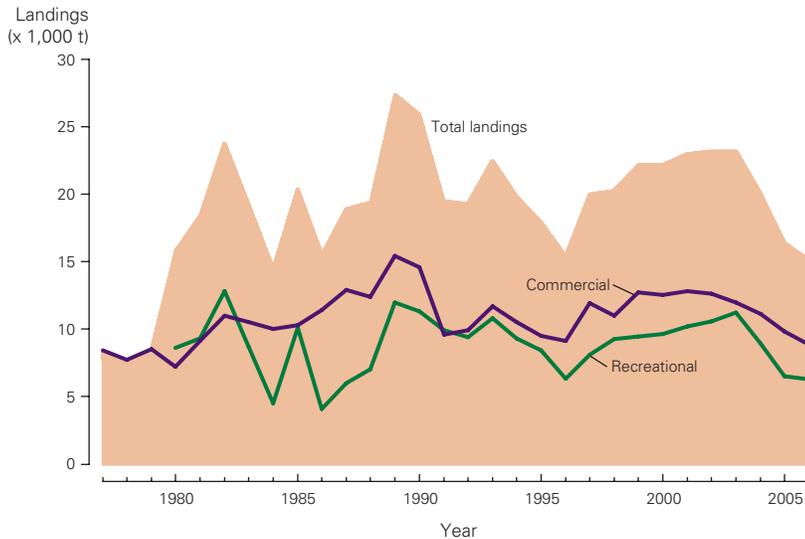


Figure 8-1
Gulf of Mexico reef fish landings in metric tons (t), 1977–2006.

mercial annual quota of 1,157 t. For grouper, a five-fish recreational daily bag limit (one fish for red grouper) and 3,992 t shallow-water and 463 t deepwater commercial quotas were established. Other FMP regulations include a ban on the harvest of goliath and Nassau groupers, a framework procedure for establishing total allowable catches and allowing the target date for rebuilding to be changed depending on scientific information, and a revised target year of 2032 for rebuilding the red snapper stock. In 1992, a moratorium on issuing new commercial reef fish permits was established. Marine protected areas (MPA's) closed to fishing have been established in three areas near the Dry Tortugas (off south Florida) and in two areas off west-central Florida (the Madison-Swanson and Steamboat Lumps Marine Reserves).

In the southern U.S. Atlantic, the Snapper–Grouper Fishery of the South Atlantic Region FMP emphasizes minimum size limits, bag limits, and commercial fishing quotas. A total of 73 reef fishes are included in the snapper–grouper complex. Because of its mixed-species nature, this fishery is challenging to manage. Through the original FMP and subsequent amendments, the Council has addressed overcapacity, implemented measures to rebuild overfished species, and is moving forward with the use of MPA's as a management tool for deepwater species. Various gears are restricted, including a prohibition of roller trawls and fish traps (except sea bass traps). Strict management

measures, including prohibition of harvest in some cases, have been implemented to rebuild overfished species in the snapper–grouper complex. For example, both goliath grouper (since 1990) and Nassau grouper (since 1992) are protected from harvest, and strict limits have been implemented for speckled hind and warsaw grouper. Additional restrictions on commercial and recreational fishing have been enacted for designated special management zones.

In the U.S. Caribbean, the Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands FMP establishes regulations to rebuild declining reef fish stocks in the EEZ and reduce conflicts among users. In this fishery management unit there are 79 reef fish species harvested for human consumption, plus an additional 60 species collected for the aquarium trade only. Regulatory management measures include those that define criteria for the construction of fish traps and requirements for owner identification and the marking of gear and boats; prohibit hauling or tampering with another person's traps without the owner's written consent; prohibit the use of poisons, drugs, other chemicals, and explosives for the taking of reef fish; and establish minimum size and bag limits for multiple species of reef fish. Many species of reef fish in

Yellowtail snapper in front of a sea fan.



Florida Keys National Marine Sanctuary



William B. Folsom, NMFS

Puerto Rico and the U.S. Virgin Islands are believed to be overexploited, largely due to trap fishing and bycatch associated with this fishery.

ISSUES

Fishing Impacts, Trophic Interactions, and Bycatch

Fishing may have direct and indirect effects on reef fish ecosystem structure and production. Removals of apex predators from the reef complex may result in shifts of species composition (i.e. trophic and ecological cascades), increased variability in population dynamics of targeted species, and potential evolutionary effects on targeted species. Bycatch (non-targeted catch) increases mortality rates for non-targeted species. For example, juvenile red snapper are caught in nearshore shrimp trawls in the Gulf of Mexico region, resulting in increased red snapper mortality and, subsequently, decreased numbers of adults available for harvest by commercial and recreational fisheries. For species caught and released alive, post-release mortality may affect stock production levels.

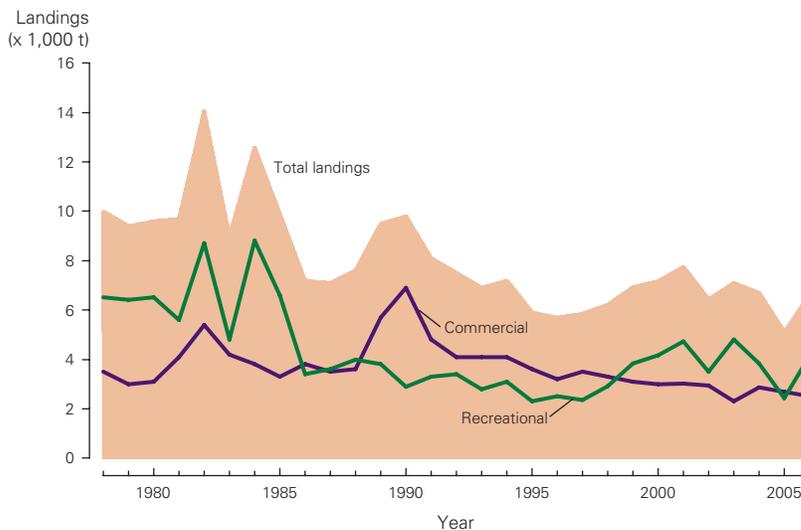


Figure 8-2
South Atlantic reef fish landings in metric tons (t), 1978–2006.

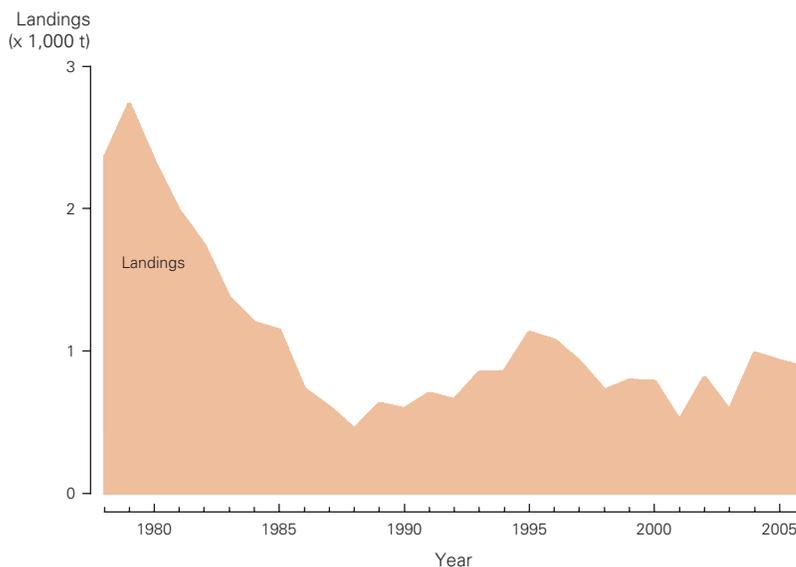
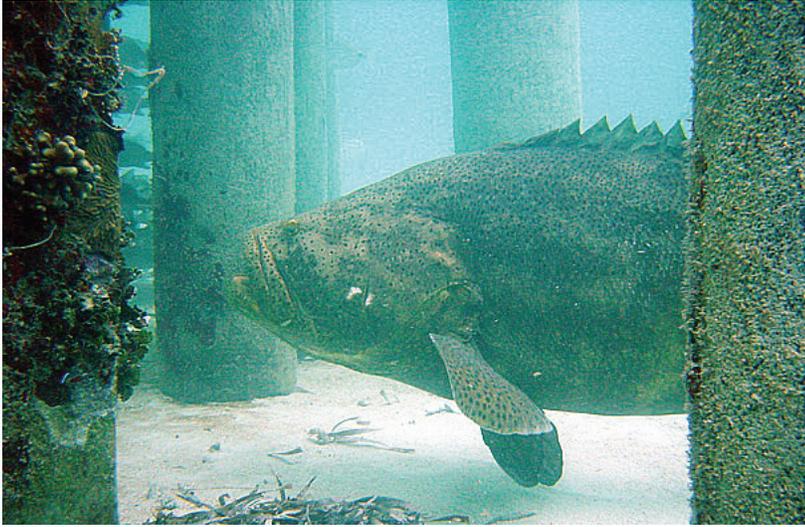


Figure 8-3
Caribbean reef fish landings in metric tons (t), 1978–2006.

Scientific Information and Adequacy of Stock Assessments

There are a number of important issues that need to be addressed to improve scientific advice for management. For all species, additional or improved fishery-dependent and fishery-independent data would improve the accuracy of statistical models used in stock assessments. For many species,

Photo, above left:
A catch of snapper from the small-boat fishing fleet in Municio de Rincon, Puerto Rico.



A large goliath grouper swims between pier pilings. Fishing on this species is prohibited in the EEZ and state/territorial waters except off Puerto Rico to allow the species to recover from past overfishing.

insufficient data exist to perform stock assessments. Additional life history and biological data are also needed for many species. Additionally, information on species interactions (e.g. predator-prey dynamics) will be necessary to guide multispecies assessments and facilitate the movement toward ecosystem management.

Allocation

A wide range of stakeholders utilizes reef fish resources, and conflicts may arise between commercial and recreational fishers and other users such as ecotourists. Balancing the competing interests of these user groups is an important management issue.

Progress

Stock rebuilding plans are in effect for all reef fish species classified as overfished or experiencing overfishing. Some overfished reef fishes (e.g. goliath grouper) are undergoing apparent significant increases in abundance. Increased awareness and public interest in conservation of marine resources have led to the establishment of a number of marine protected areas in which harvest of all marine organisms is prohibited.

FOR FURTHER READING

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