In Belize

The black grouper, although not currently considered endangered, is in decline throughout its range, including in Belize. It is currently listed as Vulnerable on the World Conservation Union's (IUCN) Red List of Threatened Species.

In Belize, the black grouper's vulnerability results in part from the destruction of its habitats: mangroves, sea grass beds and reef habitats. Such destruction usually is a consequence, presumably unintended, of development, dredging, bottom trawling, diving and boat traffic.

The black grouper also is particularly susceptible to overfishing because of its biology and reproductive behaviour, both described within. Overfishing can decimate a species, even when the fishing is done by traditional fishermen using handlines and spears. Nassau grouper, for example, once abundant throughout the Caribbean, are now rare and can no longer support a commercial fishery.

Belize's network of "no-take" marine reserves, where no fishing is permitted, provide some protection to the black grouper. Such reserves and other regulations, if respected, can be effective.

Today, important research is underway in Belize to better understand the black grouper, its biology, behaviour and critical habitats. Such research is crucial for preventing its extinction and preserving opportunities for Belize's fishermen.

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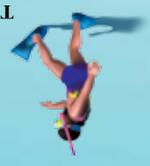
Study Conducted by: Green Reef Environmental Institute
PO Box 91, San Pedro, Ambergris Caye, Belize 011 501 226 2833 www.greenreefbelize.org greenreef@gmail.com



The earth was not given to you from your parents. It was loaned to you from your children.

Mycteroperca bonaci

Mycteroperca bonaci

BLACK GROUPER

What Is The Black Grouper?

The black grouper, also known in Belize as rockfish, abadejo and waga'nut, lives throughout the western Atlantic Ocean, with a range from New England to southernmost Brazil. Individuals typically grow to about 4.4 feet (133 cm) and 144 lbs (65 kg), the largest known having weighed an astounding 179 lbs (81 kg)!

Usually solitary fish, black groupers can live over 30 years. Approximately 24-40 hours after fertilization, black grouper eggs hatch into larvae with greatly elongated, serrated spines. After floating in the water for about 6 weeks, the larvae settle in shallow waters close to shore. There they grow rapidly while hiding from their predators among mangroves and sea grass beds. After a year or so, juveniles move to shallow-water patch reefs for several more years of rapid growth. As they mature, black groupers experience a slower growth rate and migrate to deeper, offshore sites with rocky patches, drop-off walls and coral reefs, where they can often be spotted resting on or near the bottom. Individuals are extremely faithful to their home reef territory and leave only for spawning.

Usually capturing their prey by ambush, black grouper most actively feed at dawn and dusk. The very young eat crustaceans in shallow waters, while the adults consume squid and smaller reef fishes, including grunts, snappers and herrings, in addition to crustaceans, particularly shrimp and small lobsters.

What do black grouper look like?

Despite their name, black groupers can display a variety of colouration and can change colours, referred to as phases, through processes not well understood by scientists. Juveniles are covered with blotches of reddish brown and black in a pattern referred to as "blotch." Normal colours for adults are white, dark blackish or blotch; but males generally tend to be dark and females blotch. Black groupers change among normal phases at any time, for purposes of camouflage or depending on activity. However, only during and just before spawning can males be observed in a "bicolour phase" characterized by a pale face and a white area on the caudal fin, edged in black, on an otherwise dark body.

Blotch Phase

Bicolor Phase

White Phase

Dark Phase

How do black grouper reproduce?

Black grouper abandon their home reefs and solitary ways for purposes of reproduction. All known black grouper reproductive activity takes place in gatherings known as spawning aggregations, which can include between 20 to 400 individuals, but are usually fewer than 200. These spawning aggregations appear to be timed according to phases of the moon and generally occur between the last quarter and new moon each month from December to March. The peak spawning months for black grouper in Belize are February and March. As is the case for other species, including most groupers, black grouper spawning aggregations form at specific locations, year after year, although the reason for the "choice" of site is not well understood. Black grouper spawn at a minimum of 28 different sites along the coast of Belize and on the offshore atolls. Many of these sites are also used for spawning aggregations of other species, as well.

Black groupers are protogynous hermaphrodites, meaning that all black groupers begin life as females and later transform into males. The exact stage at which the transformation occurs, which may differ among regions, is not clear and may be triggered by social cues not yet understood. The result, however, is that the older and larger groupers are male.

Like other species of grouper, black grouper change colours in connection with spawning, possibly signaling each other as to their species and sex. Larger female black groupers, sexually mature at 5 to 6 years, can produce 500 to 600 thousand eggs each during a single spawning period.

The only black grouper spawning aggregation to have been filmed and reported in detail occurred off the coast of Belize in 2006. Toward late afternoon, gathered males were observed to move from a shelf edge into the water column, an increasing number of them exhibiting the bicolour phase. The females gathered at the shelf edge and, shortly before spawning, moved as a group to join the males in deeper water off the shelf edge. At this time all individuals in the aggregation were either dark (both sexes) or bicoloured (males).

Actual spawning occurred at dusk between the last quarter and new moon in March. As the black groupers milled about in a loose aggregation, a male in bicolour phase would approach a dark phase female and position himself parallel to her. The two would then do a quick vertical swim for 3-7 meters in the water column, followed by a rapid shaking of their bodies and the release of eggs and sperm. They would then quickly return to the rest of the black groupers below them. Couple after couple repeated the pattern, one couple at a time.

Is Biology Destiny?

The black grouper's biology and reproductive behaviour render it vulnerable to overfishing and therefore at risk of extinction. First, larvae and young juveniles need the protection of mangroves and sea grass beds to reach adulthood; and those habitats, despite protective legislation, are disappearing in Belize. Because black grouper are long-lived and can reproduce as females only after 5 to 6 years, fishing can quickly reduce the number of individuals who survive to sexual maturity. Moreover, since black groupers are protogynous hermaphrodites, the older and larger individuals are male. Therefore, males are, of necessity, targeted by commercial fishermen for their size and by sport fishermen for their size and aggressiveness. In addition, males are easier to spear and take a baited hook more aggressively than smaller individuals. Thus, males, who have already had to survive many years to even become male, face a greater likelihood of capture once they do change sex. The risk is a black grouper population so skewed toward one sex that successful reproduction diminishes to a dangerously low level. That risk is enhanced by the small size of black grouper spawning aggregations, which can afford the loss of few males.

The mere fact that black groupers aggregate to spawn also renders them vulnerable to overfishing. Spawning aggregations present an attractive target for fishermen because an unusual number of individuals can be found in close proximity. Worse yet, spawning aggregations form at specific known sites and at specific known times. Fishing during a spawning aggregation not only results in the removal of a large number of fish, particularly the largest males, but also interrupts the social cues that trigger sex changes and spawning itself. The result is smaller fish with fewer eggs and, again, fewer males. Thus, fishing that concentrates on aggregations compounds the effect of population loss to a species and can quickly reach the point of overexploitation threatening to its survival.

Most economically important grouper species have been overfished, in Belize and elsewhere, sometimes to the point of extinction.