

## Report on Goliath Grouper Stock Assessment Plans



Report date: November 10, 2009

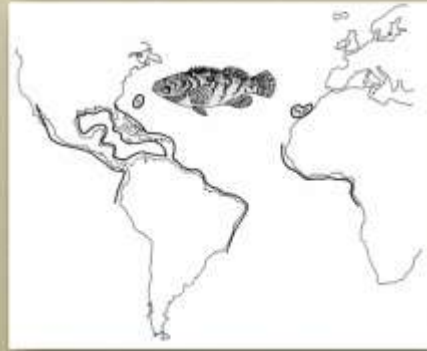
Florida Fish and Wildlife Conservation Commission  
Fish and Wildlife Research Institute

This presentation gives a brief overview of the FWC plans for assessment and management of Goliath grouper in Florida.

Authors: Gil McRae and Luiz Barbieri

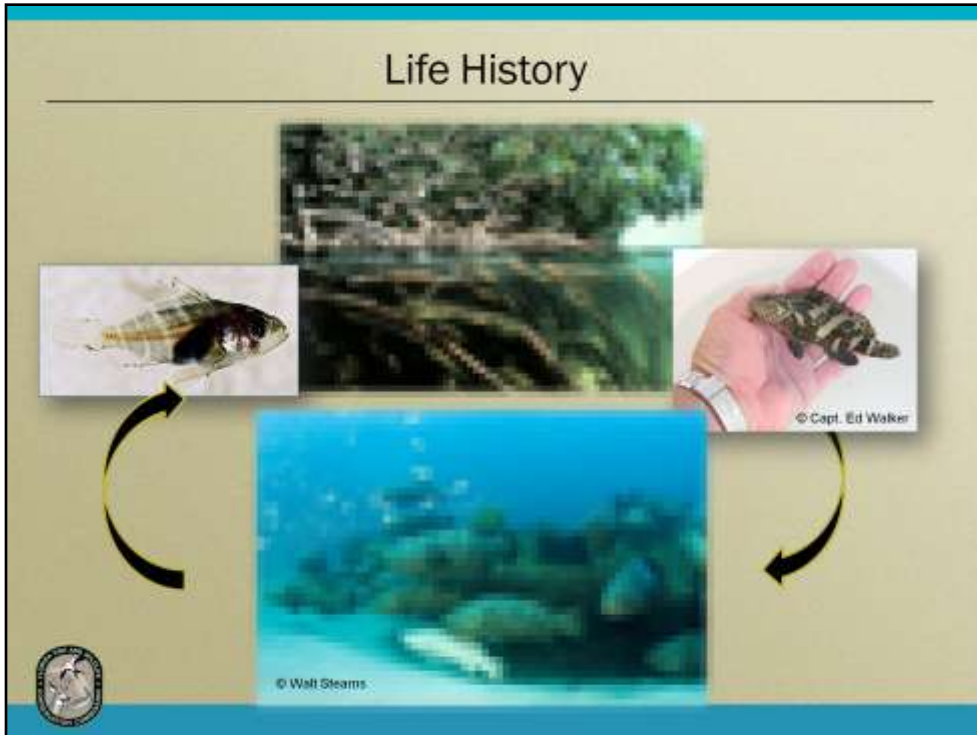
## Distribution and Biology

- Subtropical/tropical distribution (Florida to Brazil), throughout the Gulf of Mexico and Caribbean
- Long-lived (37+ yrs), slow growth
- Late maturity (3-6 yrs)
- Spawning occurs from July to September
- Aggregate to spawn



Goliath grouper are found in subtropical and tropical waters of the northwest Atlantic. The center of population abundance has historically been along the southwest coast of Florida, but their geographic range spans the northwest Atlantic, Caribbean Sea and Gulf of Mexico down to the southeast coast of Brazil. Mixing between the Gulf and Atlantic stocks is likely limited, but there is evidence that individuals are capable of migrating between regions. It is believed that there is a single stock throughout the Caribbean, but local extirpations and a lack of data within this area impede attempts to assess the species' recovery throughout its range.

## Life History



Like many marine fishes, the life history of Goliath grouper is linked intimately with both inshore and offshore habitats. They aggregate to spawn offshore—spawning occurs in the late summer months (July - Sept). Larvae spend several weeks as plankton, and settle out within shallow inshore nursery habitat. This species is dependent upon suitable estuaries that act as nurseries, and it is believed that mangroves may provide critical habitat for juvenile growth and development. Juvenile emigration to offshore waters occurs at the age of 5 or 6 years, probably at the onset of maturity that likely occurs when they approach 1 meter total length. It is unknown if goliath grouper change sex during their development, as many other groupers do.

## Management History

- Overfished through the 1980's in U.S. waters
- 1983: South Atlantic Council prohibited spear-fishing
- 1990: protected from harvest in state (NC to TX) and U.S. waters
- 2006: removed from NMFS 'species of special concern' but still considered 'critically endangered' by IUCN
- 2006: South Atlantic Council has considered classifying goliath grouper as a non-consumptive species
- 2007: Gulf Council requested FWC to work with NMFS to determine if stock is recovered



Prior to 1983, there were few regulatory measures related to the harvest and possession of goliath grouper. The fishery expanded quickly and dramatically through the 1980s, which required the introduction of conservation and management measures for the species. The South Atlantic Fishery Management Council (SAFMC) prohibited spearfishing in 1983; Florida instituted an 18 inch minimum size limit in 1985; the Gulf of Mexico Fishery Management Council (GMFMC) established a 50 inch minimum size limit in 1989. None of these regulations stemmed the population decline and all harvest of goliath was prohibited beginning in 1990. Today, consistent regulations prohibiting harvest now exist in eight states (NC to TX) and all US waters. Since then other governments throughout its range have followed suit. In 1994, Goliath grouper were listed as critically endangered on the International Union for the Conservation of Nature, World Conservation Union's Red List of Threatened Species. The species has since been protected in Brazil (2002), Puerto Rico (2004) and the US Virgin Islands (2004). However, fisheries for goliath grouper persist in other parts of the Caribbean (e.g., Honduras and Belize). In 2006, a NMFS status report indicated that goliath grouper abundance was increasing within U.S. waters, and NOAA removed goliath grouper from their Species of Special Concern list. Also in 2006, the SAFMC issued a statement that goliath grouper populations were still depleted and at risk from poaching, habitat destruction, and other environmental impacts. It considered classifying goliath grouper as a non-consumptive species, to be protected for its aesthetic value. In 2007, the GMFMC requested that the FWC work with NMFS to look into whether the stock is already recovered.

## Vulnerability

- Their biology and life history make them especially vulnerable to overexploitation (long-lived, late maturity, slow growth)
- Approachable, sedentary; form spawning aggregations at specific, predictable sites
- Dependent on mangrove habitat during early life; sustainability may be impacted by habitat loss
- One of only 2 species with long-term protection from harvest in SE U.S. (Nassau grouper is the other)
- US population may serve as source of larvae to the wider Caribbean



The life history of goliath grouper makes the species especially vulnerable to overexploitation. They are long-lived (the oldest age recorded is 37 years but they are presumed to live over 40 yrs), and exhibit late maturity and slow growth. They are sedentary, and gather predictably in large groups to spawn at specific, high relief sites. Indeed, the majority of reported landings for goliath grouper coincided with their spawning season. Catchability is further enhanced by that fact that aggregations are typically reported from relatively shallow water (<50 m), making goliath grouper aggregations accessible to a larger group of fishers and divers. Increasing coastal development and the resulting loss of mangrove nursery habitat has been also suggested as a bottleneck to the recovery of this species.

The long-term fishery closure in US waters is representative of the species vulnerability and susceptibility to overfishing. Only one other species, Nassau grouper, has been closed in southeastern US waters for more than 10 years.

## Current FWC Research

- FWC conducting cooperative research project with spearfishers (funded by NOAA, NMFS) since 11/2007
- 350 surveys at 78 different artificial and natural reef habitats over a wide range of depths. 165 fish tagged.
- External ID tags: allow resightings (divers) and/or recaptures (anglers) of individuals (movements/sight fidelity)



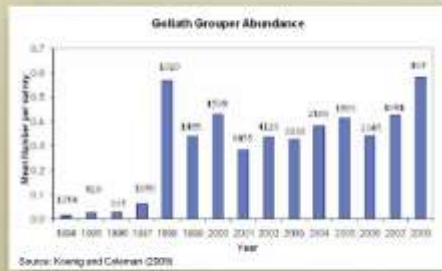
FWC's research is aimed at developing more complete information on the density and size distribution, habitat use, site fidelity, and movement patterns of Goliath grouper at natural and artificial reefs along the west-central coast of Florida. The project is conducted with the active participation of spearfishers and funded by a grant from NOAA-NMFS, Cooperative Research Program. FWC's goliath research is coordinated with university and federal research efforts.

Year-round underwater visual surveys are performed at established sites across a range of depths and habitats to determine how goliath grouper density and size distribution is affected by depth, season and habitat type. Sites are thoroughly surveyed to determine goliath grouper abundance, and size distribution is assessed using underwater video cameras equipped with a laser measuring device. Additionally, fish are fitted with identification tags in order to gather data on site fidelity and movement patterns.

Since November 2007, FWC researchers have performed approximately 350 surveys at 78 different artificial and natural reef habitats over a wide range of depths. Of the 165 fish tagged, 27 have been re-sighted (16.4%) with 7 having been re-sighted multiple times. Time at large for tagged fish has ranged from 1 to 204 days (mean = 53 days). Although research is still ongoing, results to date indicate that Goliath grouper density is highest over artificial reefs, that there is a positive relationship between abundance and depth (may be related to site characteristics), and that there is high variability on individual movements—i.e., some individuals seem to move a lot while others have been more stationary.

## Current Status of the Stock

- Different surveys (REEF visual survey, ENP creel survey, inshore juvenile study) indicate increasing population trends



- 2004 assessment: Some scenarios predicted recovery by 2010—contingent on assumptions made regarding the effectiveness of the moratorium
- New assessment with updated data needed to determine if recovery has been achieved



Different surveys indicate that substantial stock recovery has occurred since the fishery was closed in 1990, but the extent to which the population has recovered is unclear. The last stock assessment of goliath grouper off Southern Florida was completed in 2004. The assessment indicated that the 1990 harvest ban had reduced fishing pressure by about 83%. Regardless, due to illegal harvest and release mortality, the fishing mortality rate remained above the overfishing threshold and the stock biomass remained overfished. If the population continued to undergo fishing mortality at the current rates, the authors estimated the probability of recovery within the next 10 years at less than 40%. However, some scenarios (i.e., sensitivity runs) considered in the assessment predicted stock recovery by 2010—contingent on assumptions made regarding the effectiveness of the moratorium. A new stock assessment using updated data is needed to determine if the recovery has been achieved.

## Goliath Action Plan

- Goliath SEDAR assessment currently scheduled for 2014
- If FWC takes the lead assessment can be done in 2010
- FWC and NMFS concluded that stock status can be determined without a research harvest
- Assessment conducted through the SEDAR process
  - Public/stakeholder participation
  - Transparency
  - Applicable for State and Council (Federal) processes
- If the stock is recovered FWRI, DMFM will work together to develop a full set of management options



The next SEDAR assessment for Goliath grouper has been scheduled for 2014. However, if FWC takes the lead, the assessment can be conducted in 2010, with assessment workshops starting in April and an independent scientific review and publication of the final results completed by early 2011. This assessment will use similar methodology to that used in 2004, with updated and additional data. A joint analysis by FWC and NMFS scientists has determined that a research harvest would not yield information needed to significantly improve the stock assessment.

If the stock is determined to be recovered, FWC staff will work with partners and stakeholders to develop and vet a full suite of management options for the species.

Questions?

