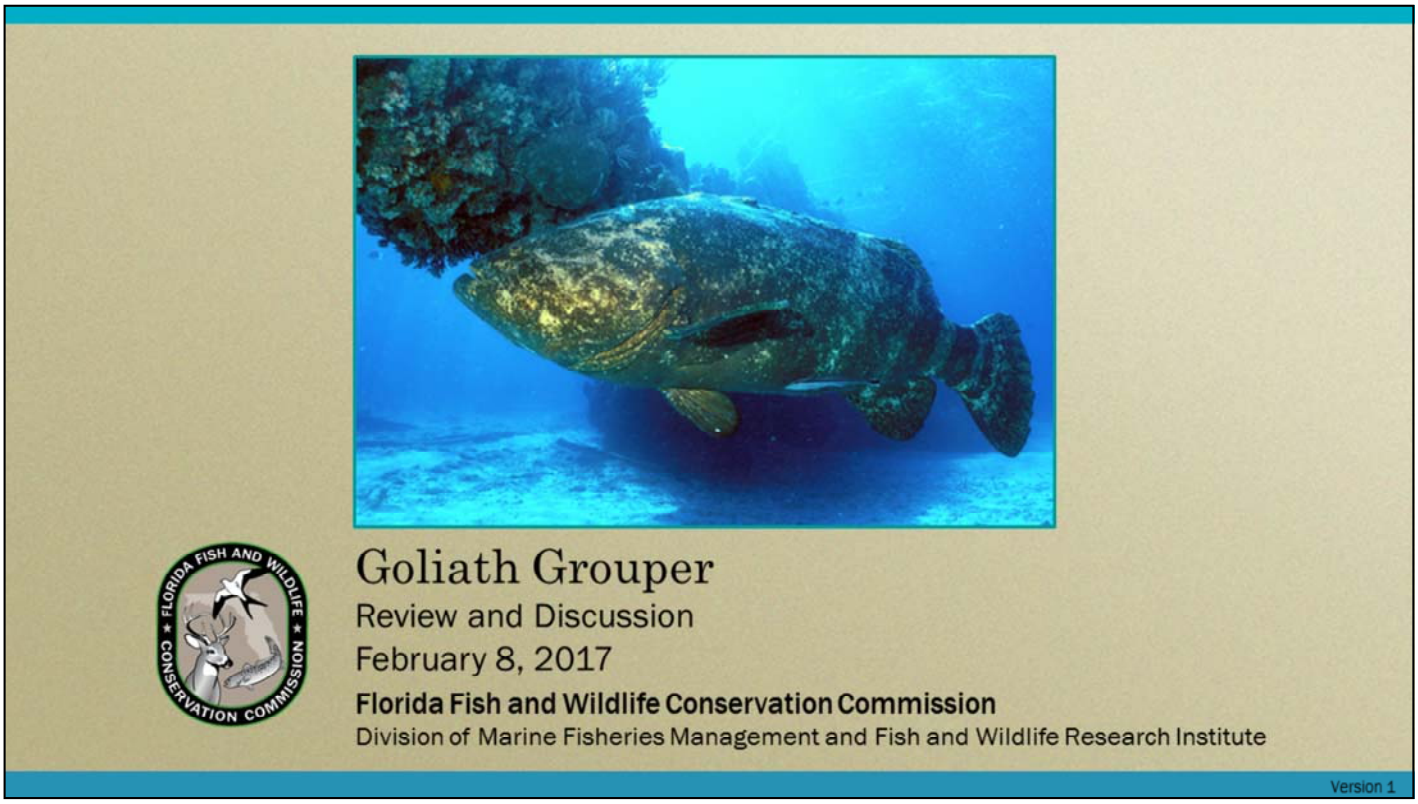


This is a review and discussion of a goliath grouper stock assessment update that was recently completed by the Florida Fish and Wildlife Conservation Commission (FWC) scientists at the Fish and Wildlife Research Institute (FWRI). The presentation will cover state and federal waters management history, life history, stakeholder survey, recent economic information and research, and an overview of potential management strategies that could be pursued by the Commission at a future meeting for a limited reopening of this fishery in Florida waters.

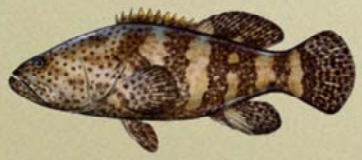
Authors: Jessica McCawley, Gil McRae, Martha Bademan, and Luiz Barbieri

Report date: February 6, 2017

Background

Management philosophies for goliath grouper are highly divergent

- Preserve for ecotourism
- Role in the ecosystem
- Concerns about the distribution outside of Florida
- Considered a nuisance species by some
- Desire for limited harvest



The management philosophies of goliath grouper are highly divergent. There are many people, especially members of the dive community that want to preserve goliath for ecotourism purposes. There are dive charter businesses that take people to dive with goliath grouper. Goliath are sedentary and tolerate divers in close proximity even while in spawning aggregations. There are others who think that goliath should be preserved for their role as a large predator in the marine ecosystem. Some of these people do not think that goliath should be harvested. Some of these folks and others have concerns about the goliath distribution outside the state of Florida. Goliath are not abundant throughout their historic range, which included the Gulf of Mexico and the southern part of the Atlantic Ocean, and people feel that the population of goliath off Florida are contributing recruits to the historic range, or helping to seed these areas. However, some anglers consider goliath a nuisance species because they often remove hooked fish from their line. Even though goliath grouper can currently be targeted for catch and release, there are also people who desire to harvest a goliath grouper because of the unique nature of this opportunity.

Outline

1. Management history
2. Life history
3. Stock assessment results
4. Recent science and research needs
5. Federal and state waters management
6. Stakeholder perspectives
7. Management options
8. Proposed stakeholder meetings
9. Commission direction requested

This is an outline for the presentation.

Management History

- Managed in state waters by the FWC and federal waters by the Gulf and South Atlantic councils

During the 1980s: The popularity of targeting goliath grouper increased and species became overfished

- 1983 - South Atlantic Council prohibited spearing in federal waters
- 1985 - Florida set an 18-inch minimum size limit
- 1986 - Florida added goliath grouper to 5-fish aggregate bag limit
- 1989 - Gulf Council set 50-inch minimum size limit

1990: Harvest prohibited in Florida state waters and Gulf and South Atlantic federal waters

1994: Listed as critically endangered by the IUCN

Goliath grouper is managed in state waters by the FWC and in federal waters by the Gulf and South Atlantic councils.

Prior to 1983 there were no state or federal regulations regarding the commercial or recreational harvest of goliath grouper. Although there were historical recreational and commercial fisheries for the species, effort was limited due to the difficulty of landing the large fish. During the 1980s, the fishery expanded quickly and the species became overfished. In response to the rapid growth of this fishery, several management actions were taken. In 1983, the South Atlantic Council prohibited the spearing of goliath grouper in Atlantic federal waters. In 1985, the state of Florida implemented an 18-inch minimum size limit to protect juveniles. The next year, Florida established a five-fish grouper aggregate recreational bag limit which included goliath grouper. In 1989, the Gulf Council implemented a minimum size limit of 50 inches in federal waters in response to a decline seen in goliath grouper landings.

Ultimately, in 1990, both federal councils and the state of Florida prohibited harvest and possession of goliath grouper because of concern that the stock was more severely depleted than previously thought. Because of the depleted status of goliath grouper, the South Atlantic Council noted that, by 1990, goliath grouper had greater value for non-consumptive purposes, like ecotourism, than consumptive value. Since 1990, some other governments throughout the species' range have followed suit and prohibited harvest. In 1994, goliath grouper were listed as critically endangered on the International Union for the Conservation of Nature (IUCN), 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).

Recent Goliath Grouper History

2006: Removed from NOAA Fisheries' "species of special concern" but still considered "critically endangered" by IUCN

- Some parts of the Caribbean still allow harvest

2007: Councils requested that NOAA Fisheries work with FWC to determine how to move goliath grouper beyond the moratorium

- 2013: Joint Ad Hoc Council Goliath Grouper Committee formed to determine if data were available to conduct a new stock assessment
  - FWC agreed to take the lead on a new assessment and committee dissolved

2016: Federal assessment completed and rejected for use in management

- Councils chose to take no action on goliath grouper in federal waters

In 2006, in response to increasing goliath grouper abundance in U.S. waters, NOAA Fisheries removed goliath grouper from their Species of Special Concern list. However, the species continued to be considered "critically endangered" by the IUCN. Some parts of the Caribbean continue to allow harvest of goliath grouper.

In 2007, the councils requested NOAA Fisheries work with the FWC to determine how to move goliath grouper beyond the moratorium. In order to complete this task, in 2013, the councils formed the Joint Ad Hoc Council Goliath Grouper Committee to consider all the available data and determine if another stock assessment could be conducted. This committee included FWC staff. After multiple meetings the FWC agreed to take the lead on conducting a new stock assessment that would go through the federal Southeast Data Assessment Review (SEDAR) process. The committee also discussed possible harvest scenarios and suggested that any type of harvest strategy be a coordinated approach in state and federal waters. Following the determination that the FWC would conduct a new assessment the goliath committee was dissolved.

In 2016, the federal assessment was completed and rejected by the reviewers for use for federal management. When the councils received an update on the 2016 assessment they chose to take no action for goliath grouper in federal waters.

Background

- Decline caused by a number of factors
  - Popular fishing target
  - Long-lived
  - Declining juvenile habitats
  - Concentrations of goliath grouper occur in places where fishermen congregate
- Councils set a 50% SPR management goal
- Stock assessments conducted in 2004, 2010, and 2016
  - All assessments rejected for use in federal management

Prior to 1983, there were no regulatory measures related to the harvest and possession of goliath grouper. While there was a historical recreational and commercial fishery for the species, effort was relatively limited due to the gear requirements to land and properly prepare large and/or numerous specimens. The fishery expanded quickly and dramatically through the 1980s, which required the introduction of conservation and management measures for the species. There were a number of factors that contributed to the decline of goliath grouper, including their ability to form large aggregations. These aggregations often occurred in areas where fishermen congregated to fish. Goliath grouper was a popular fishing target and even with limited regulations they declined rapidly partly because they are a long lived species and their juvenile habitat was in decline. Juvenile goliath grouper prefer mangroves as nursery habitats and the decline in mangrove acreage on Florida's Atlantic and Gulf coasts over the last 30 years has had negative population effects.

Because of the life history of goliath grouper and its decline, the Councils both set a very high management goal of 50% Spawning Potential Ratio (SPR) for the species. For reference, in Florida, snook and redfish have a 40% management goal.

There have been three attempted stock assessments for goliath grouper in 2004, 2010, and most recently in 2016. All of these assessments were rejected by their reviewers and thus unable to be used for federal management.

Goliath Grouper Distribution and Biology

- Historically ranged from Florida to Brazil and throughout the Gulf of Mexico and Caribbean
- U.S. population may serve as source of larvae to the wider Caribbean
- Current distribution in U.S. concentrated in S. Florida
- Long-lived (37+ yrs), slow growth
- Late maturity (3-6 yrs)
- Spawning occurs in aggregations from July to Sept.
- Susceptible to large-scale mortality events like red tide and cold-weather kills

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 subtropical and tropical Atlantic Ocean, Caribbean Sea, and Gulf of Mexico all the way down to the southeast coast of Brazil. Mixing between the Gulf and Atlantic 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 and that the U.S. population may serve as a source of larvae to the wider Caribbean. In the U.S., local extirpations have resulted in a distribution being restricted to South Florida.

Goliath grouper are slow growing and long-lived. The oldest age recorded is 37 years, but they are presumed to live over 40 years. They also exhibit late maturity (3-6 years).

Goliath are sedentary and they gather predictably in large groups to spawn at specific, high relief sites in late summer months (July – September). The majority of reported landings for goliath grouper coincided with their spawning season. 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 also been suggested as a bottleneck to the recovery of goliath grouper. In addition, this species is susceptible to large-scale mortality events from red tide or cold weather kills.

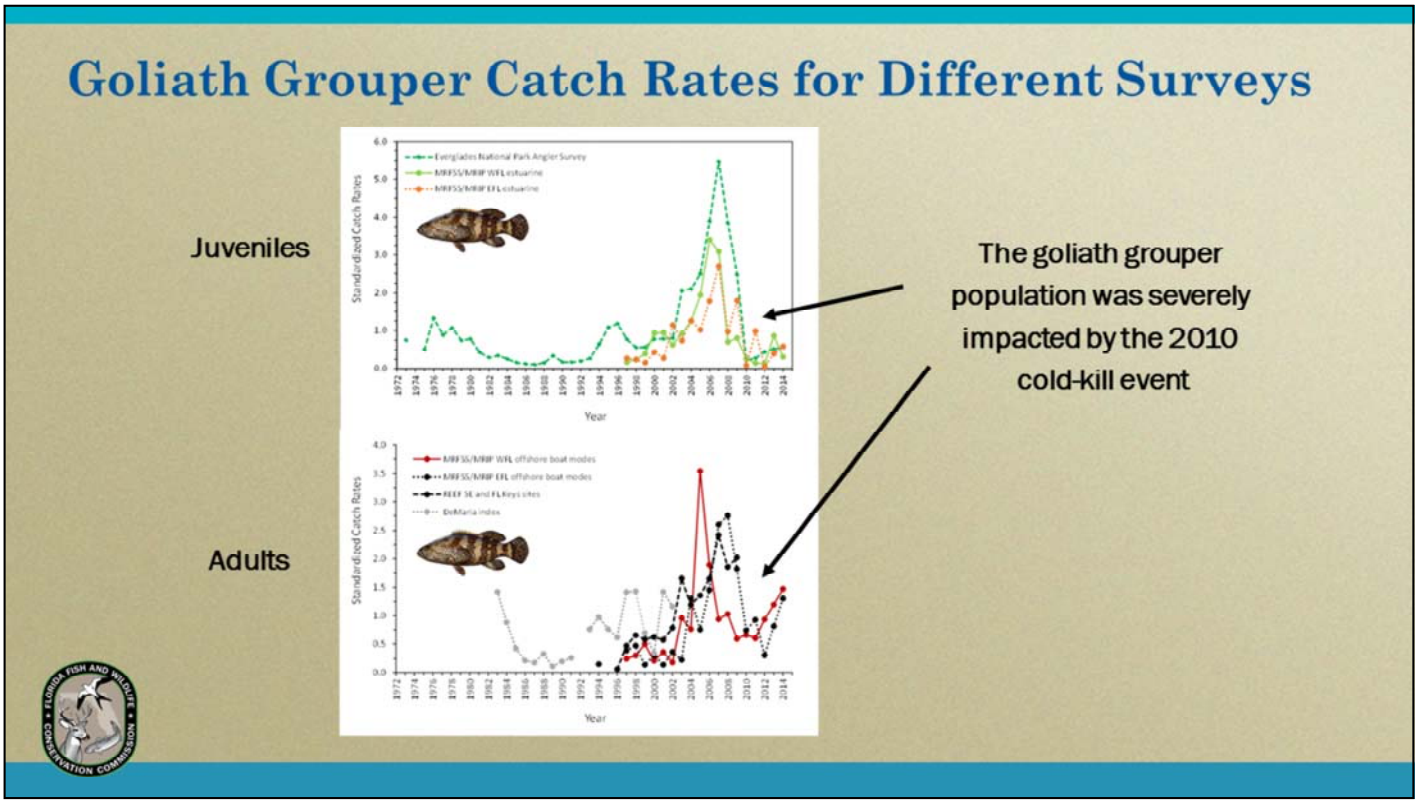
Like many marine fishes, the life history of goliath grouper is linked intimately with both inshore and offshore habitats. They aggregate to spawn offshore-spawning occurs at defined sites in the late summer months (July - Sept). Larvae spend several weeks as plankton and settle out within shallow inshore 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 1,000 mm TL.

Goliath Grouper Assessment Challenges

- Goliath grouper lacks the data typically used in standard stock assessments
- Last assessment not accepted by independent review panel
  - 20 years of no landings
  - Historical landings uncertain
  - Unknowns in life history
  - Unable to determine status of fishery
- Assessments can only provide "relative stock status"
  - Evaluate current stock relative to past abundance
  - Only option for data-poor stocks

The most recent assessment for goliath grouper was completed in late 2016. The assessment was conducted using the SEDAR process. This is a collaborative program among federal and state fishery managers and scientists. It is designed to include and evaluate all available information about a particular species, and it incorporates public participation and input. While SEDAR was designed and is primarily managed through NOAA Fisheries Service and the fishery management councils, FWC science staff at our institute have significant expertise in conducting stock assessments and using the latest modeling techniques. Consequently, FWRI often takes the lead in conducting SEDAR assessments for species centered in Florida. This was the case for the goliath grouper assessment.

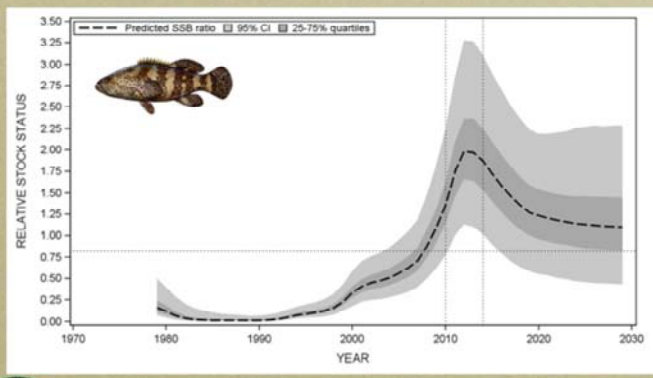
A final step in every SEDAR process is a formal review of the results by an independent panel of scientists. Unfortunately, this panel did not accept the 2016 stock assessment results. Similar to what happened in the 2010 SEDAR assessment (also led by FWC), results were not deemed suitable primarily because of missing information needed to generate an accurate "model" of the fishery.



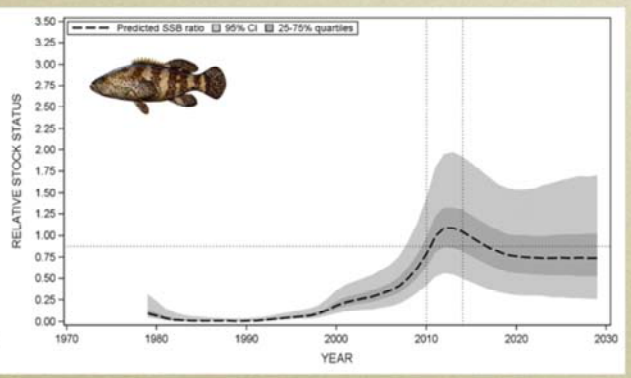
Although the 2016 assessment was not accepted for management purposes, available indices of abundance follow consistent patterns. Noticeable on these abundance graphs is the impact of the 2010 cold-kill event on the goliath grouper population, especially juveniles in shallower, inshore habitats more susceptible to be influenced by abrupt changes in water temperature.

Uncertain Maximum Age Contributes to Uncertainty in Stock Status

Stock status for an assumed maximum age of 37 years



Stock status for an assumed maximum age of 56 years



This graph shows the spawning stock biomass ratio (annual biomass relative to biomass at 50% spawning potential ratio) of goliath grouper for the period 1950-2025 as estimated by the stock assessment model (values beyond 2014 represent model projections). Results indicate that goliath grouper abundance has greatly increased since the fishery was closed in 1990 and suggest the stock could be already recovered (although results are highly uncertain).

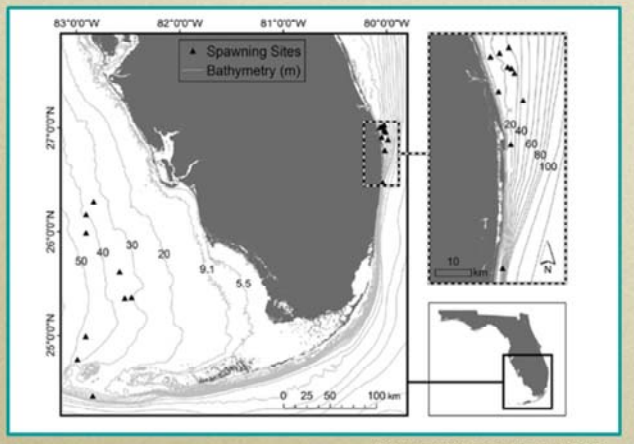
Goliath Grouper Assessment Summary

- Data gaps prevent the use of standard assessment methods
- Relative assessments require more assumptions
- Available indices of abundance follow similar patterns
- Harvest closure has increased abundance and stock is likely to be recovered in Florida but not throughout their range
- Review panel rejected the assessment, preventing its use in federal management

It is not clear that the stock has recovered across a meaningful proportion of its former U.S. range. Also, based on the uncertainly in the stock assessment model inputs the Science and Statistical Committee (SSC) was unable to make conclusions about the current status of goliath grouper relative to the proposed management benchmark (SPR50%).

Recent Goliath Grouper Spawning Research

- Confirmed spawning aggregation sites identified in south Florida
- SE Florida sites attract fish from long distances (e.g., south GA)
- Indications that goliath grouper might be hermaphroditic
- Fin ray-based aging indicates fish at these sites ≤ 20 years old



Source: Koenig et al. 2016

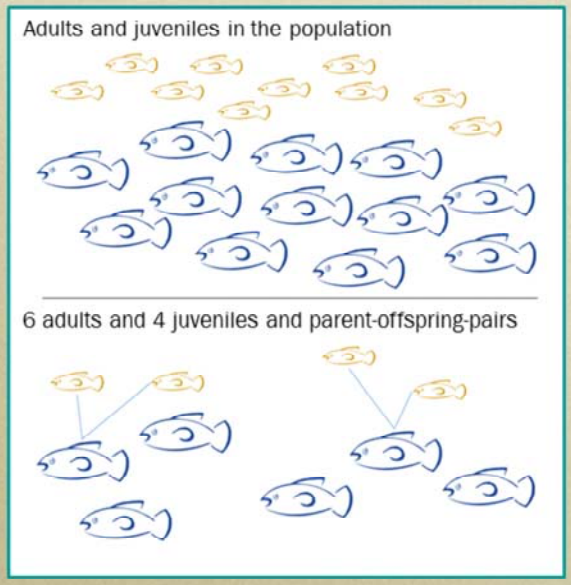
Recent research conducted by a group of Florida scientists has shed some light into their life history and biology. Goliath grouper spawning sites have been identified off the southeastern and southwestern coasts of Florida. Spawning habitats consisted of relatively high-relief rocky reefs and artificial reefs (including wrecks and towers) in water depths of 15–50 m. Researchers found no spawning sites on or near coral reefs along the Florida Keys reef tract, an area in which the abundance of goliath grouper seems to be relatively low.

Microscopic evaluation of goliath grouper ovaries showed some evidence that they are sequential hermaphrodites (i.e., they are born as females and switch to being males later in life). Further research is needed to confirm these preliminary results.

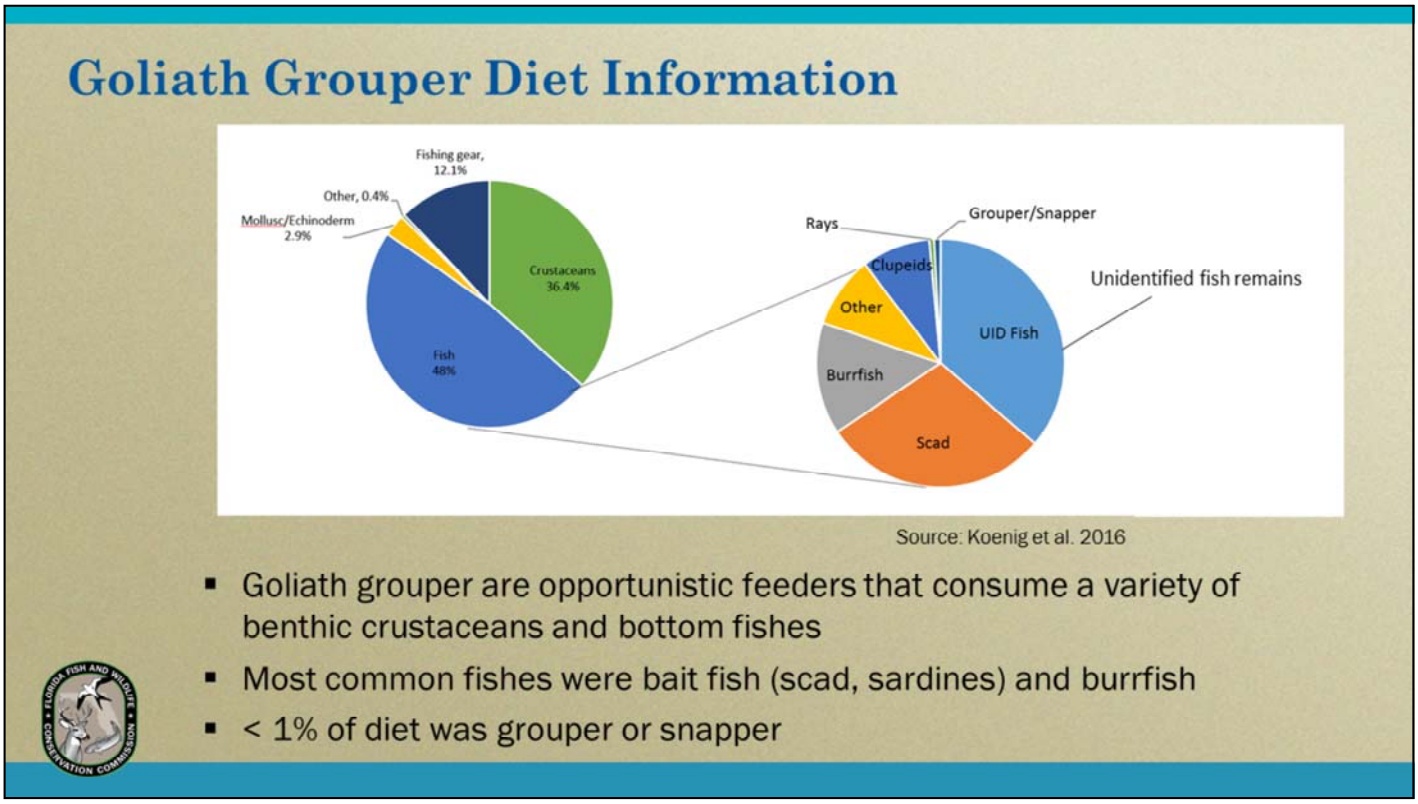
Age determination of goliath grouper in spawning aggregation sites have been based on sectioned fin rays (to avoid sacrificing spawning individuals). Results from this analysis indicates that goliath grouper at spawning aggregation sites are between 4 and 20 years of age.

Potential Use of Genetic Analysis for Population Abundance

- A group of Florida researchers is exploring the use of a novel, non-lethal genetic method to estimate goliath grouper population abundance
- The technique is called 'Close-Kin' analysis
- It uses the proportion of Parent-Offspring-Pairs (POP's) to estimate the number of adults in the population



FWC-FWRI is working with a group of Florida researchers to evaluate the potential use of a non-lethal genetic technique for estimating goliath grouper population abundance. The technique, called Close-Kin analysis, is a novel approach to ecological assessment in circumstances that are not amenable to traditional fishery stock assessments. Close-kin analysis estimates spawning stock abundance through genetic kinship analysis, coupled with statistical demographic modeling. Simply put, genetic analysis determines if Parent-Offspring-Pairs (POPs) are present among tissue samples.

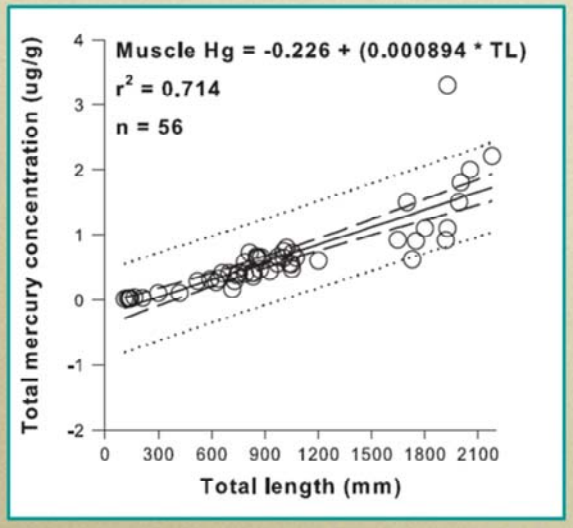


Results of a comprehensive diet study show that goliath grouper are opportunistic predators, but consume primarily prey at lower trophic levels. Benthic invertebrates, mostly crab species (but also lobster in the Florida Keys), make up a majority of the goliath grouper diet. Scad, also common in their diet, are a small shoaling species of jack that often occur near the sea floor near immobile reef structure or surrounding goliath grouper, likely for protection. It is probable that some individuals are ingested accidently through feeding events on other targeted prey; but many stomach samples included only scad, thus indicating that they also target this small prey. Snappers and groupers represent less than 1% of their diet.

A significant portion of goliath grouper stomach contents were composed of fish remains already too digested to allow identification of what type of fish they were (unidentified fish remains = IUD).

Mercury Levels in Goliath Grouper

- Mercury concentrations within the range known to cause direct health effects
- Mercury concentrations higher in larger goliath grouper (fish greater than 4 feet)



Source: Adams and Sonne 2013

The life history patterns of goliath grouper may make this species especially prone to exposure to contaminants and may exacerbate bioaccumulation of toxic substances, including mercury, which has documented detrimental health effects. Mercury concentrations observed in goliath grouper from Florida waters were within the range known to cause direct health effects. Mercury concentrations were particularly high in larger goliath grouper (fish greater than 4 feet).

Economic Study on Dive Value

2016 study done by Univ. of Miami on recreational diver willingness to pay for goliath grouper encounters:

- Recreational divers are willing to pay around $100 for one goliath grouper sighting
- Diver willingness to pay for goliath grouper spawning aggregation sites is almost $200
- There is high consumer surplus for divers targeting goliath grouper aggregations
- This consumer surplus would diminish with decreases in abundance of goliath grouper

A recent economic study conducted by the University of Miami evaluated how much recreational divers were willing to pay for goliath grouper encounters. A previous study estimated that resident anglers in Florida who wanted the fishery open were willing to pay between $34 and $79 to harvest a goliath grouper. Using a survey instrument with choice experiments, the recent University of Miami study estimated that divers off eastern Florida would be willing to pay approximately $103 for a dive trip with one goliath grouper encounter during the months of their spawning aggregation (August–October), and $202 if there are 40 Goliath Grouper (such as is common on a many spawning aggregation sites). Results suggested that divers coming from outside of Florida were willing to pay higher rates for dive trips with Goliath Grouper encounters; and at spawning aggregations sites, willingness to pay was estimated around $336 for these non-Florida divers.

Although we still have significant knowledge gaps on the biology and life history of Goliath Grouper, in terms of collecting data that would allow completion of a valid stock assessment the most important research needs are:

1) Additional information on the abundance of goliath grouper over a broader geographic area. Even when we look at stock abundance in Florida waters, most of the data come from south Florida and thus do not reflect the stock's expected distributional range. The group of independent experts who reviewed the most recent stock assessment pointed out this is perhaps the key missing piece for a valid stock assessment.

2) Information on stock productivity, i.e., what is the stock's capacity to have successful reproductive events and what proportion of the juveniles produced are likely to survive and reach sexual maturity? This type of information is usually obtained by looking at the magnitude of fishery landings over time (i.e., how many juveniles had to be produced and survive to generate the level of fishery landings observed?). Since goliath grouper have not had directed fisheries for 26 years, landings information is not available to stock assessment scientists.

Additional information on the current age composition of the stock (i.e., how far have they come after a 26 year fishery closure?), and more conclusive information on their reproductive biology are also important. However, the fact that the fishery has been closed for so long requires stock assessment scientists to use a more simplified assessment model (called a Catch-Free model) not capable of integrating more specific life history information such as age, growth, and reproduction.

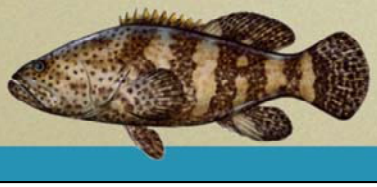
Federal and State Waters Management

Council/Federal Waters

- The Acceptable Biological Catch (ABC) is zero
  - Includes state and federal waters
- Councils have no immediate plans to consider a harvest strategy for federal waters
- Unlikely to change without an accepted stock assessment

State Waters

- FWC can allow harvest in state waters



Although the stock may be recovered in Florida, the Gulf and South Atlantic Councils cannot allow any harvest without a conclusive stock assessment. The Council's Science and Statistical Committees must be able to set an Acceptable Biological Catch (ABC) for the Councils to consider any harvest. The ABC could be set after a conclusive assessment is completed. At this time the ABC for goliath grouper is set at zero for state and federal waters.

When both the Gulf and South Atlantic Councils received the results of the goliath assessment in late 2016, neither Council showed any interest in considering a harvest strategy for federal waters at this time.

In discussions about whether FWC could allow harvest of goliath grouper in state waters FWC attorneys believe that harvest in state waters can be considered by the agency.

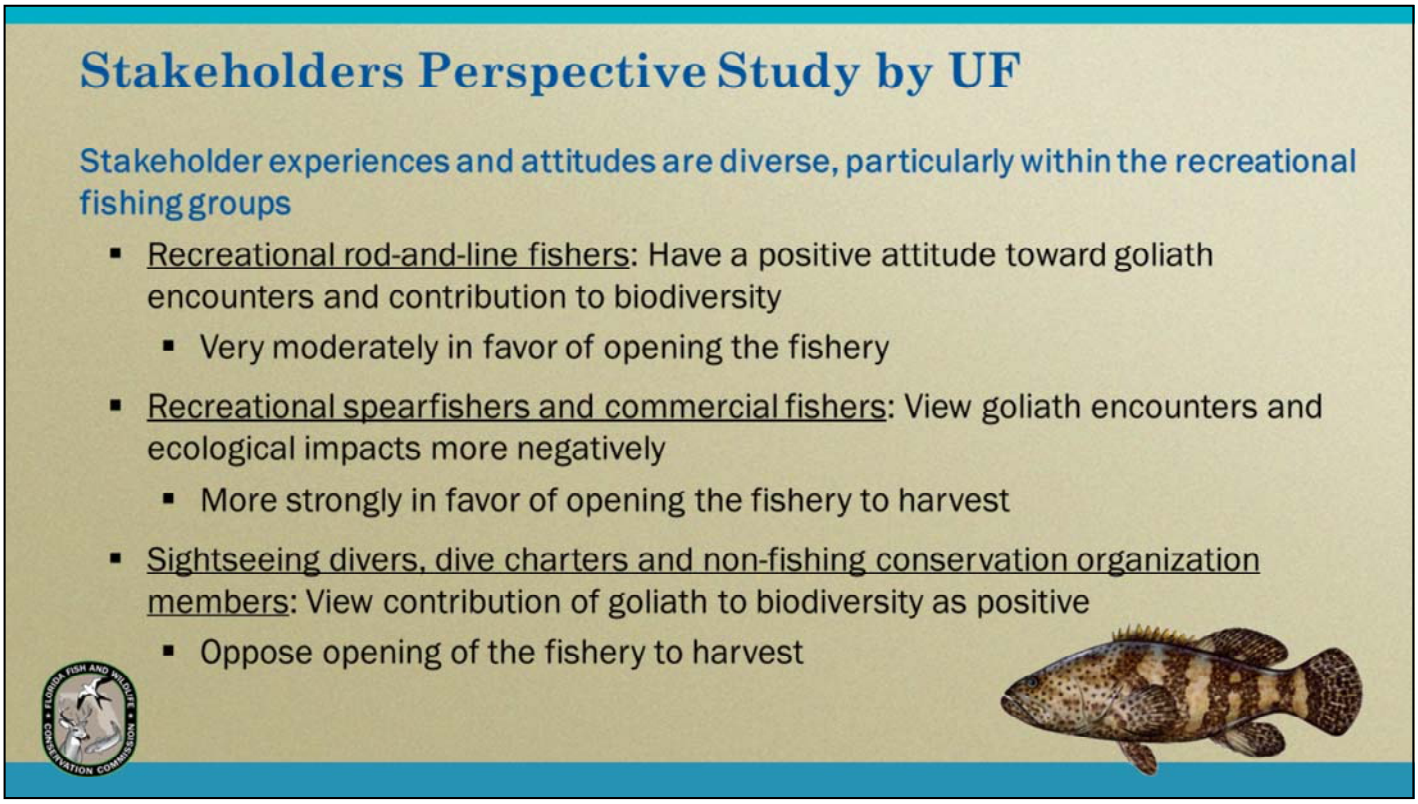
Stakeholder Perspectives

Management philosophies for goliath grouper are highly divergent

- Preserve for ecotourism
- Role in the ecosystem
- Concerns about the distribution outside of Florida
- Considered a nuisance species by some
- Desire for limited harvest

Over there past several years there have been a number of ideas from stakeholder about how to move forward regarding the management of goliath grouper. These ideas have been heard at Commission meetings as well as state and federal workshops on various topics. These ideas include keeping goliath grouper status quo, which would be no harvest, but a robust catch and release only fishery with many dive viewing opportunities.

The management philosophies of goliath grouper are highly divergent. There are many people, especially members of the dive community that want to preserve goliath for ecotourism purposes. There are dive charter businesses that take people to dive with goliath grouper. Goliath are sedentary and tolerate divers in close proximity even while in spawning aggregations. There are others who think that goliath should be preserved for their role as a large predator in the marine ecosystem. Some of these people do not think that goliath should be harvested. Some of these folks and others have concerns about the goliath distribution outside the state of Florida. Goliath are not abundant throughout their historic range, which included the Gulf of Mexico and the southern part of the Atlantic Ocean, and people feel that the population of goliath off Florida are contributing recruits to the historic range, or helping to seed these areas. However, some anglers consider goliath a nuisance species because they often remove hooked fish from their line. Even though goliath grouper can currently be targeted for catch and release, there are also people who desire to harvest a goliath grouper because of the unique nature of this opportunity.



Scientific uncertainty is only one aspect of the goliath grouper management controversy. FWC has teamed up with University of Florida and Florida Sea Grant to better understand and manage the stakeholder conflict surrounding goliath grouper. This project had two parts, an in-depth stakeholder survey and a focused stakeholder workshop. The internet-based survey was aimed at capturing the diversity of stakeholders' views and experiences regarding goliath grouper and its management. The stakeholder workshop included invited participants representing a diversity of stakeholder interests and was aimed at developing a shared understanding of management issues and options.

There were 5,882 responses received from the online survey and the responses represented all major stakeholder groups:

Stakeholder experiences and attitudes are diverse, particularly within the recreational fishing groups

- Recreational rod-and-line fishers: Have a positive attitude toward goliath encounters and contribution to biodiversity. Very moderately in favor of opening the fishery.
- Recreational spear fishers and commercial fishers: View goliath encounters and ecological impacts more negatively. More strongly in favor of opening the fishery to harvest
- Sightseeing divers, dive charters and non-fishing conservation organization members: View contribution of goliath to biodiversity as positive. Oppose opening of the fishery to harvest

Those who view the ecological impacts of goliath as negative nonetheless rank the importance of those impacts as low relative to other impacts (coastal development, etc.)

Additional Stakeholder experiences and attitudes

- Charter operators view goliath impacts as predominantly neutral (fishing charters) or positive (dive charters)
- Fishing charters expect a positive, dive charters a negative business impact from re-opening the fishery
- Stakeholders have developed a range of measures to reduce incidental catch of goliath or depredation on hooked or speared fish, which could be assessed and summarized in best practice guidelines
- A stakeholder workshop demonstrated the potential for achieving greater shared understanding of issues and options among stakeholders
- The workshop also highlighted concerns over the practicality of controlling a possible, very limited harvest

Two Management Options

1) Status quo

2) Limited harvest

There are basically two management options available for goliath, either keeping the status quo or allowing a limited harvest.

Status Quo

- Catch-and-release fishing allowed
- No harvest
- Maximize dive viewing opportunities
- Manage for high numbers of large fish
- Optimize ecosystem values

No harvest of goliath grouper is permitted at this time. However under the current structure, a widespread and popular catch-and-release-only fishery has developed for goliath grouper. Continuation of current regulations would allow that type of sport fishery to continue as well as the dive viewing business. Thus, FWC would be managing for high numbers of large fish for both the catch-and-release fishery as well as the dive industry and optimizing the ecosystem values of goliath.

Research Needs Accomplished

- *Research needs that can/will be achieved by keeping status quo*
- ✓ Information on abundance and distribution (via fisher reports through a smartphone app and collection of fin clips)
- ✓ Information on range expansion

- FWC is developing a smartphone/tablet app to facilitate collection of geo-referenced information on goliath grouper numbers and sizes by Florida fishers and divers

If the Commission chooses to keep the status quo (i.e., keep the current no-harvest status) information on the distribution, abundance, and range expansion of goliath grouper can still be obtained through fisher and diver reports, and the non-lethal collection of fin clips for genetic analyses.

Since one of the most useful pieces of information would be information on distribution and abundance, FWC is developing a smartphone/tablet app to facilitate collection of geo-referenced information on goliath grouper numbers and sizes by Florida fishers and divers. People practicing catch and release as well as those who dive could provide information about the goliath they see via this app.

Limited Harvest

- Provide harvest opportunities
- Not expected to impact stock sustainability
- Minimal impacts to dive community

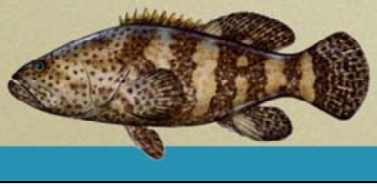
Goal: Providing harvest opportunities on a recovering species without impacting the rate of recovery

The other option for goliath grouper management is to allow a limited harvest. The goal would be to provide harvest opportunities on a recovering species without impacting the rate of recovery. This small harvest is not expected to impact stock sustainability and should only have minimal impacts to the dive community.

Research Needs Accomplished

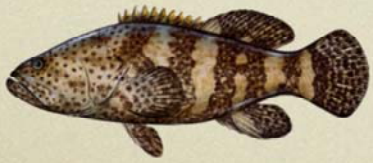
- *Research needs that could be achieved by having a limited harvest*
- ✓ Information on abundance and distribution (via fisher reports through app from fish harvested or observed)
- ✓ Information on ages
- ✓ Additional information on reproductive biology

- FWC is developing a smartphone/tablet app to facilitate collection of geo-referenced information on goliath grouper numbers and sizes by Florida fishers and divers



If the Commission chooses to consider a limited harvest, information on the distribution, abundance, and range expansion of goliath grouper can be obtained through fisher and diver reports, the non-lethal collection of fin clips for genetic analyses, as well as the collection of tissue samples from harvested fish for studies on age, growth, and reproductive biology.

Limited Harvest Opportunity Considerations



- State waters
- Could have random draw to choose participants
- If chosen, a fee could be charged
  - Fee could be up to $300
  - Money from tag could be used for goliath research
  - Could require participants to purchase recreational fishing license
- Recreational harvest tag could be issued
  - Could allow harvest of one fish per tag per person per year
  - 100 tags could be issued annually for 4 years via random drawing
  - Tags could be issued to recreational fishermen who could choose to hire guide
- Participants could be asked to "hail in" when they have a goliath

If a limited harvest opportunity is considered, staff has some suggested sideboards. The harvest should be in state waters only as the FWC does not have the authority to allow harvest in federal waters. Staff suggests that interested anglers could apply and then could be chosen via a random draw. Once selected, a fee could be charged per 379.354(8)(f) F.S. This fee could be up to $300 and the money from this opportunity could be used for goliath research. The Commission could also require people to have a recreational fishing license to participate in this opportunity.

A successful draw could qualify a single angler for a single tag. An angler could only be allowed to take one goliath a year with this tag. Staff suggests that 100 tags could be issued annually for 4 years. This random draw could be split into a certain number of tags available for each coast. Staff suggests that tags could be issued to the angler, who could then choose to hire a guide if they desired. Participants could be required to "hail in" to LE and/or FWRI when they had a harvested goliath on board their boat.

Limited Harvest Opportunity Considerations (cont.)

- Suggest allowable gear: hook-and-line only
- Suggest slot limit: 47 inches to 67 inches
- Suggest open areas that do not encompass spawning aggregations
- Suggest harvest not allowed during spawning months (July – September)
- Suggest no commercial harvest or sale
- Scientific sampling could occur either at check points or via cooler drop offs
- People could use app to report harvest locations as well as non-consumptive divers and anglers can use to report sightings

Specifically, staff is suggesting only harvesting goliath using hook-and-line gear and only taking fish within a narrow slot limit of 47 to 67 inches. It is suggested that fish not be taken from spawning aggregation areas and that harvest not be allowed during the spawning months of July – September. It is suggested that no commercial harvest or sale be allowed of the harvested fish. Fish could be scientifically sampled by yet to be determined methods, but it could include being met by a FWRI researcher or dropping off the carcass at a specified location to be placed in a cooler.

Whether people are practicing catch and release of goliath, viewing goliath underwater, or harvesting goliath, they will all be able to report the location of the fish sightings and harvest via the app that will be developed by FWRI. This will give researchers much needed distribution and abundance information.

Proposed Stakeholder Meetings

- If Commission would like to consider limited harvest, then staff suggests stakeholder meetings and outreach to obtain feedback on this topic

If the Commission chooses to consider limited harvest then staff suggests stakeholder meetings and other public comment gathering opportunities over the coming months to obtain feedback on this topic. This plan would include in-person public workshops along with other types of input gathering.

Proposed Timeline if Considering Limited Harvest

- Today: Review and discussion
- Now – August 2017: Stakeholder meetings and public input gathering
- July 2017 Commission meeting: Update on stakeholder input

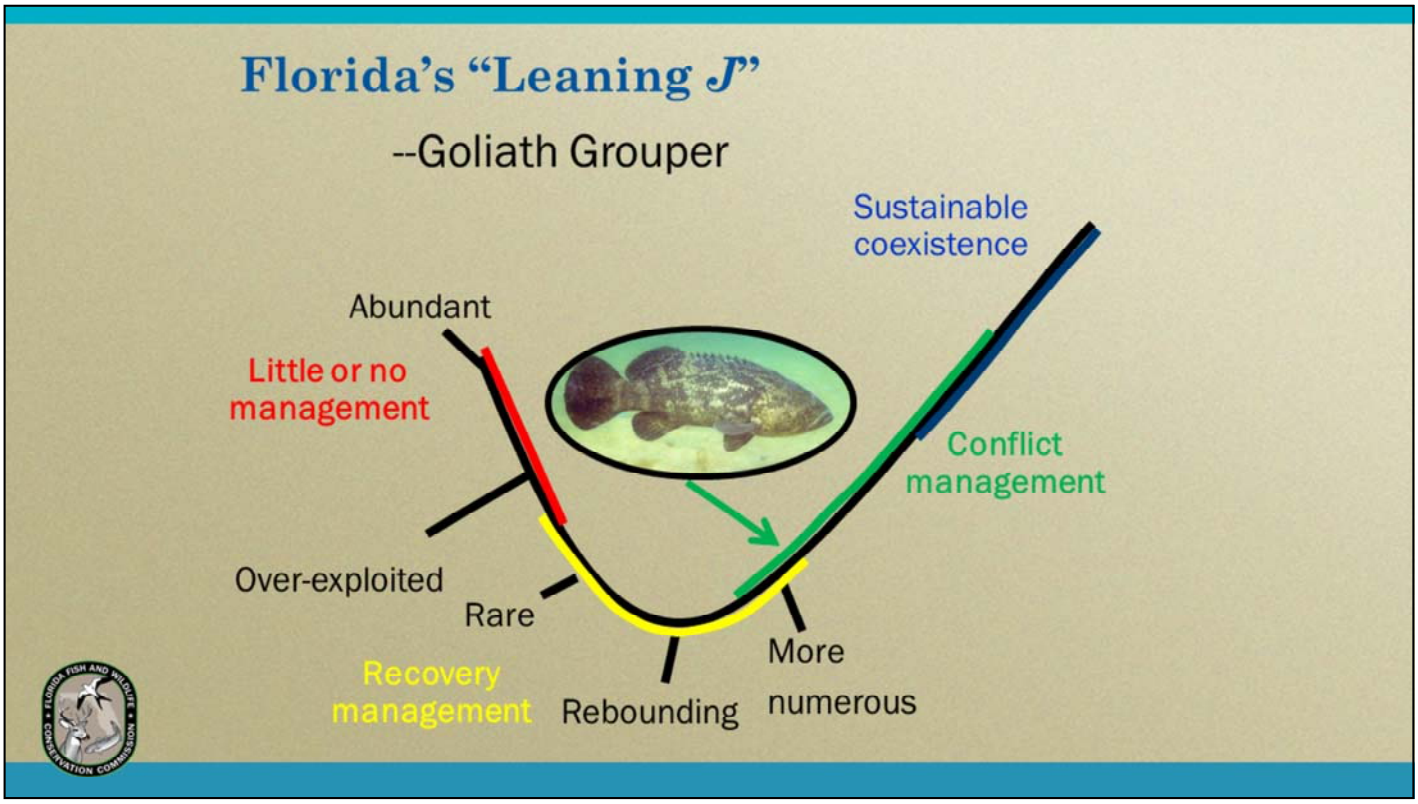
If the Commission would like to consider a limited harvest for goliath grouper in state waters staff has a proposed timeline for further action. Staff would like to conduct stakeholder meetings and gather public input in the coming months and give an update on this input at the July 2017 Commission meeting in Orlando.

Commission Direction Requested

- Staff looking for direction on whether or not to consider limited harvest opportunities for goliath grouper in state waters
  - If directed, staff will proceed with gathering feedback from stakeholders

Staff is seeking direction on how to proceed with goliath grouper management in state waters.

The following slides are considered backup material and are not anticipated to be part of the actual presentation



All bear management elements discussed today fit into the larger context of an evolving bear conservation situation and how to move further into sustainable coexistence for both bears and people.