

# Stakeholder Perspectives on Goliath Grouper Management: Overview Report



Photo: Bryan Fluech

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## Executive summary

The perspectives of diverse stakeholders on the goliath grouper and its management were investigated using an online survey of 5882 respondents and a facilitated workshop with 16 stakeholder representatives.

### Survey results

- Goliath grouper were commonly encountered but rarely targeted by commercial and recreational reef fishers around the Florida coast, and by recreational inshore fishers in south Florida. Goliath grouper were also commonly encountered and often deliberately sought out by recreational divers.
- A high proportion (39-43%) of commercial reef fishers considered goliath encounters undesirable, with another 32-33% considering them neutral. By contrast, about 50% of recreational fishers considered goliath encounters desirable with 35% of hook and line and 26% of recreational spear fishers considering them neutral. A large majority (87%) of recreational divers considered goliath encounters desirable.
- Many commercial reef and recreational spear fishers have modified their locations choice and fishing practices to minimize interactions with goliath. A majority of commercial (87%) and recreational (56%) spear fishers are taking such measures and a majority of those are finding the measures effective. Only 43% of commercial bandit gear fishermen are taking such measures only a minority of those (38%) are finding the measures effective.
- Fishing charter operators viewed the present goliath situation as mostly neutral with respect to their business, but expected positive business impacts from a possible opening of the fishery for harvest. Dive charter operators viewed the present situation as beneficial to their business and a large majority expected any opening of the fishery to harvest to have a negative impact on their business.
- All stakeholder groups considered ecological connotations of the present goliath grouper situation paramount to their management preferences but differed strongly in their perceptions as to the nature of these connotations. Commercial reef and recreational spear fishers perceived negative impacts of goliath on biodiversity more strongly than a positive contribution, while recreational hook and line fishers and sightseeing divers perceived primarily a positive contribution of goliath to biodiversity.
- Commercial and recreational fishing stakeholders (including spear fishers) on average disagreed with the present closure and agreed mostly with opening a strictly regulated fishery. Sightseeing diving (non-spearfishing) stakeholders and members of conservation organizations on average strongly agreed with the present closure and strongly disagreed with opening the fishery to harvest. A limited take for research, while not preferred by any group, was viewed neutrally by all groups and therefore was the least controversial option.

## **Workshop results**

- The workshop provided further, in-depth consideration of stakeholder perspectives.
- Participants noted that the situation was often misunderstood and universally advocated more education and communication.
- Workshop participants considered continued closure of the fishery and a limited take for research by scientists or cooperatively with fishers as possible options in the current situation where no accepted scientific (stock) assessment is available. Overall participants were more supportive of continued closure but felt that they could agree to a limited take for research if a solid scientific case for such a take was made. Consideration of the scientific case for a limited take is beyond the scope of this project, which focused on the assessment of stakeholder perspectives.

## **Recommendations**

- Further consideration of the future management of the goliath grouper fishery may benefit from more in-depth consideration of the differentiated and nuanced stakeholder perspectives detailed in this report, in conjunction with scientific assessments of population status and ecological interactions of goliath.
- Continued dialogue among stakeholder groups and participatory research may help in defining and measuring a shared set of indicators for population status and ecological effects.

## Introduction

This report summarizes the preliminary findings of a research project aimed at providing diverse stakeholders with opportunities to share their views and experiences regarding goliath grouper and its management, and to facilitate the development of a shared understanding of management issues and options. Stakeholders included people who interacted directly with goliath (fishers and divers), businesses serving the former (fishing and dive charter operators, dive shops, tackle shops etc.), and others with an interest in goliath (conservationists, scientists, etc.). The perspectives of stakeholders were investigated using an online survey and a facilitated workshop of stakeholder representatives.

## Survey

### Methodology

An internet-based survey was conducted to assess the perspectives of individual stakeholders from diverse groups. The survey allowed respondents to self-identify their stakeholder group(s) and then assessed their level and nature of personal or commercial interactions with goliath, any measures taken to avoid or enhance such interactions, perspectives on goliath biology and ecological interactions, and preferences for alternative management options.

Respondents were approached through two different pathways to ensure representation of diverse stakeholder groups. Representative samples of Florida fishing stakeholders were contacted by email and invited to complete the survey (Dillman et al. 2009). These samples were generated by random (for recreational fishers) or complete (for commercial fishers and fishing charter operators) sampling of Florida fishing license holders who had registered their email addresses at the time of license application. The populations, samples and responses for the different fishing stakeholder groups were: recreational fishing license holders with registered email addresses (population: 346,239; sample 40,000; responses: 3130; response rate: 8%); commercial fishing license holders with registered email addresses (population and sample: 3588; responses: 731; response rate 21%); charter fishing license holders with registered email addresses (population and sample: 781; responses: 196; response rate 25%). Since other stakeholders may not have fishing licenses, e-mail lists, websites, forums, and personal contacts were used to alert and invite stakeholders from the recreational dive community (dive shops and their customer contacts, dive clubs, PADI Facebook page); marine conservation organizations not primarily focusing on fishing (Ocean Conservancy Florida members email list); recreational fishing organizations (Coastal Conservation Association, Fishing Rights Alliance), the Florida Sea Grant network of contacts, and the project and FWC websites. A total of 1824 responses were received via notification through email lists, websites and forums. Of these responses, 850 were received via a survey link sent to and forwarded within the recreational dive community, 328 via a link circulated through the Florida Sea Grant network, and 137 via a link circulated to conservation organizations. The nature of this data collection process makes it impossible to report response rates.

The survey was open from May 3<sup>rd</sup> to June 10<sup>th</sup>, 2013. During this period, 5882 responses were received, with representation of all major stakeholder groups (Table 1, 2).

## Results

### Frequency and nature of encounters with goliath

Many respondents reported encounters with goliath over the past 12 months (Table 1). Commercial reef fishers reported the highest level of encounters with goliath (75% of bandit gear and 90% of spear fishers), followed by recreational spear fishers (56%). Of hook and line saltwater recreational fishers, an overall average of 20% reported having caught at least one goliath in the past 12 months.

**Table 1. Goliath encounters, practices and attitudes among stakeholders interacting directly with the species through fishing or diving. See footnotes for details of selected stakeholder categories. (LS = average Likert score on scale from 1 to 5 with 3 being neutral).**

	Commercial fishers			Recreational fishers			Sightseeing divers <sup>(e)</sup>
	All	Bandit gear <sup>(a)</sup>	Spear fishers <sup>(b)</sup>	All	Hook & line <sup>(c)</sup>	Spear Fishers <sup>(d)</sup>	(Non-fishing)
Respondents (n)	697	117	146	3005	1518	574	352
Encountered goliath in the past 12 months (%)	61	75	90	25	20	59	inshore 20 reef 50
Targeted goliath for:							
Catch & release fishing (%)				12	11		
Diving/viewing (%)			18			16	54
Take measures to avoid goliath interaction (%)	42	43	87	21	15	56	(not asked)
Judge measures effective (%)	52	38	59	60	68	64	(not asked)
Interested in harvesting (%)	68	82	80	78	72	81	(not asked)
View goliath encounters as:							
Desirable (%)	32	28	25	<b>52</b>	<b>50</b>	<b>49</b>	<b>87</b>
Neutral (%)	33	33	32	32	35	26	6
Undesirable (%)	<b>35</b>	<b>39</b>	<b>43</b>	16	15	25	7
View goliath as a nuisance species (%)	42	61	57	20	14	37	9
Perceive negative impact of goliath on biodiversity (%)	49	59	68	27	19	51	13
Goliath and biodiversity:							
Contributes positively (LS)	2.96	2.75	2.75	<b>3.49</b>	<b>3.59</b>	3.08	<b>4.21</b>
Impacts negatively (LS)	<b>3.36</b>	<b>3.54</b>	<b>3.78</b>	2.83	2.67	<b>3.38</b>	1.95
Reasons for participation in decision making:							
Impacts own livelihood (LS)	3.26	3.63	3.69	2.33	2.23	2.53	2.47
Impacts ecosystem (LS)	<b>3.91</b>	<b>4.06</b>	<b>4.22</b>	<b>3.74</b>	<b>3.60</b>	<b>3.99</b>	<b>4.44</b>

<sup>(a)</sup> Active commercial bandit gear fishers; <sup>(b)</sup> active commercial spear fishers; <sup>(c)</sup> active saltwater recreational hook and line fishers who do not spearfish; <sup>(d)</sup> active recreational spear fishers; <sup>(e)</sup> active recreational divers who do not spearfish responding to survey links circulated among the dive community and Sea Grant networks.

However, goliath catches were reported by about 40% of both inshore and reef anglers in southwest Florida and the Keys, compared to about 20% in southeast Florida. In North Florida, some 20-25% of reef anglers reported catches of goliath but few inshore anglers did.

Between 20% (inshore) and 50% (on reefs) of sightseeing divers (recreational divers who do not spearfish) reported seeing at least one goliath over the past 12 months. About half (54%) of sightseeing divers reported having undertaken dives specifically to see goliath, in contrast to fishing stakeholders whose encounters with goliath were predominantly incidental (with only 11% of recreational anglers specifically targeting them).

### **Perceived desirability and impact of encounters**

A high proportion but not a majority of commercial fishers (37% overall, 39% of bandit gear and 43% of spear fishers) considered goliath encounters undesirable (with the remainder being mostly neutral). Impacts of encounters on bandit gear fishers included (in rank order): time spent releasing goliath, damaged or lost gear and damaged or lost catch. Impacts of encounters on spear fishers included damaged or lost catch and damaged or lost gear. It is also clear from the measures reportedly taken to avoid interactions with goliath (see below) that many commercial fishers have had to adapt the way they fish in order to 'live with the goliath'.

A high proportion of recreational saltwater fishers (around 50%) found goliath encounters desirable, with only 15% hook and line and 25% spear fishers considering goliath encounters undesirable. Among saltwater recreational hook and line fishers who had caught at least one goliath in the past 12 months, the proportion finding encounters undesirable was moderately higher at 25%.

Sightseeing divers had overwhelmingly positive views of goliath, with only 7% perceiving encounters as undesirable, 9% viewing the species as nuisance and 13% perceiving a negative impact on biodiversity.

### **Measures taken by fishers to avoid encounters or minimize their impacts**

A majority of commercial and recreational spear fishers (87% and 56% respectively) reported taking measures to reduce goliath interactions and their impacts, including: avoiding goliath, scaring them, nudging them with their spear gun, bagging and protecting their catch, and sending their catch to the boat quickly. These measures were seen as effective by a majority (59%-64%) of those using them. Of commercial bandit gear fishers, only 43% took measures to avoid incidental catches of goliath or the taking of catch from their line by goliath. These measures focused on avoidance of locations where goliath were abundant but also included technical strategies such as using a leader that breaks when large fish are hooked or take hooked catches. Only 38% of bandit gear fishers taking such measures found them effective and many stated that 'there is nothing you can do.' Only 15% of recreational rod and line fishers attempted to avoid incidental catches of goliath or the taking of catch from their line. These measures focused on avoiding locations where goliath are abundant and reeling in the catch as fast as possible (68% of those using them found these measures effective).

### **Interest in harvesting goliath among fishing stakeholders**

A large majority of fishing stakeholders (68-82 % of different groups) expressed an interest in harvesting goliath, far more than are currently targeting the species (11% of recreational anglers) or considering it a



nuisance (14-60% of different stakeholder groups). This suggests that most fishers would like to have the option of taking a goliath when encountered even though few presently target the species. It is not known how the proportions of fishers targeting goliath would be affected if the fishery was opened to harvest.

### Impacts of goliath on marine businesses

Impacts of the current goliath situation on fishing charter businesses were seen as predominantly neutral (56%), with the remainder about equally split between negative (24%) and positive (19%). Those seeing impacts as negative emphasized perceived negative impacts of goliath on the reef ecosystem and negative impacts on equipment, followed by decreased customer satisfaction. Those seeing impact as positive emphasized customer interest in the species and increased customer satisfaction. Only 17-23% of those stating a negative or positive impact of goliath on their fishing charter business perceived that it had impacted on their revenue.

Dive charter businesses saw impact of the goliath situation as predominantly positive (75%), with only 8% perceiving a negative impact. Positive impacts were associated with customer interest in the species and increased customer satisfaction (Table 2). About 60% of dive charter operators reported that goliath had positively impacted the amount of customers and their customer revenue.

If harvest of goliath were allowed, 56% of fishing charter operators expect a positive impact on their business with the remainder expecting mostly a neutral impact (35%). By contrast, 82% of dive charter operators expect a negative impact.

**Table 2: Perceptions of fishing and dive charter operators regarding impacts of the present goliath grouper situation, and a possible opening of the fishery to harvest on their business. (LS = average Likert score on scale from 1 to 5 with 3 being neutral).**

	Fishing charters	Dive charters
<b>Respondents (n)</b>	191	116
<b>Perceive present business impact of goliath as:</b>		
Positive (%)	19	<b>75</b>
Neutral (%)	<b>56</b>	17
Negative (%)	24	8
<b>Expect business impact of allowing harvest to be:</b>		
Positive (%)	<b>56</b>	10
Neutral (%)	36	8
Negative (%)	8	<b>82</b>
<b>View goliath as a nuisance species (%)</b>	42	5
<b>Perceive negative impact of goliath on biodiversity (%)</b>	51	10
<b>Goliath and biodiversity:</b>		
Contributes positively (LS)	3.05	<b>4.45</b>
Impacts negatively (LS)	<b>3.40</b>	1.63
<b>Reasons for participation in decision making:</b>		
Impacts own livelihood (LS)	3.21	4.05
Impacts ecosystem (LS)	<b>4.09</b>	<b>4.66</b>

### **Perceptions of goliath impacts on marine ecosystems**

Over half (49-68%) of commercial bandit gear and spear fishers, recreational spear fishers and charter fishing operators perceived impacts of goliath grouper on reef biodiversity to be negative. By contrast, only 19% of recreational saltwater hook and line fishers, 13% of sightseeing divers, and 10% of dive charter operators perceived negative ecological impacts of goliath. The latter groups felt more strongly that goliath contributed positively to biodiversity than that it impacted negatively, while the reverse was true for the former groups.

It is interesting to note here that the stakeholder groups who have the most direct opportunity to observe goliath in the natural environment (spear fishing and sightseeing divers) reported very conflicting perceptions on the species' impact on reef biodiversity.

All groups, including those where a majority perceived negative impacts of goliath on reef biodiversity, rated the importance of goliath as a factor impacting Florida's reefs as low compared to other threats including declining water quality, coastal development, habitat loss and invasive species.

### **Communication and education**

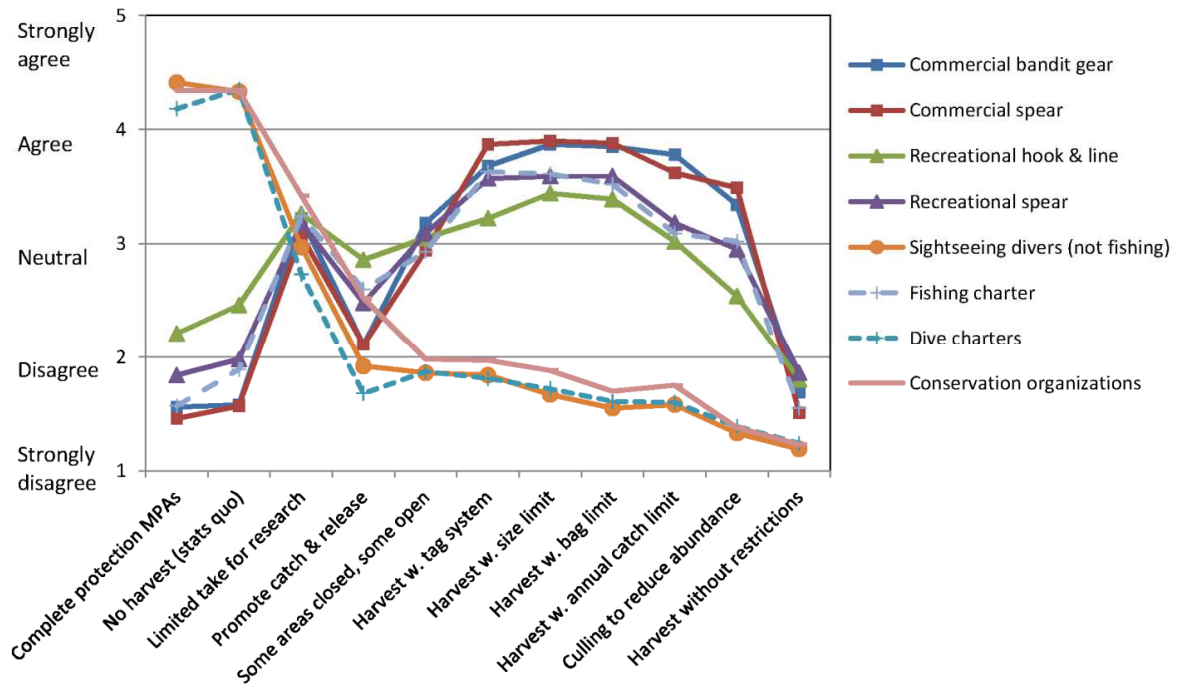
Stakeholders from all groups called for greater communication and education regarding goliath grouper population status, interactions with fishing activities and measures to minimize these, and protection. The survey also showed that different stakeholder groups relied on and trusted different sources of information.

### **Respondent's reasons for taking an interest in goliath management**

When asked about their reasons for participating in the goliath management decision processes (for example by responding to the survey), stakeholders from all groups emphasized that 'the outcome of goliath grouper management will directly affect the ecosystem I care about' over other reasons including direct impacts of goliath management on their livelihoods (Tables 1, 2). Direct impacts of goliath management on their livelihoods were rated as important (but secondary to ecosystem considerations) by dive charter operators, commercial fishers and to a much lesser extent fishing charter operators.

### **Management preferences**

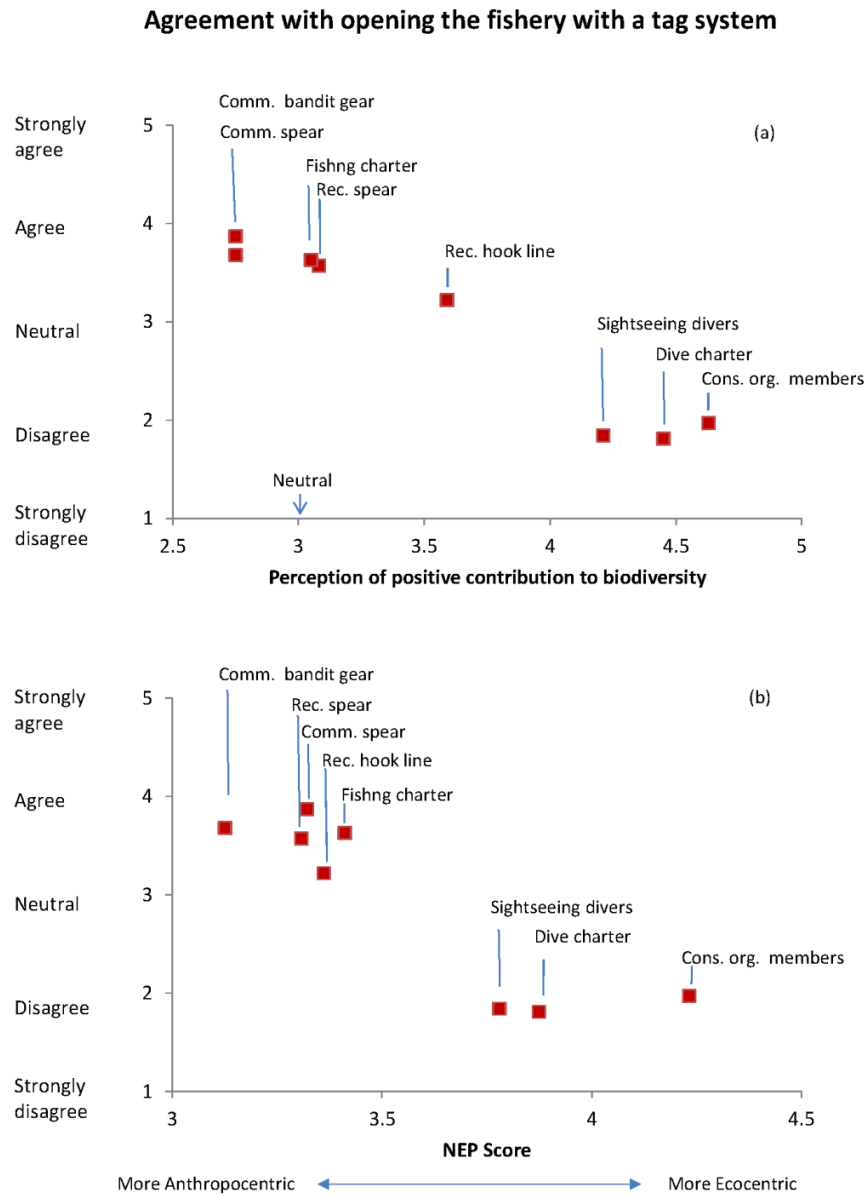
Survey respondents were divided in their opinion on future management (Figure 1). Commercial and recreational fishing stakeholders (including spear fishers) on average disagreed with the present closure and preferred opening the fishery for regulated harvest. Sightseeing divers (non-fishers), dive charter operators and members of conservation organizations on average strongly agreed with the present closure and strongly disagreed with opening the fishery to harvest. A limited take for research, while not preferred by any group, was the least controversial option. Overall, the preferences of sightseeing divers, dive charters and conservation organization members are more extreme than the (generally opposite) preferences of the fishing stakeholders. This may reflect the more variable attitudes of fishing stakeholders towards goliath grouper as documented above.



**Figure 1: Average rating of agreement with alternative management options by different stakeholder groups. Management options are ordered by increasing expected impact on the goliath population. Respondents scored their agreement on a five point Likert scale.**

Stated preferences for or against management options reflect experience of interactions with goliath, perceptions of the ecological connotations of goliath population increase, and fundamental beliefs about human’s place in and interactions with the ecosystem. To explore the role of such fundamental beliefs in determining management preferences the survey included a question rating the respondent’s position on the New Ecological Paradigm (NEP) scale (Dunlap et al. 2004). The NEP scale is designed to measure the respondent’s level of environmental concern with lower scores indicating a more anthropocentric and resource-use oriented beliefs and higher scores indicating more ecocentric and preservation-oriented beliefs. Stakeholder’s preferences for re-opening the fishery with a tag system for example can be related to both, their perception of goliath contribution to biodiversity and their fundamental beliefs as measures by the NEP scale (Figure 2). Fishing stakeholders’ perceptions of goliath contribution to biodiversity range from moderately negative to moderately positive and while all fishing stakeholder groups on average support re-opening of the fishery, their level of support declines with increasingly positive perceptions of goliath contribution to biodiversity (Figure 2a). The more fundamentally resource-use oriented stakeholders support opening of the fishery and the more preservation-oriented stakeholders support continued closure (Figure 2b). It is interesting to note that the recreational, commercial spear and fishing charter stakeholder groups were similar in their fundamental beliefs but showed moderate differences in their management preferences that are likely to relate to different perceptions of ecological connotations of goliath and desirability of encounters

(with commercial spear fishers showing the strongest, and recreational hook and line fishers the weakest preference for re-opening the fishery).



**Figure 2: Relationships between preference for opening the goliath fishery with a tag systems and perceptions of goliath contribution to biodiversity (a) and fundamental ecological beliefs as measures by the NEP scale (b) among stakeholder groups. See text for a brief explanation of the NEP score.**

## Project workshop with stakeholder representatives

### Objectives

The workshop objectives were to:

- Foster a shared understanding of management issues and the likely outcomes of different management options as perceived by stakeholders.
- Brainstorm a menu of management options and explore the pros, cons and uncertainties of each option

### Methodology

On Tuesday, May 21<sup>st</sup> and Wednesday, May 22<sup>nd</sup>, 2013 the University of Florida convened a Goliath Grouper Management Stakeholder Workshop in Tampa, FL (Figure 3). The workshop was designed over three months. Participants were invited based on a completed situation assessment, as well as interviews with stakeholders, researchers and agency personnel. Criteria for participation included knowledge and passion for the subject as well as a willingness to engage in difficult discussions with people with whom they may disagree. Twenty-four participants were invited to attend the workshop and twenty-three said yes. Seven of these agreed participants were not able to attend due to work or personal conflicts. Sixteen key stakeholders attended the workshop, representing the recreational and commercial fishing sectors, recreational divers, fishing and dive charter operators, conservation organizations and outdoor writers.



**Figure 3. Opening session of the workshop.**

## Results

### Perspectives on the present situation

Participants discussed the present situation and how it affected them. They noted that the goliath population was recovering but cautioned that recovery was stronger in some areas than in others and

that overall the status of the population remained uncertain. Many participants hailed the pattern of recovery under the moratorium as a fisheries management success. However, participants were divided in their views on the current populations status and over the best course of action to be taken in light of this status, with some arguing that recovery was only partial and urging to 'stay the course' and others arguing that the population had recovered to a large extent and the 'management impasse' could be resolved by allowing limited harvest. Participants also noted that the situation was often misunderstood and universally advocated more education and communication.

Asked how the present situation affected them, some participants noted positive business impacts from goliath-related dive tourism while others noted negative impacts on fishing activities (need to avoid areas they would like to fish). One participant –an artificial reefs coordinator –now considers options for designing reefs to avoid aggregating goliath grouper and thereby enhancing the recreational fishing experience. Many participants said they were not impacted economically but expressed emotions ranging from enjoyment about the goliath population increase and offence at even debating a re-opening of the fishery to frustration about the 'management impasse'.

### Stakeholder needs

In order to increase shared understanding of the needs of different stakeholders with regards to the goliath grouper, participants were encouraged to formulate and share those needs. The following needs were identified

- A healthy ecosystem and sustainable goliath grouper population (multiple participants)
- Responsible management based on a good scientific process and a good stakeholder process
- More information/data is needed, this includes scientific information and people's experience and observations
- Use goliath to build economic, social and environmental identity and as an inspirational resource
- Desire to be an environmental steward
- Consider financial value of allocating goliath grouper to different uses

### Options

Workshop participants worked in small groups to identify options for addressing the current situation in the light of their needs. They identified alternative rule-based management options as well as educational/communication and research needs.

#### Rule-Based Management Options

- Keep status quo, no open season
- Limited Take
  - For science only, by scientists
  - For science, but highly controlled; paid lottery seasonal system
  - Other limitations, tags, triggers
- Enhanced enforcement

### Outreach/Education

- Outreach and education on goliath population status, ecological interactions, and fishing methods to avoid problematic interactions.
- Education of fishers, spear fishers, captains, non-fishers, and the general public with science-based information to confront negative attitudes and behaviors.

### Research

- Biological Science: age/sex/reproduction/population, sustainable yield & mortality, ecosystem management, mercury contamination, data collection issue
- Socioeconomic science: value of live/dead fish, collaborative partnerships to enhance trust

### **Pros and cons of alternative rule-based options**

Participants worked in groups to discuss the pros and cons of alternative regulatory management options (Table 3).

**Table 3: Summary of the pros and cons of different management options as viewed by workshop participants.**

<b>Option</b>	<b>Pros</b>	<b>Cons</b>
Fishery closed to harvest (status quo)	<ul style="list-style-type: none"> <li>• Good for dive tourism</li> <li>• Avoid returning to overexploitation</li> <li>• GG will increase abundance</li> <li>• Stability of regulations</li> </ul>	<ul style="list-style-type: none"> <li>• User conflict</li> <li>• Exclusion of certain user groups</li> <li>• Leads to negative attitude by some user groups</li> </ul>
Limited take for science, by scientists	<ul style="list-style-type: none"> <li>• Scientific benefits</li> <li>• Take limited strictly to research needs</li> <li>• Easier to control than other take options</li> </ul>	<ul style="list-style-type: none"> <li>• Likely criticism of scientists for consumptive research</li> </ul>
Limited take for science, collaborative with fishers	<ul style="list-style-type: none"> <li>• Scientific benefits</li> <li>• Inclusion of user groups</li> <li>• Cost sharing</li> <li>• Perception of managers listening to user groups</li> </ul>	<ul style="list-style-type: none"> <li>• Potential for abuse</li> <li>• Difficulty of controlling harvest</li> <li>• Likely criticism from general public</li> </ul>
Limited take for harvest	<ul style="list-style-type: none"> <li>• Stakeholder perception of proactive management</li> <li>• Some economic benefits to fishers and fishing charters</li> </ul>	<ul style="list-style-type: none"> <li>• User conflict</li> <li>• Leads to negative attitude by some user groups</li> <li>• Negative economic impact on dive charters</li> <li>• Management costs</li> <li>• Enforcement concerns</li> <li>• Any revenue generated will not go back to the resource</li> </ul>

### Acceptability of alternative management options to workshop participants

Workshop participants considered continued closure of the fishery and a limited take for research by scientists or cooperatively with fishers as possible options in the current situation where no accepted scientific (stock) assessment is available. Overall participants were more supportive of continued closure but felt that they could agree to a limited take for research if a solid scientific case for such a take was made. Consideration of the scientific case for a limited take is beyond the scope of this project, which focused on the assessment of stakeholder perspectives.

## Synthesis of perspectives from the survey and workshop

### Perspectives by stakeholder group

- **Commercial reef fishers (bandit gear).** Experience frequent interactions with goliath that result in lost time, catch and gear damage. Attempt to minimize such interactions through fishing location choice but with limited success. Strongly supportive of re-opening the fishery to harvest on the grounds of perception of a negative impact of goliath on the ecosystem, experience of negative interactions of goliath with their work, and strong resource-use oriented beliefs.
- **Commercial spear fishers.** Experience frequent interactions with goliath that result in lost time, catch and gear damage. They attempt to minimize such interactions with fishing technique and location choice and are quite successful in doing so (though this adaptation may carry costs). Strongly supportive of re-opening the fishery to harvest on the grounds of perception of a negative impact of goliath on the ecosystem, experience of negative interactions of goliath with their work, and resource-use oriented beliefs.
- **Recreational hook and line fishers.** Experience moderately frequent interactions with goliath while fishing on reefs around Florida and more frequent interactions while fishing on reefs and inshore in south Florida. Interactions are predominantly incidental with only 11% of recreational hook and line fishers targeting goliath and most of those only rarely (it is not known how targeting behavior might change if harvesting was allowed). Predominantly view interactions as positive or neutral. Only 15% of all recreational hook and line fishers and 25% of those who have experienced goliath encounters viewing them as undesirable. Moderately supportive of re-opening the fishery to harvest on the grounds of a personal interest in harvesting goliath caught incidentally and resource-use oriented beliefs.
- **Recreational spear fishers.** Experience frequent interactions with goliath that result in lost catch and sometimes gear damage. Attempt to minimize such interactions with fishing technique and location choice and are quite successful in doing so. Strongly supportive of re-opening the fishery to harvest on the grounds of perception of a negative impact of goliath on the ecosystem, experience of negative interactions of goliath with their recreational activity, and resource-use oriented beliefs. (Recreational spear fishers perspectives are more moderate than those of commercial spear fishers).
- **Sightseeing (non-spearfishing) recreational divers.** Experience frequent encounters with goliath while diving on reefs and positively seek out such encounters. Strongly supportive of keeping



the fishery closed to harvest on the grounds of positive perceptions of goliath and their contribution to reef biodiversity, positive experience and deliberate seeking out of goliath encounters, and ecologically oriented beliefs.

- **Fishing charter operators.** View business impacts of the current goliath situation as predominantly neutral but expect a positive business impact should the fishery be re-opened to harvest. Supportive of re-opening the fishery to harvest on the grounds of perception of a negative impact of goliath on the ecosystem, expected positive business impact and resource-use oriented beliefs.
- **Dive charter operators.** View business impacts of the current goliath situation as positive and expect negative business impact should the fishery be re-opened to harvest. Strongly supportive of keeping the fishery closed to harvest on the grounds of positive perceptions of goliath and their contribution to reef biodiversity, positive business impacts, and ecologically oriented beliefs.
- **Members of conservation organizations.** View the current goliath situation as positive. Strongly supportive of keeping the fishery closed to harvest on the grounds of positive perceptions of goliath and their contribution to reef biodiversity and ecologically oriented beliefs.

### Stakeholder preferences by option

- **No harvest (status quo).** Consistently preferred by sightseeing divers, dive charters and members of conservation organizations but rejected by all fishing stakeholder groups to a varying degree.
- **Limited take for research.** Viewed neutrally on average (not preferred by any group but not rejected by any group either). The least controversial option. Workshop participants qualified possible support for this option based on whether or not a solid scientific case was made for a take and the take could be sufficiently controlled.
- **Promoting goliath for catch and release fishing.** Rejected by all stakeholder groups to a varying degree but viewed almost neutrally by recreational hook and line fishers. Survey results also indicate that at present very few recreational fishers target goliath for catch and release fishing.
- **Some areas closed to fishing, some open.** Viewed neutrally by fishing stakeholders but rejected by sightseeing divers, dive charters and members of conservation organizations. Despite potentially offering a way of meeting objectives of different stakeholder groups in different locations, this option enjoys little overall support.
- **Harvest with a tag system, length-, bag- or annual catch limits.** Regulated opening of the fishery to harvest is preferred by fishing stakeholders (most strongly by commercial fishers and least strongly by recreational hook and line fishers) but rejected by sightseeing divers, dive charters and members of conservation organizations. Workshop participants considered that a full scientific (stock) assessment would be required before this option could be considered.
- **Culling to reduce goliath abundance.** Culling is moderately supported by commercial fishers but rejected or viewed neutrally by the other stakeholder groups.
- **Opening the fishery to harvest without restrictions** is strongly rejected by all stakeholder groups.

## Recommendations

- Results from the goliath grouper stakeholder survey and workshop show that key stakeholder groups experience different interactions with goliath, hold very different views on the current situation with regard to ecological effects of an increasing goliath population, and support different management options. These perspectives are more differentiated and nuanced than those commonly stated at public meetings or on discussion boards.
- Further consideration of the future management of the goliath grouper fishery may benefit from more in-depth consideration of stakeholder perspectives as detailed in this report, with consideration of scientific information on population status and ecological interactions.
- All stakeholder groups considered ecological connotations of the present goliath grouper situation paramount to their views and management preferences, but differed strongly in their perceptions of these ecological connotations. Continued dialogue among stakeholder groups and participatory research may help in defining and measuring a shared set of indicators for population status and ecological effects.

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## Further Information and opportunities to comment

This report is part of an ongoing research project investigating stakeholder perspectives on goliath grouper management. Further information on the project can be found on <http://fisheriessolutions.org/projects/goliath/>.

Opportunities for public input also exist at all meetings of the Florida Fish and Wildlife Conservation Commission and the Gulf of Mexico and South Atlantic Fisheries Management Councils where project outputs may be presented.