

The Case for Regional Management of the Nassau grouper, *Epinephelus striatus*

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ABSTRACT

The management of the Nassau grouper through the Caribbean will be discussed in light of the continuous decrease in the resource throughout the area. Management strategies throughout the wider Caribbean range from no action (allowing all harvest of Nassau grouper) to total closures of the fishery in some countries; with strategies including seasonal closures, size limits, bag limits, and area closures.

The Nassau grouper fishery has shifted from being a major fishery in the Caribbean to an almost extinct fishery – both economically and population wise. These top predators are essential to the economic and ecological sustainability of reef based, multi species and multi gear fisheries so predominant in the wider Caribbean. A historical overview of the management changes in the region will be presented whenever possible.

KEY WORDS: Nassau grouper, Fisheries, Caribbean.

El Caso para el Manejo Regional del Mero de Nassau, *Epinephelus striatus*

El manejo del mero de Nassau a través del Caribe será discutido en razón a la continua disminución del recurso a través del área. Estrategias de manejo a través de todo el Caribe empiezan por ninguna acción (lo cual permite toda la captura del mero de Nassau) hasta el cierre total de la pesquería en algunos países; con estrategias incluyendo encierros, límites del tamaño, límites de capturas, temporadas de veda y áreas de veda.

La pesquería del mero de Nassau ha cambiado de posición de importancia de ser una pesquería importante en el Caribe a una pesquería casi extinta - ambos económicamente y nivel poblacional. Estos depredadores superiores son esenciales para la continuidad económica y ecológica de las pesquerías multi-especies y multi-artes basadas en especies arrecifales que predominan a través del Caribe. Una descripción histórica de los cambios de la gerencia en la región será presentada siempre que sea posible

PALABRAS CLAVES: Mero de Nassau, Pesquerías, Caribe.

INTRODUCTION

There is concern in the wider Caribbean Region over the continuous decline of a commercially important grouper, the Nassau grouper, *Epinephelus striatus*. Like many groupers, this species aggregates to spawn and the species was formerly among the most important groupers landed on islands of the region. Many spawning aggregations of Nassau grouper have disappeared, many others are reported to contain fewer fish now than in the past and, regionally, the fishery for this species appears to be in poor condition (Sala *et al.* 2001, Sadovy *et al.* In press). While some exceptions are noted, such as in the Turks and Caicos Islands where there has been little fishing attention on the species to date, and fishery information is lacking for some countries within the geographic range of this species, there numerous reports in the precipitous decline in the landings of this species in countries such as Cuba, Bahamas, Belize, Puerto Rico, the USVI, Brazil and the Southeast United States. Particularly noteworthy are Cuba, the Bahamas and Belize, formerly the major fishing nations for this species (Sadovy and Eklund 1999, SCRFA 2004). Despite the listing of the Nassau grouper on the IUCN (World Conservation Union) Red List as threatened in 1996, and again in 2003 after an update of information on the species,

its status as a Species of Concern in the United States, and protective legislation for the species in several countries, the species shows little sign of recovery (IUCN 2004, Sadovy *et al.* In press).

As a reflection of growing concern for the Nassau grouper, a panel of experts met in November 2005 at the 58th Gulf and Caribbean Fisheries Institute (GCFI) meeting in San Andres, Columbia, and identified several management alternatives suitable for this species: in order of preference from the highest to the lowest these were; closed seasons, closed spawning areas, limited entry, marine protected areas (MPAs), total closure of the fishery and landings to retain skin on fillets for species identification. The need for more information on the status of the species was also recognized.

In 2006, the Caribbean Fishery Management Council (CFMC) hosted a Nassau Grouper Workshop (November 7) at the 59th GCFI meeting in Belize. Scientists, non-government organizations (NGO) and representatives from various countries in the Caribbean discussed the need for action to protect the Nassau grouper region-wide. Among the issues discussed at the workshop was the need to collect information from countries in the Caribbean as well as historical data on landings, management strategies and other information pertaining to studies conducted on Nassau grouper.

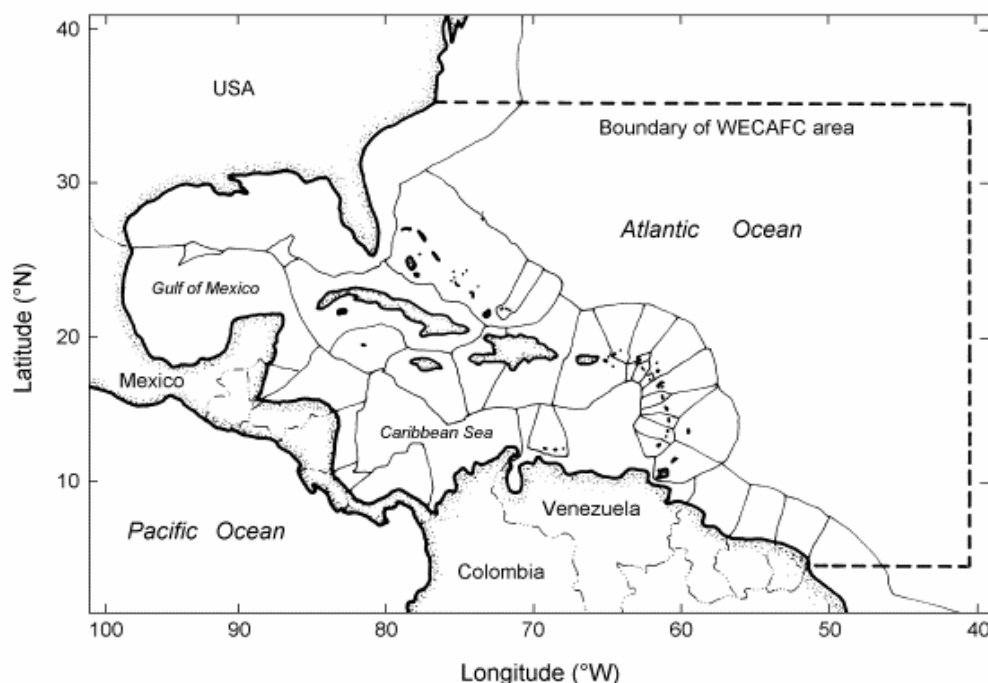


Figure 1. Exclusive Economic Zones (EEZ) of the wider Caribbean (FAO WECAFC), also includes the distribution of the Nassau grouper.

In preparation for a follow-up meeting and panel discussion on the Nassau grouper scheduled for the 60th GCFI meeting in the Dominican Republic, and co-organized by the CFMC and the Society for the Conservation of Reef Fish Aggregations (SCRFA), a summary of management strategies used in the Caribbean to protect the Nassau grouper and the major problems faced by this resource was compiled and is reported on herein.

METHODS

To compile information on management, a questionnaire (Appendix A) was sent out on August 7 2007, drawing on discussions at the 2006 meeting, to over 20 interested parties. An Internet search was conducted by querying country websites for official laws, regulations or decrees regarding Nassau grouper, groupers and fishing. Also, summaries of these regulations were searched and official representatives contacted as indicated in the country's web site (see Literature Cited). Additionally, during the 60th GCFI, people were approached regarding the regulations implemented in their countries to protect Nassau grouper and published and unpublished literature assembled (Tables 1 and 2).

Searches were also conducted to obtain general information on the status of the fishery of the Nassau grouper resource in countries of the region (overfished, overexploited, at risk, unknown), and to identify monitoring programmes.

RESULTS

The Nassau grouper is a resource shared by about 34 countries in the wider Caribbean; the presence of the species in Brazil could not be confirmed. Figure 1 shows the exclusive economic zones of these countries (FAO-WECAFC) that constitute the wider Caribbean.

In respect of management, available information is summarized in Table 1 and involves a range of management measures. Seasonal closures or complete bans on the take of Nassau grouper are shown by country for the wider Caribbean. The seasonal closures established in the region were specifically established to protect the Nassau grouper during the months of spawning. Management measures applied have increased over the years.

Other measures include species-specific controls such as minimum size and more general measures such as MPAs that could also benefit the species. In Cuba, the minimum size for Nassau grouper is 570 g (~32 cm TL) and at present there are three MPAs although these are not specifically for Nassau grouper (R. Claro, Pers. comm.). There are numerous protected areas in the wider Caribbean but few are specific for the protection of Nassau grouper and the extent to which this species might benefit is unknown. The establishment of seasonally closed areas for the protection of the red hind (*Epinephelus guttatus*), the prohibition on the deployment of bottom tending gear (e.g., traps) from six seasonally closed areas, as well as seasonal closures of other fisheries, could also afford some protection to the Nassau grouper through reduction of incidental catch and mortality. However, there are no data to evaluate this possibility.

Table 2. Management history of the Caribbean Fishery Management Council with direct and indirect impact on the Nassau grouper (Reef Fish and Coral Fishery Management Plan for the US Caribbean).

Year	Reef Fish FMP Regulations
1985	Min Size 30.5 to 61 cm (increasing 2.5 cm/yr); Seasonal closure (prohibition on take) from January 1 to March 31 each year
1990	No harvest or possession in exclusive economic zone (EEZ); Seasonal area closure at Hind Bank (MCD), St. Thomas (Dec-Feb each year); [MCD became a no-take area in 1999]
1993	Seasonal area closure for red hind (closed to all fishing) at Tourmaline (PR) and Lang Bank (St. Croix) from December 1 to February 28 each year
1996	Additional seasonal (December to February) area closures for red hind (closed to all fishing) at Bajo de Cico and Abrir La Sierra (PR)
2004	No harvest or possession in Puerto Rico; No filleting fish at sea
2005	Bottom tending gear prohibited year-round from all seasonal area closures: No filleting fish from the EEZ at sea
2006	No harvest or possession in the US Virgin Islands; No filleting fish at sea

The first no-take zone established in the US EEZ was the Hind Bank or marine conservation district (MCD) off St. Thomas, USVI in 1999. Originally a seasonally closed area to protect red hind it was closed to all fishing under Amendment 1 to the Coral Fishery Management Plan (CFMC 1999) to protect the essential fish habitat of groupers. Olsen and LaPlace (1979) indicated that Nassau grouper aggregations took place within the Hind Bank of the US Virgin Islands. At present there are no reports of large aggregations forming at this site although one study indicates that it was (and is) used by Nassau grouper (R. Nemeth, University of the Virgin Islands, personal communication, J. Garcia-Sais, University of Puerto Rico Pers. comm.).

The history of the management of Nassau grouper for the US Caribbean is summarized in Table 2 (CFMC 1985, 1990, 1993, 1996, 2005, Puerto Rico Fishing Regulation 2004, US Virgin Islands Fishing Rules and Regulations 2006). The Caribbean Fishery Management Council (CFMC) implemented size limits (based on the data for the closely related *E. morio*) and a seasonal closure for the Nassau grouper in the EEZ (Exclusive Economic Zone) (CFMC 1985, Table 2) for the US Caribbean EEZ. Prohibition on the harvest and possession of Nassau grouper was established in 1990 for the EEZ and in the state waters of Puerto Rico in 2004 and in the USVI in 2006. A determination of over-fishing of Nassau grouper was officially made in 2005 (CFMC 2005) and since then the objective of rebuilding of Nassau grouper was established and the fishery will be closed until the year 2020.

The US Caribbean includes several management jurisdictions with the state waters of Puerto Rico extending from the shore-line to 9 nautical miles (nm), in the USVI from the shoreline to 3 nm and the EEZ extends from these limits to the 200 nm. These boundaries complicate fishery management when there is no compatibility of measures between them. This situation is also the case for the southeast United States and the US Gulf of Mexico. Compatibility of regulations has been achieved in the USA since a complete ban on the harvest of Nassau grouper and a prohibition on the possession of Nassau grouper was introduced.

Regarding status of the species, marked declines are noted for the species in all active fisheries for which data are available and > 50% of known aggregations have shown declines (Sadovy and Eklund 1999, Sadovy *et al.* In press). In other feedback on status, comments from Fisheries Officers suggested that in some countries the Nassau grouper is seldom seen and or harvested. In such areas, the Nassau grouper may never have been an important fishery or fishers do not target the resource. Thus, there are no restrictions on the take of Nassau and separate landings data are not collected for this grouper. In most countries, however, Nassau grouper landings data are incorporated into a combined dataset for 'grouper'; landings data without information on the percent composition by species. There are few available data on the recreational catches of this species outside of the United States.

Regarding monitoring of Nassau grouper resources, there is no regular detailed monitoring of Nassau grouper

spawning aggregations or of the population in general to assess ongoing status or recovery of the Nassau grouper populations/stocks in the US Caribbean, or elsewhere.

DISCUSSION

From the information compiled emerges a profile for the Nassau grouper of a species that is undergoing marked declines throughout parts of its range, is of unknown status in others, and, despite a growing suite of national-level management measures, shows no indication of recovery. Its currently low perceived value in many places attracts little in the way of funding for enforcement and there are few relevant monitoring programmes for the species.

The trans-jurisdictional boundary component of the resource of the Nassau grouper and lack of management success, the biology of the species and continuing concerns over declines, clearly call for a regional management approach for the Nassau grouper. The circa 34 jurisdictions that encompass the geographic distribution of this species are of little relevance to its life history since early life stages include a pelagic egg and larval phase that could potentially be carried throughout the region. Moreover, adults are capable of migrating across for example, the USVI-BVI platform, or along the shelf of the Yucatán Peninsula (México) to Belize and on to Panama, particularly in relation to spawning aggregations; adults are known from tagging experiments to travel more than 100 km from a spawning site.

Management strategies throughout the wider Caribbean range from no action (allowing all harvest of Nassau grouper) to total closure (moratorium) of the fishery in some countries, with additional strategies including seasonal closures, size limits, bag limits, and area closures. Other fishing regulations, although not directed at protecting Nassau grouper but that could benefit the fishery, include MPAs, gear and minimum size restrictions. Yet there are no indications that these measures are fostering recovery of the species.

The issues regarding the protection and sustainability of the Nassau grouper include but are not limited to: (1) monitoring, (2) enforcement, (3) outreach and education, (4) commercial vs recreational conflicts, (5) jurisdictions, and (6) economics/alternatives. There are also possible environmental changes to consider (changes in food webs, presence or absence of species from fishing or other anthropogenic impacts). The lack of monitoring has been documented for the US Caribbean and appears to also be a factor in many of the countries in the region. This could be attributed to lack of funding allocated to such activities, in some cases the result of the currently low value of the Nassau grouper fishery. Likewise, the lack of enforcement might also respond to the minimal allocation of funds for, and importance attributed to, this fishery. There are important efforts in the Caribbean to expand marine education including the development of curricula that address the protection of the natural and fishery resources

of the island nations and countries in the wider Caribbean.

For progress to be made and suitable measures developed for the future of Nassau grouper stocks, an assessment of the occurrence of Nassau throughout the wider Caribbean is needed. Comments from Fisheries Officers indicate that the Nassau is seldom harvested in some areas (St. Vincent and the Grenadines), either because it is not and has never been present in significant numbers, or because over-fishing has reduced numbers to negligible levels; local data compilation should be able to determine which. In other countries, such as Cuba, Bahamas and Belize, amongst others, where once the Nassau was a more important fishery, numbers are clearly substantially reduced relative to the past and we could locate no readily available information on the fishery status of the species. In Cuba, the fishery has all but disappeared (Claro *et al.* Unpubl. manuscript) and in Belize, the effectiveness of aggregation protection is in doubt and further measures being discussed (J. Gibson. Pers. comm.).

Given the wide distribution of the Nassau grouper in the Caribbean and adjacent waters, the declines indicated throughout much of its range, and the apparent failure of the various of management measures implemented at the national level, regionwide pan-Caribbean management for the Nassau grouper is likely to be the most suitable approach to protect and aid the recovery of the Nassau grouper.

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Table 1. Legal measures in effect for the conservation and management of Nassau grouper *Epinephelus striatus* (updated from Shatter the Myth Case Study – Nassau grouper *Epinephelus striatus* – Craig Dahlgren, 2006, unpublished)

Jurisdiction	Management Measure	References
Bahamas	Minimum size limit of 3lbs/1.36kg established in 1980s; no-take marine reserve established in the Exuma Cays in 1984; seasonal closure of specific spawning aggregation sites first implemented in 1998; annual ca. two-month (according to full moon) first implemented December 2003	Sadovy and Eklund (1999); DoF (2003); Fisheries Resources (Jurisdiction and Conservation) Regulations (Statutory Instrument N°10), 1986; SCRFA (2005)
Belize	Since 1 November 2003, closed season (prohibition on take, purchase, sale and possession) from 1 December through 31 March, except traditional, licensed fishing at two sites; 11 no-take marine reserves, established in 2003, protect spawning aggregation sites for Nassau and other species year-round, except limited, licensed traditional fishing	Fisheries (Spawning Aggregation Site Reserves) Order (Statutory Instrument N°161), 2003; Fisheries (Nassau Grouper Protection) Regulations (Statutory Instrument N°162) of 2003
Bermuda	Completely protected through prohibition on take and possession; possibly benefits from numerous no-take marine reserves	Sadovy and Eklund (1999)
Cayman Islands	Effective 29 December 2003, fishing closed at 6 Nassau grouper spawning sites for a period of 8 years. In adopting this decision, the Marine Conservation Board noted that three of the six areas were “fished out and two in serious decline.”	SCRFA (2003b)
Cuba	Fishery quota established in mid-1980s; minimum size limit of 570g or 20cm in length entered into effect on 2 January 1997	Sadovy and Eklund (1999); Resolución N°561/96 del Ministerio de la Industria Pesquera
Dom. Rep.	Prohibition on fishing during spawning season	Sadovy and Eklund (1999)
Mexico	Prohibition on spearfishing (implemented in 1990) and use of gillnets at spawning aggregation sites; Closed season for all grouper species from 15 February to 15 March established in February 2003; applies to all waters of the Mexican EEZ from Campeche and Yucatán (Gulf of Mexico) and Quintana Roo (Caribbean) states, as well as from Rio San Pedro, between Tabasco and Campeche states to Belize border. In 2007 a seasonal closure for all groupers and all regions in México (A. Aguilar-Perera, pers. comm.).	Sadovy and Eklund (1999); SCRFA (2003a)
Puerto Rico	Take and possession in US federal waters (9-200 nautical miles) prohibited in November 1990; take, sale, and pursuit in state waters (up to 9 nautical miles) prohibited in March 2004	CFMC (1996); Puerto Rico Fisheries Regulation N°6768 (DENR) See also Table 2.
Florida, USA	Take and possession prohibited in federal waters in November 1990 and in state of Florida in 1993; protected in Dry Tortugas Marine Reserve and Florida Keys National Marine Sanctuary; listed as Species of Concern by US NMFS.	Anon. (2004a, b)
Turks and Caicos Is.	One spawning aggregation site protected from fishing in Northwest Point Marine National Park, Providenciales. Additional management measures for the Nassau grouper being considered (J. Claydon pers. comm).	(DECR 2004); National Parks Ordinance and Subsidiary Legislation CAP. 80 of 1988
US Virgin Islands	First spawning season fishery closure, from 3 December 2005 to 14 February 2006, established for Nassau grouper and yellowfin grouper <i>Mycteroperca venenosa</i> at Grammanik Bank, St. Thomas; Hind Bank Marine Conservation District (14mi ²), St. Thomas, closed to fishing year-round in 1998, protects red hind spawning aggregation and former Nassau grouper spawning site; several no-take marine reserves; no take or possession from US federal waters (3–200 nautical miles offshore) entered into effect in 1990	CFMC (1996); www.scrfa.org ; DPNR (2005)

APPENDIX I:**Nassau grouper management questionnaire:**

Is the Nassau grouper fished in your country? If so, what are the estimated annual landings? Is there a seasonal pattern to the landings (i.e., certain months when landings are particularly high or low)?

How is the Nassau grouper marketed – is it used for the tourists/restaurant sector or just for family use? Do you have any price information for the species?

Is the Nassau grouper valued for tourism, either for catching (recreational fishing) or for dive tourism?

Do you know of any spawning aggregation sites for the Nassau grouper in your country?

Do you have a report on the status of Nassau grouper in your country?

Do you have fishery regulations that include the Nassau grouper?

If yes, can you provide a brief summary and/or reference document with applicable laws and regulations?

Do you believe the Nassau grouper should be included as a threatened or endangered species in your country's laws or regulations?

Please provide any comments or suggestions you may have to protect the Nassau grouper throughout the Caribbean region.

Thank you very much for your collaboration.

Please contact Mr. Miguel A. Rolón, or Ms. Diana Martino, CFMC Staff, for any questions on this matter at: 787-766-5926, or by email: miguel_rolon_cfmc@yahoo.com or diana_martino_cfmc@yahoo.com.