

## WESTERN CENTRAL ATLANTIC FISHERY COMMISSION

Report of the

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### FIRST MEETING OF THE CFMC/WECAFC/OSPESCA/CRFM WORKING GROUP ON SPAWNING AGGREGATIONS

Miami, United States of America, 29–31 October 2013



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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS  
Sub-regional Office for the Caribbean  
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## **PREPARATION OF THIS DOCUMENT**

This is the report of the first meeting of the Caribbean Fisheries Management Council (CFMC), the Western Central Atlantic Fishery Commission (WECAFC), the Central American Organization of the Fisheries and Aquaculture Sector (OSPESCA), and the Caribbean Regional Fishery Mechanism (CRFM) Working Group on Spawning Aggregations, held in Miami, from 29 to 31 October 2013.

The joint Working Group was established by the fourteenth session of WECAFC in February 2012 and this first meeting was co-organized and sponsored by the CFMC of the United States Department of Commerce, WECAFC and FAO.

The FAO Secretariat to the meeting consisted of Dr Raymon van Anrooy, WECAFC Secretary. Administrative and logistical support was provided by CFMC, and coordinated by Mr Miguel Rolon, Executive Director of CFMC and convener of this Working Group, with assistance from Ms Diana Martino and Ms Maria de los Angeles Irizarry. Dr Yvonne Sadovy of the University of Hong Kong, technically coordinated and facilitated the meeting.

This report contains a summary of the presentations, discussions, conclusions and recommendations of the meeting. The conclusions adopted and recommendations made are presented in the form of a “Declaration of Miami” and a Recommendation to the fifteenth session of WECAFC on the establishment of a regional closed season for fisheries in the WECAFC area to protect spawning aggregations of groupers and snappers. The national summary reports presented at the meeting will be published separately with support from CFMC.

**FAO Western Central Atlantic Fishery Commission. 2014.**

*Report of the first meeting of the CFMC/WECAFC/OSPESCA/CRFM Working Group on Spawning Aggregations, Miami, United States of America, 29–31 October 2013.*

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#### **ABSTRACT**

The first meeting of the CFMC/WECAFC/OSPESCA/CRFM Working Group on Spawning Aggregations, was held in Miami, United States of America from 29 to 31 October 2013. The meeting brought together 23 experts working on spawning aggregations of fishes from all over the Western Central Atlantic region. The Working Group noted with concern the ongoing declines in stocks of many aggregating species and particularly groupers and snappers in the Wider Caribbean Region, the reduced numbers of their aggregations and the relatively smaller size of remaining aggregations. The Working Group also verified that the status of Nassau Grouper, Goliath Grouper (and several other species) stocks in the Wider Caribbean Region should be considered “overexploited”, and that some stocks can even be regarded as “depleted”. The Working Group further emphasized the high ecological and biological value of reef fishes that aggregate to spawn (including groupers and snappers) for the ecosystem and aquatic biodiversity in the region, as well as for achieving regional food security and livelihood objectives. The Working Group compiled information on the spawning fish aggregation management and conservation measures in place and examined their effectiveness. The meeting issued a “Declaration of Miami”, which included a recommendation to the fifteenth session of WECAFC on the establishment of a regional closed season for Nassau Grouper fisheries in the WECAFC area to protect spawning aggregations of this species.

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## ABBREVIATIONS AND ACRONYMS

CFMC	Caribbean Fishery Management Council
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CRFM	Caribbean Regional Fisheries Mechanism
EEZ	exclusive economic zone
ESA	Endangered Species Act (USA)
FSA	fish spawning aggregation
GCFI	Gulf and Caribbean Fisheries Institute
INPESCA	Institute for Fisheries and Aquaculture (Nicaragua)
IUCN	International Union for Conservation of Nature
MPAs	marine protected areas
MSC	Marine Stewardship Council
NGO	non-governmental organization
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration (USA)
OSPESCA	Central American Organization of the Fisheries and Aquaculture Sector
SAG	Scientific Advisory Group
SCRFA	Society for the Conservation of Reef Fish Aggregations
SIDS	Small Island Developing States
SPAW Protocol	Protocol Concerning Specially Protected Areas and Wildlife
STAC	Scientific Meeting and Technical Advisory Committee
Code	Code of Conduct for Responsible Fisheries (FAO)
USVI	United States Virgin Islands
WECAFC	Western Central Atlantic Fishery Commission



## **INTRODUCTION**

1. Spawning Aggregations of reef fishes, particularly groupers, have been the focus of various regional meetings in the Caribbean. A Regional Workshop on Nassau grouper, which was coordinated by the Caribbean Fishery Management Council (CFMC) and the Western Central Atlantic Fishery Commission (WECAFC), was held on 20 and 21 October 2008, prior to the thirteenth session of WECAFC. The National Oceanographic and Atmospheric Administration (NOAA) and the National Marine Fisheries Service (NMFS) of the United States of America sponsored that workshop. Representatives from 17 countries attended the workshop. The two main items on the agenda were: a regional summary of the status of the Nassau grouper fishery in the region and the compilation of country status reports. The Regional Workshop made various recommendations which were presented to WECAFC. These recommendations included:

- a) a proposal for establishment of a WECAFC/CFMC ad hoc Working Group on Nassau Grouper;
- b) that management of Nassau Grouper be more effective at the national level;
- c) closed seasons are one of the most effective ways to protect spawning aggregations, when the species is more vulnerable to fishing; and
- d) countries that do not have a closed season from December to February should establish one.

2. The thirteenth session of WECAFC (Colombia, October 2008) endorsed the recommendations and added that the main purpose of the Working Group is to foster regional cooperation in the management and conservation and restoration of Nassau grouper stocks in the WECAFC region; and to include coordination and harmonization of efforts for the management and conservation of the Nassau grouper. The thirteenth session recommended a regional coherent management approach, supported by national level implementation efforts.

3. Various Gulf and Caribbean Fisheries Institute (GCFI) annual conferences in recent years incorporated sessions or presentations on Spawning Aggregations or Nassau Grouper management and conservation. Moreover, the Society for Conservation of Reef Fish Aggregations (SCRFA) (later revised to Science and Conservation of Fish Aggregations) has been very active in raising awareness and building capacity on aggregations over the last decade. Numerous scientists, researchers, fishers and projects have been working on spawning aggregations and related issues lately.

4. At the fourteenth session of WECAFC, held in Panama City in February 2012, the Commission noted the limited activities of the Working Group on Nassau Grouper and Mr Miguel Rolon (CFMC) kindly offered to revive the working group as CFMC/WECAFC/OSPESCA/CRFM Working Group on Spawning Aggregations. The respective terms of reference were developed and endorsed by WECAFC (available in Appendix E) and funding was sought in support of Working Group activities. Mr Rolon called, as convener, the Working Group together to meet in Miami, United States of America. Moreover, Dr Sadovy compiled a status report on Nassau grouper which was delivered to the CFMC following the thirteenth session of WECAFC.

5. The principal objective of this first Working Group meeting was to bring together key experts to examine the available biological and socio-economic information from Caribbean countries involved in the fisheries of groupers and snappers and other species that aggregate to spawn. It was aimed to use the information to provide (as Working Group) advice on the management and implementation of regional strategies and regulations to protect spawning aggregations.

## **OPENING OF THE MEETING**

6. The first meeting of the CFMC/WECAFC/OSPESCA/CRFM Working Group on Spawning Aggregations was held in Miami from 29 to 31 October 2013. The meeting was kindly hosted by the

Caribbean Fisheries Management Council (CFMC). Welcoming remarks were delivered by Mr Miguel Rolon on behalf of CFMC and as convener of the Working Group, and by Dr Raymon van Anrooy on behalf of FAO/WECAFC.

## **ATTENDANCE**

7. The following countries and territories attended the meeting: Bahamas, Belize, Brazil, Caribbean Netherlands, Cayman Islands, Cuba, China (Hong Kong SAR), Mexico, Nicaragua, Puerto Rico, United States Virgin Islands and the United States of America. CMFC, CRFM, PEW and WECAFC/FAO, as well as various Spawning Aggregations experts were also in attendance. The list of 23 participants, including Working Group members and other participants, can be found in Appendix B.

## **ELECTION OF CHAIRPERSONS AND RAPPORTEURS**

8. Dr Yvonne Sadovy was elected Chairperson of the Meeting. She was assisted by Dr Raymon Van Anrooy who also agreed to act as Rapporteur.

## **ADOPTION OF THE AGENDA**

9. The Meeting adopted the agenda as shown in Appendix A.

## **GLOBAL PERSPECTIVE OF AGGREGATING SNAPPERS AND GROUPERS**

10. Dr Yvonne Sadovy presented a “Global Perspective of Aggregating Snappers and Groupers”. The presentation covered what is known of the fish taxa that aggregate to spawn (mainly groupers and snappers according to the SCRFA database), the main habitats that spawning occurs globally, multispecies spawning, timing, relative to lunar phase, of spawning, and spawning behaviour. The talk covered the high importance of aggregating species within reef fisheries and hence their significance for food security and for earnings, with particular focus on groupers and snappers used both domestically and for exports. It was noted that export trade can drive particularly heavy focus on aggregating and migrating fish to fulfill the need to complete large shipments and catch large numbers of fish quickly (the cases of Honduras and Fiji were presented) which can contribute to overfishing of the species. Aggregating species are typically fished both during the aggregation season as well as outside of it and the case was presented to protect aggregations, the source of the next generation, and only fish outside of aggregations to ensure continuation of the fishery (of aggregating species) in the long term.

11. The status of aggregations globally was presented with most of known status found to be declining and little effective management in place. The case of the Nassau grouper throughout its geographic range was presented in detail for the lessons learned, as was the role of overfishing of aggregations in producing the threatened and near-threatened listings (International Union for Conservation of Nature [IUCN] Red List criteria) of several grouper species. Finally, the challenges and opportunities of management of aggregating species were presented highlighting particularly the issues of the value of aggregating species, the challenges of assessing their status (hyper-stability) from aggregation catches and the illusion of plenty that large number of fish gathered at one time and place can give. Management options were presented and statements of concern from various forums summarized.

12. The presentation triggered a lot of discussion on a wide range of issues. The importance of getting disaggregated trade data on grouper imports and exports, the potential impact of climate change and variability on reef fish species that aggregate to spawn, hyperstability issues of stocks of fishes that aggregate to spawn, the need for local fisherfolk participation in development and implementation of spawning aggregation conservation measures and the availability of and access to fisheries manuals and other awareness raising materials on spawning aggregations, were among the issues discussed. It was argued that there is an imbalance in terms of regulatory and management

measures in place for aquatic species, as lobster, queen conch and turtle are often covered by these measures, but groupers and other fishes that aggregate to spawn frequently (or even typically) are not. The Working Group agreed that the SCRFA website ([www.scrfa.org](http://www.scrfa.org)), with its database and visibility and training materials could be used as repository for researchers/experts in the region who would like to share information on spawning aggregations.

## **HISTORICAL BACKGROUND OF WECAFC'S WORK ON SPAWNING AGGREGATIONS OF KEY SPECIES**

13. Dr Van Anrooy made a presentation which covered the history, objectives and core activities of WECAFC, membership issues, and the work of the seven current working groups. Most information presented, as well as reports and publications of WECAFC working groups are available at the WECAFC website in three languages, accessible at: [www.fao.org/fishery/rfb/wecafc/en](http://www.fao.org/fishery/rfb/wecafc/en). Dr Van Anrooy provided further some historical background to the Working Group on Spawning Aggregations and detailed (on behalf of the convener) the Terms of Reference of the Working Group. He also presented the data and information that FAO has on grouper landings in the WECAFC mandate area. In summary, the total landings of groupers in the WECAFC region were estimated in 2010 to be 16 400 tonnes and in 2011 some 14 400 tonnes. This is equivalent to 1.3 percent and 1 percent of total capture fisheries production in the region in these years. Mexico (51 percent), USA (28 percent), Venezuela (9 percent) and the Dominican Republic (5 percent) are the largest producers in terms of volumes of grouper harvested. The FAO data showed that since the 1980s there is a clear downward trend in landings of groupers. It was noted that the USA is the largest importer of grouper and grouper products from the region.

14. The discussion succeeding the presentation related to the role of non-coastal member states of WECAFC and how they could be incorporated better in regional fisheries management and to a perceived need to be able to make binding fisheries management recommendations in the region.

## **PRESENTATIONS OF NATIONAL STATUS REPORTS**

15. National Summary Reports were prepared by expert participants from most countries attending the Working Group meeting. These summary reports and other research outcomes provided are made available in full in a separate report, along with an updated regional status overview. Also the representative of the CRFM provided an overview of the work of the Mechanism on aggregating species.

16. The presentations of the overviews were received with interest by the Working Group.

17. Summarized below are the presentations made by the experts and issues raised by participants during the discussions following the presentations.

18. **The United States Virgin Islands (USVI).** Dr Richard S. Nemeth of the Center for Marine and Environmental Studies of the University of the Virgin Islands presented the status of spawning aggregations in the USVI.

19. In the United States Virgin Islands at least 20 species from five families (*Lutjanidae*, *Epinephelidae*, *Carangidae*, *Balistidae*, *Kyphosidae*) are known or suspected to form transient fish spawning aggregations (FSA). FSA's are important life history events characterized by very predictable locations and timing where the spawning adults are the primary source of annual reproductive effort. These characteristics make spawning aggregations very vulnerable to fishing which may severely deplete local populations: a scenario that has occurred repeatedly in the USVI and elsewhere in the Caribbean, especially the collapse of Nassau grouper (*Epinephalus striatus*) spawning aggregations.

20. Understanding the status of spawning aggregations is critical to their management. In the USVI, nearly all of the species that form transient spawning aggregations are either declining or have

insufficient information to evaluate their status, even though management regulations have been in place for five to ten years. These regulations include three US federal marine protected areas, three federal and local seasonal area closures and three areas with limited protection. Additional regulations include no-take for Nassau and Goliath grouper (*E. itajara*) and three endangered parrotfish (*Scarus guacamaia*, *S. coelestinus*, *S. coeruleus*) and seasonal catch restrictions on groupers (February to April) and snappers (April to June). In only one case has a species (red hind *E. guttatus* on St. Thomas) shown recovery due to protection of its spawning aggregation site. This is in stark contrast to the St. Croix red hind spawning population which has shown continuous decline for the past ten years in terms of size of males and females, sex ratios, population abundance and biomass even though it has received similar protection. A lack of basic biological information is hindering our understanding of these differences in response to management actions.

21. A minimum level of research is needed to provide Caribbean countries a baseline on which to establish FSA monitoring protocols (i.e. port surveys, underwater fish counts, bathymetric and habitat mapping). This basic information as well as more sophisticated studies can provide guidance for implementing precautionary management regulations. For example, a study in the USVI using acoustic telemetry to track grouper movements found that area requirements around spawning sites showed a strong positive relationship based on fish size. The largest species (yellowfin grouper, *Mycteroperca venenosa*) required 10–12 km<sup>2</sup>, Nassau grouper required 5–6 km<sup>2</sup> and tiger grouper (*M. tigris*) 3–4 km<sup>2</sup>. This information is broadly applicable to other countries and can be used to guide managers to define spatial and temporal closed areas and justify boundaries to stakeholders through a variety of outreach and informal education efforts.

22. The discussion which followed Dr Nemeth's presentation focused on the recommendations from the study, expressed a need to investigate the differences in effects of implementation of various management measures, and noted that the status of the stocks continued to decline.

23. **Puerto Rico.** Dr Michelle T. Schärer-Umpierre of the Department of Marine Sciences of the University of Puerto Rico presented the status of spawning aggregations in Puerto Rico.

24. Spawning aggregations of groupers and snappers have been confirmed for a handful of sites in the Puerto Rican archipelago. Various vulnerable, threatened and endangered species of grouper have been documented at some of these multi-species spawning sites with the aid of passive acoustic monitoring studies. Many of these species are extremely rare and hence they are not detected in fishery-independent studies; therefore the study of aggregations provides an efficient method to monitor their populations.

25. Of the spawning aggregation sites highlighted in Puerto Rico one is permanently protected from fishing year-round, three have seasonal protections and a three remain unprotected despite research documenting them. Current seasonal bans for some of the species that aggregate to spawn are applied island-wide, but differ in compatibility between local and federal regulations in the exclusive economic zone (EEZ). Compliance and enforcement efforts at sea are very limited and the effectiveness of seasonal bans is not perceived in local restaurants and markets and there is no export of these products to other locations.

26. Current fishery-dependent data available for these species is unsuitable for trends analyses. Difficulties associated with inconsistent data collection methods, lack of species-specific landings, misreporting from commercial fisheries and little or no information from the recreational sector make population evaluations problematic. The fishery-dependent recreational fishery data available is limited and contains high uncertainty due to the rarity of many of these species.

27. Questions asked after this presentation related to the effectiveness of management measures applied, occurrence of illegal fisheries, confiscation of illegally caught red hind, and why a buffer area around sites where fish aggregate to spawn is needed.

28. **Cayman Islands.** Mr Phillippe Bush, of the Marine Conservation Board of the Department of Environment of the Cayman Islands presented the “Historical and proposed future management of the Nassau grouper spawning aggregations of the Cayman Islands”.

29. Monitoring of the Nassau grouper spawning aggregation-based fishery of the Cayman Islands began in 1987, due to earlier complaints and reports from fishermen of decreasing catches and fish size. Fifteen years of data (1987–2001) from three main historical spawning aggregations showed declining trends in catch, size, and CPUE. In 2001 and 2002, approximately 4 000 fish were taken from a newly discovered spawning aggregation at the west end of Little Cayman, essentially halving a pre-fishing aggregation estimated at 7 000–8 000.

30. As a result of public outcry, 2003 saw the first (and only) “no-take” year based on “alternate year fishing” regulations, and a defined spawning season of November through March. Based on ageing and validation work done earlier, an 8 year (2004–2011) fishing ban prohibited the taking of Nassau grouper from any of the eight designated grouper spawning areas. In 2011, a second consecutive eight year ban (2012–2019) was implemented. In 2012, a conspicuous recruitment pulse of 1–2 year old juvenile Nassau grouper (total length ranging from 12–26 cm) occurred. This was the first time a recruitment of this magnitude was detected in ten years since the cessation of the fishery in 2003. Current frequent sightings of larger sub adults (30–40 cm) suggest much lower level recruitment events in prior years. This underpins importance of long term protection in maximizing chances of meaningful recruitment events. Thus, realistically, protection for depressed Caribbean stocks should therefore be in perpetuity.

31. The currently proposed legislation includes:

- Placing the species on protected status lists (i.e. prohibit the taking of the species anywhere in Cayman waters). Once recovered, the productivity of its population can provide a healthy non-spawning season fishery. (This is the most desirable option).
- Implement an annual closed season throughout Cayman waters for Nassau grouper from November through March.
- Impose a daily catch limit of two fish/person/day in open season.
- Impose a slot size limit of 45–60 cm.
- Ban the taking of Nassau grouper from all designated grouper spawning areas indefinitely.
- Change the current boundaries of designated grouper spawning areas to more realistically accommodate the potential shifting of spawning aggregations.

32. The discussion that succeeded the presentation revolved around the success of the eight year bans and why a permanent ban may be necessary, the proposed legislation and the question whether fishing should be allowed on recovered populations.

33. Dr Brice Semmens of the Scripps Institution of Oceanography of the University of California presented some work of the Grouper Moon research program in the Cayman Islands.

34. The Grouper Moon research program, a collaborative effort between the Reef Environmental Education Foundation (REEF) and the Cayman Islands Department of the Environment, uses a diverse array of field techniques in order to study the population and spatial biology of Nassau grouper (*Epinephalus striatus*). The Cayman Islands maintains a uniquely large (healthy) spawning aggregation of Nassau grouper (~4 000 fish), in addition to several heavily depleted spawning aggregations of the species. Acoustic tagging studies on both the healthy and depleted spawning aggregations indicate that all or nearly all reproductively mature individuals aggregate each year, and do not make abyssal migrations between islands. The acoustic data also suggest that individual grouper may visit multiple aggregation sites before ultimately coalescing at a single site. Finally, acoustic data revealed that larger (more fecund) fish aggregate longer than smaller fish, and that regardless of size, all fish appear to aggregate over a longer period of time at depleted spawning sites.

35. Taken together, these findings suggest a set of behavioral characteristics that present a mechanistic underpinning to the apparent hyper-stability in aggregating species; hyper-stability refers to the fact that catch per unit effort remains relatively constant despite steep declines in catch. The fact that hyper-stability is mediated by spawning behaviors suggests that efforts to harvest aggregating species during their spawning season will likely stymie traditional fisheries management and assessment approaches.

36. Questions after the presentation related to the size of the spawning aggregation and the time spent by fish on the aggregation site, the reason why catchability is higher in smaller populations, and the movement of fish to and from spawning aggregations.

37. **The Bahamas.** Mr Lester Gittens of the Department of Marine Resources of the Ministry of Agriculture, Marine Resources and Local Government presented the status of spawning aggregations in The Bahamas.

38. Though many fish species aggregate in The Bahamas, the Nassau grouper, Yellowfin grouper, Mutton snapper and Lane snapper have been targeted at spawning aggregations. Other than the iconic Nassau grouper, not much is known about the status of these resources either by species or by individual spawning aggregation. While quantitative evidence of management success is largely limited to a study that showed a greater diversity of groupers in the Exuma Cays Land and Sea Park, fishers also make anecdotal reports that there are greater numbers of small Nassau grouper. Nevertheless, despite the use of closed seasons in most years since the late 1990s (along with other older management measures) and abounding educational efforts led by non-governmental organizations (NGOs), the overall Nassau grouper fishery is estimated to range from fully exploited to overexploited. In addition, studies of a few individual Nassau grouper aggregations showed the disappearance of some aggregations and greatly reduced numbers in others.

39. Like regional counterparts, The Bahamas is challenged with finding the right combination of enforceable management measures that simultaneously facilitate food security, sustainability and the ability of fishers to right now earn a living. This can only be achieved by excising the current scourge of poaching (foreign and local) in addition to further embracing informed management decisions. Likewise, informed management implies that there is information to base decisions on. More resources must be contributed towards enhancing these sources of information including surveillance for enforcement purposes, accurate monitoring of landings, scientific research and stock assessments.

40. In the discussion that took place after the presentation the success of a closed season combined with a sales ban compared with a closed season without sales ban was an issue. The impact of the closed season on the stocks of Nassau grouper was discussed also and the need for a regional recommendation on the use of fish traps with biodegradable panels.

41. **Mexico.** Dr Alfonso Aguilar-Perera of the Universidad Autónoma de Yucatán presented the status of spawning aggregations in the Southern Gulf of Mexico and Mexican Caribbean.

42. In the Southern Gulf of Mexico and Mexican Caribbean, a lack of detailed knowledge prevails on the current conditions and fishery status of fish spawning aggregations (FSAs). Limited scientific documentation has revealed that grouper species (*Epinephelus striatus*, *E. itajara*, *E. guttatus*, *Mycteroperca bonaci*, *M. tigris*, *M. venenosa*) and snappers species (*Lutjanus analis*, *L. cyanopterus*, *L. synagris*, *L. jocu*, *Ocyurus chrysurus*) are opportunistically exploited during spawning aggregations. The practice of exploiting groupers, such as the Nassau and the Goliath, has been progressively fading because of population declines of these groupers. In fact, no fishermen community now strongly depends economically on fishing these aggregations.

43. There are no legal provisions by the Mexican Government for management of FSAs in the region. Most attention is paid to management of the red grouper, *E. morio* and the red snapper,

*Lutjanus campechanus*. The only regulation for grouper fishing is a one-month ban (February 15 to March 15 every year) established in 2005 for all grouper species (about 17). Also, a normative regulation (NOM-065-PESC-2007) established in 2010 provides complementary criteria to regulate the grouper fishing. None of these latter legal instruments consider the existence of FSAs. The equivalence of a Species Red List in Mexico is the NOM-059-SEMARNAT-2010, which only includes one commercially, marine, exploited teleost: *Totoaba macdonaldi* endemic to the Gulf of California.

44. The presentation contained a range of proposals to improve management, including introduction of co-management for FSAs. The subsequent discussion stressed the need for a regional coherent approach and that stock assessments should be conducted for more species.

45. **Cuba.** Mr Servando Valle of the Centre for Fisheries Research of Cuba presented, on behalf of Mr Rodolfo Claro, the status of spawning aggregations in Cuba.

46. Traditionally, the catches of reef-associated fin fishes in Cuba have shown strong seasonal trends, mainly associated with the reproductive periods of the most economically important species, among them snappers (*Lutjanidae*) and groupers (*Serranidae*). This seasonality in catch trends is determined by the increased vulnerability of aggregating species to fishing during the reproductive period and the resulting focus of fishing activity on spawning aggregations which yields a large proportion of annual catches of such species. Since the responses of aggregating species to fishing vary according to the biology of different targeted species, an understanding of the impacts of fishing and the consequences of management can only be understood by species-specific analyses in the context of the coastal fishery and its management history as a whole. The history of the coastal, reef-associated, fishery of Cuba is one of increasing and decreasing fishing pressure and variable management effectiveness that ultimately led to substantial declines in most key commercial species.

47. Snappers and the Nassau grouper are traditionally considered to be the major fin fish resources in Cuba, but many of these species have declined over the last four decades. The fishery of snappers and groupers typically concentrated on seasonal spawning aggregations. Twenty-two spawning aggregation sites were identified around the Cuban Shelf. Most of these sites are sequentially used by several species in different times. Some other sites may be found, but probably most important sites for massive spawning of targeted species are included.

48. Direct observations of spawning events have been rare in Cuba and more information on the population size of past and current spawning aggregations is needed. Active spawning aggregations due to their discrete nature and high productivity are clearly important resources. This emphasizes the need to validate aggregation information when available. Use of these spawning aggregation sites may vary temporally under natural conditions or be fully eliminated due to fishing pressure; therefore, efforts to confirm the existence of nominal aggregation sites and monitor their production through time will be essential to optimal reserve design and management.

49. Following the presentation the effects of a closed season were discussed as well as the identification of historical sites of Nassau grouper spawning aggregations. It was argued that the spawning aggregations in Cuba are often far at sea and that rough weather plus the distance to the site are not permitting the fishers to fish at many of these spawning aggregations.

50. **Belize.** Mr Mauro Gongora of the Fisheries Department presented the status of spawning aggregations in Belize.

51. Since 2003, the Government of Belize passed legislation to protect several commercially important fish species at 11 spawning aggregation sites distributed along the coast and in the three atolls of Belize. The major declines in the number of fish species, and in particular, the Nassau grouper (*Epinephelus striatus*) in the spawning aggregation sites, as demonstrated by studies done,

prompted the passing of Statutory Instrument numbers 161 and 162 of 2003 to protect the Nassau grouper and several other fish species.

52. Currently, seven spawning aggregation sites are monitored regularly. The monitoring teams are guided by the Reef Fish Spawning Aggregation Monitoring Protocol for the Mesoamerican Reef and Wider Caribbean. The inconsistency in spawning aggregation data collection as a result of the lack of resources has not helped the spawning aggregation working group to determine whether a particular fish species or more that aggregate to spawn in Belize have either recovered or have declined even further. It is clear that more resources are urgently needed to conduct additional field research and fisheries law enforcement activities at these sites to deter illegal fishing. This is a major challenge and needs to be addressed through a coordinated national and regional approach.

53. The presentation was followed by a discussion on the monitoring data, timing of monitoring, manpower available for monitoring and the concern about Nassau grouper aggregations moving between Belize and Mexico's EEZs, which requires subregional collaborative research.

54. **Nicaragua.** Mr Renaldy Barnuty Navarro of the Nicaraguan Institute for Fisheries and Aquaculture (INPESCA) made a presentation on the status of finfish fisheries in the Caribbean Sea of Nicaragua.

55. Finfish fisheries are the most important in Nicaragua in terms of volume landed and from the social point of view, because it is carried out mainly by artisanal fishermen. In Nicaragua finfish fisheries usually operate in environments dominated by multispecies landings comprising mainly snappers and groupers (*Lutjanidae* and *Serranidae*), snook (*Centropomus spp*), sharks (*Carcharhinidae*, *Triakidae*) and croakers (*Sciaenidae*). The highest landings of finfish originate from the Pacific and are clearly dominated by snappers. The boats used for fishing are mostly fiberglass boats with lengths between 5–10 m and outboard motors up to 75 HP. The crew of two to three people uses a variety of gears, such as gill nets, trammel nets, cast nets and lines with hooks.

56. In the case of finfish landings in the Caribbean Sea, the snappers (*Lutjanus spp.*) show a clear predominance followed by the snooks (*Centropomus spp*), and the group of other fish, followed by groupers (*Epinephelus spp.*) and sharks (*Carcharhinidae* and *Triakide*). For all species, there are growing trends in landings over the last five years.

57. The landings of snapper species in the Caribbean of Nicaragua are increasing and this is mainly due to the improvement of national and international market prices and an increased fishing effort mainly by the industrial fleet which is using traps. In the case of groupers, stability is observed in the landings over the last five years. The snapper and grouper landings in 2012 were equivalent to respectively USD2.4 million and 270 000 pounds round weight.

58. The trends of landings for the Caribbean groupers show that they were decreasing until 2009. After this period, there is a stabilization in the order of the thirty thousand pounds harvested per month. Major grouper species that are landed are the black grouper (*Mycteroperca bonaci*) Warsaw grouper (*Hyporthodus nigrurus*) and yellow grouper (*Epinephelus flavolimbatus*). The monthly snappers landings showed an increasing trend, the main species that are landed is yellowtail snapper (*Ocyurus chrysurus*) with 71 percent, followed by 7 percent yellow eye snapper (*Lutjanus vivanus*) and the black end snapper (*Lutjanus buccanella*).

59. In Nicaragua there have been a few studies on the biology and dynamics population of finfish. INPESCA, responsible for the management and wise use of fishery resources of the country and as the competent authority for the application of Law 489, Law on Fisheries and Aquaculture and Regulations, established minimum sizes for fish species catches from the Caribbean Sea and the Pacific Ocean in Nicaragua. (Executive Resolution 003-2012). The minimum size is established based on studies and regulations established and conducted in other countries, such as Mexico, Jamaica and



the United States of America and by applying the precautionary principle and the Code of Conduct for Responsible Fisheries (the Code) of FAO.

60. Measures established to promote the use of the minimum size:

- Mesh size regulation for gill nets, traps and the size of hooks used in fishing - target fish by a Technical Standard Fishing Gear and Methods.
- Releasing live fish caught that are below the minimum size.
- Prohibition of fishing in breeding and nursery areas.
- Implementation of the Code.
- From 2012 onwards, monthly biological sampling of snappers in the Pacific Ocean.

61. In Nicaragua, closed seasons or quotas for finfish fisheries have not been established and today these fisheries are considered open-access fisheries. In the case of sharks, an indefinite closed season for species that penetrate inland waters exists.

62. The presentation was followed by some discussion on how minimum fish size regulations are enforced in practice. Examples of collaboration between the fishing authorities, navy, coast guard and police were given. The limited monitoring and few stock assessment studies being done were issues of concern raised.

63. **Caribbean Netherlands.** Mr Pieter Van Baren of the Rijksdienst Caribisch Nederland presented the status of spawning aggregations of commercially exploited aggregating species of the Caribbean Netherlands.

64. Various grouper and snapper species are exploited commercially. This is being done in an artisanal manner with hook and line and fish traps being used as gear. The status of FSA's in the Caribbean Netherlands is largely unknown. Currently, there is one known targeted multispecies (red hind and queen triggerfish) FSA off the coast of Saba. The red hind (*Epinephelus gattatus*) is being targeted commercially whereas the queen triggerfish (*Balistes vetula*) for recreational use. Red hind is being exported from Saba, mainly to St. Maarten.

65. In 2005, a study on the FSA was carried out of which the outcome was that the FSA was moderately exploited. Since then fishing pressure has increased tremendously and it is being presumed that the spawning aggregation is heavily overfished. As of 1<sup>st</sup> December 2013, the FSA will be closed during the months of December, January and February for the next five years. During this time the FSA will be monitored and after five years, the measure will be evaluated to see if prolonging is required and if additional measures are necessary.

66. On Bonaire and St. Eustatius there have been reporting's of FSA's in the past. Currently, there are no known FSA's near these islands.

67. The discussion that succeeded the presentation referred to a recommendation on Nassau grouper, which came out of the fourth Scientific Meeting and Technical Advisory Committee (STAC) of the SPAW protocol that discussed whether there was a need to protect marbled grouper and the threat of increased fishing pressure on FSAs following their identification through research efforts.

68. **Brazil.** Dr Athila Bertocini, of the Federal University of the State of Rio de Janeiro made a presentation on reef fish aggregations in Southern Brazil: Pró-Arribada and Meros do Brasil Initiatives.

69. The presentation was followed by some questions that related to the incentives for fishers and other stakeholders to monitor goliath grouper sticks and FSAs, the type of environmental education and the focus of the research projects on dusky grouper and goliath grouper.

70. **USA – Atlantic Coast.** Dr Ken Lindeman of the Florida Institute of Technology presented an overview of “Snapper and Grouper Spawning Aggregation Information for the United States Atlantic Coast”. His presentation summarized joint research work with G. Sedberry, M. Meadows, M. Burton, T. Kellison, N. Farmer, M. Reichert, D. DeMaria, C. Koenig, D. Morley, A. Acosta, C. Taylor, W. Heyman, S. Harter, and A. David.

71. They surveyed literature, unpublished data, and interviewed fishers to identify known and potential spawning aggregation sites for the snapper and grouper reef fish faunal complex of the United States Atlantic coast. Focal species included the 14 *lutjanid* and 18 *serranid* species (five and four genera, respectively) managed under the Snapper-Grouper Fishery Management Plan of the United States South Atlantic Fishery Management Council on diverse reef systems from the lower Florida Keys through North Carolina. Criteria were based on Domeier and Colin (1997) and use of local fisher information to supplement research data.

72. Nine snapper species have confirmed or potential spawning aggregation sites identified on the United States Atlantic coast. Mutton and cubera snapper had the most known spawning sites (13–15). There is considerable evidence of simple migratory spawning and some evidence of spawning aggregations for *L griseus*, *L campechanus* and five other species. In total, >40 confirmed or potential *lutjanid* spawning sites were identified. Confirmed and potential spawning aggregation sites were identified for seven grouper species with 20–30 total sites. Of these, at least nine goliath grouper aggregations have been confirmed by Koenig and Coleman (2013) in the Jupiter Inlet area of East Florida (27°N).

73. The majority of known or potential aggregation sites for the southeast United States snapper-grouper reef fish complex are subject to few specific management measures to ensure aggregation sustainability; however where no-take areas are enforced, in situ data are positive for some aggregation sites. Monitoring and research have often been constrained by funding and few data to fully characterize potentially important spawning aggregations are available for the majority of sites.

74. The presentation was followed by discussion on the comparative effectiveness of spawning season closures. It was also noted that the Society for the Conservation of Reef Fish Aggregations had many outreach materials on its website and that fisher outreach should be scaled up through outreach campaigns as part of management measures.

75. The second day of the Working Group meeting started with summarizing the main findings and conclusions from the first day. A number of important additional observations were made related to the following issues:

- The multi-species, multi gear reef fisheries and aspects of fishing down the food web, given that many of the more vulnerable aggregating species are at the top of the food web.
- The public-value of aggregating species (food, tourism, earnings), along with ecological and biological values.
- The need to acknowledge as part of the ecosystem value that top predators contribute to the Caribbean marine ecosystem and the ecosystem role of groupers and other species that aggregate to spawn.
- The need to have a minimum standard regional closed-season for aggregating species, like there exists for lobster at the sub-regional level, given the dispersive larval phase of aggregating species and challenges for enforcing regulations, especially when there is international trade.
- The possibility to develop eco-tourism around spawning aggregations.
- The involvement of fishers in the management of spawning aggregations, as well as in spawning aggregation research and verification of spawning aggregations.

- The outreach and fishers exchange programmes that could contribute to increasing awareness and involvement of fishers in the management of spawning aggregations.
- The need to put in place threatened species legislation, as many countries in the region lack such legislation.
- The need for enforcement of existing regulations and monitoring of aggregating species.

76. Some additional questions were posed to the presenters of the national status reports. These questions related to the enforcement of fish size, catch and gear regulations, the ways to reduce fishing pressure and fleet capacity, the functioning of spawning aggregation working groups at national level (e.g. in Belize), alternative employment options for fishers during closed seasons, social development programmes that fishers can tap into, and the involvement of fishers in spawning aggregation monitoring programmes.

### **Biogeography of transient reef-fish spawning aggregations in the Wider Caribbean**

77. Dr Shinichi Kobara of Texas A&M University presented a brief summary of the recently published review paper, “Biogeography of transient reef-fish spawning aggregations in the Caribbean: a synthesis for future research and management.” The review evaluates all currently known and documented transient reef fish species and their spawning aggregation sites in the Wider Caribbean. In this region, 37 species of fish from ten families form transient FSAs and there are at least 108 geographically discrete transient FSA sites. Nassau grouper aggregations were the most commonly documented spawning aggregations (55 sites) and 32 sites had multispecies aggregations.

78. Dr Kobara emphasized the importance of bathymetric data collection in characterizing spawning aggregations. Even relatively crude bathymetric information can support site characterization and help design of appropriately sized marine protected areas (MPAs). Bathymetric information can also help in the understanding and modeling of hydrodynamics – water mass movement around the spawning site – and thus the influences on larval transport from the site. Finally, and perhaps most importantly, bathymetric data can be used to predict previously unknown spawning sites.

79. There are 18 multispecies sites that have bathymetric data available in this region. For every site, the spawning aggregation occurred at a shelf edge, adjacent to relatively deep water, and a reef promontory. Although it might not be applicable for every single-species spawning aggregation site (e.g. red hind spawning aggregation sites in Puerto Rico), the geomorphological approach has been used to predict and find a previously unknown multispecies spawning aggregation site in Belize. The approach might prove feasible in other locations as well.

80. Dr William D. Heyman of LGL Ecological Research Associates, Inc., continued the presentation on the research undertaken.

81. Many large groupers and snapper species can be considered as components of a snapper-grouper complex – a suite of species that share similar life history characteristics that are harvested as part of multi-species fisheries throughout the wider Caribbean. Many of these species are over-fished; some are threatened or endangered. Though many are considered data-poor species in that their status has not been successfully evaluated. These fishes are generally long-lived, late to reproductive maturity, and spawn in massive transient aggregations – all contributing to their vulnerability to over-exploitation.

82. Dr Heyman categorized research on aggregations into eight levels with increasing cost and sophistication. He identified the minimum data needed for management action: a site map and characterization using fisher interviews, fishery dependent surveys, and underwater visual counts and documentation with photos or video. He further documented that research can be conducted and sites

protected more efficiently by involving local aggregation fishermen in all aspects of the research and management process.

83. Dr Heyman offered support for the hypothesis that multi-species spawning aggregations occur predictably at the tips of reef promontories, at shelf edges in 15–60 m water depth, adjacent to deepwater (>200 m). This search image has been used to predict the location of multi-species spawning aggregations in Belize and Mexico, and may prove useful throughout the wider Caribbean and the Gulf of Mexico. He offered a vision of the future whereby a network of multi-species spawning aggregations are protected and monitored with a standard protocol, promoting recovery of the Wider Caribbean snapper grouper complex.

84. The discussion that succeeded the presentations focused on the interconnection of the grouper/snapper complex and the need to update a spawning aggregation monitoring manual.

### **ESA, CITES, SPAW PROTOCOL**

85. Ms Stephania Bolden of the National Oceanic and Atmospheric Administration, National Marine Fisheries Service and Southeast Regional Office made a presentation on the regulatory tools: the Endangered Species Act (ESA), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Protocol Concerning Specially Protected Areas and Wildlife (SPAW).

86. The presentation outlined what CITES involves and does and discussed the CITES appendices. The benefits of CITES listing in an appendix were noted as well. An overview was given also of the United States ESA and the various ESA sections of relevance to the process of listing endangered marine aquatic species under ESA.

87. The Cartagena Convention, the only legally binding environmental treaty for the region, was discussed as well, with emphasis on the SPAW Protocol. Ms Bolden detailed that the SPAW Protocol assists governments in the Wider Caribbean region to:

- protect and recover certain species;
- protect areas and ecosystems;
- develop technical and scientific research on these areas and species, and exchange and coordinate information concerning research or monitoring programmes.

88. The SPAW Protocol establishes the principle of coordination of measures, criteria and guidelines corresponding to these different objectives. The Protocol includes three species lists to protect listed flora (Annex I), fauna (Annex II), and species of flora and fauna to be maintained at a sustainable level (Annex III). The Protocol became international law in 2000 and 16 countries have ratified; however SPAW ratification is not necessary for collaborative activities.

89. Ms Bolden added that at the fifth Meeting of the STAC to the Protocol Concerning Specially Protected Areas and Wildlife (SPAW) in the Wider Caribbean region, a report was submitted by the Government of Cuba with recommendations for listing of species under the SPAW Annexes, which given time limitations, could not be previously considered. That list included, amongst others, the Nassau grouper.

90. The Working Group took note of the three regulatory tools and recognized that CITES and SPAW listings are only useful if they receive follow-up from the countries. It was noted that CITES is not a management body as such and that all CITES decisions are to be carried out by the national governments. There was some resistance among various of the country delegates to have any of the grouper species listed under CITES. It was argued further that most Nassau grouper currently caught

ends up at domestic markets and that thus the CITES tool would not add much to the management of spawning aggregations.

91. In terms of ESA the ongoing process following the proposal for the listing of queen conch was explained. It was noted that ESA listing will have far reaching consequences and that any ESA related follow-up recovery plans are limited to the USA EEZ only; there is unlikely to be management support for other countries.

92. The listing of Nassau grouper under an appendix of the SPAW protocol was an option favoured by many experts in the Working Group. It was recognized that the distribution of Nassau grouper has dwindled at the regional level. While at the national level, in some cases, the stocks are not under threat it is a different situation when looking at the regional trends of landings of Nassau grouper by fisheries and occurrence of spawning aggregations. It was noted however that there are large gaps in terms of ratification of the SPAW protocol in the region and that the recommendations of it are non-binding, i.e. voluntary.

## WORKING GROUP DISCUSSIONS

93. The meeting decided to split into three break-out working groups:

- Group 1: Importance of aggregating species for food and income and the need to manage/conservate them.
- Group 2: Research and monitoring of aggregating species
- Group 3: Educational and outreach – experiences and challenges

94. **Group 1** (Importance of aggregating species for food and income and the need to manage/conservate them) summary of the group discussions:

- It is a “no-brainer” that the aggregations that are commercially fished need to be protected or managed in order to have populations of fishes that form aggregations in the long term (includes most reef fishes such as parrotfish, surgeonfishes, snappers and groupers as well as pelagic sp. i.e. flying fish).
- Fisheries regulations regarding traps should be revised to make sure they do not impact the species that form spawning aggregations (timing, mesh size, biodegradable panels, etc.).
- It is important to highlight the cultural, economic and ecological value of the fish populations for the livelihood of many Caribbean communities.
- There was much discussion regarding the need for highlighting the importance of fish spawning aggregations for “food security” in some of these countries since many coastal communities depend on many different coral reef species which aggregate.
- The urgency of this matter was highlighted since we have been discussing among us for many years the need to protect FSA.
- It would be useful to develop a report card for the Caribbean countries, similar to “Reefs at Risk” to present which countries have FSAs and how they are doing.
- Fisheries management bodies haven’t all incorporated the protection of FSA as a priority and this is worrisome, but perhaps due to short-term alternatives such as aquaculture that don’t really shift effort but add to it.
- An effort has to be made to highlight the urgent need for protecting FSAs to fisheries managers and include the list of solutions that they can use to act, not leave it at “here is the problem and deal with it”.

- The cascading benefits of protecting FSA due to ecological integrity i.e. improved coral reefs.
- The plight of FSAs needs to be encapsulated into a marketing campaign for which the information already exists (SCRFA) and the audience should be two-fold one bottom-up (public and constituency) and another top-down (government levels).
- We need to develop a marketing plan focused on the importance of FSAs for the fisheries species, then seek the support of NGOs and other partners to be able to implement across Caribbean and the Gulf of Mexico.
- Mexico could be a good pilot project for the implementation of this marketing plan.
- Some type of eco-label could be applied to products from sustainable “non” FSA fisheries.
- Perhaps some “earned media” coverage could be used to highlight the importance of protecting FSA.
- The message of the importance of FSAs should be transmitted through the voice of fishers, i.e. the ‘Ambassadors’ that can take the message to their government agencies and stakeholders.

95. The discussion that followed Group 1’s presentation added that, for coastal communities’ food security, and for long-term general food security, the management of FSAs is essential. It was noted that no new eco-label may be needed as there are so many around already and that some linkage with the Marine Stewardship Council (MSC) certification scheme may be an option.

96. **Group 2** (Research and monitoring of aggregating species) summarized its discussion in the following table:

	<b>Realities/ current situation</b>	<b>Needs/GAPS desired situation</b>	<b>Approaches to bridge gaps/ Action required and who to act</b>
<b>Identification</b>			
Issues: ongoing work	<ul style="list-style-type: none"> <li>• Discovery based monitoring (detailed maps – occurrence)</li> <li>• Acoustic monitoring</li> <li>• Cuba has lengthy historical landing information</li> </ul>	Know what is/are most important spawning sites regionally Know the migration patterns of each species – to inform management and conservation	In Turks and Caicos islands, no fishing for Nassau grouper, thus it would be opportunity to identify spawning sites.
<b>Research</b>			
Issues:	Countries fearful of other countries getting hands on data  Researchers that collect data and information in other countries need to provide info/findings to these countries	<ul style="list-style-type: none"> <li>• Effective data and info exchange at regional level</li> <li>• Raw level data can be kept internal; only aggregated data be shared</li> <li>• All Small Island Developing States (SIDS) should identify spawning aggregation sites</li> <li>• Socio-economic dependence on aggregations and perception related to conservation of aggregations</li> </ul>	Website – database – digital library established.  NGOs conservation community is needed to collect data.  Transfer of technology and knowledge from south-east Asia may be useful

		<ul style="list-style-type: none"> <li>• Ecological indicators</li> <li>• Reference points for management</li> <li>• Stock assessment methods for spawning aggregation species</li> <li>• Restocking of wild stocks might provide options in some cases</li> <li>• Threshold density for aggregating species?</li> <li>• Artificial fertilization – aquaculture – survival rate of larvae is low</li> </ul>	
<b>Monitoring</b>			
Issues:	<p>Shifts in aggregations are occurring (MPAs were established but now fish aggregate elsewhere – albeit nearby – in some cases)</p> <p>Difficult to find aggregations without fishers knowledge/information</p> <p>Allow a few cooperating fishers to fish on specific days (note that fish won't bite on actual spawning day) only – to ensure data/ information requirements are met, and only a small part of the fish is caught (use of single hook and line – one day per month -17 vessels – two fishers per vessel in Belize; estimated that 18–20% is caught). Limited access, rights based fisheries.</p> <p>Visual surveys are done additionally as well as cross-checking of info with exporters.</p> <p>NGO community has created public awareness and conservation efforts promotion.</p>	<p>Legislation + voluntary collaboration with fishers</p> <p>Monitoring manual to be updated and endorsed by WECAFC, CRFM, etc.</p>	<p>Fisherfolk cooperation is required to identify and monitor spawning aggregation sites</p> <p>May be needed to issue special permit to allow few fishers to fish site for limited time – in return for full collaboration/info from fishers</p> <p>Acoustic monitoring may include also vessels monitoring during aggregation events</p>

97. The presentation of the above group discussion was followed by a plenary discussion in which the issue of identification of spawning sites got most attention. Some experts regarded it important not to reveal the spawning sites in cases where there are no management measures in place to protect the spawning aggregation. Moreover, it was argued that there are often no immediate benefits for fishers to inform the government or researchers of existing spawning sites. Local institutional capacity is often too limited to monitor and manage spawning aggregation sites effectively and more remote aggregation sites are often difficult to protect/monitor due to the high costs related to doing so.

98. **Group 3** (Educational and outreach – experiences and challenges) summary of discussions:

99. What is the goal? We need to have people broadly understand, but also to ACT.  
WHO DOES the OUTREACH? Fishermen

“Low Hanging Fruit”

1. Capture all of the existing outreach information in a single website that links to all existing education and outreach information.
  - SCRFA website
  - Project Goliath
  - TAMU Geography UTube
  - Reef resilience Website (TNC)
  - Exchange videos
  - Spawning aggregation working group site
  - REEF – kids programme in Cayman Islands, live uplink from aggregation
2. Support local fishermen leaders as spokespersons and Ambassadors
  - Awards for student paper
  - Award for best fishermen
  - Gladding Award Winner
  - Training fishermen on policies and public speaking
  - CFMC to pay for travel expenses for fishers to attend
  - Travel expenses for fishermen to attend GCFI
3. Messaging might be targeted for various audiences
  - Fishermen = value in supporting sustainable source of seafood
  - Divers – a great dive experience
  - Broad general public – anyone who knows about the sea should know
  - Decision makers/managers – protect multi-species aggregations year round
4. Tools to use:
  - Live Traveling educational shows
    - ✓ Mero-movil Grouper-mobile
    - ✓ Sailboat – educational boat
    - ✓ Carnival or travelling festival
    - ✓ Children’s play
  - Fisher exchanges
  - Social media
    - ✓ YouTUBE
    - ✓ Facebook
    - ✓ iTunes University
  - Get companies who want to advertise to contribute and use the platforms for their own purpose of advertising.
5. Existing Television or Video outlets
  - Wild Krat’s Episode
  - National Geographic Film
6. Certification of species – Work with MSC to have them consider whether a species aggregates to spawn and if a fish was caught outside time and location of spawning aggregations – as part of the certification process



7. Fishermen Ambassador Programme
  - Through GCFI
  - Gladding Award Winners
8. MESSAGE SHOULD COME FROM FISHERMEN
  - Videos of fishermen talking to fishermen
  - Fisher exchange videos
  - “At Sea Level”
9. Possible Donors: Ballard Foundation, watch leaders – Ocean Exploration Trust
10. Donors must also remember that regional bodies need support
11. Teacher training programme
  - Packages for interested schools – grouper day, curricula

100. In the discussion that followed Group 3’s presentation the CFMC Secretariat referred to the importance to have a teacher’s manual for educating school children on spawning fish aggregations.

## GENERAL DISCUSSIONS

101. Following an example provided by the CFMC/WECAFC Working Group Secretariat, the participants were requested to complete overview tables of fisheries management measures for aggregating groupers and snappers in each of the participating countries. The overview table included input controls (e.g. closed areas, closed seasons, gear restrictions, method restrictions, effort restrictions, and licenses) as well as output controls (e.g. harvest restrictions, length limits, bag/catch limits, fish holding restrictions, sale/market restrictions, trade restrictions and landing requirements). The completed overview tables will be published in the updated regional status overview in a separate report.

102. Ms Elizabeth Mohammed of the Caribbean Regional Fisheries Mechanism (CRFM) Secretariat made a presentation on the work of CRFM in relation to fish spawning aggregations.

103. The CRFM is an inter-governmental organization which seeks to promote and facilitate the responsible utilization of the region's fisheries and other aquatic resources for the economic and social benefits of the population of the region. Currently the Mechanism comprises seventeen member States, of which spawning aggregations are documented thus far to be of importance to Jamaica, Belize, the Bahamas and Antigua and Barbuda.

104. Through the CRFM Reef and Slope Fish Resource Working Group, which meets at the CRFM Annual Scientific Meetings, data analyses have been conducted for several fisheries targeting snappers (*Lutjanus purpureus*, *L. synagris*), groupers (*Epinephelus guttatus*, *E. striatus*) and other reef and slope species. Management objectives do not focus specifically on fish spawning aggregations, except perhaps in the case of Belize and Jamaica, but address inter alia the need for long-term sustainability of the resource, application of the ecosystem approach, rebuilding depleted fish stocks in nearshore areas, protection of essential fish habitat, regulation of fishing effort, fishing areas and size of fish in the catch and control of the alien invasive species, *Pterois* spp. (Indo-Pacific lionfish).

105. Current management measures include, to varying degrees among member States, effort regulation through licensing systems, mesh size regulation, closed seasons, reduction in ghost fishing and establishment of marine protected areas. Weak monitoring, control and surveillance capability continues to impede effective management. Generally, stock assessment results have been inconclusive due to uncertainties regarding stock identification, distribution and level of sharing

among countries and inadequate catch, effort and biological data. Consequently, to improve the quality of stock assessments and management advice provided, future data collection and research efforts should focus in these areas as well as collection of industry socio-economic data; identification of spawning locations; consideration of environmental data in assessment modelling; biomass, ecological and economic evaluation of fish spawning aggregations, assessment of socio-economic impacts of management measures on fishing communities and examination of alternative livelihood options. Public awareness and education on the need to identify and protect spawning aggregations for long term sustainability of the resource should target decision-making bodies such as the CRFM Ministerial Council as well as direct stakeholders such as the Caribbean Network of Fisherfolk Organizations. The latter could be instrumental in acquiring local ecological knowledge on fish spawning aggregations to inform management.

106. In the discussion that followed the presentation questions were asked about the sub-regional flying fish management plan and when it would come into effect, the effects of fish aggregating devices (FADs) in fisheries, how the working group of CRFM relates to the joint working group with CFMC, OSPECA and WECAFC, and about the need to work jointly on public outreach to increase understanding on spawning aggregations.

#### **PREPARATION AND ADOPTION OF THE REPORT TO WECAFC**

107. The Working Group was presented by the meeting Secretariat with a draft declaration in which the main discussions, conclusions and recommendations from the meeting were combined. The draft declaration was discussed and modified by the Working Group. The final version of the Declaration of Miami, as approved by the Working Group, can be found in Appendix C. The Declaration contains an annex with the recommendation to the sixth session of the Scientific Advisory Group (SAG) of WECAFC and the fifteenth session of WECAFC on the “Establishment of a regional closed season for fisheries in the WECAFC area to protect spawning aggregations of groupers and snappers”. The sixth session of the SAG reviewed and endorsed the Recommendation on 3 November 2013. The Recommendation to the fifteenth session of WECAFC can be found in Appendix D.

#### **CLOSURE OF THE MEETING**

108. Mr Miguel Rolon, on behalf of CFMC, thanked the Working Group members and other meeting participants, the co-organizers, the members of the CFMC/WECAFC meeting Secretariat, chairperson and interpreters for their active participation and their contributions to the success of the meeting.

109. The meeting was declared closed by Mr Rolon, on Thursday 31 October 2013, at 13:00 hours.

**Agenda**

1. Opening of the meeting
2. Election of the Chairpersons and rapporteurs
3. Adoption of the agenda and arrangements for the meeting
4. Global perspective of aggregating snappers and groupers
5. Historical background of WECAFC's Work on Spawning Aggregations of key species
6. Presentations of national status reports by each of the participants
7. Biogeography of Transient Reef Fish Spawning Aggregations in the Caribbean
8. ESA, CITES, SPAW Protocol
9. Working Group Discussions
10. General discussions
11. Preparation and adoption of the report to WECAFC
12. Closure of the meeting

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### Declaration of Miami

The Members of the CFMC/WECAFC/OSPESCA/CRFM Working Group on Spawning Aggregations:

*Recalling* the Terms of Reference of the joint Working Group, as established by the 14<sup>th</sup> session of the Western Central Atlantic Fishery Commission (Panama City, 6–9 February 2012);

*Noting* with concern the ongoing declines in stocks of many aggregating species and particularly groupers and snappers in the Wider Caribbean Region, the reduced numbers of spawning aggregations, the relatively smaller size of remaining aggregations and the resulting reduced economic and food opportunities;

*Having verified* with scientific methods and based on the information available that the status of Nassau Grouper, Goliath Grouper (and several other species) stocks in the Wider Caribbean Region should be considered “overexploited”, and that some stocks can even be regarded as “depleted”;

*Stressing* the high ecological and biological value of fishes that aggregate to spawn (including groupers and snappers) for the ecosystem and aquatic biodiversity in the region, and that fishing down the food web needs to be avoided;

*Noting* that the biological connectivity of both adults and larvae of some species of snapper and grouper are geographically extensive and hence cross national boundaries;

*Mindful* of the importance of groupers and snapper fisheries for local food security and of the social and economic value of these fisheries for coastal communities in the region;

*Noting* that the actual number of fishers targeting spawning aggregations (as opposed to species that have the aggregating habit) is low. Consequently, while management aimed to conserve spawning aggregations may reduce short-term profits for few fishers, it should enhance long-term sustainable fisheries for many other fishers that fish outside of aggregations. As such spawning aggregations are best considered as capital in a savings account that is guarded to allow provision of annual interest (more fish) to the fishery sector when conducted outside of the aggregation period;

*Concerned* about the increasing demand for grouper and snapper in the international market, which will almost certainly further increase fishing pressure on aggregating species in the region and is strongly implicated in illegal, unregulated and unreported trade;

*Reiterating* the recommendations from the CFMC/WECAFC Regional Workshop on Nassau Grouper (Cartagena, Colombia, October 2008), which called for a regional closed season and establishment of regional collaboration on grouper research and management;

*Recognizing* that in recent years, national level management and conservation efforts targeting spawning aggregations and aggregating species have shown mixed results in the Caribbean, and that introductions of closed seasons and/or site closures in some of the countries in the Wider Caribbean region and in other regions have proven successful in protecting aggregations, particularly when networks of such reserves are implemented by neighbouring countries or regionally. Simultaneous sales controls active fisherfolk involvement can also increase effectiveness;

*Recognizing* that fishers and their organizations have a key role in fisheries management and that there is a need for their active involvement in the research, conservation, and adaptive management of spawning aggregations of fishes;

*Recognizing* that many groupers and snappers spawn in multi-species spawning aggregations and that these aggregations are both extremely valuable and extremely vulnerable to overfishing in the absence of management;

*Further recognizing* the efforts at local, national and regional level to conserve aggregating fish species fisheries in line with the FAO Code of Conduct for Responsible Fisheries, the 1995 UN Fish Stocks Agreement, the precautionary approach and the Ecosystem Approach to Fisheries (EAF), the 2009 FAO Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing, the IUCN Red list, a Recommendation to better protect and manage fish spawning aggregations (adopted by the 4th IUCN World Fisheries Congress, 2004), the work of the Science and Conservation of Fish Aggregations (SCRFA), the Statement of Concern adopted by the second Inter-Tropical Marine Ecosystem Management Symposium in March 2003 on aggregations, and the recommendations of the 4th Scientific Meeting and Technical Advisory Committee (STAC) of the SPAW protocol;

*Convinced* that scientific research on aggregating species and spawning aggregations (e.g. local traditional knowledge, specific stock assessment methods, biology, ecology and life cycle, social and economic value, and reference points for conservation and management of aggregating fish species) should continue to inform fisheries decision makers on *inter alia* suitable input and output measures for fisheries management, appropriate harvesting strategies, consistent with the Ecosystem Approach to Fisheries as well as trade controls and measures to enhance capacities for enforcement and compliance;

*Committed* to individually and collectively taking measures and actions to further improve the management and conservation of fish aggregations and aggregating species in the Wider Caribbean Region;

1. RECOMMEND the endorsement and implementation of the enclosed draft Recommendation to the 6th WECAFC Scientific Advisory Group and 15th session of WECAFC on the establishment of a regional suit of harmonized closed seasons for specific species (starting with Nassau Grouper and adding others as appropriate) in the WECAFC area to protect spawning of overexploited aggregating species (see Annex A);
2. RECOMMEND that the range countries collect and share species specific national and international trade data for Nassau Grouper and other fish species that aggregate to spawn;
3. RECOMMEND that WECAFC members propose the listing of species that aggregate to spawn (in particular Nassau Grouper and Goliath Grouper) under Annex III<sup>1</sup> of the SPAW Protocol , to the Scientific and Technical Advisory Committee (STAC);
4. RECOMMEND that WECAFC, CFMC, CRFM and OSPESCA support the development of a regional plan for the management and conservation of fish species that aggregate to spawn (targeting groupers and snappers), in accordance with the best available scientific evidence to be presented to the 16<sup>th</sup> session of WECAFC in 2016 for review, consideration and regional adoption;
5. RECOMMEND that member countries assess the timing, location and status, of all known transient multi-species spawning aggregations. A list of sites should be prioritized for monitoring, conservation and management based on status and institutional capacity for management at each site;

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<sup>1</sup> Containing threatened and endangered species of marine and coastal fauna that may be utilized on a sustainable basis, but for which management measures are necessary in collaboration with other range States.



6. FURTHER RECOMMEND that these assessments be conducted along with local fishers who are presently fishing those aggregations, in part to gather their support and in part to offer economic alternatives to fishing those aggregations;
7. SOLICIT the support for, and the direct and immediate implementation by the countries in the Wider Caribbean Region of the above listed recommendations; and
8. REQUESTS THE RESPECTIVE SECRETARIATS to present this declaration and its annexes for discussion and endorsement to the 15th Session of WECAFC, which is scheduled to be held in Trinidad and Tobago in March 2014, as well as to the next session of the Caribbean Fisheries Forum of CRFM and the next ministerial meeting of OSPESCA and communicate with the SPAW Secretariat for appropriate follow-up.

**Annex A: Recommendation to the sixth WECAFC Scientific Advisory Group  
and fifteenth session of WECAFC**

**ON THE ESTABLISHMENT OF A REGIONAL CLOSED SEASON FOR FISHERIES IN  
THE WECAFC AREA TO PROTECT SPAWNING AGGREGATIONS OF GROUPERS AND  
SNAPPERS**

The Western Central Atlantic Fishery Commission (WECAFC),

*RECALLING* that the objective of the Commission is to promote the effective conservation, management and development of the living marine resources within the area of competence of the Commission, in accordance with the FAO Code of Conduct for Responsible Fisheries, and address common problems of fisheries management and development faced by members of the Commission;

*RECALLING* the recommendations of the Regional Workshop on the Management of Nassau Grouper and the agreement of the 13th session of WECAFC (both held in Colombia, October 2008) with these recommendations on the management of Nassau Grouper;

*REAFFIRMING* its commitments, made at the 14th session, through establishing the CFMC/WECAFC/OSPESCA/CRFM Working Group on Spawning Aggregations with an aim to provide advice on the management and implementation of regional strategies and regulations to protect spawning aggregations and aggregating species;

*RECOGNIZING* the conclusions of the CFMC/WECAFC/OSPESCA/CRFM Working Group on Spawning Aggregations, which convened in Miami, USA, 29-31 October 2013, reviewed the status of some species that aggregate to spawn in the WECAFC Area and discussed a large variety of management and conservation options;

*CONSIDERING* that the Scientific Advisory Group (SAG) at its 6th Session assessed that several fish species that aggregate to spawn (in particular Nassau Grouper and Goliath Grouper) are overexploited, some with a high risk of collapse, and that sustainable management requires that measures aimed at limiting the fishing of spawning aggregations and aggregating species are implemented;

*NOTING* that both the Working Group and the SAG advise of the need to establish a harmonized regional closed season for commercial and recreational fisheries of fish species that aggregate to spawn;

*NOTING* that both the Working Group and the SAG advise the WECAFC members to establish year round no-take marine protected areas at known transient multi-species spawning aggregation sites;

*RECOGNIZING* that various WECAFC members have already established closed seasons for commercial grouper fishing and/or closed areas to protect spawning aggregations;

*NOTING* that many of the spawning aggregations of grouper and snapper in the Caribbean have seriously declined or disappeared in the last two decades and that immediate action is required to stop further reduction in spawning areas and depletion of the stocks;

*CONSIDERING* that current management and conservation efforts targeting spawning aggregations and addressing aggregating species have shown mixed results in the Caribbean, and that application of closed seasons in other regions has proven to be successful when implemented regionally, it is fundamental to limit the fishing effort in areas where adults of important species aggregate to spawn to allow these stocks to reproduce, and, in many cases to recover, thereby allowing for their sustainable exploitation and ongoing contribution to long-term food security and social and economic objectives of the governments in the WECAFC region;

*CONSIDERING* that more scientific information and research is needed with a view to better understanding the relevance of areas on the continental shelf and slope for the protection of spawners in known aggregations and sensitive habitats, as well as to better know the level and spatial distribution of the fishing effort exerted on aggregating species in general;

*PENDING* the delivery of this additional information by the Working Group and the SAG;

*ADOPTS* in conformity with the provision of Article 6 (h) of the Revised Statutes of the WECAFC the RECOMMENDATION that:

1. Members of WECAFC [shall] identify and monitor all known and exploited spawning aggregation areas of groupers and snappers and inform the SAG of any changes in these areas.
2. Members of WECAFC [shall] issue a regional seasonal closure for all commercial and recreational fishing activities of Nassau Grouper (*Epinephelus striatus*) in the identified areas for the period 1 December – 31 March.
3. For the fisheries restricted area referred to in paragraph 1 above, Members [shall] call the attention of the appropriate national and international authorities in order to protect spawning aggregations from the impact of any other human activity jeopardizing the spawning aggregation areas, and ensure enforcement of closed seasons during the reproductive period, if necessary by also implementing sales bans during the closed season.
4. Members of WECAFC [shall] not permit any export of Nassau grouper and Nassau grouper products (e.g. roe, fillets) for the duration of the regional seasonal closure.
5. Member shall conduct research to ascertain the ecological, social and economic impacts of the proposed management measures to inform future management decision-making.
6. Members [shall] prepare national grouper and snapper fisheries management and conservation plans.
7. Members [shall] communicate to the WECAFC Secretariat the measures taken to adhere to the above paragraphs.
8. The WECAFC Secretariat [shall], together with the Members, establish an outreach and communication campaign on the closed areas and regionally agreed closed season.
9. The WECAFC Secretariat [shall], together with the Members, seek to mobilize resources to assist the Members in the implementation of research, monitoring and management measures.
10. Boundaries of the identified spawning areas, spawning seasons and conditions to fish therein, as referred to in previous paragraphs may change on the basis of Working Group and SAG advice coming from additional knowledge.

11. WECAFC, CFMC, and as appropriate CRFM and OSPESCA, [shall] support the development of a regional plan for the management and conservation of fish species that aggregate to spawn (targeting groupers and snappers), in accordance with the best available scientific evidence to be presented to the 16th session of WECAFC in 2016 for review, consideration and regional adoption.
12. Members [shall] assess the timing, location and status, of all known transient multi-species spawning aggregations. A list of aggregations should be prioritized for monitoring, conservation and management based on status and institutional capacity for management at each site.
13. Members [shall] conduct assessments along with local fishers who are presently fishing those aggregations, in part to gather their support and in part to offer economic alternatives to fishing those aggregations.
14. Members [shall] solicit support for direct and immediate implementation by the countries in the Wider Caribbean Region of the above listed recommendations.

**Terms of Reference of the CFMC/WECAFC/OSPESCA/CRFM Working Group  
on Spawning Aggregations**

Convener: Miguel Rolón (CFMC)

The working group will carry out the following tasks:

- Compile and analyze data on spawning aggregations in the member countries and monitor any changes.
- Seek partnerships with other institutions that could provide assistance in the monitoring, evaluation, and recommendations for management for protection and conservation of spawning aggregations.
- Provide advice on the management and implementation of regional strategies and regulations to protect spawning aggregations.
- Report to the appropriate institutions at each session.

The first meeting of the CFMC/WECAFC/OSPESCA/CRFM Working Group on Spawning Aggregations, was held in Miami, United States of America, from 29 to 31 October 2013. The meeting brought together experts working on spawning aggregations of fish from all over Western Central Atlantic region. The Working Group noted with concern the ongoing declines in stocks of many aggregating species and particularly groupers and snappers in the Wider Caribbean Region, the reduced numbers of aggregations and the relatively smaller size of remaining aggregations. The Working Group also verified that the status of Nassau grouper, Goliath grouper (and several other species) stocks in the Wider Caribbean region should be considered “overexploited”, and that some stocks can even be regarded as “depleted”. The meeting issued a “Declaration of Miami”, which included a recommendation to the fifteenth session of WECAFC on the establishment of a regional closed season for Nassau Grouper fisheries in the WECAFC area to protect spawning aggregations of this species.

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