SERO Protected Resources Division's Briefing Document
September 2018 SAFMC Meeting

ESA Recovery News

Nassau Grouper Recovery Outline Completed [New]

- NOAA Fisheries has completed a Nassau grouper recovery outline and it is available at https://www.fisheries.noaa.gov/resource/document/nassau-grouper-recovery-outline
- The recovery outline serves as an interim guidance document to direct recovery efforts, including recovery planning, for the threatened Nassau grouper (81 FR 442286; June 226, 2016) until a full recovery plan is developed and approved.
- The recovery outline presents a preliminary strategy for recovery of the species and recommends high priority actions to stabilize and recover the species.
- The initial focus is to abate removal of adults from the spawning aggregations. With SAWG assistance and the authority of the SPAW protocol, the following actions will be urgently pursued:

Endangered Species Act (ESA) Listing Actions and Other Rulemaking

Sea Turtle Conservation and Recovery Actions in Relation to the Southeastern United States Shrimp Fishery [No change]

- On December 16, 2016, NOAA Fisheries published a proposed rule that, if implemented, would require all shrimp trawlers using skimmer trawls, pusher-head trawls, and wing nets to use TEDs designed to exclude small turtles in their nets.
- The Final Rule is back under development in SERO.

ESA Section 7-Related Actions and News

FMP Consultations [No change]

- Section 7 consultations on SA and Joint SA/Gulf of Mexico FMPs (Wahoo, Spiny Lobster FMPs) have been/will be reinitiated to address newly listed species/DPSs. With multiple SERO fisheries consultations reinitiated in the Southeast to address recent revised/new listings (e.g., Oceanic whitetip, Giant Manta Rays); consultation timelines are/will be extended.

Marine Mammal Protection Act (MMPA) Actions and News

North Atlantic Right Whale Unusual Mortality Event (UME) [No change]

- Elevated North Atlantic right whale mortalities began in 2017, primarily in Canada, and were declared a UME. In 2017 a total of 17 confirmed dead stranded whales (12 in Canada; 5 in the U.S.), and five live whale entanglements in Canada have been documented. As of February 1, 2018, one whale stranded in the United States bringing the total mortalities to 18 confirmed dead stranded whales (12 in Canada; 6 in the U.S.). More information on this UME is provided at: https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2018-north-atlantic-right-whale-unusual-mortality-event.
- The most recent North Atlantic right whale population estimate is about 458 whales, which is up from around 270 in 1990, but has shown a consistent decline since the 2010 estimate of 483.

Humpback Whale UME [No change]

- Since January 2016, elevated humpback whale mortalities have occurred along the Atlantic coast from Maine through Florida. Partial or full necropsy examinations were conducted on approximately half of the whales. Of the whales examined at necropsy about 50% had evidence of human interaction, either ship strike or entanglement. These findings are not consistent across all of the whales examined, so more research is needed.

Minke Whale UME [No change]

- Since January 2017, elevated minke whale mortalities have occurred along the Atlantic coast from Maine through South Carolina. While minke whales are protected under the MMPA, the species is not listed as endangered or threatened under the ESA.
- Full or partial necropsy examinations were conducted on over 60% of the whales. Preliminary findings in several of the whales have shown evidence of human interactions or infectious disease. These findings are not consistent across all of the whales examined, so more research is needed.
- As part of the UME investigation process, NOAA is assembling an independent team of scientist to coordinate with the Working Group on Marine Mammal UMEs to review the data collected, sample stranded whales, and determine the next steps for the investigation.

Pelagic Longline Take Reduction Plan Proposed Rule Development [No change]

- SERO is working on a proposed rule to update regulatory and non-regulatory requirements of the Pelagic Longline Take Reduction Plan based on consensus recommendations from the Pelagic Longline Take Reduction Team after meetings in December 2015 and September and October 2016 (recommendations can be found in the Key Outcomes Memorandums at http://www.nmfs.noaa.gov/pr/interactions/trt/pl-trt.html).

Bottlenose Dolphin Take Reduction Plan [No change]

- The Bottlenose Dolphin Take Reduction Team (Team) was convened for an in-person meeting on December 5-7, 2017, to discuss modified or additional conservation measures to reduce gillnet bycatch of bottlenose dolphin estuarine stocks in North Carolina to levels required by the MMPA. The Team provided NOAA Fisheries with consensus recommendations for additional conservation measures, particularly related to North Carolina gillnet fisheries.

NOAA FISHERIES
Protected Resources

RECOVERY OUTLINE

NASSAU GROUPER

This outline is meant to serve as an interim guidance document to direct recovery efforts, including recovery planning, for the threatened Nassau grouper (81 FR 42286; June 26, 2016) until a full recovery plan is developed and approved. A preliminary strategy for recovery of the species is presented here, as are recommended high priority actions to stabilize and recover the species.

This Recovery Outline commences our recovery planning process. The Recovery Outline is intended primarily for internal use by NOAA Fisheries as a preplanning document. Formal public participation in recovery planning for the Nassau grouper will be invited when a Recovery Plan is developed. However, any new information or comments that members of the public may wish to offer as a result of this Recovery Outline will be taken into consideration during the recovery planning process. Interested parties may contact Stephania Bolden 727-824-5312; stephania.bolden@noaa.gov.

INTRODUCTION

This document presents the broad, preliminary outline for the recovery of the Nassau grouper. A recovery team will be assembled for these species to inform the Recovery Plan, which will provide a complete roadmap for activities necessary to recover the species so they no longer need the protections of the Endangered Species Act (ESA). Meanwhile, this outline will serve to guide recovery-planning efforts and provide information for ESA Section 7 consultations, permitting activities, and conservation efforts until the formal Recovery Plan has been developed, finalized, and approved.

Listing information:

Scientific Name:	*Epinephelus striatus*
Common Name:	Nassau grouper
Listing Classification:	Threatened
Listing Date:	June 26, 2016 (81 FR 42286)
Lead Agency:	National Marine Fisheries Service (NOAA Fisheries)
Lead Office:	Southeast Regional Office, St. Petersburg, Florida
Contact Biologist:	Stephania Bolden, 727-824-5312,

Available information on the life history, range, and habitat requirements of the Nassau grouper is described in the listing rule (81 FR 42286). The most significant uncertainties with respect to setting recovery objectives and prioritizing recovery actions include the following: current and historical distribution and abundance of spawning aggregations; domestic and international trade, impact and extent of fishing on aggregations, and distribution and success of recruits.

RECOVERY NEEDS ASSESSMENT

BIOLOGICAL ASSESSMENT

Recovery implications of the species' demographic and genetic status

Nassau grouper occur in Bermuda and Florida, throughout the Bahamas and the Caribbean Sea (Figure 1). Their distribution within Florida is from Cape Canaveral south through the Florida Keys and Florida Bay westward to the Dry Tortugas and Pulley Ridge. They are fairly uncommon in Florida, with mixed accounts of historical abundance, and are considered rare in the Gulf of Mexico. As with most large marine fishes, Nassau grouper demonstrate a bi-partite life cycle with demersal adults and juveniles but pelagic eggs and larvae.

Figure 1. Range of Nassau grouper (*Epinephelus striatus*).

Nassau grouper as adults are considered a sedentary and solitary reef-fish. Both adults and juveniles are generally associated with both artificial and natural high-relief coral reefs and hardbottom. Juveniles (~15-30 cm TL) are relatively solitary and can remain in specific areas for extended periods (Bardach 1958). While there is no clear distinction between habitat-types for juvenile and adult (>30 cm TL) Nassau grouper, they become size-segregated by depth; smaller fish are found in shallow inshore waters and larger individuals more common on deeper offshore reefs up to 130 m depth.

Early juveniles (~4.5-15 cm TL) are found nearshore on both natural and artificial reef structures in coral clumps and seagrass beds (Eggleston 1995), in debris (e.g., conch shells) and tilefish rubble mounds, and around *Thallasia* beds. The smallest fish (~2.5 – 5 cm TL), recruit from the oceanic environment into demersal habitat primarily within coral clumps covered by masses of macroalgae (*Laurencia)*, in areas of coarse calcareous sand habitats (Colin 1992; Eggleston 1995).

Before settling out of the water column into the nearshore habitats, Nassau grouper are planktonic as larvae for a mean of 35-40 days (Colin 1992). Movement of these larval Nassau grouper during this 5-6 week period is likely a result of prevailing winds, current, and lunar phase (Shenker et al. 1993). Water circulation in the Caribbean is complex (Figure 2) with regular occurrences of eddies and meanders. The buoyance of the eggs carried by the water currents and the long pelagic (egg + larvae) duration leads to dispersal of Nassau grouper larvae throughout the Caribbean Sea.

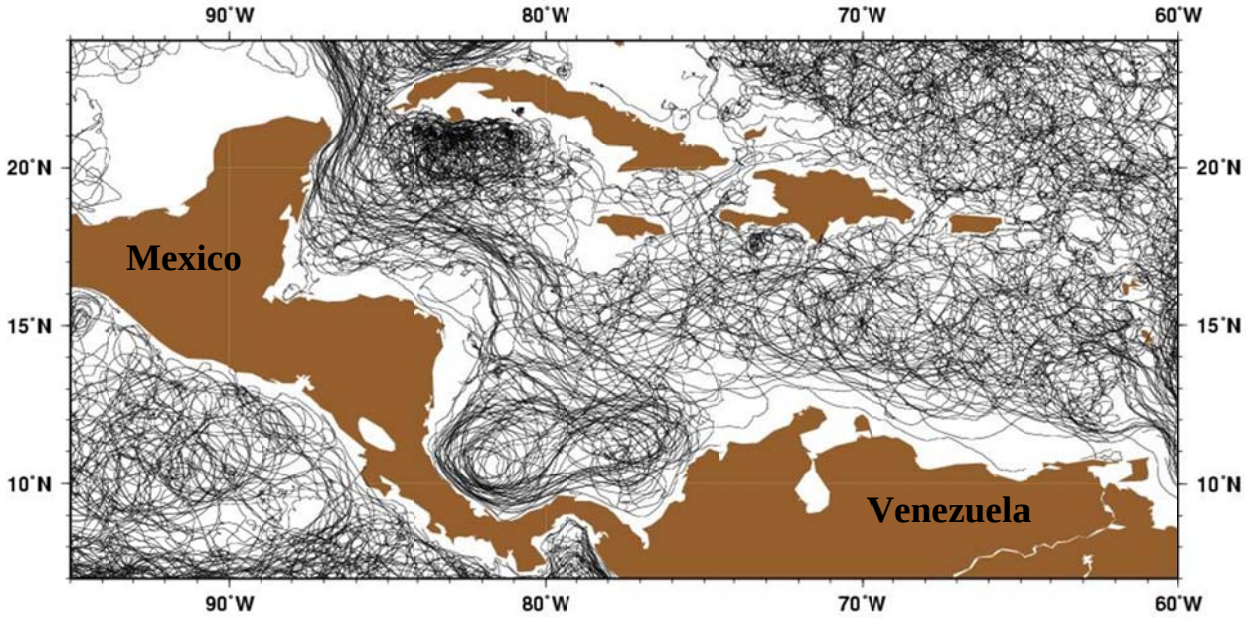

Figure 2. The trajectories of all of the NOAA AMOL Drifting Buoy Data Assembly Centers archived near-surface buoys from 1978 to June, 2003 in the Caribbean Sea. The data density or the amount of drifting buoy data in each region is large where the trajectories overlay and are darkest.

Nassau grouper spawn annually in highly synchronized, transient aggregations that form around the full moon of November through February when mature adults (age 4-8 years at about 50 cm TL) move from their resident reef and gather at predictable locations. Around sunset groups of 3-25 fish will rush up into the water column and release gametes (sperm and eggs) and then quickly return to the bottom. Repeated spawning occurs at the same site for up to three consecutive months but participation by individual fish across months is unknown. All know reproductive activity occurs at these spawning aggregations.

Of the 50 Nassau grouper spawning aggregations historically identified throughout the Caribbean, less than 20 probably remain (Sadovy de Mitcheson et al. 2008). In addition to a reduction in the number of spawning aggregations, the number of Nassau grouper within each aggregation has also been greatly reduced (Sadovy de Mitcheson et al. 2008). Population declines and loss of spawning aggregations continue throughout the Nassau grouper's range (Sadovy de Mitcheson 2012). The information available regarding re-establishment of spawning aggregations is limited and the mechanisms unknown (Stevenson et al. 1998). While most extirpated sites show no sign of recovery, a few historic sites are showing potential re-establishment (USVI and Puerto Rico) or positive trends (i.e., Cayman Islands). Based on the size and number of current spawning aggregations, the Nassau grouper population appears to be just a fraction of its historical size.

While the link between adult spawning sites and larval settlement sites is not understood, genetic analysis of Nassau grouper tissue indicates high gene flow and connectivity (Hateley 2005; Sedberry et al. 1996; Bernard et al. 2016; Sherman et al. 2017) across the region. DNA sequencing indicates extensive gene exchange across the region given the lack of genetic differentiation across spawning aggregation sites indicating contemporary genetic connectivity. A comparison of spawning adults to nearby juveniles found no parent-offspring matches indicating self-recruitment was not occurring (Bernard et al. 2016). Although the relative contribution of local and foreign recruitment is not well understood, collectively this information suggests that external recruitment is likely contributing across populations.

THREATS ASSESSMENT

What are the recovery implications of the threats facing the species?

Fishing is the major threat to Nassau grouper. The lack of effective regulations and enforcement to limit overexploitation of Nassau grouper exacerbates the negative effect of fishing. To ensure successful recruitment, habitat for all life stages must be available across the range.

Both historical harvest and contemporary fishing at spawning aggregations have reduced the number of Nassau grouper. Impacts of historical harvest continue as the removal of the long-lived adults reduces future productivity. Fishing occurs both during the winter spawning period and during non-spawning months, at both aggregation sites and at reefs. Harvesting species during its reproductive period increases adult mortality and diminishes recruitment rates – both factors that can greatly increase the risk of extinction.

Nassau grouper are particularly vulnerable to over-exploitation because of their reproductive biology: they are long lived and take many years to reach sexual maturity making them vulnerable to fishing for many years before reproducing. Spawning aggregations make adults an easy and highly predictable targets for fisheries (Sadovy and Domeier 2005), allowing a large proportion of the adult population to be captured over a very short period of time. While a long life-span allows multiple opportunities to contribute to future generations, it increases repeated exposure to removal by fishers at the spawning aggregation sites. Removing Nassau grouper leads not only to a loss of individual spawning potential, but heavy fishing has reduced density to a point that some Nassau grouper spawning aggregations no longer forming at traditional sites (Sadovy and Eklund 1999). Loss of a spawning aggregation would in turn lead to absence of local larvae dispersed through the oceanic currents, eventually impacting the spatial structure of Nassau grouper. Habitat to support larval settlement and growth to the adult stage across the Caribbean Sea is also necessary to support spatial structure.

Reducing the number of Nassau grouper taken by fishing is essential to recovery. Over-exploitation via fishing was the major threat identified in the listing of the Nassau grouper. Fishery management regulations to protect Nassau grouper across their range vary greatly and there are many inconsistencies in the suite of management measures (closed seasons, closed areas, gear and effort restrictions) prescribed throughout the Caribbean. For example, all countries except for the U.S. allow fishing for Nassau grouper outside of their spawning period. In addition to inconsistencies, Nassau grouper continue to decline because of difficulties implementing these regulations (Sadovy de Mitcheson et al. 2013).

Poaching of Nassau grouper from the spawning aggregations is known to occur throughout the Caribbean. The large geographic area, coupled with the predictable aggregations sites creates an enforcement challenge for fisheries departments with limited budget, boats, and personnel. Fish houses oftentimes purchase frozen fish that were held and marketed as legal capture. Fishers have recommended improved monitoring control and surveillance during the open and closed seasons. Without improved compliance with fishery closures, illegal and unmonitored fishing and trade will continue to reduce Nassau grouper abundance and impede conservation.

Ensuring habitats necessary for successful recruitment of larvae through the mature reef-dwelling adults is also essential to recovery of the Nassau grouper. As currents carry and disperse larvae from the spawning aggregations, inshore algal beds are necessary for larvae to settle. As the Nassau grouper grow and move from the off-reef habitat to the adjacent reef habitats, successive habitats to support growth and maturity must also be available. Although ranked as a “low” risk to the species, loss of nearshore habitat and changes in water quality could negatively impact survival and growth of local recruits. The information needed to accurately identify these settlement and growth areas for local recruitment of Nassau grouper is not currently available. However, the International Union for Conservation of Nature

(IUCN) states that of the estimated 20,000 km² of coral reef in the Caribbean, 29% is estimated to be under high risk of degradation from human activities, 32% is at medium risk and 39% is at low risk (Bryant et al. 1998).

CONSERVATION ASSESSMENT

What steps have been taken to address the species' recovery needs?

Various governmental agencies, groups, and individuals are carrying out a number of efforts aimed at protecting and conserving the Nassau grouper. The broadest and most effective approach to harmonized regional conservation is the Spawning Aggregations Working Group (SAWG) through the FAO Western Central Atlantic Fishery Commission (WECAFC). The SAWG was established to seek partnerships, provide advice and implement regional strategies and regulations to protect spawning aggregations. While non-regulatory, the SAWG works directly with all the member countries and other regional partner institutions; Nassau grouper are present in about 35 countries in the wider Caribbean. The recent SAWG meeting (2018) resulted in both a list of Recommendations and a 2-year Work Plan that will guide regional efforts for protection and conservation of spawning aggregations. Funds to support tasks in the work plan are being sought and dedicated by governmental agencies and conservation groups.

Individual countries within the region enact fishing regulations. Conservation groups have provided funds for survey and enforcement of Nassau grouper spawning aggregations. Classroom materials describing the vulnerability of Nassau grouper and their importance to the economy have been developed. In 1996 Nassau grouper were identified as endangered by the IUCN and placed on the Red List for species at a high risk of global extinction based on a high rate of decline in population size. IUCN estimated that the population has declined by approximately 60% over the last three generations (27-30 years). Responding to the trans-boundary nature of the fisheries, and realizing the need to establish regional co-operation and protection, Nassau grouper were added to Annex III of the Specially Protected Areas and Wildlife (SPAW) under the Cartagena Convention in March 2017.

SUMMARY ASSESSMENT

There is urgency for region wide conservation of Nassau grouper. The continuing decline of Nassau grouper across the region has a compounding effect: removing spawning individuals leads to a loss of reproductive output and a decline in abundance leads to the long-term loss of spawning aggregations. Despite conservation actions being in place for years, the species shows little sign of recovery. Further reduction in the number and abundance of spawning aggregations endangers the continued existence of the Nassau grouper. Conservation and recovery of Nassau grouper requires a two-prong approach. First, reproduction and recruitment is essential; spawning aggregations must continue to function throughout the range to provide larvae. Second, ensuring appropriate habitat is available for settlement and growth across the Caribbean Sea is necessary for recovery.

PRELIMINARY RECOVERY STRATEGY

RECOVERY PRIORITY NUMBER WITH RATIONALE

Nassau grouper should be assigned a recovery priority of 3 as they have a high potential for recovery. The major threat of fishing on the spawning aggregation sites is understood and existing regulations, when enforced, will be highly effective. There is demonstrated success of increasing abundance at a few spawning sites with enforcement. The U.S. has led efforts to

utilize existing international treaties (i.e., SPAW) to highlight and abate the major threat of fishing.

RECOVERY VISION STATEMENT

Nassau grouper spawning aggregations will occur across their historical range in numbers sufficient to produce larvae to increase adult abundance. These aggregations must be of sufficient size and distribution to support successful larval recruitment across the range. In turn, the growth of juveniles to the sub-adult and adult life stages must increase and be maintained over many years in order to realize an increase of reproductive adults in the spawning aggregations. Recovery will require conservation of habitats for all life stages.

INITIAL ACTION PLAN

The initial focus is to abate removal of adults from the spawning aggregations. With SAWG assistance and the authority of the SPAW protocol, the following actions will be urgently pursued:

- Building awareness and a constituency for conservation of Nassau grouper spawning aggregations through outreach and education highlighting the importance of preserving reproductive output for future fishery.
- Ensuring consistent regulations across the region during the spawning period.
- Trade assistance both during and after the aggregation period to ensure only legally caught fish are marketed.
- Decreasing fishing pressure through increased enforcement of existing regulations.

Other actions that should be undertaken early in the process include the following:

- Managing region-wide removal of adult Nassau grouper outside spawning period to ensure growth overfishing does not occur.
- Identifying and assessing status of spawning aggregations across the region using standardized methods.
- Developing and adopting country-specific national fisheries management and conservation plan for Nassau grouper.
- Improving understanding of larval and adult connectivity through research.
- Gathering information regarding domestic and international trade.

Recovery actions needed in the longer term may also include:

- Identification and conservation of larval settlement and nursery habitat and adjacent reefs.
- Investigate impacts of rising sea surface temperature on larval success.
- Monitor population dynamics given longevity of the species.
- Mechanisms regarding site fidelity and homing to both reefs and spawning aggregation sites.

PREPLANNING DECISIONS

PLANNING APPROACH

A Recovery Plan will be prepared for the Nassau grouper pursuant to Section 4(f) of the ESA. Coordination with the SAWG is necessary to ensure region wide adoption of the conservation plan.

INFORMATION MANAGEMENT

All information relevant to recovery management of the Nassau grouper will be housed in NOAA Fisheries Southeast Regional Office's administrative files.

STAKEHOLDER INVOLVEMENT

Key stakeholders:
WECAFC and its member countries
National, federal, state, territorial, and local agencies
Domestic and foreign universities and research organizations
Domestic and foreign conservation organizations

Stakeholder involvement strategy:
Management actions outside of the U.S. are necessary for the conservation and recovery of Nassau grouper as both larvae and adults move across international borders. Using the existing SAWG is a practical approach to seek cooperation and ensure coordination with other countries within the range of the Nassau grouper. Including individuals or representative of agencies from other nations will greatly assist in adoption and success of recovery planning. Coordinating recovery meetings in association with other planned events (e.g., Gulf and Caribbean Fisheries Institute, WECAFC) will assist in travel costs and managing schedules; using online video conferencing such as Skype and Zoom for international communication can support discussions. All stakeholders will be afforded an opportunity to review and comment on a draft of the Recovery Plan in conformance with the ESA. Stakeholders may also be asked to contribute directly in the development of implementation strategies for planned actions.

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