Determining the Need for Conservation and Management and Designation of Ecosystem Component Species

prepared for the
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Background

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) section 302(h)(1) requires that a Council prepare a fishery management plan (FMP) for each fishery under its authority that requires conservation and management. Not every fishery requires federal management. Any stocks that are predominately caught in federal waters and are overfished or subject to overfishing, or likely to become overfished or subject to overfishing, are considered to require conservation and management (50 CFR § 600.305(c)(1)). Beyond such stocks, Councils may determine that additional stocks require "conservation and management." (see Magnuson-Stevens Act definition at 16 U.S.C. 1802(5)). Based on this definition, and other relevant provisions of the Magnuson-Stevens Act, a Council should consider the following non-exhaustive list of factors when deciding whether additional stocks require conservation and management:

1. The stock is an important component of the marine environment.
2. The stock is caught by the fishery.
3. Whether an FMP can improve or maintain the condition of the stock.
4. The stock is a target of a fishery.
5. The stock is important to commercial, recreational, or subsistence users.
6. The fishery is important to the Nation or to the regional economy.
7. The need to resolve competing interests and conflicts among user groups and whether an FMP can further that resolution.
8. The economic condition of a fishery and whether an FMP can produce more efficient utilization.
9. The needs of a developing fishery, and whether an FMP can foster orderly growth.
10. The extent to which the fishery is already adequately managed by states, by state/federal programs, or by federal regulations pursuant to other FMPs or international commissions, or by industry self-regulation, consistent with the requirements of the MSA and other applicable law.

Adding a stock to an FMP

Guidance in §600.305 (c)(3) further specifies that when considering adding a stock to an FMP, no single factor is required. One or more of factors 1 through 10 above, and any additional considerations that may be relevant to the stock, may provide the basis for determining that a stock requires conservation and management.

Based on factor 3 (whether an FMP can improve or maintain the condition of the stock), if the amount and/or type of catch that occurs in Federal waters is a significant contributing factor to the stock's status, such information would weigh heavily in favor of adding a stock to an FMP. However, Councils should consider factor 10 (the extent to which the fishery is already adequately managed by states or other entities) before deciding whether to include a stock in an FMP. In many circumstances, adequate management of a fishery by states, state/Federal programs, or another Federal FMP would weigh heavily against a Federal FMP action.

The South Atlantic Council has not added any stocks to the original FMPs for species under its jurisdiction.

Ecosystem Component Designation

While there is no mention of "ecosystem component" (EC) species in the MSA, the basis for the concept presumably is derived from multiple references to "ecosystem" and the authority for Councils "to conserve target and non-target species and habitats" through FMPs. Guidance on EC species is in the National Standard Guidelines where EC species are defined as "stocks that a Council or the Secretary has determined do not require conservation and management, but desire to list in an FMP in order to achieve ecosystem management objectives."

The South Atlantic Council initially designated EC species in the Snapper Grouper FMP (through the Comprehensive ACL Amendment) in 2012. Additional species were designated as such in Amendment 35 to the FMP in 2016. The Council is currently moving forward with designating bullet mackerel and frigate mackerel as EC species in the Dolphin Wahoo FMP. Species that are currently designated as EC in the South Atlantic are in **Table 1**. See **Appendix A** for additional details on EC designations of South Atlantic Council managed species.

Table 1. Species currently designated as ecosystem components in the South Atlantic.

Species	FMP	Amendment
Cottonwick	Snapper Grouper	Comprehensive ACL Amendment
Longspine Porgy	Snapper Grouper	Comprehensive ACL Amendment
Bank Sea Bass	Snapper Grouper	Comprehensive ACL Amendment
Rock Sea Bass	Snapper Grouper	Comprehensive ACL Amendment
Ocean Triggerfish	Snapper Grouper	Comprehensive ACL Amendment

In October 2019, the South Atlantic Council's Scientific and Statistical Committee (SSC) recommended EC designation for the following species currently managed under the Snapper Grouper FMP: Cubera Snapper, Margate, Sailor's Choice, Coney, Yellowfin Grouper, and Saucereye Porgy. The SSC made this recommendation for these species "as they are not targeted

by the fishery and do not require management as a separate stock or member of a species complex".

Removing a stock from an FMP

The language at 50 CFR § 600.305(c)(4) states that when considering removing a stock from, or continuing to include a stock in, an FMP, Councils should prepare a thorough analysis of factors 1-10, and any additional considerations that may be relevant to the particular stock. Further, the guidance reiterates that if the amount and/or type of catch that occurs in Federal waters is a significant contributing factor to the stock's status, such information would weigh heavily in favor of continuing to include a stock in an FMP.

In addition, factors 1-3 should be considered first, as they address maintaining a fishery resource and the marine environment. These factors weigh in favor of continuing to include a stock in an FMP. Councils should next consider factors 4-9, which set forth key economic, social, and other reasons contained within the MSA for an FMP action. Finally, a Council should consider factor 10 before deciding to remove a stock from, or continue to include a stock in, an FMP. In many circumstances, adequate management of a fishery by states, state/Federal programs, or another Federal FMP would weigh in favor of removing a stock from an FMP.

The Council has removed several species from federal management (see **Appendix B** for detailed rationale and additional information on species that have been removed from federal management in the South Atlantic region):

- Red drum was removed from federal management in 1990.
- Thirteen species (French Grunt, Spanish Grunt, Yellow Jack, Grass Porgy, Porkfish, Puddingwife, Bluestriped Grunt, Sheepshead, Crevalle Jack, Black Margate, Queen Triggerfish, Tiger Grouper, and Smallmouth Grunt) were removed from the Snapper Grouper FMP in 2012 through implementation of the Comprehensive ACL Amendment.
- Four species (Bluefish, Cero Mackerel, Little Tunny, and Dolphin), which were originally included in the Coastal Migratory Pelagics FMP for data collection purposes, were removed from the FMP in 2012 through implementation of Amendment 18.
- One species (Blue Runner) was removed from the Snapper Grouper FMP in 2013 through implementation of Amendment 27.
- Four species (Black Snapper, Mahogany Snapper, Dog Snapper, and Schoolmaster [previously designated as EC species]) were removed from the Snapper Grouper FMP in 2016 through implementation of Amendment 35.
- Atlantic Migratory Group Cobia was removed from the Coastal Migratory Pelagics FMP in 2019 through implementation of Amendment 31.

Possible tools/data/methods to evaluate need for conservation and management

Is the stock an important component of the marine environment (**factor #1**)?

- *Predator/prey relationships, diet composition -- published and gray literature and Ecopath model inputs*

Is the stock is caught by the fishery (**factor #2**)?

- *Composition of landings – would need to determine a threshold that satisfies this criterion.*

Could an FMP improve or maintain the condition of the stock (**factor #3**)?

- *Stock assessment or life history information if an assessment is not available*
- *Modified risk analysis (SAFMC methodology, see **Appendix C**)*

Is the stock the target of a fishery (**factor #4**)?
Is the stock is important to commercial, recreational, or subsistence users (**factor #5**)?
Is the fishery is important to the Nation or to the regional economy (**factor #6**)?

- *Landings (federal and state) and value*
- *Fishery Performance Reports/information from fishermen (APs)*
- *If OY is known, evaluate whether the fishery is obtaining OY*

Is there a need to resolve competing interests and conflicts among user groups and could an FMP further that resolution (**factor #7**)?

- *Management issues for the candidate species (e.g., spatio-temporal factors affecting accessibility)*

What is the economic condition of the fishery and could an FMP produce more efficient utilization (**factor #8**)?
What are the needs of the developing fishery, and could an FMP foster orderly growth (**factor #9**)?

- *Trends in landings and value*
- *Cost/benefit analysis*
- *Management efforts vs. fishery production and risk of overfishing*

To what extent is the fishery already adequately managed by states, state/federal programs, or by federal regulations pursuant to other FMPs or international commissions, or by industry self-regulation, consistent with the requirements of the MSA and other applicable law (**factor #10**)?

- *Management history*
- *Location of landings (federal vs. state waters)*

If evaluation of the 10 factors above indicates a species *does not* need conservation and management through a federal FMP, the Council can determine whether EC designation is appropriate if:

1. The species is not a targeted species or stock
    - *Is the species listed as a target species in MRIP?*

- *Is the species the primary species landed (>50% of the catch or highest value/weight/number of kept fish on trip)*

2. The species is not subject to overfishing, approaching overfished, or overfished
   - *Determine through assessment if available*
3. The species is not likely to become subject to overfishing or overfished, according to the best available information, in the absence of conservation and management measures
   - *Modified risk analysis (SAFMC methodology, see **Appendix C**)*
4. The species is not generally retained for sale or personal use
   - *Release-to-kept ratio?*
   - *Landings?*

In addition, the Council must determine whether EC designation would be beneficial "to achieve ecosystem management objectives". The Vision Blueprint for the Snapper Grouper Fishery (adopted in 2015) includes the following objectives:

- Promote data collection and analysis to support ecosystem and habitat considerations for the snapper grouper fishery.
- Support management measures that incorporate ecosystem and habitat considerations for the snapper grouper fishery.

Next steps/Guidance from the Council

Does the Council want to further explore?

1. Developing a policy for when to add, remove, or designate species as EC?

2. Consider adding species to an FMP?
   Guidance from December 2019 meeting was to possibly include African pompano and barrelfish in the Snapper Grouper FMP
   False Albacore (Mackerel Cobia AP Recommendation)

3. Removing species from management?

4. Pursue EC status?
   SSC recommendations: Cubera Snapper, Margate, Sailor's Choice, Coney, Yellowfin Grouper, and Saucereye Porgy.

Appendix A. History of Management for Ecosystem Component (EC) Species

The Council initially designated EC species in the Comprehensive ACL Amendment in 2012. The Council selected candidate species for this designation based on them meeting three out of the four criteria included in the National Standard 1 (NS 1) Guidelines. The NS1 guidelines pertaining to ecosystem component species (74 FR 3178; Section 50 CFR 600.310 (d) (5) (i)) indicate a species should meet four criteria to be considered for classification as an EC species if it is:

1. not a targeted species or stock;
2. not determined to be subject to overfishing, approaching overfished, or overfished;
3. not likely to become subject to overfishing or overfished, according to the best available information, in the absence of conservation and management measures; and
4. not generally retained for sale or personal use.

Comprehensive Annual Catch Limit (ACL) Amendment

To determine if a species could be considered as an ecosystem component species, the four criteria identified in the NS1 guidelines were scored a 1 (does not meet criteria) or 0 (meets criteria) for each of the four components.

Scoring of non-target species or stock was based on landings (commercial and recreational). If landings met the threshold of less than or equal to 10,000 lbs, a score of 0 was provided. Species with landings greater than 10,000 lbs were scored a 1.

If a species had a stock assessment, and the assessment indicated a status of overfishing or overfished, a score of 1 was provided. If a species had no stock assessment, or if there was a stock assessment but the assessment indicated that the species was not overfished/overfishing, a score of 0 was provided. The likelihood of becoming overfished or undergoing overfishing was based on a Productivity and Susceptibility Analysis (PSA) score provided by MRAG Americas, which suggests vulnerability to overfishing or becoming overfished (MRAG 2009). A score ranges from 1 to 3 for high to low productivity and 1-3 for low to high susceptibility. Productivity factors include life-history characteristics of the species such as age at maturity, size at maturity, and its role in the food web. Examples of susceptibility factors include release mortality, availability, and “encounterability” (MRAG 2009). If the total PSA score for a species provided by MRAG (2009) is less than 3, the stock is considered to have a low probability of overfishing or becoming overfished; and therefore, given a score of 0.

Evaluation for EC criterion #4 (not generally retained for sale or personal use) was based on landings, magnitude of discards not affected by regulations in relation to landings, and desirability. Assigning a score to this category was subjective. For example, it was assumed a grouper or snapper species occurring in South Atlantic waters would be retained even if landings were low because they are generally sought after by most commercial and recreational fishermen. Level of desirability depends on individuals fishing and availability of a species. Some species like bank sea bass are generally not retained because of their small size and availability of other higher quality co-occurring species. However, if regulations restrict harvest of all species except one species that was formerly discarded, that species would likely be

retained. Further, it is likely that all species in the snapper grouper FMU are retained to some degree by some segments of the fishing population.

Six species were given an EC designation through implementation of the Comprehensive ACL Amendment: Cottonwick, Longspine Porgy, Bank Sea Bass, Rock Sea Bass, Ocean Triggerfish, and Schoolmaster.

What Are Ecosystem Management Objectives?

Ecosystem management objectives have not yet been adopted specifically for the Snapper Grouper FMP. The Vision Blueprint for the Snapper Grouper Fishery was adopted in 2015 to guide management of the fishery into the future. However, objectives included in the Blueprint (**Table 1**) have not been formally adopted as the FMP's objectives. The Council intends to adopt the Vision Blueprint objectives in Amendment 48 to the Snapper Grouper FMP (under development). The current management objectives in the snapper grouper FMP as amended are:

1. Prevent overfishing.
2. Collect necessary data.
3. Promote orderly utilization of the resource.
4. Provide for a flexible management system.
5. Minimize habitat damage.
6. Promote public compliance and enforcement.
7. Mechanism to vest participants.
8. Promote stability and facilitate long-run planning.
9. Create market-driven harvest pace and increase product continuity.
10. Minimize gear and area conflicts among fishermen.
11. Decrease incentives for overcapitalization.
12. Prevent continual dissipation of returns from fishing through open access.
13. Evaluate and minimize localized depletion.
14. End overfishing of snapper grouper stocks undergoing overfishing.
15. Rebuild stocks declared overfished.

Relevant "ecosystem objectives" in the Vision Blueprint for the Snapper Grouper fishery are:

Objective 5 (under Science goal) - Promote data collection and analysis to support ecosystem and habitat considerations for the snapper grouper fishery.

Objective 5 (under Management goal) - Support management measures that incorporate ecosystem and habitat considerations for the snapper grouper fishery.

How have other Councils designated EC Species?

Mid-Atlantic Fishery Management Council

The MAFMC developed an Unmanaged Forage Omnibus Amendment intended "*to prohibit the development of new and expansion of existing directed commercial fisheries on unmanaged forage species in mid-Atlantic federal waters until the Council* (MAFMC) *has had an adequate opportunity to assess the scientific information relating to any new or expanded directed fisheries and consider potential impacts to existing fisheries, fishing communities, and the marine ecosystem*" (MAFMC 2017). This amendment comprehensively implemented management measures for 17 species and groups of species, with 16 of the species or species groups being designated as ecosystem components in all the MAFMC's FMPs. The amendment established a possession limit for all EC species combined, along with permit, transit, and reporting provisions and became effect September 27, 2017. The following specific measures were implemented[1]:

- Possession limit: A 1,700-pound possession limit for all EC species combined.
- Permit: Requirement that all commercial vessels and operators that catch and/or possess EC species be issued a commercial vessel and operator permit from NMFS.
- Transit provisions: Allows commercial vessels to transit the Mid-Atlantic Forage Species Management Unit, which covers an area from approximately Hatteras, North Carolina through Connecticut, with an amount of EC species onboard that exceeds the possession limit to land in a port outside of the management unit provided that the fish were harvested outside of the management unit and that all gear is stowed and not available for immediate use while transiting.
- Record keeping and reporting: Requires vessel operators and seafood dealers to report the catch and sale of EC species on existing vessel trip reports and dealer reports.

EC species included in the amendment were anchovies, argentines/smelt herring, greeneyes, halfbeaks, lanternfish, round herring, scaled sardine, Atlantic thread herring, Spanish sardine, pearlsides/deepsea hatchetfish, sand lances, silversides, cusk-eels, Atlantic saury, unmanaged pelagic mollusks except sharptail softfin squid, and species under 1 inch as adults (copepods, krill, and amphipods). While initially proposed for inclusion in this amendment, frigate mackerel (*Auxis thazard*) and bullet mackerel (*Auxis rochet*) were excluded before the amendment's implementation, with NMFS citing concerns over inconsistency with National Standard 2[2] and an insufficient connection to the MAFMC's managed species. At least part of the concern over National Standard 2 appears to be based on the two mackerel species falling outside of the guidelines for defining forage species that were developed by the MAFMC's Scientific and Statistical Committee (SSC).

Pacific Fishery Management Council

The Pacific Fishery Management Council (PFMC) developed a Comprehensive Ecosystem-Based Amendment 1 (CEBA 1), effective May 4, 2016, that "*prohibits the development of new directed fisheries on forage species that are not currently managed by the Council* (PFMC)*, or the States, until the Council* (PFMC) *has had an adequate opportunity to assess the science*

[1] As outlined on the MAFMC's website at: http://www.mafmc.org/actions/unmanaged-forage
[2]National Standard 2 covers scientific information.

relating to any proposed fishery and any potential impacts to our existing fisheries and communities." It is stated that the amendment "*is not a permanent moratorium on fishing for forage fish. Instead, the Council* (PFMC) *adopted COP (*Council Operating Procedure*) 24, which outlines a review process for any proposed fishery*" (PFMC 2016). COP 24 provides a standard process for the PFMC, advisory bodies, and the public to consider EFP proposals for EC species intended to develop scientific information that may lead to potential future directed fisheries for one or more of the EC species[3] (PFMC 2016).

CEBA 1 included round herring, thread herring, mesopelagic fishes of the families *Myctophidae*, *Bathylagidae*, *Paralepididae*, and *Gonostomatidoae*, pacific sand lance, pacific saury, silversides, smelts of the family *Osmeridae*, and pelagic squids. The stated rationale of the PFMC to identify these species and groups of species for inclusion as EC species was "*to address "other ecosystem issues," because these species are the broadly used prey of marine mammal, seabird, and fish species in the U.S. West Coast EEZ. Shared EC Species are among the known prey of FMU species of all four of the Council's FMPs; therefore, Shared EC Species support predator species' growth and development…*" (PFMC 2016). CEBA 1 amended four of the PFMC's finfish FMPs and according to the amendment document, no new directed fishing can begin for EC species without a Council-related process to develop an exempted fishing permit. EC species can continue to be taken incidentally and landed or discarded, unless regulated or restricted for other purposes, such as with bycatch minimization regulations. The prohibition on directed commercial fisheries for EC species the following specific measures[4]:

General measures:

- Retention limit: A prohibition on landing EC species without any other species onboard.
- Trip limit: A vessel trip limit of 10 metric tons combined weight of all EC species onboard.
- Annual limit: An annual vessel limit of 30 metric tons combined weight of all EC species in a calendar year.
- Processing limitation: A prohibition, with limited exceptions, of at-sea processing of EC species.

Trawl gear measures:

- Trip limit: A vessel trip limit of 1 metric ton combined weight of all EC species onboard, with the exception of EC squid species.
- Annual limit: An annual vessel limit of 40 metric tons combined weight of any EC squid species in a calendar year.

No long-term directed EEZ fisheries are possible for the listed EC species without a future FMP amendment to specify the targeted species as a fishery management unit (FMU) species and to meet Magnuson-Stevens Act requirements for FMU species, which include: developing harvest specifications, identifying essential fish habitat (EFH) for the species, and providing gear specifications for the fishery (PFMC 2016).

[3] The PFMC's COP 24 can be found at: http://www.pcouncil.org/wp-content/uploads/2015/12/cop24.pdf
[4] As outlined in Federal Register implementing CEBA 1: http://www.pcouncil.org/wp-content/uploads/2016/04/2016-07516.pdf

North Pacific Fishery Management Council

The North Pacific Fishery Management Council (NPFMC) recently classified squids as EC species through amendments to their Bering Sea Aleutian Islands (BSAI) Groundfish and Gulf of Alaska (GOA) Groundfish FMPs (NPFMC 2018a and 2018b). The NPFMC noted that "*squid are important prey species for marine mammals, fish, and other squid*" and "*although squid do not require conservation and management, it is still appropriate to take measures to minimize squid bycatch to the extent practicable. This is consistent with Nation Standard 9 and the Councils* (NPFMC) *long-standing practice of minimizing the bycatch of species such as forage fish and grenadiers that are important to the ecosystem but that do not require conservation and management"* (NMFS 2018).

In addition to classifying squids as EC species, the two amendments prohibited directed fishing for squids in the BSAI or GOA groundfish fisheries, maintained record keeping and reporting requirements to record and report catches of squids, and specified retention limits for squids. These amendments became effective on August 6, 2018. Specific measures were as follows[5]:

- Record keeping and reporting: catch, discard, and production of squid must be recorded in logbooks or on catch or production reports.
- Retention limit: the maximum retainable amount of squid is not to exceed 20 percent of the total landings retained.

Sources:

MAFMC (Mid-Atlantic Fishery Management Council). 2017. *Unmanaged Forage Omnibus Amendment*. Mid-Atlantic Fishery Management Council, 800 North State Street, Dover, DE 19901.

NMFS (National Marine Fisheries Service). 2018. *Environmental Assessment/ Regulatory Impact Review for Proposed Amendment 117(BSAI) and 106 (GOA) to the Fishery Management Plans for Bering Sea Aleutian Islands Groundfish and Gulf of Alaska Groundfish*. National Marine Fisheries Service, Alaska Region.

NPFMC (North Pacific Fishery Management Council). 2018a. *Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area*. North Pacific Fishery Management Council, 605 W. 4th Avenue, Suite 306, Anchorage, AK 99501.

NPFMC (North Pacific Fishery Management Council). 2018b. *Fishery Management Plan for Groundfish of the Gulf of Alaska*. North Pacific Fishery Management Council, 605 W. 4th Avenue, Suite 306, Anchorage, AK 99501.

PFMC (Pacific Fishery Management Council). 2016. *Comprehensive Ecosystem-Based Amendment 1: Protecting unfished and unmanaged forage fish species*. Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 101, Portland, OR 97220.

[5] As outlined in Federal Register implementing BSAI Groundfish Amendment 117 and GOA Groundfish Amendment 106: https://www.federalregister.gov/documents/2018/07/06/2018-14457/fisheries-of-the-exclusive-economic-zone-off-alaska-reclassifying-squid-species-in-the-bsai-and-goa

Appendix B. History of Management for Inclusion/Removal of Species from an FMP in the South Atlantic

Snapper Grouper FMP

The original Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (Snapper Grouper FMP; SAFMC 1983) included 73 species.

According to the Snapper Grouper FMP, the composition of the snapper grouper fishery management unit (FMU) was originally defined to include species that:

1. are considered sub-tropical/tropical in distribution and therefore limited to south of Cape Hatteras on the east coast of the U.S.;
2. have overlapping ranges; and
3. are part of a large multi-species fishery where co-occurring species are taken together with the same gear in the same area (SAFMC 1983).

Part of this rationale suggests an "ecosystem" reason for originally including species in the federal management plan. Also, at the time the FMU was established, there was concern that about 13 of the species included in the FMU could be experiencing growth overfishing and that many others could be subject to overfishing in the future if corrective action was not taken (SAFMC 1983).

Comprehensive Annual Catch Limit (ACL) Amendment

In 2012, implementation or the Comprehensive Annual Catch Limit (ACL) Amendment (SAFMC 2011), removed 13 species from the Snapper Grouper FMP. Four factors were the primary reasons to identify candidate species for removal: the species were of minor importance to the National or regional economy, there was no identified need to improve the condition of the stock, the fishery could be or was adequately managed by states:

- Species with 95% (or greater) of landings in state waters (10): French Grunt, Spanish Grunt, Yellow Jack, Grass Porgy, Porkfish, Puddingwife, Bluestriped Grunt, Sheepshead, Crevalle Jack, Black Margate.
- Species under Florida Marine Life Rule management (3): Queen Triggerfish, Porkfish, Puddingwife (note that two species in this category overlap with the previous).
- Species with no recorded commercial or recreational landings in the South Atlantic from 2005 through 2009 (2): Tiger Grouper, Smallmouth Grunt.

These species were deemed not to need continued conservation and management under the federal plan as they were landed almost exclusively from state waters, were already adequately managed at the state level, or had no reported landings.

Amendment 27

In 2013, Amendment 27 re-evaluated whether blue runner was in need of federal management based on updated information. Data used for the Comprehensive ACL Amendment to evaluate whether this species should be removed from the FMU did not include harvest from the shore mode. Landings from states waters accounted for 76% of blue runner landings from 2005 to 2011, and a large portion of the recreational landings were attributed to the shore mode. Furthermore, most recreational (99%) and commercial (99%) blue runner harvest is from Florida waters, and the species is not commonly retained for human consumption, is primarily used as

bait, and is subject to management in Florida state waters. This information was not presented for blue runner when the South Atlantic Council determined that some species should be removed from the Snapper Grouper FMP in the Comprehensive ACL Amendment. Based on MSA factors, this species could be better served through state management where the majority of harvest occurred, and regulations in federal waters would not likely improve stock condition, increase efficiency in the fishery, address conflicts, improve stock condition, or foster a developing fishery.

Amendment 35

In 2015, the Council removed black snapper, dog snapper, mahogany snapper, and schoolmaster from the Snapper Grouper FMP because they had extremely low commercial landings in state and federal waters, almost all harvest (recreational and commercial) occurred in South Florida (MSA factor 3), and to establish consistent regulations for snapper grouper species caught primarily in South Florida (MSA factor 5). The Florida Fish and Wildlife Conservation Commission (FWC) committed to extend state regulations for those species into federal waters of the South Atlantic and Gulf of Mexico if the four species were removed from the Snapper Grouper FMP.

The Council did not consider designating dog snapper, mahogany snapper, and black snapper as EC species because the designation would not have established a consistent regulatory environment across the jurisdictional boundaries of the South Atlantic, Gulf of Mexico, and Florida. Additionally, had these been designated EC species, and if schoolmaster had been retained as an EC species in the FMP, the state of Florida would not have been able to extend management authority into federal waters because states may not manage species included in federal fishery management plans in federal waters.

Coastal Migratory Pelagics FMP

The Fishery Management Plan for Coastal Migratory Pelagic Resources (Mackerels) of the Gulf of Mexico and South Atlantic (1983) specifies species in the management unit in two groups: species for which regulations were proposed (King Mackerel, Spanish Mackerel, Cobia) and species for which regulations were not proposed (Cero, Little Tunny, Dolphin, and Bluefish (Gulf of Mexico only)). No specific rationale is stated in the amendment for the fishery management unit.

Amendment 18

Prior to implementation of Amendment 18 to the CMP FMP, Cero and Little Tunny were included in the FMP for both the Gulf and South Atlantic. Dolphin and Bluefish were in the CMP FMP only for the Gulf of Mexico. Dolphin was already managed in the South Atlantic under the Dolphin/Wahoo FMP, and Bluefish were managed jointly by the Mid-Atlantic Council and the Atlantic States Marine Fisheries Commission (ASMFC) from Maine through the Florida east coast. The CMP FMP had no management measures for any of these four species. Amendment 18 includes the following rationale for this action: *The Councils reviewed the AP, SSC, and public hearing recommendations and chose Preferred Alternative 3 to remove species from the FMP because those species are not in need of federal management. Although these species are targeted in some areas, landings are fairly low. Further, if landings or effort changed and the Councils felt management was needed, these species could be added back into*

the FMP. The Councils concluded the preferred alternative provides the necessary management protection to the species that need management at this time and that this fishery management unit would provide the necessary structure to properly manage and prevent overfishing of king mackerel, Spanish mackerel, and cobia. The Councils also concluded the preferred alternative meets the requirements of the reauthorized Magnuson-Stevens Act and best meets the goals and objectives of the coastal migratory pelagics (mackerel) fishery management plan as amended.

Amendment 31

Atlantic migratory group Cobia was removed from the CMP FMP through implementation of Amendment 31. The amendment includes the following rationale for this action: *As specifically noted in at 50 CFR §600.305(b)(3), "[i]n many circumstances, adequate management of a CMP fishery by states, state/federal programs, or another federal FMP would weigh heavily against a federal FMP action." Since the majority of the harvest, particularly in recent years, is attributed to state waters, there has been little the CMP FMP could do to effectively constrain landings and prevent overfishing. Combine this with the fact that ASFMC has developed the Interstate FMP to more effectively constrain state harvest and has sought consistent provisions for federal waters under separate legal authority, and the scale tips heavily in favor of removal of Atlantic cobia from the CMP FMP. Therefore, the Gulf and South Atlantic Councils determined that the Atlantic cobia stock is no longer in need of conservation and management within the South Atlantic Council's jurisdiction and the stock is eligible for removal from the CMP FMP.*

The Gulf and South Atlantic Councils chose Preferred Alternative 2 as its preferred alternative to remove Atlantic cobia from the CMP FMP. The Councils determined that Alternative 1 (No Action) would not be the best alternative because, in recent years, harvest of the Atlantic cobia stock has occurred primarily in state waters. As a result, the CMP FMP has been unable to effectively constrain landings and prevent overfishing. The ASMFC has developed an Interstate FMP that is expected to effectively constrain Atlantic cobia harvest in state waters. Additionally, ASMFC has requested that consistent provisions be implemented in federal waters under the Atlantic Coastal Fisheries Cooperative Management Act (Atlantic Coastal Act). The Gulf and South Atlantic Councils determined the preferred alternative was the best management strategy based on biological, social, and economic factors.

The Gulf and South Atlantic Council concluded Preferred Alternative 2 best meets the purpose and need, the objectives of the CMP FMP, as amended, while complying with the requirements of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and other applicable law.

Appendix C. Risk Tolerance Analysis (DRAFT)

The intent of this analysis is to help guide the Council on the level of Risk Tolerance they may want to have for each of the stocks they manage. This Risk Tolerance will be used when setting catch limits for stocks. In particular, the level of Risk Tolerance tells the Council how much they can manipulate the P* value when determining the ABC using the new ABC Control Rule. Considering factors used to evaluate the productivity and susceptibility of a stock to overfishing, as is done in the NMFS PSA analysis, and then brainstorming with other Council staff on what factors relate more to relative risk, we were able to incorporate attributes that the Council would use to judge how much risk they may be willing to take when it comes to deciding on catch limits for a particular stock (Risk Tolerance). Specifically, to decide on how much they are willing to decrease the OFL-ABC buffer (P* value) to mitigate socio-economic impacts from a new SSC recommendation. There are 3 main categories of attributes used to evaluate Risk Tolerance in this analysis: Biological attributes, Human Dimension attributes, and Environmental attributes.

A.1 Attributes

A.1.1 Biological Attributes

The Biological attributes have to do with the biology of the species and will only change when new science is conducted that uncovers new information about the stock (Table A.1.1). The higher the Biological score, the less vulnerable the stock is to overfishing, and the higher risk the Council can safely take. The lower the score, the more vulnerable the stock is and the less risky the Council should be.

The Biological attributes consist of the Estimated Natural Mortality (M) for a species and the Age at Maturity. M was deemed to be an important attribute for categorizing a stock's productivity. The higher the value of M, the more productive that stock is and the higher the tolerance for risk can be (Table A.1.1). M has been determined for some stocks using such techniques as Tag-Recapture experiments, but most of the SAFMC's managed stocks have values of M estimated using maximum age and the Hoenig equation. The values for the scoring metrics were derived by taking the 33rd and 66th percentiles of the M values for all the species in the analysis. These values matched up very closely with those from the NMFS PSA Analysis.

Age at Maturity was estimated as age at 50% maturity where available (Table A.1.1). Since many grouper species are protogynous, the age at maturity was estimated as the age at which 50% of females were mature. If a species was protandrous, it was the age at which 50% of males were mature. If there was a sexual dichotomy in age at maturity for gonochoristic species, the older age at maturity was used. The ages used for the scoring metrics were taken from the NMFS PSA Analysis.

Table A.1.1. Biological attributes for the Risk Tolerance Analysis and their scoring metrics.

Biological Attributes	Notes	Risk of Overexploitation		
		High	Moderate	Low
Estimated natural mortality (M)	This attribute gets at productivity. The higher M is, the more productive the stock is and the higher your tolerance for risk can be.	<0.179	0.179-0.345	>0.345
Age at maturity	This attribute is also informative about productivity and the risk of overfishing. A higher age at maturity is associated with lower productivity and overfishing can more easily occur.	>4 yrs	2-4 yrs (mid-point 3.0)	<2 yrs

A.1.2 Human Dimensions Attributes

The Human Dimension attributes include factors dealing with management, value, desirability, and social issues (Table A.1.2). For these attributes, a high score means the stock is more vulnerable to either overfishing or causing a large socio-economic upset if things do not go well and the less risk the Council should take. There are two general categories of attributes under the Human Dimensions umbrella: Management Attributes and Socio-economic Attributes.

Table A.1.2. Human Dimension attributes for the Risk Tolerance Analysis and their scoring metrics.

Human Dimension Attributes	Notes	High Risk	Moderate Risk	Low Risk
Ability to regulate fishery	This attribute considers the ability of the Council/NMFS to regulate a fishery. A stock may be biologically resistant to overfishing or becoming overfished (i.e. highly productive), but if management is unable to control harvest and large overages occur on a regular basis, then there is still a high risk of overfishing occurring and the stock status declining. Therefore, the better able the Council/NMFS are at regulating a fishery, the riskier they can be with setting catch limits. There are many factors to keep in mind, such as variability and trends in landings, state compatibility and consistency with federal regs, if there are significant landings in state waters, and to apply a discount for regulatory overages due to changing the ACL mid-season (shouldn't get a poor score because an ACL was suddenly cut in half mid-way through the season).	fishery consistently exceeds Total ACL (ex. 3+ out of 5 years) and/or exceeds Total ACL by more than 15%	fishery mostly kept below Total ACL (ex. Exceeds ACL 1-2 out of 5 years) and/or does not exceed ACL by more than 15%	fishery consistently kept below Total ACL
Potential for discard losses	If a stock is prone to discard losses, either from large amounts of discarding, a high discard M, or both, then being too risky when setting catch limits can more easily lead to overfishing. In these situations, the Council should be less risky when considering setting catch limits for the stock. We can look at releases vs. landings and discard M to categorize stocks in this attribute.	Dead discards are a significant proportion of the total catch (over 40%)	Dead discards are a moderate proportion of the total catch (20%-40%)	Dead discards very small component of total catch (<15%-20%)
Annual Commercial value	This attribute looks at the importance (value) of a stock to either the total annual revenue of all the stocks in the FMP or the relative importance of a stock on trips that catch that	> 10% total annual revenue	Between 1% and 10% of total annual revenue	< 1% total annual revenue

Human Dimension Attributes	Notes	High Risk	Moderate Risk	Low Risk
	stock and considers the long-term implications of risk on that stock. Therefore, the higher the proportion of the value of the stock in question to the total annual value or total trip value, the less risky the Council should be when considering setting catch limits.	> 40% of total trip revenue, on average	Between 10% and 40% of total trip revenue, on average	< 10% total trip revenue, on average
Recreational desirability	This attribute also looks at the importance of a stock, but to the recreational fishery. This is determined by looking at the proportion of trips reported targeting this stock within an FMP. The assumption is the higher the proportion of trips reported targeting a stock, the more important it is to the rec fishery overall. This attribute also considers the long-term implications of risk on the stock, meaning the more important it is to the fishery, the less risky the Council should be when considering setting catch limits. DW was compared to the total targeted trips of SG.	> 5% trips report targeting this stock	Between 1% and 5% of trips report targeting this stock	< 1% trips report targeting this stock
Social concerns	This attribute examines the risk of social impact to communities in the South Atlantic. The categories are determined using the regional and local quotients, which are calculated using data such as revenue, landings, and directed trips for a particular stock in relation to all other stocks affecting communities in the South Atlantic. Long term costs and benefits are considered over short-term ones when scoring for this attribute. Meaning if many communities are reliant upon a stock, the Council should be risk averse when setting catch limits. This is because if a management decision results in an unintended decline in biomass, it will have a disproportionately higher effect under a high social concern score (many reliant communities) than under a lower social score (few reliant communities).	> X communities reliant	X to Y communities reliant	Z or < communities reliant

A.1.2.1 Management Attributes

The management attributes attempt to get at how well the fishery is managed. A highly productive stock with a poorly managed fishery can still result in the stock having a high risk of overfishing occurring and/or becoming overfished. The two management attributes in this analysis are the Ability to Regulate the Fishery and the Potential for Discard Losses.
The Ability to Regulate the Fishery attribute considers the ability of the Council/NMFS to regulate a fishery for a stock. A stock may be biologically resistant to overfishing or becoming overfished (i.e. highly productive), but if management is unable to control harvest and large overages occur on a regular basis, then there is still a high risk of overfishing occurring and the stock status declining. Therefore, the better able the Council/NMFS are at regulating a fishery, the riskier they can be with setting catch limits. There are many factors that needed to be considered when scoring this attribute, such as variability and trends in landings, state compatibility and consistency with federal regulations, if there are significant landings in state waters, and to apply a discount for regulatory overages due to changing the ACL mid-season (It was decided that a stock shouldn't get a poor score because an ACL was suddenly cut in half mid-way through the season). With these factors in mind, the scoring for the Ability to Regulate the Fishery attribute was based on how often a fishery exceeded its ACL and by what magnitude in the most recent 5 years (Table A.1.2).

The other management attribute is the Potential for Discard Losses. If a stock is prone to discard losses, either from large amounts of discarding, a high discard M, or both, then being too risky when setting catch limits can more easily lead to overfishing. In these situations, the Council should be less risky when considering setting catch limits for the stock. We looked at releases vs. landings and discard M to categorize stocks in this attribute. The metric calculated was the proportion of dead discards to landings averaged over the most recent 3 years (Table A.1.2).

A.1.2.2 Socio-Economic Attributes

There are also socio-economic attributes that have both social and economic factors, which get at how important each stock is to the industry and the fishing community (Table A.1.2). The approach illustrated here considers these attributes in terms of the long-term benefits rather than the short-term benefits. Functionally, that means that the higher the value of a stock to the fishery, or the more desirable it is, the less risky the Council should be. This is because if the catch level is set too high, the social and economic impacts of that decision causing the stock status to decline and even become overfished are higher. These attributes include Annual Commercial Value, Recreational Desirability, and Social Concerns.

Annual Commercial Value looks at the importance (value) of a stock to both the total annual revenue of all the stocks in the Fishery Management Unit (FMU) and the relative importance of a stock on trips that catch that stock and considers the long-term implications of risk on that stock. Therefore, the higher the proportion of the value of the stock in question to the total annual value or total trip value, the less risky the Council should be when considering setting catch limits. Both metrics were included because they give us information about 2 different aspects regarding the importance of a stock to the fishery. Looking at the total annual revenue from a stock compared to all other stocks in the FMU tells us how important a stock is to the entire commercial fishery in the South Atlantic. Looking at the relative value of a stock per trip tells us how important a stock is to those who catch it, which helps us to see important stocks like

Golden Tilefish and Wreckfish that are very important to a small number of fishermen. The riskier of the 2 scores was used for each stock (Table A.1.2).

Recreational Desirability also looks at the importance of a stock, but to the recreational fishery. This is determined by looking at the proportion of trips reported targeting this stock within an FMU. The assumption is the higher the proportion of trips reported targeting a stock, the more important it is to the recreational fishery overall (Table A.1.2). This attribute also considers the long-term implications of risk on the stock, meaning the more important it is to the fishery, the less risky the Council should be when considering setting catch limits. Dolphin Wahoo was compared to the total targeted trips of Snapper Grouper since there are only 2 stocks in the Dolphin Wahoo FMU and most trips list Dolphin, which may give a skewed perception of desirability.

Social Concerns look at the risk of impact to fishing communities in the South Atlantic region. For the commercial fishery this is determined by identifying the top ten communities for a given stock based on their regional quotient (the total value of a stock landed in a given community, by the total value for that stock for all communities in the region) and determining whether the local quotient (an individual vessel's total value for one stock in a fishing year compared to value of all stocks in that year, averaged across communities) for each community exceeds the reliance threshold. For the recreational fishery risk of impact is determined by identifying the top ten communities for a given stock based on the number of directed trips for a given stock in a given community by directed trips for that stock throughout the region and determining whether the number of directed trips for a given stock by the number of directed trips for all Council managed stocks for each community exceeds the reliance threshold. The results are then compared to available qualitative information. Based on the number of reliant communities, stocks are classified as high, medium, or low social concern (Table A.1.2.1). Like the previous attributes, the Social Concerns attribute focuses on long term costs and benefits over the short term when scoring. Meaning if a large number of communities are reliant upon a stock, the Council should be risk averse when setting catch limits. This is because if a management decision results in an unintended decline in biomass, it will have a disproportionately higher effect under a high social concern score (many reliant communities) than under a lower social score (few reliant communities).

A.1.3 Environmental Attributes

Finally, there are Environmental Attributes, including Ecosystem Importance and Climate Change. These 2 attributes are set up differently from all the rest in that they do not have 3 categories for scoring (Low, Moderate, and High). Instead, these attributes function more like an on/off switch. We either know there is an affect from one or both of these attributes or we don't. The reasoning is two-fold. First, we found it difficult to develop criteria for categorizing a situation as having a Low, Moderate, or High affect. Second, there are very few stocks for which we have enough knowledge and/or data to even attempt to categorize them as being an important ecosystem species or having been affected by climate change. Therefore, we chose to proceed as we have with the on/off approach. These attributes act to alert the Council to a stock that is of particular importance to the ecosystem or has an issue with climate change that is affecting its

population in a way that may make it more vulnerable to overfishing. Therefore, they would tell the Council that they may want to be less risky with these stocks.

Ecosystem Importance is related to a species' importance to the ecosystem in the South Atlantic. The more important it is to the ecosystem, the less risky the Council should be when making decisions on setting catch limits. Traits that may make a species an important ecosystem component are important predator/prey species, reef builders, or reef maintainers (Table A.1.3).

Climate Change is related to effects on a stock due to climate change. These changes would likely affect stock productivity or the ability of the Council to successfully manage the stock in order to change the Council's tolerance for risk. Some examples of characteristics that may make a stock more vulnerable to overfishing due to climate change are a range expansion or collapse, interaction with new species, or a change in habitat availability or suitability (Table A.1.3).

Table A.1.3. Ecological attributes for the Risk Tolerance Analysis and their scoring metrics.

Environmental Attributes	Notes		High (1)
Ecosystem importance	This attribute is related to a species' importance to the ecosystem in the South Atlantic. The more important it is to the ecosystem, the less risky the Council should be when making decisions on setting catch limits.	These 2 attributes are set up differently from all the rest in that they do not have 3 categories for scoring (Low, Moderate, and High). Instead, these attributes function more like an on/off switch. We either know there is an affect from one or both of these attributes or we don't. The reasoning is two-fold. First, we found it difficult to develop criteria for categorizing a situation as having a Low, Moderate, or High affect. Second, there are very few species for which we have enough knowledge and/or data to even attempt to categorize them as being an important ecosystem species or having been affected by climate change. Therefore, we chose to proceed as we have with the on/off approach.	Import ecosystem species: ex. Predator/prey species, reef maintenance/building
Climate change	This attribute is related to effects on a stock due to climate change. These changes would likely affect stock productivity or the ability of the Council to successfully manage the stock in order to change the Council's tolerance for risk.		Affected by climate change: ex. Range expansion or collapse, Interaction with new species, change in habitat availability/suitability

A.2 Final Risk Scoring and Discussion

To derive an overall level of risk for each attribute category, and ultimately for the stock, each attribute risk level was assigned a numerical value. All Low risk scores were assigned a value of 3, all Moderate risk scores were assigned a value of 2, and all High risk scores were assigned a value of 1.

The final scores for each of the attribute categories was calculated by simply taking the average of each of the individual attribute scores. There were several alternative methods explored for instances when an attribute was unable to be scored. These methods fall under 3 major categories: 1) Assign a default value, 2) Incur a penalty, and 3) Drop the attribute from the analysis. If an entire attribute category was unable to be scored (Biological or Human Dimension only), then a default value was used. The default values used were either 2 (Moderate) or 1 (High). The penalty approach worked by assigning a value of zero to the attribute, but down weighting it by a half. The final Risk score was calculated as the average of the category scores, including the Environmental score (if there was one).

For each category score and the final Risk score, the minimum value is 1 and the maximum value is 3. Currently, the scale for each category score and the final Risk score are divided into thirds. The bottom third (scores less than or equal to 1.7) are considered High Risk, the middle third (greater than 1.7 but less than or equal to 2.4) are considered Moderate Risk, and the upper third (greater than 2.4) are considered Low Risk. The histogram below shows the distribution of scores within those 3 categories by the three different methods of handling unknowns (Figure A.2.1).

The results of the analysis indicate that the final Risk Category for ORCS and Decision Tree stocks are highly dependent on which method is chosen for the handling of unknowns (Table A.2.2 and Table A.2.3). However, the scores for the assessed stocks remain unchanged regardless of which method is used (Table A.2.1). The reason why the assessed stocks are so robust to the choice of method for handling unknowns is because they do not have any unknown attributes. These are the stocks we know the most about. The ORCS and Decision Tree stocks are those we know the least about. Therefore, they have more unknown attributes leading to the large discrepancies in Risk scores between methodologies.

Between the three methodologies presented, removal of unknown attributes is the most liberal of the three. This method says that if you don’t know enough to score an attribute, you should drop it from the analysis and only use what you have. The effect of doing this is that it gives the attributes that are left more weight than they would have had if all the attributes were present. This is especially important for the Biological attributes, where there are only 2. If one is dropped, then the entire category score is decided by the other attribute. In this analysis, the attributes that tend to be known for most stocks are those that indicate the stock has a lower risk.

The most conservative of the methods is when a penalty is levied against an unknown attribute. This makes sense since you are saying that since you don’t know this information about the stock, you want to be extra cautious (follows the precautionary principle). This method equates an unknown attribute more with high risk than moderate risk.

Defaulting to a value of Moderate tends to be somewhere in the middle of the other two. This method says that you want to be careful since you can’t score an attribute, but you don’t want to be overly cautious. This might be because most of the stocks that have information gaps are that

way because they are not heavily targeted stocks and not highly sought after by anglers. They are mostly bycatch or incidental catch in the multi-species Snapper Grouper fishery and therefore there isn't really any big concern about them.

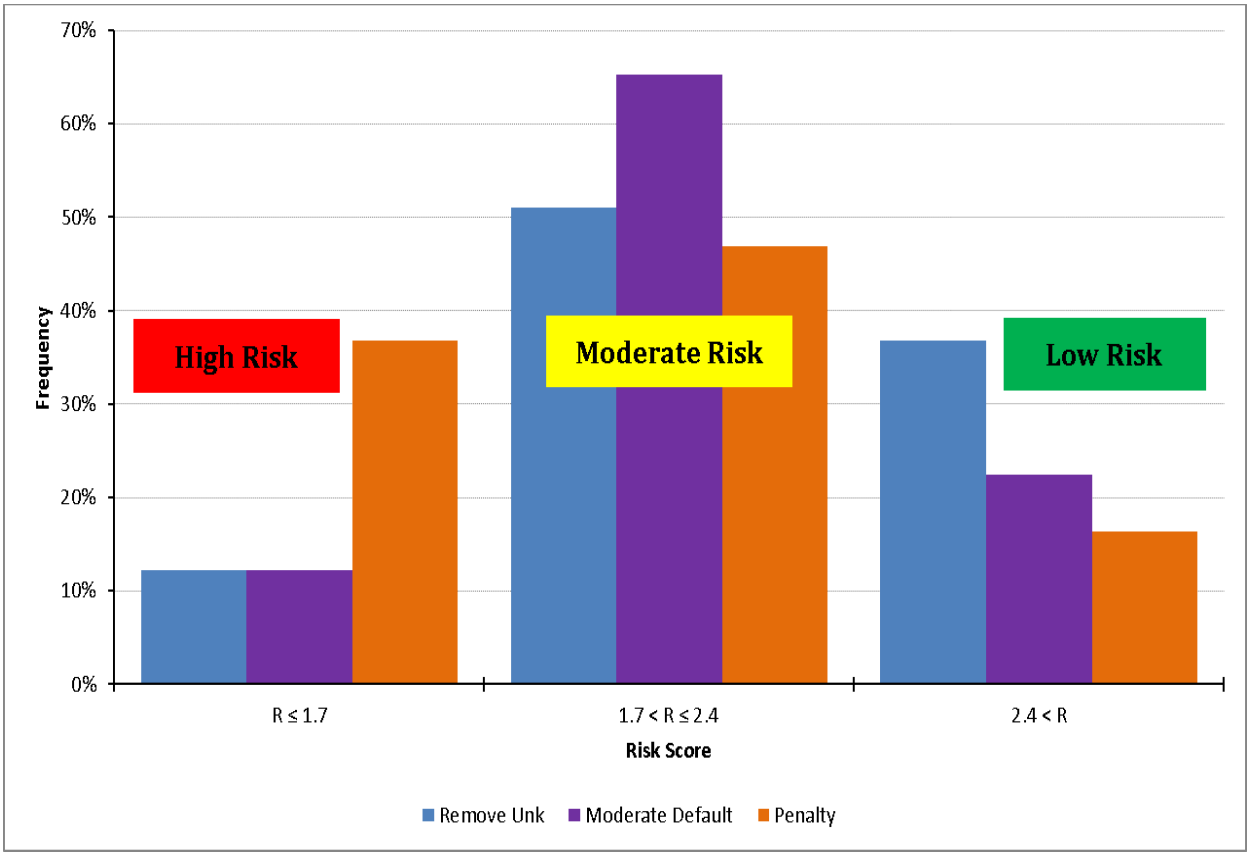

Figure A.2.1. Histogram of the frequency of occurrence of each of the Risk categories in the results of the analysis by each of the methods of handling unknowns.

Table A.2.1. Results of risk analysis for assessed stocks by each of the three methods for treating unknowns.

Stock	Remove Unk	Mod Default	Penalty
Black Grouper	High	High	High
Black Sea Bass	Low	Low	Low
Blueline Tilefish	High	High	High
Gag	Moderate	Moderate	Moderate
Golden Tilefish	Moderate	Moderate	Moderate
Greater Amberjack	Moderate	Moderate	Moderate
FLK/EFL Hogfish	High	High	High
Mutton Snapper	Moderate	Moderate	Moderate
Red Grouper	High	High	High
Red Porgy	Low	Low	Low
Red Snapper	Moderate	Moderate	Moderate
Snowy Grouper	High	High	High
Vermilion Snapper	Moderate	Moderate	Moderate
Wreckfish	High	High	High
Yellowtail Snapper	Moderate	Moderate	Moderate

Table A.2.2. Results of risk analysis for ORCS stocks by each of the three methods for treating unknowns.

Stock	Remove Unk	Mod Default	Penalty
Atlantic Spadefish	Low	Low	Low
Bar Jack	Low	Moderate	Moderate
Cubera Snapper	Moderate	Moderate	High
Gray Snapper	Moderate	Moderate	Moderate
Gray Triggerfish	Moderate	Moderate	Moderate
GA-NC Hogfish	Moderate	Moderate	High
Lane Snapper	Low	Low	Low
Margate	Low	Low	Moderate
Red Hind	Low	Moderate	Moderate
Rock Hind	Low	Moderate	Moderate
Scamp	Low	Low	Low
Silk Snapper	Moderate	Moderate	High
Tomtate	Low	Low	Low
White Grunt	Low	Moderate	Moderate
Yellowedge Grouper	Moderate	Moderate	High

Table A.2.3. Results of risk analysis for Decision Tree stocks by each of the three methods for treating unknowns.

Stock	Remove Unk	Mod Default	Penalty
Almaco Jack	Moderate	Moderate	High
Banded Rudderfish	Moderate	Moderate	High
Blackfin Snapper	Moderate	Moderate	High
Coney	Low	Low	Moderate
Graysby	Low	Moderate	Moderate
Jolthead Porgy	Moderate	Moderate	High
Knobbed Porgy	Moderate	Moderate	Moderate
Lesser Amberjack	Moderate	Moderate	High
Misty Grouper	Moderate	Moderate	High
Queen Snapper	Low	Low	Low
Sailors Choice	Moderate	Moderate	High
Sand Tilefish	Low	Moderate	Moderate
Saucereye Porgy	Moderate	Moderate	High
Scup	Low	Low	Low
Yellowfin Grouper	Low	Low	Moderate
Yellowmouth Grouper	Moderate	Moderate	Moderate
Whitebone Porgy	Low	Moderate	Moderate

A.3 Conclusions and Recommendations

When comparing the results of the Risk analysis between each of the three methodologies handling unknowns, it is quite clear that the pattern of the final Risk categories is different between each of the methods. Figure A.3.1 shows the frequency distribution of Risk categories for each of the methodologies handling unknowns for ORCS and Decision Tree stocks only. The most apparent difference is that neither the Removal nor the Moderate default method have any high risk stocks. However, almost 40% of the stocks are high risk in the Penalty method.
The other apparent difference is that half of the stocks in the Removal method are low risk. Being that these stocks are not heavily targeted and tend to be incidentally caught when fishing for higher profile stocks, it seems unlikely that almost 40% of them would be at high risk. Conversely, since we have some significant data gaps for many of these stocks, it seems irresponsible to list half of them as low risk.
Although the Moderate default method has no stocks listed as high risk, it still has the most reasonable distribution of risk categories than any of the other methods. This issue can be addressed by the Council if they feel a stock warrants a risk level of high. The Council can change the risk level if they so choose, since they may have knowledge, experience, and public comment to help them better understand the issues facing a particular stock.

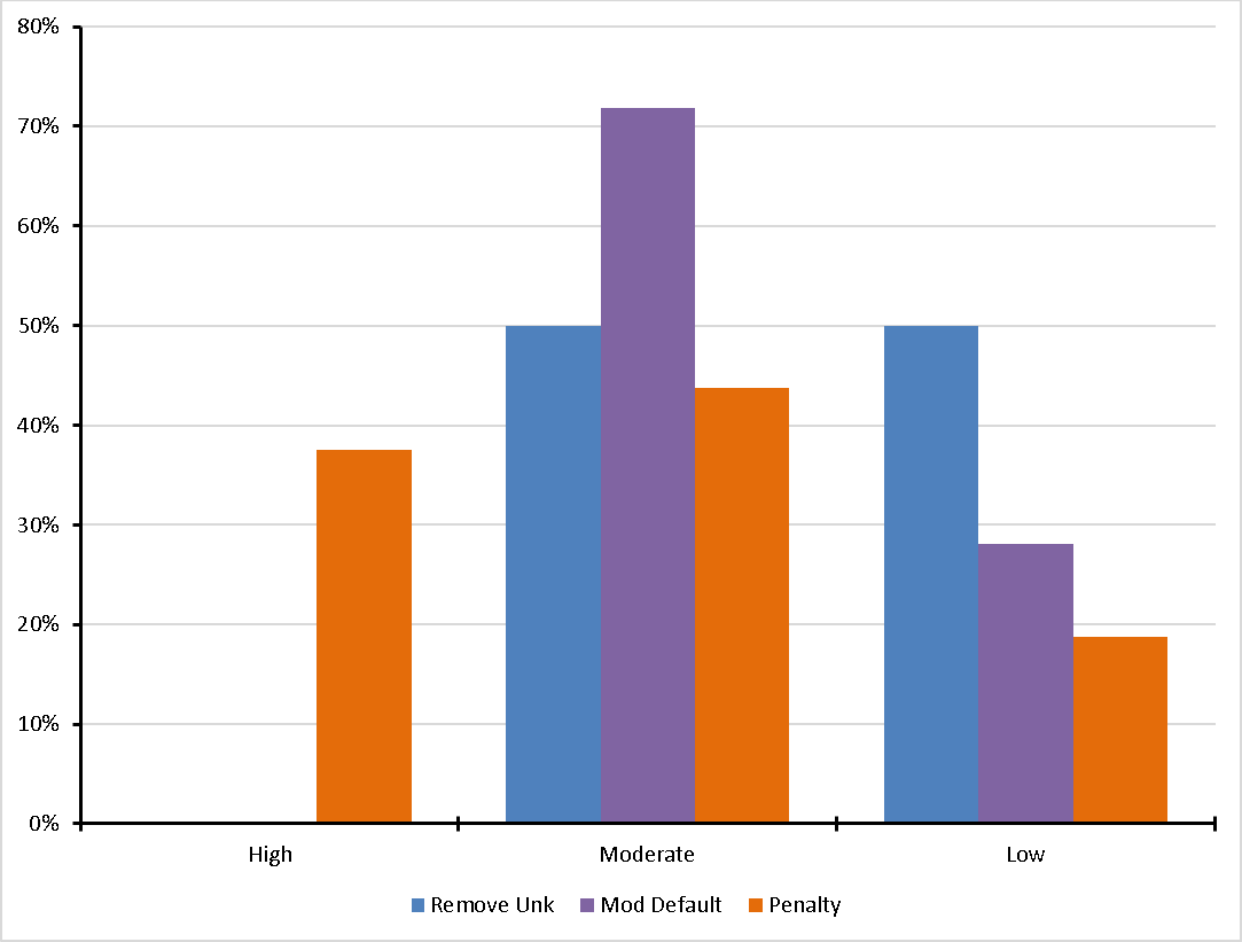

Figure A.3.1. Histogram of the frequency of occurrence of each of the Risk categories in the results of the analysis by each of the methods of handling unknowns for only the ORCS and Decision Tree stocks.