

Rev. 9/4/2009

**Scoping Document for a Generic ACL/AM Amendment
For the
Gulf of Mexico Fishery Management Council's
Red Drum, Reef Fish, Shrimp, Coral and Coral Reefs, and Stone Crab
Fishery Management Plans**

SEPTEMBER 2009



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Schedule of Scoping Meetings

Scoping meetings will be held from 6:00 p.m. – 9:00 p.m. at the following dates and locations.

Monday, September 21, 2009		
Monroe County Harvey Govt. Center 1200 Truman Avenue Key West, FL 33040	LA Wildlife & Fisheries 195 Ludwig Annex Grand Isle, LA 70358	
Tuesday, September 22, 2009		
Banana Bay 4590 Overseas Highway Marathon, Florida 33050	Best Western 7921 Lamar Poole Road Biloxi, MS 39532	Holiday Inn - Emerald Bch 1102 S. Shoreline Blvd. Corpus Christi, TX 78401
Wednesday, September 23, 2009		
City of Madeira Beach 300 Municipal Drive Madeira Beach, FL 33708	City of Orange Beach Community Center 27235 Canal Road Orange Beach, AL 36561	Springhill Suites 7922 Moley Road Houston, TX 77061
Thursday, September 24, 2009		
NMFS Laboratory 3500 Dellwood Beach Dr. Panama City, FL 32408		

In addition to providing information and comments at the above scoping meetings, you may submit written comments on or before 5:00 p.m., EDT, on October 13, 2009 to:

Gulf of Mexico Fishery Management Council
Generic ACL/AM Amendment Scoping Comment
2203 N. Lois Ave., Suite 1100
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Comments may also be sent via fax at the above fax number or by e-mail to ACLScoping@gulfcouncil.org. Please note on your correspondence and in the subject line of e-mail comments the following identifier: "Generic ACL/AM Amendment Scoping Comment."

Abbreviations Used in This Document

ABC	Acceptable biological catch
ACL	Annual catch limit
ACT	Annual catch target
AM	Accountability measure
AP	Advisory panel
B	Biomass
EA	Environmental assessment
EC	Ecosystem component
EDAH	Estimated domestic annual harvest
EEZ	Exclusive economic zone
EIS	Environmental impact statement
F	Fishing mortality rate
FMP	Fishery management plan
IFQ	Individual fishing quota
MFMT	Maximum fishing mortality threshold (overfishing threshold)
MRIP	Marine Recreational Information Program
MSRA	Magnuson-Stevens Reauthorization Act of 2006
MSST	Minimum stock size threshold (overfished threshold)
MSY	Maximum sustainable yield
NMFS	National Marine Fisheries Service (NOAA Fisheries)
NOAA	National Oceanic & Atmospheric Administration
NS1	National Standard 1 (in the Magnuson-Stevens Act)
OFL	Overfishing limit
OY	Optimum yield
PSA	Productivity-susceptibility analyses
PSE	Proportional standard error
RA	Regional Administrator
SAFMC	South Atlantic Fishery Management Council
SDC	Status determination criteria
SEDAR	Southeast Data, Assessment and Review Panel
SEP	Socioeconomic Panel
SFA	Sustainable Fisheries Act of 1996
SPR	Spawning potential ratio
SSB	Spawning stock biomass
SSBR	Spawning stock biomass ratio
SSC	Scientific and Statistical Committee
TAC	Total allowable catch
TALFF	Total allowable level of foreign fishing

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Introduction

The Magnuson-Stevens Reauthorization Act (MSRA) of 2006 established new requirements to end and prevent overfishing through the use of annual catch limits (ACLs) and accountability measures (AMs). Implementation of ACL/AM provisions must begin in 2010 or earlier for stocks subject to overfishing, and in 2011 or earlier for all other stocks under federal management.

The Council met the requirement for stocks subject to overfishing through Reef Fish Amendments 30A (greater amberjack and gray triggerfish) and 30B (gag). Additionally, the Council has established commercial and recreational quotas for the red snapper fishery, including an individual quota system for the commercial sector. When an individual red snapper quota is reached, a commercial fisherman must stop fishing for red snapper unless he can obtain additional quota. The recreational red snapper quota is implemented by adjusting the length of the recreational season on an annual basis to match the projected length needed to fill the quota. The red snapper quotas and quota closures are consistent with establishing ACLs and AMs for this fishery.

The generic comprehensive ACL/AM amendment will address ACLs and AMs for the remaining stocks in the Council's fishery management plans (FMPs) with the exception of species managed under the Coastal Migratory Pelagics FMP and Spiny Lobster FMP, which will be addressed in joint plan amendments with the South Atlantic Fishery Management Council (SAFMC). In addition, the Council could choose to revisit and adjust the ACL/AM provisions previously adopted for red snapper, greater amberjack, gray triggerfish and gag if the Council finds it is necessary in order to be consistent with policies adopted in the generic comprehensive ACL/AM amendment.

This scoping document introduces and discusses concepts and issues related to the incorporation of ACLs and AMs into the Council's FMPs. There are no alternatives for action at this stage of development, but several issues involved in developing ACLs and AMs are identified, along with a series of questions for each issue to help generate discussion that can guide the Council in developing an options paper, and ultimately a generic plan amendment for establishing ACLs and AMs in each of the Council's FMPs. The issues identified in this document that the reader is asked to consider include the following:

- Issue 1. Overfishing level control rule and overfishing criteria
- Issue 2. Acceptable biological catch control rules
- Issue 3. Annual catch limit control rules
- Issue 4. Annual catch target control rules
- Issue 5. How should accountability measures be implemented?
- Issue 6. Stock complexes

- Issue 7. Removal of selected stocks from federal management
- Issue 8. Ecosystem component stocks
- Issue 9. Framework procedures

In addition to the above, the reader is also encouraged to comment on any other issues that may not be covered in this scoping document.

History of Management Targets

The Reef Fish FMP history of management targets presented below is representative of all of the FMPs.

The Original Reef Fish FMP, submitted in August, 1981 and implemented in November, 1984, contained estimates, for snapper/grouper in aggregate and for sea basses in aggregate, of maximum sustainable yield (MSY), optimum yield (OY), estimated domestic annual harvest (EDAH), and total allowable level of foreign fishing (TALFF). The OY levels were defined as the then current catch levels:

<u>Group</u>	<u>MSY</u>	<u>OY</u>	<u>EDAH</u>	<u>TALFF</u>
Snapper and Grouper	51.0 mp	45.0 mp	45.0 mp	0
Sea basses	0.5 mp	0.5 mp	0.5 mp	0

Amendment 1, implemented in 1990, set as a primary objective of the FMP the stabilization of long-term population levels of all reef fish species by establishing a survival rate of biomass into the stock of spawning age to achieve at least 20 percent spawning stock biomass per recruit (SSBR), relative to the SSBR that would occur with no fishing. The target date for achieving the 20 percent SSBR goal was set at January 1, 2000.

Amendment 3, implemented in July 1991, revised the FMP's primary objective, definitions of OY and overfishing and framework procedure for setting total allowable catch (TAC) by replacing the 20 percent SSBR target with 20 percent spawning potential ratio (SPR), and replacing the fixed target date with a rebuilding time period for each stock not to exceed one and a half generation times of the stock.

Amendment 11 was partially implemented in January 1996. The National Marine Fisheries Service (NMFS) disapproved a proposal to redefine OY from 20 percent SPR (the same level as overfishing) to an SPR corresponding to a fishing mortality rate (F) of $F_{0.1}$ on the basis that the use of $F_{0.1}$ was not appropriate for reef fish, and directed the Council to focus on defining OY as a fixed SPR above the 20 percent overfished level. In April 1997, the Council resubmitted the OY definition with a new proposal to redefine OY as 30 percent SPR. However, the resubmission document was disapproved by NMFS on the basis that NMFS felt the OY definition should correspond to 40 percent SPR.

A **Generic Sustainable Fisheries Act Amendment** was submitted to NMFS in February 1999, containing proposals to define MSY, OY, maximum fishing mortality threshold (MFMT) and minimum stock size threshold (MSST) for all stocks managed in FMPs in order to bring those definitions into compliance with the Sustainable Fisheries Act of 1996 (SFA). All of these parameters were proposed to be defined in terms of SPR. For reef fish, MSY was proposed to be 30 percent static SPR and OY was 40 percent static SPR for most stocks, and the MFMT overfishing level was proposed to be $F_{30\% SPR}$ for most stocks. In November 1999, NMFS accepted the SPR based definitions of overfishing, but disapproved all SPR based definitions of MSY and OY and MSST. NMFS now felt that SPR was not biomass based and was not an appropriate proxy for biomass reference points. Consequently, stocks were left with no SFA-compliant definition of MSY, OY or MSST until defined following stock assessments on a stock-by-stock basis.

Since 1999, SFA compliant definitions have been adopted for red snapper, red grouper, gag, greater amberjack, and gray triggerfish. In all cases, MSY has been the biomass estimate of fishing at F_{MSY} under prevailing ecological conditions and gear selectivity, OY has been the yield corresponding to fishing at 75 percent of F_{MSY} , and MSST has been the stock biomass level (or egg productivity as a proxy) at $(1-M)*SSB_{MSY}$.

Purpose and Need for Action

The purpose of the Generic ACL/AM Amendment is to establish the methods for implementing ACLs, AMs and associated parameters for stocks managed solely by the Gulf Council, along with initial specifications of an ACL that may be changed under a framework procedure for specifying an ACL.

The need for this action is to improve management capability to prevent and end overfishing and to maintain stocks at healthy levels, and to do so in a consistent and structures manner across all FMPs.

Terms and Definitions

Maximum Sustainable Yield (MSY) is the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological, environmental conditions and fishery technological characteristics (e.g., gear selectivity), and the distribution of catch among fleets.

MSY fishing mortality rate (F_{MSY}) is the fishing mortality rate that, if applied over the long term, would result in MSY.

MSY stock size (B_{MSY}) means the long-term average size of the stock or stock complex, measured in terms of spawning biomass or other appropriate measure of the stock's reproductive potential that would be achieved by fishing at F_{MSY} .

MSY for stock complexes. MSY should be estimated on a stock-by-stock basis whenever possible. However, when MSY cannot be estimated for each stock in a stock complex, then MSY may be estimated for one or more indicator stocks for the complex or for the complex as a whole. When indicator stocks are used, the stock complex's MSY could be listed as "unknown," while noting that the complex is managed on the basis of one or more indicator stocks that do have known stock-specific MSYs, or suitable proxies, as described in paragraph (e)(1)(iv) of this section. When indicator stocks are not used, MSY, or a suitable proxy, should be calculated for the stock complex as a whole.

Status determination criteria (SDC) mean the quantifiable factors, MFMT, OFL, and MSST, or their proxies, that are used to determine if overfishing has occurred, or if the stock or stock complex is overfished. Magnuson-Stevens Act (section 3(34)) defines both "overfishing" and "overfished" to mean a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce the MSY on a continuing basis. To avoid confusion, this section clarifies that "overfished" relates to biomass of a stock or stock complex, and "overfishing" pertains to a rate or level of removal of fish from a stock or stock complex.

Overfishing (to overfish) occurs whenever a stock or stock complex is subjected to a level of fishing mortality or annual total catch that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis.

- Exceeding the MFMT for a period of 1 year or more constitutes overfishing. (CFR 600.310(e)(2)(ii)(A)(1))
- Should the annual catch exceed the annual OFL for 1 year or more, the stock or stock complex is considered subject to overfishing. (CFR 600.310(e)(2)(ii)(A)(2))

Maximum fishing mortality threshold (MFMT) means the level of fishing mortality (F), on an annual basis, above which overfishing is occurring. The MFMT or reasonable proxy may be expressed either as a single number (a fishing mortality rate or F value), or as a function of spawning biomass or other measure of reproductive potential.

Overfishing limit (OFL) means the annual amount of catch that corresponds to the estimate of MFMT applied to a stock or stock complex's abundance and is expressed in terms of numbers or weight of fish. The OFL is an estimate of the catch level above which overfishing is occurring.

Overfished. A stock or stock complex is considered "overfished" when its biomass has declined below a level that jeopardizes the capacity of the stock or stock complex to produce MSY on a continuing basis.

Minimum stock size threshold (MSST) means the level of biomass below which the stock or stock complex is considered to be overfished.

- The MSST or reasonable proxy must be expressed in terms of spawning biomass or other measure of reproductive potential. (CFR 630.310(e)(2)(ii)(B))
- To the extent possible, the MSST should equal whichever of the following is greater: One-half the MSY stock size, or the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years, if the stock or stock complex were exploited at the MFMT (CFR 630.310(e)(2)(ii)(B))

Approaching an overfished condition. A stock or stock complex is approaching an overfished condition when it is projected that there is more than a 50 percent chance that the biomass of the stock or stock complex will decline below the MSST within two years.

Optimum yield (OY). Magnuson- Stevens Act section (3)(33) defines “optimum,” with respect to the yield from a fishery, as the amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities and taking into account the protection of marine ecosystems; that is prescribed on the basis of the MSY from the fishery, as reduced by any relevant economic, social, or ecological factor; and, in the case of an overfished fishery, that provides for rebuilding to a level consistent with producing the MSY in such fishery. OY may be established at the stock or stock complex level, or at the fishery level.

Catch is the total quantity of fish, measured in weight or numbers of fish, taken in commercial, recreational, subsistence, tribal, and other fisheries. Catch includes fish that are retained for any purpose, as well as mortality of fish that are discarded.

Acceptable biological catch (ABC) is a level of a stock or stock complex’s annual catch that accounts for the scientific uncertainty in the estimate of OFL and any other scientific uncertainty, and should be specified based on the ABC control rule.

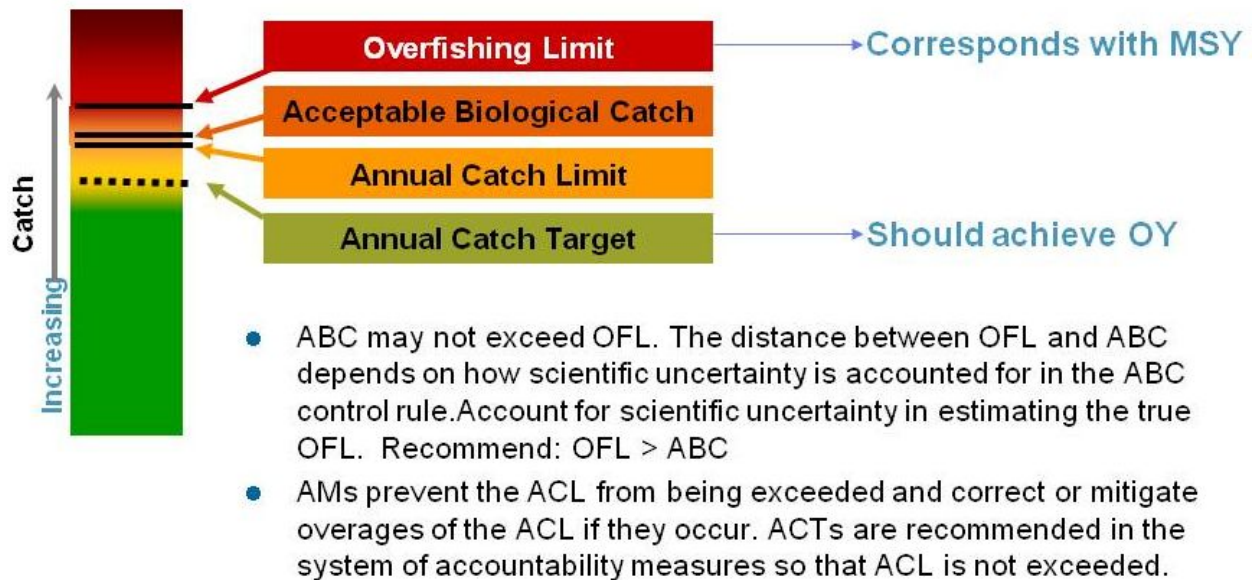
ABC control rule means a specified approach to setting the ABC for a stock or stock complex as a function of the scientific uncertainty in the estimate of OFL and any other scientific uncertainty.

Annual catch limit (ACL) is the level of annual catch of a stock or stock complex that serves as the basis for invoking AMs. ACL cannot exceed the ABC, but may be divided into sector- ACLs.

Annual catch target (ACT) is an amount of annual catch of a stock or stock complex that is the management target of the fishery, and accounts for management uncertainty in controlling the actual catch at or below the ACL. ACTs are recommended in the system of accountability measures so that ACL is not exceeded.

ACT control rule means a specified approach to setting the ACT for a stock or stock complex such that the risk of exceeding the ACL due to management uncertainty is at an acceptably low level.

Overview



The setting of an ACL begins with specifying an OFL. This is the yield above which overfishing occurs. It corresponds to fishing at the MFMT which is usually the fishing mortality rate corresponding to MSY (F_{MSY}). When sufficient data exists to conduct an assessment the OFL is set based on a stock assessment. When there is insufficient data for an assessment the OFL is based on the Scientific and Statistical Committee's (SSC) best estimate of the catch level when fishing at MFMT. In the latter case, an OFL control rule may be developed as part of this amendment to guide the SSC in setting OFL. OFL is similar to MSY, except that OFL is the annual estimate of maximum yield which can fluctuate from year to year, whereas MSY is a long-term average.

Once an OFL is specified, an ABC level is recommended by the Council's SSC. The ABC is based on the OFL as reduced by scientific uncertainty.

OFL and ABC are set by scientists, whereas the next two reference points, ACL and, optionally, ACT, are set by managers.

The ACL is set by the Council at a level which cannot exceed the ABC. The purpose of an ACL is to set a catch level that triggers AMs to prevent the ABC from being exceeded or to correct for an overage in the prior year. While it is possible to set OFL, ABC and ACL all equal to each other, NMFS will assume that this will lead to overfishing unless justification can be provided why it won't.

ACT is optional, but if used, is analogous to the OY level in the same way that OFL is analogous to the MSY level. If an ACT is specified, it should be set at a level that takes into account management uncertainty and provides a low likelihood of the ACL being exceeded. If ACTs are not used, then management uncertainty must be incorporated into the AMs. However, ACTs can be integrated into AMs.

Scientific Uncertainty vs. Management Uncertainty

The NS1 Guidelines discuss two types of uncertainty that must be taken into consideration when setting catch levels, scientific uncertainty and management uncertainty. The two types of uncertainty are described, and are applied at different points in the process.

Scientific uncertainty includes uncertainty around the estimate of a stock's biomass and its MFMT. Stock assessment models have scientific uncertainty associated with the validity of assumptions used in the model, and with the accuracy and variability of the data used.

Management uncertainty occurs because of the lack of sufficient information about catch (e.g., late reporting, underreporting and misreporting of landings or bycatch). There are two sources of management uncertainty:

1. Uncertainty in the ability of managers to constrain catch so the ACL is not exceeded. This relates to the difference between the actual catch and the amount of catch that was expected to result from the management measures applied to a fishery.
2. Uncertainty in quantifying the true catch amounts (i.e., estimation errors). Errors can be caused by untimely catch data that prevents inseason management measures from being effective, from underreporting, late reporting and misreporting, or from inaccurate assumptions about discard mortality of a stock in commercial and recreational fisheries.

The basic relationship of these parameters can be shown as:

$$\text{OFL} \geq \text{ABC} \geq \text{ACL} \geq \text{ACT}$$

OFL and ABC are single values that apply to the entire stock. ACLs and ACTs can be divided into sector ACLs and ACTs as long as the sum of the ACLs does not exceed the ABC and the sum of the ACTs does not exceed the ACL. However, for some stocks the landings data is highly variable, which could make any division of ACL into sector-ACLs difficult and controversial.

AMs are pre-arranged actions triggered by the ACL to prevent the ACL from being exceeded, or to implement mitigating actions if ACLs are exceeded. AMs can be either inseason (such as monitoring and closing a fishery to prevent its ACL from being exceeded), or post-season (such

as shortening a fishing season in the subsequent year if the ACL was exceeded in the current year).

This scoping document introduces and examines concepts involved in establishing ACLs, AMs and associated parameters.

Control Rules

A control rule is a specified approach to setting a catch targets and limits. Having a standard specified approach allows management decisions to be made with respect to catch targets and limits in a consistent and objective manner.

Development of control rules requires interaction between fisheries managers and scientists as well as input from the public in order to determine the appropriate approach and level of acceptable risk under any given situation.

The specific control rule used depends upon the quality and quantity of available data. As a result, it may be necessary to have a variety of control rules that can be applied over a range of data adequacy.

Issue 1. OFL Control Rule and Overfishing Criteria

Under the new National Standard 1 (NS1) Guidelines, an OFL is the catch level above which overfishing is occurring. It is defined as the catch level associated with fishing at the MFMT, which is usually set equal to F_{MSY} . When sufficient information exists to conduct a stock assessment, an OFL is generated with each of the assessment's model runs, and the SSC selects the model run and OFL that they judge as providing the best scientific advice to the Council.

When there is insufficient information to conduct a stock assessment, an OFL is selected by the SSC based on the SSC's best estimate of the catch level when fishing at MFMT. For example, OFL may be based on an average of recent annual catches. An OFL control rule may be developed as part of this amendment to guide the SSC in setting OFL in data poor situations.

The NS1 Guidelines give the Councils a choice of two methods to determine if overfishing occurs.

- 1) When the current fishing mortality rate exceeds the maximum fishing mortality threshold ($F > MFMT$), or
- 2) When the actual catch in any year exceeds the overfishing limit (catch > OFL).

The first method (MFMT) is a more direct way of comparing the fishing rate to the maximum allowed level, and it is less sensitive to recent fluctuations in recruitment. However, F cannot be calculated until an assessment has been updated, which may lag the fishery by several years. Furthermore, this method cannot be used at all if there is no stock assessment, and hence no F estimate, for a given fishery.

The second method (OFL) is based on catch levels that have been estimated to correspond to fishing at MFMT. Catch levels are more easily understood by constituents than fishing mortality, and a determination can be made as soon as catch totals are available. Furthermore, a maximum catch level can be set for data poor stocks in the absence of a stock assessment by using alternate methods such as historical catch levels. However, the use of the OFL method might not be appropriate for stocks with highly variable recruitment that cannot be predicted and therefore incorporated into the forecast of stock condition on which OFL is based.

Issue 1. OFL control rule and overfishing criteria

Question 1. Should overfishing of a stock of stock complex be defined as:

- a. Fishing mortality rate exceeding the MFMT threshold;*
- b. Annual catch exceeding the OFL limit;*
- c. Use both methods for all stocks;*
- d. Develop criteria for when method (a) should be used, and when method (b) should be used.*

Question 2. Should an OFL control rule be established for stocks where data is inadequate to conduct a traditional stock assessment?

Issue 2. ABC Control Rules

The NS1 Guidelines state that ABC is based on OFL as reduced by scientific uncertainty. It is the role of the SSC to recommend ABC. While it is possible to set ABC equal to OFL, if a Council subsequently recommends an ACL which equals ABC, and the ABC is equal to OFL, the Secretary may presume that the proposal would not prevent overfishing, in the absence of sufficient analysis and justification for the approach. Therefore, in most cases, ABC will be set less than OFL.

All sources of fishing mortality must be considered when setting ABC, including discards. The NS1 Guidelines state that ABC should be expressed in terms of catch, but may be expressed in terms of landings as long as estimates of bycatch and any other fishing mortality not accounted

for in the landings are incorporated into the determination of ABC. If ABC is expressed in terms of landed catch, discards and other sources of fishing mortality should be explicitly discussed and accounted for.

Several approaches can be used to determine the appropriate ABC for a stock or stock complex. As a result, the Council may adopt several control rules, depending upon adequacy of the available data. A tiered approach as described below may help to decide which of several possible control rules to use.

At its June 2009 meeting, the Gulf Council formed an ABC Control Rule Working Group to develop a structured decision making framework to assist in assessing scientific uncertainty, the probability of overfishing, and acceptable levels of risk when setting ABC. The group, which consists of Council members, Council staff, NMFS staff, and SSC members, is expected to make its recommendations to the Council at the October 2009 Council meeting.

ABC: Tier-based approach applied to all managed resources

ABC control rules for each stock or stock complex could be determined based on a tier system such as the one shown in the following table. This table is one example of a tiered approach to ABC control rules for all the managed stocks, with the tiers ranked in descending order of data adequacy to conduct a stock assessment. Nested within each tier, are three different levels of stocks status which are considered when determining which ABC control rule would apply. While this example only considers stock status with respect to its biomass level and overfished status, overfishing status with respect to fishing mortality or other factors could also be included.

Example of a Tier-based System for Selecting ABC Control Rule	
Stock Status	ABC Control Rule
Tier 1) Data adequate for a full model based stock assessment	
1a) $B/B_{MSY} \geq 1$ (i.e., not overfished, above B_{MSY})	ABC Control Rule A
1b) $MSST \leq B/B_{MSY} < 1$ (i.e., not overfished, below B_{MSY})	ABC Control Rule B
1c) $B/B_{MSY} < MSST$ (i.e., overfished)	ABC Control Rule C
Tier 2) Data adequate for a simple stock assessment (e.g., surplus production)	
2a) $B/B_{MSY} \geq 1$ (i.e., not overfished, above B_{MSY})	ABC Control Rule D
2b) $MSST \leq B/B_{MSY} < 1$ (i.e., not overfished, below B_{MSY})	ABC Control Rule E
2c) $B/B_{MSY} < MSST$ (i.e., overfished)	ABC Control Rule F
Tier 3) Data inadequate for a stock assessment	
All stock conditions	ABC Control Rule G

There are many different kinds of control rules that could be developed. These could be based on probabilistic approaches, percentage-based approaches, approaches based on maximum spawning potential, or approaches that use risk of overfishing based on methods such as probability-susceptibility analyses (PSA). The Council could also consider ABC control rules that integrate additional biological factors (i.e., hermaphroditism, spawning behavior, role of the species in the ecosystem) or some other level or range of acceptable risk of overfishing as identified by the Council.

Examples of Approaches to ABC Control Rules

ABC probability-based approach

ABC is reduced from OFL based on a higher likelihood of not exceeding the maximum limit fishing mortality of F_{MSY} , or $F_{REBUILD}$ if under a formal rebuilding plan. Assuming that methodologies exist or can be developed to assign specific risk levels to a given catch level, a control rule could state that the ABC is the level of catch associated with a specific risk level, for example, 75% probability of not exceeding F_{MSY} .

For example:

OFL = yield with a 50% probability of not exceeding overfishing

ABC = yield with a 75% probability of not exceeding overfishing

ABC percentage-based approach

ABC is reduced from OFL based on a fixed percentage of the OFL catch; in this example ABC is 75 percent of OFL. This is not the same as setting a 75 percent probability as in the previous approach. Different levels of volatility in year to year recruitment, stock biomass, or other factors mean that at a fixed percentage of OFL, different stocks will have different probabilities of exceeding true F_{MSY} . However, in a data limited stock, this may be the easiest, and perhaps only, way to set an ABC level.

For example:

$$ABC = 0.75 \times OFL$$

ABC spawning potential based approach

The SPR of a stock is the spawning stock biomass or egg production of a stock relative to the spawning stock biomass or egg production in the absence of fishing. The fishing mortality rate associated with MSY (F_{MSY}) can also be expressed in terms of SPR ($F_{\% SPR}$), and the yield associated with that fishing mortality rate can be calculated. Selecting F at an SPR that is, for example, 5 percentage points higher than F_{MSY} would result in a lower fishing mortality rate and a reduced catch level.

For example:

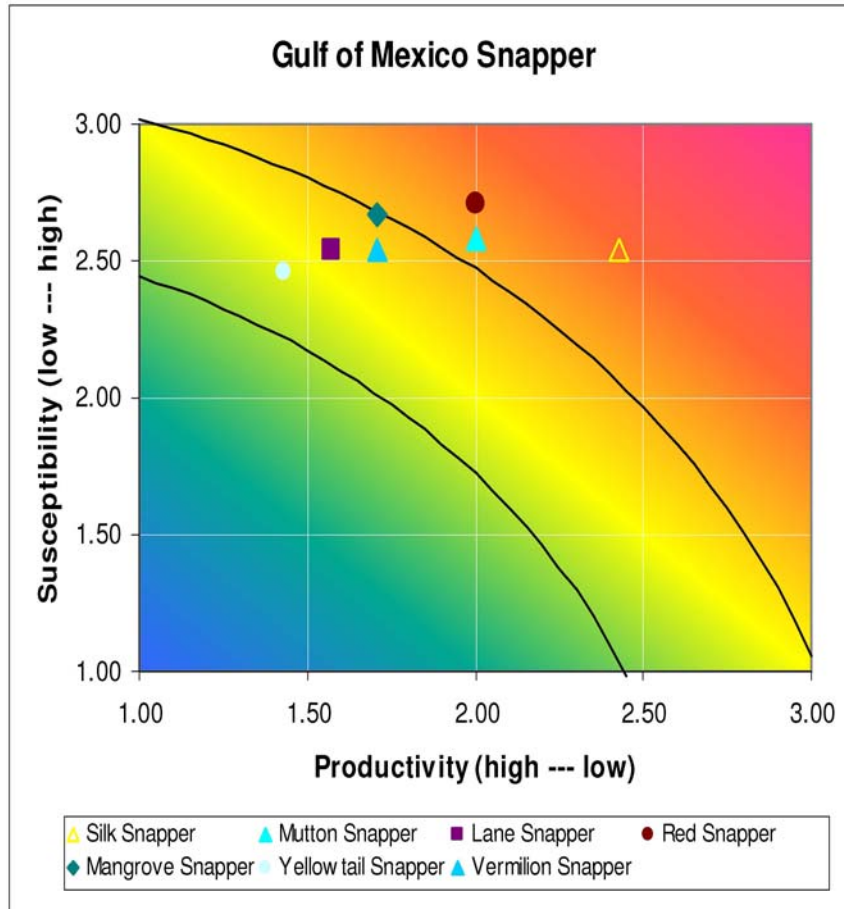
If OFL is the yield associated with $F_{OFL} = F_{MSY} = F_{30\% SPR}$

then ABC is the yield associated with $F_{ABC} = F_{35\% SPR}$

Productivity-Susceptibility Analyses (PSA) based approach

The PSA approach could be either a stand-alone method or part of the input to a probability or percentage based method to help determine an appropriate level of risk of overfishing for a given stock. PSA is a relatively new method for assessing risk of a fishery species or stock based on a comprehensive screening of a set of predetermined measurable attributes. It is based on the assumption that the risk to a species will depend on two characteristics: (1) the productivity of the unit, which will determine the rate at which the unit can sustain fishing pressure or recover from depletion or other impacts due to the fishery; and (2) the susceptibility of the unit

to fishing activities. Productivity and Susceptibility are each ranked on a scale from 1 to 3 and plotted as below to represent risk of overfishing. The two characteristics can also be combined into a single overall risk estimate that can be used to determine how much separation there should be between OFL and ABC.



For example:

The above graph is from a series of PSA analyses for Gulf of Mexico stocks conducted by MRAG Americas for Ocean Conservancy. In the graph above, stocks with symbols in the red region are considered to have a high risk of overfishing (red snapper, mutton snapper, silk snapper), while those in the middle region have a medium risk (lane snapper, mangrove snapper, yellowtail snapper, vermilion snapper). Silk snapper (yellow triangle) is represented with an open symbol meaning that there is added uncertainty due to incomplete information (fecundity in this case).

The complete Ocean Conservancy/MRAG Americas analysis is appended to this scoping document¹.

Recent catch history approach

For some stocks the available data may be inadequate to determine the parameters needed to set ABC using any of the above methods. In some cases the only data available may be annual landings. The simplest method available would be to base ABC on historical landings.

For example:

ABC = average recent historical catch, or
ABC = 0.75 * highest recent historical catch

Depletion-corrected average catch approach

The recent catch history method works best if abundance has remained stable over time. A recently developed method called Depletion-Corrected Average Catch can be used for estimating sustainable yields for data poor fisheries by applying a correction factor if it is believed that abundance has increased or decreased (which may be the subject of an educated guess based on subjective impressions). This method works best on species with low mortality rates, and has not yet been extensively tested.

The above are only some examples of possible control rules. It may be possible to develop control rules that incorporate factors such as recruitment variability, generation time, or other variables. The Council may develop a tiered ABC control rule process that differs from the example given above. In addition, the Council may opt to not apply control rules to all target stocks in a tier-structured manner and may instead develop rules by species.

SAFMC Draft ABC Control Rule (as of June 8, 2009)

The South Atlantic Fishery Management Council's SSC is developing a draft ABC control rule framework that incorporates many of the concepts presented in this scoping document. For consistency, the Gulf Council may choose to adopt an ABC framework based on the one being

¹ The Ocean Conservancy/MRAG Americas PSA analyses are included with permission from Ocean Conservancy.

developed by the SAFMC. The SAFMC control rule is comprised of a framework of dimensions (critical characteristics to evaluate) and tiers within each dimension that reflect the range of information available. Each tier is assigned a score, and scores are summed across stocks to provide an overall adjustment from the Council’s acceptable probability of overfishing, which is then used to calculate the buffer between the ABC and the OFL/MSY level. The following table shows the make-up of dimensions, tiers and points currently being considered in the SAFMC framework.

Dimension	Tiers	Pts.
Assessment Information	1. Quantitative assessment provides estimates of exploitation and biomass; includes MSY-derived benchmarks.	0
	2. Quantitative assessment provides estimates of either exploitation or biomass, but not MSY benchmarks; requires proxy reference points.	-2.5
	3. Quantitative assessment that provides relative measures of exploitation or biomass; absolute measures of status are unavailable; references may be based on proxy.	-5
	4. Reliable catch history available	-7.5
	5. Scarce or unreliable catch records	-10
Characterization of Uncertainty	1. Complete. Uncertainty in both assessment inputs and environmental conditions are included. (No currently assessed stocks meet this level.)	0
	2. High. This tier represents those assessments that include resampling (e.g. Bootstrap or Monte Carlo techniques) of important or critical inputs such as natural mortality, old landings, discard rates, age and growth parameters.	-2.5
	3. Medium: This tier represents assessments in which key uncertainties are addressed via statistical techniques and sensitivities, but the full uncertainties are not carried forward into the projections and reference point calculations.	-5
	4. Low. Distributions of FMSY and MSY are lacking.	-7.5
	5. None. This tier represents assessments that only provide single point estimates, with no sensitivities or other evaluation of uncertainties.	-10
Stock Status	1. Neither overfished nor overfishing, and stock is at high biomass and low exploitation relative to benchmark values.	0
	2. Neither overfished nor overfishing, but stock may be in close proximity to benchmark values.	-2.5
	3. Stock is either overfished or overfishing.	-5
	4. Stock is both overfished and overfishing.	-7.5
	5. Either status criterion is unknown.	-10
Productivity and Susceptibility Considerations	1. Low Risk. Productivity High, Vulnerability Low, Susceptibility Low	0
	2. Moderate Risk. Moderate Productivity, Moderate Vulnerability, Moderate Susceptibility	-5
	3. High Risk. Low Productivity, High Vulnerability, High Susceptibility	-10

In addition to the above, the SAFMC ABC control rule contains a “Depletion Threshold” which states that no fishing would be allowed if a stock’s biomass is at or below 10% of the virgin biomass.

Issue 2. ABC control rules

Question 1. Should a tiered system be used to define control rules, or should they be established on a species by species basis?

Question 2. Should one or more of the control rule methodologies described above be used, should some other method be used, or should a combination of methods be used?

Question 3. Should the Gulf Council adopt the control rule being developed by the SAFMC, with changes if needed to reflect differences between South Atlantic and Gulf of Mexico fisheries?

Issue 3. ACL Control Rules

Relationship between ACL, ACT and OY

NS1 Guidelines state that management measures should prevent overfishing while achieving, on a continuing basis, optimum yield. Thus, the relationship between ACL, ACT and OY must be considered when setting catch levels. ACL is a limit which should not be exceeded, and which triggers accountability measures if it is exceeded. ACT and OY are both targets, desired catch levels around which catches may fluctuate from year to year. The use of ACTs is optional. The NS1 Guidelines provide two ways in which ACL and ACT can be related to each other, and to OY, depending upon whether ACTs are used. Each has its pros and cons.

1) If ACTs are not used, The Council should generally set the ACL lower than the ABC to take into account management uncertainty and other factors related to preventing overfishing or achieving OY. Setting ACL below ABC reduces the probability that overfishing (i.e., exceeding OFL) will occur since AMs will be triggered at a more conservative level. However, setting the ACL too close to OY increases the likelihood of the ACL being exceeded due to normal year to year fluctuations in catch. The NS1 Guidelines state that if catch exceeds the ACL for a given stock or stock complex more than once in the last four years, the system of ACLs and AMs should be re-evaluated, and modified if necessary, to improve its performance and effectiveness.

2) If ACTs are used, the ACL may be set equal to the ABC and the additional factors related to preventing overfishing or achieving OY can be taken into account when setting an ACT below the ACL. If $ACT = OY$, catches can fluctuate to allow long-term average catches to be equal to OY. However, there may be an increased likelihood that catches persistently exceed the OY target but be below the ACL. The NS1 Guidelines state that continual harvest at a level above OY would violate NS1, because OY was not achieved on a continuing basis.

ACL is the level of annual catch of a stock or stock complex triggers AMs. ACL cannot exceed the ABC, but it may be set equal to ABC. ACLs may be divided into sector-ACLs provided the sum of the sector ACLs does not exceed the ABC. Whereas ABC is set by a scientific committee, ACL is set by managers.

Setting ACL equal to ABC

The NS1 Guidelines suggest that ACL should be set less than ABC when ACTs are not used. The guidelines state that management uncertainty is accounted for by the AMs. Management uncertainty can also be accounted for by ACT if used, which can be incorporated into the AMs. Thus, if ACTs are used, an approach to setting ACL might be to simply set the ACL, or the sum of the sector-ACLs, equal to ABC.

For example:

$$ACL = ABC$$

$$Recreational-ACL + Commercial-ACL = ABC$$

If ACTs are not used, the NS1 guidelines suggest that ACL should be set less than ABC. The combination of ACLs and AMs for a stock should be set to prevent overfishing, and adjusted if necessary to prevent ACL from being exceeded. In this case the ACL in combination with AM must take into account management uncertainty. Using a method such as one of those described below may be appropriate to set ACL below ABC.

ACL based on precision of catch estimates

Certain sectors or fishery management approaches attempt to count every fish caught by that sector, e.g., Individual Fishing Quota (IFQ) programs, catch card based reporting systems, or observer or survey programs with 100 percent coverage. The precision of these data collection programs is likely to be better than that of statistical sampling methods such as the Marine Recreational Information Program (MRIP). Even within the statistical sampling methods, frequently caught species will have a greater precision than infrequently caught species. ACL could be set based on the precision of a given stock and sector.

For example:

For programs with 100 percent coverage (i.e., $PSE^2 = 0$),	ACL = ABC
For sampling programs	if $PSE < 5.0$, ACL = $0.90 * ABC$
	if $PSE \geq 5.0$ and < 10.0 , ACL = $0.80 * ABC$
	if $PSE \geq 10.0$ or unknown ACL = $0.70 * ABC$

ACL based on previous management success

For fisheries and sectors that have had previous catch limits set (TAC, quota, ACL), compare the catch limit to the actual catches. For sectors that have exceeded catch limits, reduce ACL.

For example:

If catches exceeded catch limits by 7% during previous two years, reduce current ACL by 7%.

ACL based on bycatch

If bycatch mortality is known or reasonably estimated, it should be taken into account when setting OFL and ABC, and therefore need not be taken into account again with ACL. However, if bycatch is poorly estimated or unknown, NMFS suggests developing proxies based on National Bycatch Report bycatch ratios in similar fisheries until better data are available. For more information on the National Bycatch Report, see http://www.st.nmfs.noaa.gov/st4/nop/Outreach/NBR_Factsheet_Final.pdf. However, the decision about the best methodology for estimating bycatch should be made by the Council in consultation with its SSC, considering the best available scientific information.

For species with bycatch levels that have not been incorporated into the estimates of OFL and ABC, ACL should be reduced by an amount that takes into account the bycatch level for that species and sector.

² PSE = proportional standard error (also called coefficient of variation), which is the standard error of an estimate expressed as a percentage of the estimate. Smaller means more precise. In public opinion surveys, a PSE of 20% or less is generally considered acceptable (http://www.hrsdc.gc.ca/eng/publications_resources/por/subjects/learning/2007/18106/page05.shtml).

Running Average ACL

In Amendment 30B, for species undergoing overfishing, the Council adopted an ACL that was based on a three year running average of ABC. This method is useful for smoothing out year to year variations in stocks with a high level of volatility, but it can be difficult to follow.

ACL based on inseason vs. post-season accountability measures

ACL is, in addition to any other adjustments, subject to an additional reduction if accountability measures are implemented at the end of the season rather than in-season. This method is intended to be used in combination with other methods.

For example:

Fisheries and sectors with in-season AMs: no additional reduction in ACL

Fisheries and sectors with end of season AMs: reduce ACL by an additional 5 percent

Issue 3. ACL control rules

Question 1. If ACTs are used, should ACL = ABC, with management uncertainty incorporated into the ACT and AM, or should ACL be less than ABC based on one or more of the control rule methodologies described above?

Question 2. If ACTs are not used, should one or more of the control rule methodologies described above be used to set ACL less than ABC, or should some other method be used, or should a combination of methods be used?

Question 3. Should ACL be based on a running average of recent ABCs or on the current single year ABC?

Question 4. What other considerations should be taken into account when setting ACL?

Issue 4. ACT Control Rules

ACTs are the catch levels that management is targeted to achieve. As with ACLs, ACTs, if used, are set by management and should be set at levels that reduce the likelihood of ACL being exceeded after taking into account management uncertainty.

Management uncertainty occurs because of the lack of sufficient information about catch, and may include late catch reporting, misreporting, and underreporting of catches. Management uncertainty is affected by a fishery's ability to control actual catch. For example, a fishery that has in-season catch data available and in-season closure authority has better management control and precision than a fishery that does not have these features.

The guidelines state, "As a performance standard, if catch exceeds the ACL for a given stock or stock complex more than once in the last four years, the system of ACLs and AMs should be re-evaluated, and modified if necessary, to improve its performance and effectiveness".

The NS1 Guidelines do not require that ACTs always be established, but provide that ACTs may be used as part of a system of AMs. AMs are required regardless of whether ACTs are explicitly established.

Examples of Approaches for Setting ACT

ACT based on current OY control rule

The old 1998 technical guidance for setting OY recommends that OY be set at a level such that the probability of overfishing occurring is no more than 20% - 30%. This is similar to the recommendation in the current NS1 Guidelines that ACTs be included in the system of accountability measures so that ACL is not exceeded. The specific recommendation from the 1998 technical guidance was to set the OY target as follows:

For stocks that are not overfished: yield at $F_{OY} = 75\% F_{MSY}$

For overfished stocks, the Gulf Council has used the yield at $F_{Rebuilding}$ rather than the above formula.

ACT based on one or more of the control rules described for ACL

If ACL is set equal to ABC, then the ACT should account for part or all of the management uncertainty using one or more of the control rules described for ACL.

Issue 4. ACT control rules

Question 1: Should ACTs be used? If so, should they be used for all stocks, or should criteria be established to determine which stocks need an ACT?

Question 2: If used, should ACT = OY, or should one or more of the control rule methodologies described for ACL be used to set ACT, or should some other method be used?

Question 3. If used, should ACT be based on a running average of recent ACTs or on the current single year ACT?

Question 4. What other considerations should be taken into account when setting ACT?

Issue 5. Accountability Measures

AMs are management controls to prevent ACLs, including sector-ACLs, from being exceeded, and to correct or mitigate overages of the ACL if they occur. NMFS has identified two categories of AMs, in-season AMs that can be implemented during a fishing season, and postseason AMs that take effect in the following season for when the ACL is exceeded.

In-season AMs: This type of AM provides the greatest control over catches. If properly implemented and with a real-time or close to real-time monitoring program, an in-season AM can prevent, rather than react to, ACL being exceeded, but it requires that catch data be available in a timely enough manner to be able to take action real-time. Some types of in-season AMs include (but are not limited to):

- quota closure
- reduce the trip limit/bag limit when a certain percentage of the ACT or sector ACT has been reached
- gear restrictions
- individual fishing quota
- catch cards/fish tags

In the above examples, the in-season AMs may be triggered by the more conservative ACT or by the ACL. ACT could be exceeded due to uncertainty or incompleteness of the landings data, but the ACL is kept from being exceeded.

Post-season AMs: This type of AM (which is also called a reactive AM) implements corrective management measures in the following season if, at the end of the current season it is determined that the ACL has been exceeded. An AM authorizes the Regional Administrator to implement specific management changes without the need for a regulatory or full plan amendment to the FMP. Unlike in-season AMs, post-season AMs do not require catch data to be compiled on a real-time basis, only that it be available before the next season.

The NS1 Guidelines do not require that ACTs be used. However, where there is a lack of effective in-season controls, there is greater uncertainty as to whether ACL will be exceeded in

the current year. Therefore, the NS1 Guidelines state that, for fisheries without in-season management control to prevent the ACL from being exceeded, AMs should utilize ACTs that are set below ACLs so that catches do not exceed the ACL. Some types of post-season AMs include:

- shorten the subsequent year's fishing season
- reduce trip limit/bag limit
- implement seasonal area closures

If ACTs are used, management measures will be designed to achieve the ACT. Exceeding the ACT does not trigger the corresponding AM provided the ACT is set below the ACL. Thus, there is a buffer that allows year to year fluctuations to occur without triggering AMs. AMs are triggered only if the catch exceeds the ACL.

The resulting AM actions could either be set to restore catches to the ACT level, or could be set as "payback" measures that reduce the following year's catch levels by the amount of overage in the current year. For stocks that are not overfished, restoring the catch to the ACT level may be sufficient to maintain healthy stocks. However, for stocks that are overfished and undergoing rebuilding, a "payback" AM may be necessary in order to keep the rebuilding plan on track, and the NS1 Guidelines recommend "payback" in such a circumstance.

Performance Reviews

The NS1 Guidelines state that, as a performance standard, if catch exceeds the ACL for a given stock or stock complex more than once in the last four years, the system of ACLs and AMs should be re-evaluated, and modified if necessary, to improve its performance and effectiveness.

The Council could consider establishing a periodic formal review by the SSC, for example, every five years, which provides the opportunity to review the system of ABC, ACL and ACT control rules and accountability measures, and recommend revisions to the Council where appropriate. Alternatively, in lieu of fixed time intervals, a review could be called for if triggered by certain events, such as catch levels exceeding ACL more than once in four years.

Issue 5. How should AMs be implemented?

Question 1. Should in-season AMs be used where feasible and pos-season AMs used for other fishery/sectors, or should some other combination be used?

Question 2. What management measures are appropriate for in-season AMs? For post-season AMs? Should criteria be developed for determining appropriate actions?

Question 3. Should "payback" AMs be used only for overfished stocks or for all stocks?

Question 4. Should AMs be based on a running average of recent ACTs or on the current single year ACT? If ACT is not used, what should be the basis for setting AMs?

Question 5. Should performance reviews be conducted at fixed year intervals, or only when triggered by certain events?

Issue 6. Stock Complexes

“Stock complex” is defined in the NS1 Guidelines as a group of stocks that are sufficiently similar in geographic distribution, life history, and vulnerabilities to the fishery such that the impact of management actions on the stocks is similar.

Stocks may be grouped into complexes for various reasons, including:

- where stocks in a multispecies fishery cannot be targeted independent of one another and MSY cannot be defined on a stock-by-stock basis;
- where there is insufficient data to measure their individual stock status; or
- when it is not feasible for fishermen to distinguish individual stocks among their catch.

Stock complexes may be comprised of:

- one or more indicator stocks, each of which has status determination criteria and ACLs, and several other stocks;
- several stocks without an indicator stock, with status determination criteria and an ACL for the complex as a whole; or
- one or more indicator stocks, each of which has status determination criteria, with an ACL for the complex as a whole.

The indicator stock should be representative of the typical status of each stock within the complex, due to similarity in vulnerability. If there is a wide range of vulnerabilities, the stock complexes should be reorganized or the indicator stock should be chosen to represent the more vulnerable stocks within the complex. If this is not possible, then in instances where an indicator stock is less vulnerable than other members of the complex, management measures need to be more conservative so that the more vulnerable members of the complex are not at risk from the fishery.

Several stock complexes currently exist (e.g., shallow-water grouper, deep-water grouper, and snappers other than red, vermilion or lane). However, some of these do not have indicator species, or status determination criteria and ACLs. Furthermore, the appropriateness of these complexes has not been evaluated since they were set up. Methods such as cluster analyses or

PSA analyses could be useful in determining whether the existing complexes are appropriate for management under the new NS1 Guidelines. In addition, there are species for which little information is known, and are not part of a stock complex (for example, lesser amberjack).

The NS1 Guidelines state that if the stocks within a stock complex have a wide range of vulnerability, they should be reorganized into different stock complexes that have similar vulnerabilities; otherwise the indicator stock should be chosen to represent the more vulnerable stocks within the complex. In instances where an indicator stock is less vulnerable than other members of the complex, management measures need to be more conservative so that the more vulnerable members of the complex are not at risk from the fishery.

Issue 6: Stock complexes

Question 1: Should stock complexes be used at all, or should individual status determination criteria and ACLs be established for each individual stock under management?

Question 2: Which stocks should be combined into stock complexes?

Question 3: Should vulnerability to overfishing as determined by PSA analyses be used as criteria for establishing stock complexes?

Question 4: Should each stock complex have one or more indicator species, or should some stock complexes be set up without an indicator stock, with status determination criteria and an ACL for the complex as a whole?

Issue 7. Removal of Selected Stocks from Gulf Council Management

In some cases, it may be more appropriate for either a state fishery management agency or the South Atlantic Fishery Management Council to manage a species that occurs partially in the Gulf of Mexico Exclusive Economic Zone (EEZ). This could occur if the stock occurs primarily in another jurisdiction with only a small presence in the Gulf EEZ (for example, Nassau grouper), or if another agency has taken the lead in assessing and managing the stock (for example, stone crab).

To allow a state to manage a stock both within and without their state waters, the species could be removed from the FMP, or the FMP itself could be withdrawn. The states would be able to

apply state regulations to fish caught in Federal waters for fish landed in that state or caught by vessels registered to the state. In some cases NMFS could possibly, with Council approval, allow management measures for a stock that occurs primarily in SAFMC jurisdiction to also apply to fringe areas of the stock that occur in the Gulf. Stocks that could be considered removal from Gulf Council management include:

- Nassau grouper (primarily occurs in SAFMC jurisdiction)
- Yellowtail snapper (primarily occurs in SAFMC or Florida state jurisdiction)
- Mutton snapper (primarily occurs in SAFMC jurisdiction)
- Octocorals (Florida's Marine Life Rule regulates most species caught for Aquarium industry)
- Withdrawal of Stone Crab FMP (conflict issues that required an FMP no longer exist)

Issue 7: Removal of selected stocks from Gulf Council management

Question 1: Should selected stocks that occur primarily in state waters be withdrawn from Gulf Council FMPs?

Question 2: Should certain stocks that occur primarily in SAFMC jurisdiction be withdrawn from Gulf Council FMPs?

Question 3: Should the Council request that the SAFMC withdraw certain stocks which occur primarily in Gulf Council jurisdiction from their FMPs (for example, goliath grouper)?

Issue 8. Ecosystem Component Stocks

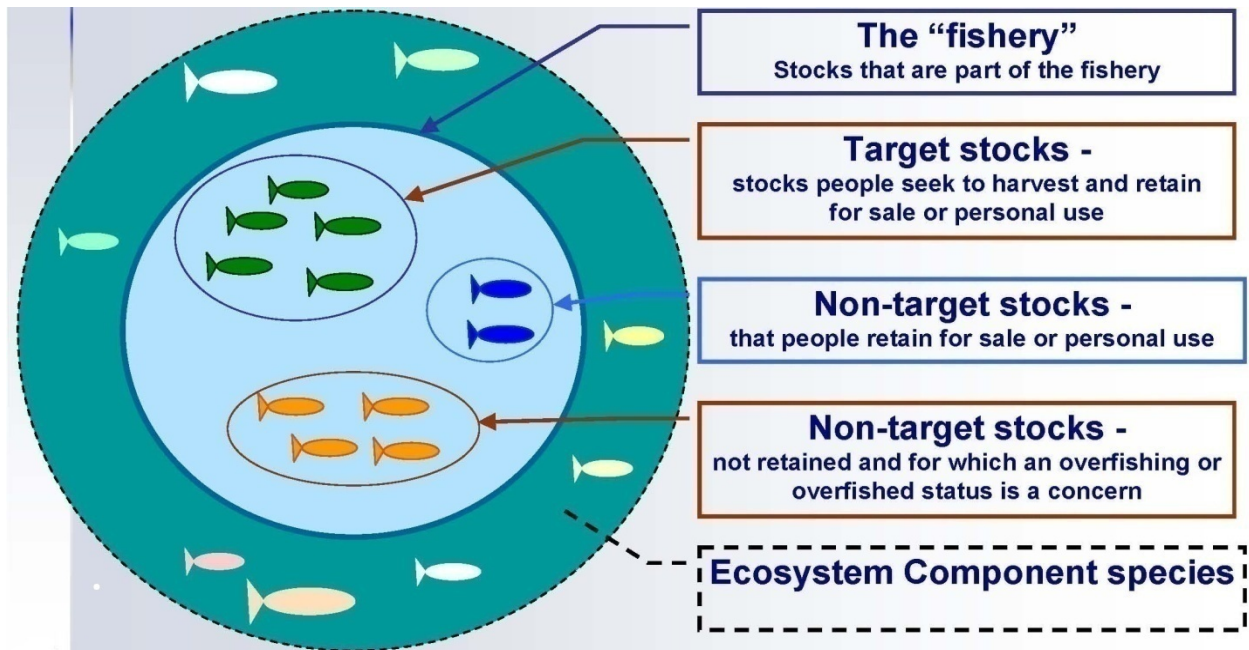
Stocks listed in an FMP are classified as either “in the fishery” or as an “ecosystem component” (EC). By default, stocks are considered to be “in the fishery” unless declared ecosystem components. Under the NS1 Guidelines, because ecosystem component stocks species are not managed in the FMP, ACLs and AMs are not required for those species. The option to use EC status is intended to encourage Councils to incorporate ecosystem considerations into FMPs.

Ecosystem component species may, but are not required to, be included in an FMP or FMP amendment for any of the following reasons: For data collection purposes; for ecosystem considerations related to specification of OY for the associated fishery; as considerations in the

development of conservation and management measures for the associated fishery; and/or to address other ecosystem issues.

To be considered for possible classification as an EC species, the species should:

- (A) Be a non-target species or non-target stock;
- (B) Not be determined to be subject to overfishing, approaching overfished, or overfished;
- (C) Not be likely to become subject to overfishing or overfished, according to the best available information, in the absence of conservation and management measures; and
- (D) Not generally be retained for sale or personal use.



Issue 8: Ecosystem component stocks

Question 1: Should some stocks currently in FMPs be declared ecosystem component stocks?

Question 2: Are there stocks not currently in an FMP that should be added as an ecosystem component?

Issue 9. Framework Procedures

The implementation process for a plan amendment can take over a year from initial scoping to final implementation. Framework procedures provide for a timelier implementation of routine actions such as setting ACL, and provide a written guideline for implementing such actions in a consistent manner. Council FMPs have had framework procedures for setting TAC, but each FMP has implemented its TAC framework slightly differently. This section contains a proposed Generic Framework Procedure for Specifying ACL and associated management measures for all FMPs that are included in this generic amendment (see Appendix B). If a generic ACL framework procedure is not adopted, there will either need to be separate ACL framework procedures adopted for each FMP, or changes to ACL and related management measures will require a full plan amendment each time a change is needed.

Management measures implemented under the FMPs must comply with applicable provisions of many laws and Executive Orders in addition to the Magnuson-Stevens Act, including the Endangered Species Act, National Environmental Policy Act, and others. As a result, it may occasionally be necessary to modify management measures for reasons other than implementation or modification of ACLs in order to be in compliance with these laws. Currently, such changes require a full plan amendment. The Framework Procedure for Specifying ACL is a specialized procedure that incorporates several requirements under the Magnuson-Stevens Act and NS1 Guidelines for setting ACLs and associated management measures, including the specification of OFL in a stock assessment, and recommendation of ABC by an SSC. Consequently, it does not readily lend itself to be used as a vehicle to modify management measures for reasons other than setting ACL.

Appendix C is a proposed Supplemental Framework Procedure for Other Applicable Law. It is more broadly based, and it allows for timely and efficient response if the Council is notified that this FMP is not or will not be in compliance with one or more applicable laws unless actions are taken to come into compliance. This framework also allows for timely and efficient response to implement actions that are required to bring this FMP into compliance with any judicial decisions if action is required by a court of law. This framework procedure would apply to all FMPs covered by this Generic Amendment.

The Generic Framework for Setting ACL is intended to be used to adjust ACL and other management measures on the basis of control rules or methodologies described in this generic amendment or in the individual FMPs, but is not intended to be used to change those fundamental control rules and methodologies. Such fundamental changes, if needed, should be done through a full plan amendment.

The Supplemental Framework Procedure is not intended to be used to implement changes that are indicated as a result of a stock assessment or new assessment information. Those changes should be implemented under the framework procedure for setting ACL. This framework is also not intended to be used to implement changes that may be considered fundamental changes to the FMP. These types of changes should be implemented through the full amendment rulemaking process.

Issue 9: Framework procedures

Question 1: Should a generic framework procedure for specifying ACL be adopted, or should ACL framework procedures be adopted on an FMP by FMP basis? Is the framework procedure in Appendix B a suitable generic ACL framework procedure, or are changes to it needed?

Question 2: Should a framework procedure for management measures to address other applicable law or judicial compliance be adopted? If so, is the framework procedure in Appendix C a suitable generic ACL framework procedure, or are changes to it needed?

Question 3: Should a framework procedure be created for any other purpose?

APPENDIX A. SPECIES LISTED IN GULF COUNCIL FMPS

ACLs and AMs for species in joint FMPS will be set through separate joint amendments.

Coastal Migratory Pelagics FMP (Gulf and South Atlantic Councils joint plan)

Species in the Management Unit

king mackerel	<i>Scomberomorus cavalla</i>
Spanish mackerel	<i>Scomberomorus maculatus</i>
cobia	<i>Rachycentron canadum</i>

Species in the Fishery but Not in the Management Unit

cero	<i>Scomberomorus regalis</i>
little tuny	<i>Euthynnus alletteratus</i>
dolphin	<i>Coryphaena hippurus</i>
bluefish	<i>Pomatomus saltatrix</i> (Gulf of Mexico only)

Red Drum FMP

Species in the Management Unit

red drum	<i>Sciaenops ocellatus</i>
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Reef Fish FMP

Species in the Management Unit

Snappers - Lutjanidae Family

queen snapper	<i>Etelis oculatus</i>
mutton snapper	<i>Lutjanus analis</i>
schoolmaster	<i>Lutjanus apodus</i>
blackfin snapper	<i>Lutjanus buccanella</i>
red snapper	<i>Lutjanus campechanus</i>
cupera snapper	<i>Lutjanus cyanopterus</i>
gray (mangrove) snapper	<i>Lutjanus griseus</i>
dog snapper	<i>Lutjanus jocu</i>
mahogany snapper	<i>Lutjanus mahogoni</i>
lane snapper	<i>Lutjanus synagris</i>
silk snapper	<i>Lutjanus vivanus</i>
yellowtail snapper	<i>Ocyurus chrysurus</i>
wenchman	<i>Pristipomoides aquilonaris</i>
vermilion snapper	<i>Rhomboplites aurorubens</i>

Groupers - Serranidae Family

rock hind	<i>Epinephelus adscensionis</i>	
speckled hind	<i>Epinephelus drummondhayi</i>	(deep-water grouper)
yellowedge grouper	<i>Epinephelus flavolimbatus</i>	(deep-water grouper)
red hind	<i>Epinephelus guttatus</i>	
goliath grouper	<i>Epinephelus itajara</i>	(protected species)
red grouper	<i>Epinephelus morio</i>	
misty grouper	<i>Epinephelus mystacinus</i>	(deep-water grouper)
warsaw grouper	<i>Epinephelus nigritus</i>	(deep-water grouper)
snowy grouper	<i>Epinephelus niveatus</i>	(deep-water grouper)
Nassau grouper	<i>Epinephelus striatus</i>	(protected species)
black grouper	<i>Mycteroperca bonaci</i>	
yellowmouth grouper	<i>Mycteroperca interstitialis</i>	
gag	<i>Mycteroperca microlepis</i>	
scamp	<i>Mycteroperca phenax</i>	
yellowfin grouper	<i>Mycteroperca venenosa</i>	

Marbled grouper (*Epinephelus inermis*) landings are included in NMFS landings, but are not listed in the regulations as a grouper (50 CFR Part 622, Appendix A, Table 3).

Tilefishes - Malacanthidae (Branchiostegidae) Family

goldface tilefish	<i>Caulolatilus crysops</i>
blackline tilefish	<i>Caulolatilus cyanops</i>
anchor tilefish	<i>Caulolatilus intermedius</i>
blueline tilefish	<i>Caulolatilus microps</i>
tilefish	<i>Lopholatilus chamaeleonticeps</i>

Jacks - Carangidae Family

greater amberjack	<i>Seriola dumerili</i>
lesser amberjack	<i>Seriola fasciata</i>
almaco jack	<i>Seriola rivoliana</i>
banded rudderfish	<i>Seriola zonata</i>

Triggerfishes - Balistidae Family

gray triggerfish	<i>Balistes capriscus</i>
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Wrasses - Labridae Family

hogfish	<i>Lachnolaimus maximus</i>
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Sand Perches - Serranidae Family**

sand perch	<i>Diplectrum bivattatum</i>
dwarf sand perch	<i>Diplectrum formosum</i>

** Sand perches are listed as groupers in 50 CFR Part 622, Appendix A, Table 3, but are excluded from regulations that prohibit the use of reef fish for bait, that prohibit harvest in the stressed area using a powerhead, and are excluded from bag limit regulations.

Shrimp FMP

<u>Species in the Management Unit</u>		
***brown shrimp	<i>Penaeus aztecus</i>	(exempt from ACL/AM)
***white shrimp	<i>Penaeus setiferus</i>	(exempt from ACL/AM)
***pink shrimp	<i>Penaeus duorarum</i>	(exempt from ACL/AM)
royal red shrimp	<i>Hymenopenaeus robustus</i>	

*** Species with a life cycle of approximately 1 year are exempt from ACL and AM requirements. This includes all species in the shrimp FMP except royal red shrimp.

Spiny Lobster FMP (Gulf and South Atlantic Councils joint plan)

<u>Species in the Management Unit</u>	
spiny lobster	<i>Panulirus argus</i>
slipper lobster	<i>Scyllarides nodifer</i>

<u>Species in the Fishery but Not in the Management Unit</u>	
spotted spiny lobster	<i>Panulirus argus</i>
smooth tail lobster	<i>Panulirus laevicauda</i>
Spanish slipper lobster	<i>Scyllarides aequinoctialis</i>

Stone Crab FMP

<u>Species in the Management Unit</u>	
stone crab	<i>Menippe mercenaria</i>
stone crab (Cedar Key north)	<i>Menippe adina</i>

Coral and Coral Reefs FMP (Gulf and South Atlantic Councils joint Plan)

<u>Species in the Management Unit</u>
corals of the class Hydrozoa (stinging and hydrocorals)
corals of the class Anthozoa (sea fans, whips, precious coral, sea pen, stony corals)

Note: The FMP does not list individual coral species comprising the management unit. However, there are 318 species referred to in the FMP as occurring in Gulf of Mexico and/or South Atlantic waters. The list of coral species is available upon request.

APPENDIX B. GENERIC FRAMEWORK PROCEDURE FOR SPECIFICATION OF ANNUAL CATCH LIMIT

The following is a framework procedure for specification OFL, ABC, ACL and ACT (if used) along with proposed regulations and accountability measures. This framework, along with the control rules established elsewhere in the Generic ACL/AM Amendment is applicable to all FMPs covered by this generic amendment. Subsequent changes to the generic framework or the control rules should be made in a subsequent generic amendment. Any Regulatory Amendment submitted under this framework must be accompanied by an environmental assessment (EA) or environmental impact statement (EIS), as appropriate. If an EIS rather than an EA is considered the necessary level of NEPA analyses, a plan amendment rather than a Regulatory Amendment may be a more appropriate action.

Procedure for Specification of ACL:

1. At times determined by the Southeast Data Assessment and Review (SEDAR) Steering Committee, and in consultation with the Council, NMFS Southeast Regional Office (SERO), and Southeast Fisheries Science Center (SEFSC), benchmark stock assessments or update stock assessments will be conducted under the SEDAR process for stocks or stock complexes managed under an FMP. Each SEDAR stock assessment or update assessment will include one or more candidate models that will: a) assess to the extent possible the current biomass, biomass proxy, or SPR levels for each stock; b) estimate F in relation to F_{MSY} (MFMT) and F_{OY} ; c) estimate the OFL associated with the model; d) estimate other population parameters deemed appropriate; e) summarize statistics on the fishery for each stock or stock complex; f) specify the geographical variations in stock abundance, mortality, recruitment, and age of entry into the fishery for each stock or stock complex; and g) develop estimates of B_{MSY} and MSST.
2. The Council will utilize the SEDAR process as described in the most current version of the SEDAR Procedural and Administrative Guidelines³, which may be revised from time to time by the SEDAR Steering Committee, to provide the biological analyses and data listed above in paragraph 1. Either the SEFSC or the stock assessment branch of a state agency may serve as the lead in conducting the analyses, as determined by the SEDAR Steering Committee.

For benchmark assessments, the SEDAR review panel is expected to select a base model, among any candidate models, as the best available science for a given

³ The SEDAR Procedural and Administrative Guidelines document is available on the SEDAR website, <http://www.sefsc.noaa.gov/sedar/>, and is incorporated into the framework procedure by reference.

assessment. Part of the modeling output from a given base model will be an estimate of the OFL or OFLs in the case of multi-year projections, the specification of which will be part of the terms of reference with which SEDAR review panels will be tasked. (Note: The OFL is the annual harvest level corresponding to fishing at MFMT (F_{MSY} or proxy)). However, the ultimate review of which model, among any candidate models, represents the best available science, and therefore what OFL estimate is most appropriate, will occur within the Council's SSC. The SEDAR review panel will prepare a written report to the Council's SSC specifying the base model and its associated estimate of OFL (or OFLs) for each stock assessed. The Panel may also provide guidance to the SSC for its recommendation of ABC for assessed stocks. The SSC will evaluate recommendations provided by a SEDAR review panel for the base model, based on the best scientific information available, to assess the status of a given stock.

In the case of update stock assessments, the SSC will take on many of the functions of reviewing stock assessments that are ascribed to SEDAR review panels in the case of benchmark assessments. For example, the SSC will select the base model that members believe represents the best available science, and the OFL, or OFLs in the case of multi-year projections, will be estimated with the base model.

Assessment outputs for each model should include, to the extent practicable, the probability that overfishing will occur in the future at various catch levels, and the annual transitional yields (i.e., catch streams) calculated for each level of fishing mortality at various catch levels should be estimated. For overfished stocks, a range of catch levels shall be calculated so as to end overfishing and achieve population levels at or above F_{MSY} at B_{MSY} within the rebuilding periods specified by the Council and approved by NMFS. The SEDAR report will recommend rebuilding periods based on the provisions of the National Standard Guidelines, including generation times for the affected stocks. Generation times are to be specified by the stock assessment panel based on the biological characteristics of the individual stocks. The SEDAR report will recommend to the Council's SSC a B_{MSY} level and MSST from B_{MSY} . The SEDAR report may also recommend a more appropriate estimate of F_{MSY} for any stock. The report may also recommend more appropriate levels for the MSY proxy, OY, MFMT, and MSST. For stock or stock complexes where data are inadequate to compute an OFL, the SEDAR report will use other available information as a guide in providing their best estimate of an OFL corresponding to MFMT and a range of catch levels that should result in not exceeding the MFMT.

3. The SSC will review SEDAR reports to determine if SEDAR recommendations for base models, OFL estimates, and other biological reference points, represent the best scientific information available for assessed stocks. In addition, the SSC will examine information provided by social scientists and economists from the

Council staff and from the NMFS SERO Fisheries Social Science Branch analyzing social and economic impacts of any specification demanding adjustments of allocations, quotas, bag limits or other fishing restrictions. The SSC will recommend an OFL and an ABC that is at or below the OFL, taking into account scientific uncertainty in accordance with the ABC control rule(s) described in the Generic ACL/AM Amendment (or as modified in a subsequent plan amendment). If the SSC recommends an ABC equal to OFL, the SSC will provide its rationale why it believes that level of fishing will not exceed MFMT. The SSC may also recommend additional species for future analysis.

4. The Council will conduct a public hearing on the SEDAR reports and the SSC's OFL and ABC recommendations at, or prior, to the time it is considered by the Council for action. Other public hearings may be held as appropriate. The Council will request review of the reports by the appropriate Advisory Panel (AP) and optionally by the Socioeconomic Panel (SEP) and convene these groups before taking action.
5. The Council in selecting an ACL and ACT (if used), and a stock restoration time period (target date), if necessary, for each stock or stock complex for which an ABC has been identified will, in addition to taking into consideration the recommendations and information provided for in (1), (2), and (3) and (4), utilize the following criteria:
 - a. Set ACL at or below the ABC recommended by the SSC or set a series of annual ACLs at or below the projected ABCs for a period of five years or less. If the Council sets ACL equal to ABC, and ABC has been set equal to OFL, the Council will provide its rationale why it believes that level of fishing will not exceed MFMT.
 - b. May subdivide the ACLs into commercial and recreational, and optionally for-hire sector-ACLs that maximize the net benefits of the fishery to the nation. The sector-ACLs will be based on allocations determined by criteria established under the Council's Allocation Guidance Principles and specified by the Council through a plan amendment. For an overfished stock, if the harvest in any year exceeds the ACL or sector-ACL, management measures and catch levels for that sector will be adjusted in accordance with the AMs established for that stock.
 - c. Set ACTs or sector-ACTs (if used) at or below ACLs and in accordance with the provisions of the AM for that stock. The ACT is the management target that accounts for management uncertainty in controlling the actual catch at or below the ACL.

6. Appropriate regulatory changes that may be implemented by a Regulatory Amendment should conform to the appropriate control rules established in the Generic ACL/AM Amendment, and may include:
 - a. The ACLs or sector-ACLs, and ACTs or sector-ACTs, or a series of annual ACLs or sector ACLs along with ACTs or sector ACTs for a period of five years or less.
 - b. Bag limits, size limits, vessel trip limits, closed seasons (including adjustments of opening or closing dates) or areas, gear restrictions, and quotas designed to keep harvest levels from exceeding the ACL or sector-ACL.
 - c. AMs consisting of one or more of the actions described in paragraph (b). For in-season AMs the measures may be designated to take effect upon landings reaching or projected to reach the ACL or sector ACL, or upon approaching or projected to approach (e.g., within x percent of) the ACL or sector-ACL. For post-season AMs the measures may be designated to take effect the following fishing season if an ACL (or sector-ACL) is exceeded.
 - d. The time period (target date) specified for rebuilding an overfished stock, estimates of B_{MSY} and MSST for overfished stocks and MFMT if such change results from new biological information and a recalculation of the formula used to determine the reference point. Changes to the underlying formula may only be made by a plan amendment.
 - e. New levels or statements of MSY (or proxy) and OY for any stock if such change results from new biological information and a recalculation of the stock assessment or formula used to determine the reference point.
 - f. Within a multi-species IFQ program, adjustments to percentages of species-specific IFQ shares converted to multi-use IFQ shares.
7. The Council will provide a Regulatory Amendment to the NMFS Regional Administrator (RA) containing the SEDAR specification of OFL, SSC recommendation of ABC, estimates of B_{MSY} and MSST, estimates of MFMT, and the Council's recommendations for ACLs, sector-ACLs, ACTs, sector-ACTs, AMs, stock restoration target dates for each stock or stock complex, and the quotas, bag limits, trip limits, size limits, closed seasons, and gear restrictions necessary to avoid exceeding the ACL or sector-ACLs. A regulatory impact review and

environmental assessment of impacts, and the proposed regulations will be included. The Regulatory Amendment will be submitted within 30 days of the date that the Council takes final action, or such other time as agreed upon by the Council and RA. The Council may also recommend new levels or statements for MSY (or proxy) and OY. Modifications to the framework(s) and control rule(s) for setting OFL, ABC, ACL and ACT (if used) may not be made by a Regulatory Amendment since they require a plan amendment.

8. Upon transmittal of the Regulatory Amendment and the proposed regulations to the RA, the RA shall commence a review of the Regulatory Amendment and the proposed regulations, and approval and implementation, or notice to the Council of disapproval, in accordance with Section 304 of the MSA⁴.

⁴ SEC. 304. ACTION BY THE SECRETARY 16 U.S.C. 1854

(a) REVIEW OF PLANS.—

(1) Upon transmittal by the Council to the Secretary of a fishery management plan or plan amendment, the Secretary shall—

(A) immediately commence a review of the plan or amendment to determine whether it is consistent with the national standards, the other provisions of this Act, and any other applicable law; and

(B) immediately publish in the Federal Register a notice stating that the plan or amendment is available and that written information, views, or comments of interested persons on the plan or amendment may be submitted to the Secretary during the 60-day period beginning on the date the notice is published.

(2) In undertaking the review required under paragraph (1), the Secretary shall—

(A) take into account the information, views, and comments received from interested persons;

(B) consult with the Secretary of State with respect to foreign fishing; and

(C) consult with the Secretary of the department in which the Coast Guard is operating with respect to enforcement at sea and to fishery access adjustments referred to in section 303(a)(6).

(3) The Secretary shall approve, disapprove, or partially approve a plan or amendment within 30 days of the end of the comment period under paragraph (1) by written notice to the Council. A notice of disapproval or partial approval shall specify—

(A) the applicable law with which the plan or amendment is inconsistent;

(B) the nature of such inconsistencies; and

(C) recommendations concerning the actions that could be taken by the Council to conform such plan or amendment to the requirements of applicable law. If the Secretary does not notify a Council within 30 days of the end of the comment period of the approval, disapproval, or partial approval of a plan or amendment, then such plan or amendment shall take effect as if approved.

(4) If the Secretary disapproves or partially approves a plan or amendment, the Council may submit a revised plan or amendment to the Secretary for review under this subsection.

(5) For purposes of this subsection and subsection (b), the term “immediately” means on or before the 5th day after the day on which a Council transmits to the Secretary a fishery management plan, plan amendment, or proposed regulation that the Council characterizes as final.

(b) REVIEW OF REGULATIONS.—

(1) Upon transmittal by the Council to the Secretary of proposed regulations prepared under section 303(c), the Secretary shall immediately initiate an evaluation of the proposed regulations to determine

9. The RA is authorized, through notice action, to conduct the following activities:
- a. Close the commercial fishery of a species or species group that has a commercial quota or sub-quota at such time as projected to be necessary to prevent the commercial sector from exceeding its sector-ACL for the remainder of the fishing year or sub-quota season.
 - b. In the case of the Reef Fish FMP, close the recreational red snapper fishery in the EEZ, i.e., reduce the red snapper bag limit to zero, at such time as projected to be necessary to prevent the recreational sector from exceeding its quota for the remainder of the fishing year. If the recreational red snapper fishery is divided into private and for-hire sectors, each with its own quota, then this provision applies to each sector independently.
 - c. Reopen a commercial or recreational season that had been prematurely closed if needed to assure that a quota can be reached.
 - d. Implement an in-season AM for a sector that has reached or is projected to reach, or is approaching (e.g., within x percent) or is projected to approach its ACL, or implement a post-season AM for a sector that exceeded its ACL in the current year.

whether they are consistent with the fishery management plan, plan amendment, this Act and other applicable law. Within 15 days of initiating such evaluation the Secretary shall make a determination and—

(A) if that determination is affirmative, the Secretary shall publish such regulations in the Federal Register, with such technical changes as may be necessary for clarity and an explanation of those changes, for a public comment period of 15 to 60 days; or

(B) if that determination is negative, the Secretary shall notify the Council in writing of the inconsistencies and provide recommendations on revisions that would make the proposed regulations consistent with the fishery management plan, plan amendment, this Act, and other applicable law.

(2) Upon receiving a notification under paragraph (1)(B), the Council may revise the proposed regulations and submit them to the Secretary for reevaluation under paragraph (1).

(3) The Secretary shall promulgate final regulations within 30 days after the end of the comment period under paragraph (1)(A). The Secretary shall consult with the Council before making any revisions to the proposed regulations, and must publish in the Federal Register an explanation of any differences between the proposed and final regulations.

APPENDIX C. SUPPLEMENTAL FRAMEWORK PROCEDURE FOR OTHER APPLICABLE LAW

The Framework Procedure for Specification of ACL is a specialized procedure for implementing changes to ACL, other associated parameters, and management measures in accordance with the requirements of the Magnuson-Stevens Act and the NS1 Guidelines. On occasion, it may be necessary to implement management changes in response to requirements of other laws affecting fisheries management. This supplemental framework procedure provides a standardized procedure for implementing management changes required by other applicable laws.

Procedure for Management Measures to Address Other Applicable Law or Judicial Compliance:

1. If the RA is notified by an appropriate National Oceanic and Atmospheric Administration (NOAA) office or by another Federal agency that management measures implemented under this FMP are not in compliance with one or more of the laws specified above, or if changes to management measures implemented under this FMP are required as a result of a court order, he/she will notify the Council of the issue and that action is required. If there is a legal deadline for taking action, he/she will include that deadline.
2. The Council will initiate a scoping process to inform the public of the issue and develop a range of alternatives to address the issue. The scoping process will include the development of a scoping document and/or options paper, and an opportunity for public comment. The Council will then develop a framework amendment, may select preferred alternatives, and will hold public hearings.
3. During the public hearing phase, and at other times that the Council may choose during development of the framework amendment, the Council will convene its Standing and applicable Special SSC and the appropriate AP to provide recommendations on the proposed actions. The Council may optionally convene other advisory groups if it deems necessary, including the Ecosystem SSC, Law Enforcement AP, and other APs. The AP and SSC meetings may be in person, via conference call, or via video or web conferencing, or other meeting technology as it sees fit, provided that the method of meeting allows for public monitoring.
4. Regulatory changes implemented through this framework procedure should be directed toward resolving the specific issue or issues for which the framework

action was initiated, and should not address ACL or other unrelated issues. Regulations that may be implemented by proposed rule in the Federal Register include:

- a. Bag limits, size limits, vessel trip limits, closed seasons or areas, gear restrictions, and quotas.
 - b. Reporting requirements, VMS or other tracking gear requirements, and permit requirements, except that IFQs or changes to IFQs cannot be implemented under this framework.
5. The Council will provide a completed framework amendment along with proposed regulations to the RA in a timely manner following final action by the Council. Council members who wish to submit minority reports may do so at the time that the completed framework amendment is submitted or within two weeks of the submission.
 6. The RA will review the Council's recommendations and supporting information; and within 90 days, if he/she concurs that the recommendations are consistent with the objectives of the FMP while resolving the issue identified under other applicable law or under judicial compliance, he/she will publish a proposed rule in the Federal Register (providing up to 30 days for additional public comment). The RA will take into consideration all public comment and information received and will forward for publication in the Federal Register the notice of final rule within 30 days of the close of public comment, or such other time as agreed upon by the Council and RA.
 7. If NMFS decides not to publish the proposed rule of the recommended management measures, or to otherwise hold the measures in abeyance, then the RA must notify the Council of his/her intended action within 30 days of receipt of the Council's proposal and the reasons for NMFS concern along with suggested changes to the proposed management measures that would alleviate the concerns. Such notice shall specify: 1) the applicable law or judicial ruling with which the amendment is inconsistent, 2) the nature of such inconsistencies, and 3) recommendations concerning the actions that could be taken by the Council to conform the amendment to the requirements of applicable law or judicial ruling.

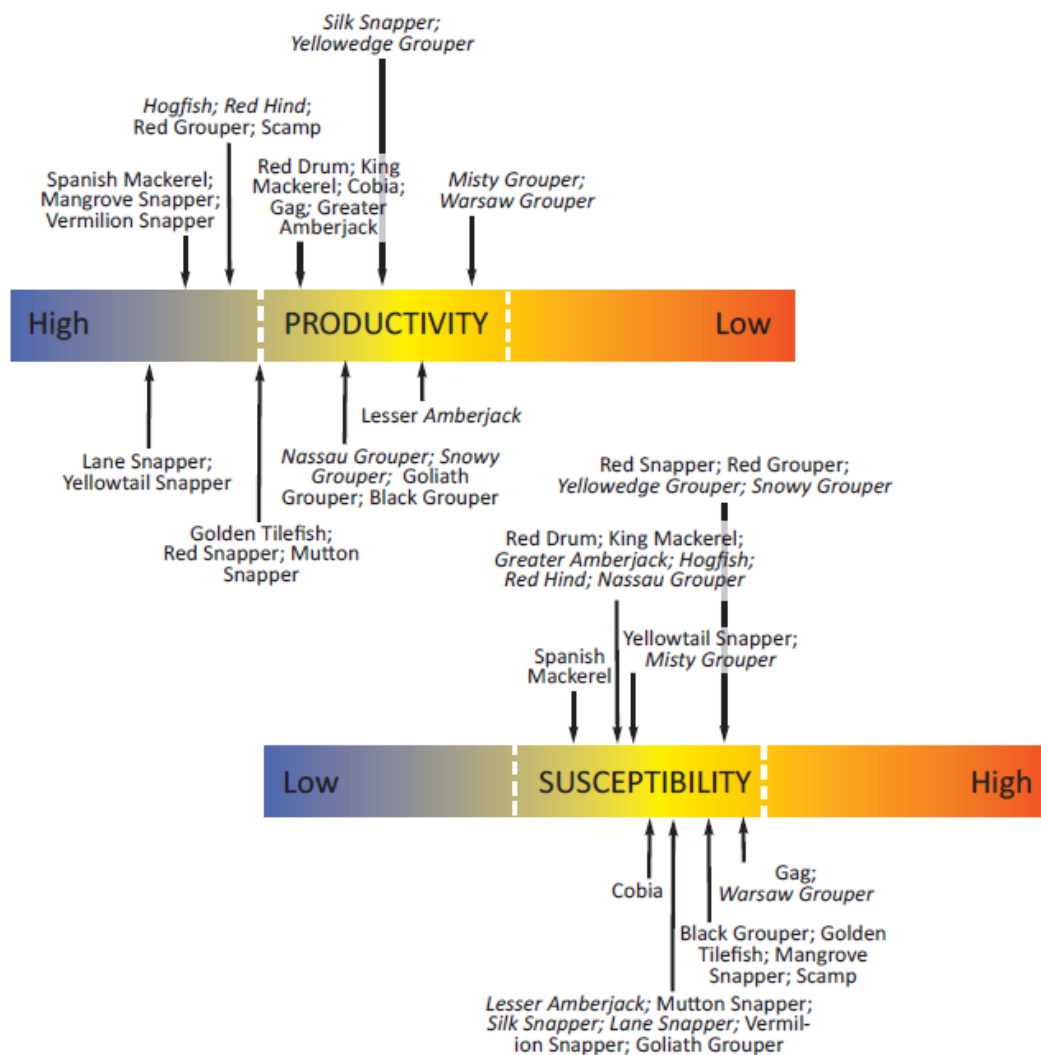
**APPENDIX D. PSA ANALYSES OF 26 STOCKS BY OCEAN
CONSERVANCY/MRAG AMERICAS**

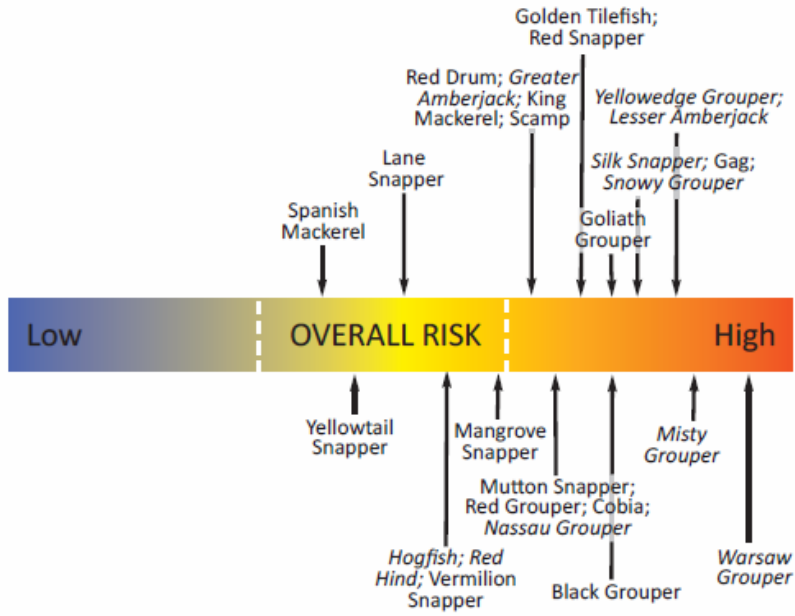
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Productivity and Susceptibility Analyses: Gulf of Mexico

Productivity and susceptibility analyses (PSA) were conducted for 26 species managed by the Gulf of Mexico Fishery Management Council (GMFMC). Of these, three are managed under the Coastal Migratory Pelagics Fishery Management Plan (FMP), one is red drum (Red Drum FMP) and the remaining 22 are managed through the Reef Fish FMP.

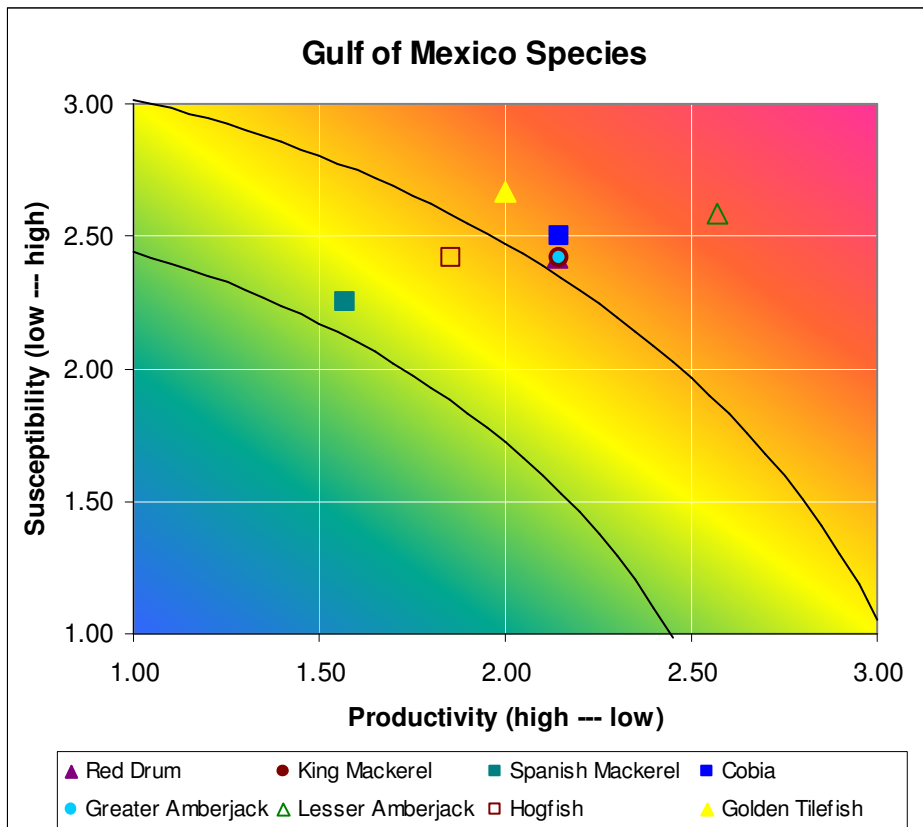
Of these 26, eight scored moderate overall risk, and eighteen scored high overall risk. Of those 18, seven are missing information for at least one attribute; of the seven, one is missing information for two attributes and two are missing information for three or more attributes. In the following figures, the italicized stock names are those stocks where at least one attribute is missing information and was given a high score due to that uncertainty, in accordance with the CSIRO's treatment of uncertainty in their ERAEF methodology. In the plotted results below, open symbols indicate uncertainty.



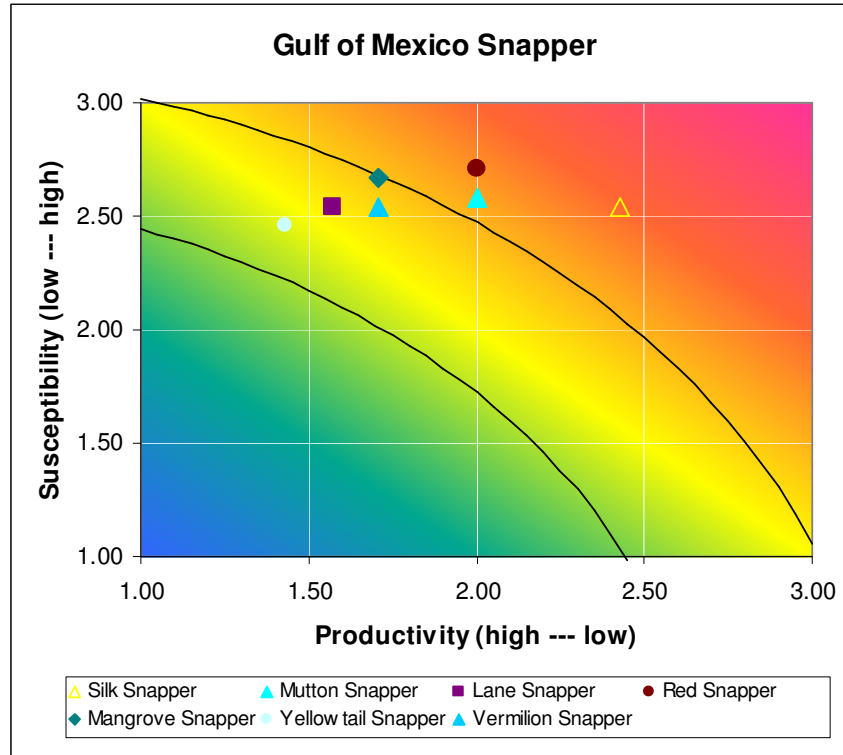


Coastal Migratory Pelagics: King Mackerel, Spanish Mackerel, Cobia

Red Drum and Reef Fish Resources: Red Drum, Greater Amberjack, Lesser Amberjack, Hogfish and Golden Tilefish



Reef Fish Resources, Snapper: Silk Snapper, Mutton Snapper, Lane Snapper, Red Snapper, Mangrove Snapper, Yellowtail Snapper, Vermilion Snapper



		Migratory Pelagics			Reef Fish Resources					
		King Mackerel	Spanish Mackerel	Cobia	Red Drum	Greater Amberjack	Lesser Amberjack	Hogfish	Tilefish	
Productivity	Age at maturity	high	low	high	med	med	unk	unk	high	
	Size at maturity	med	med	med	high	high	unk	low	med	
	Maximum age	med	low	med	high	med	unk	med	high	
	Maximum size	high	med	high	med	high	med	med	med	
	Fecundity	low	low	low	low	low	unk	low	low	
	Reproductive strategy	low	low	low	low	low	low	low	low	
	Trophic level	high	high	high	high	high	high	high	med	
	Productivity Score	2.14	1.57	2.14	2.14	2.14	2.57	1.86	2.00	
Susceptibility	Availability	Global Dist	med	high	low	high	low	high	high	high
		Behavior	med	high	high	high	high	med	high	high
	Encounterability	Habitat	low	low	low	high	low	m	high	high
		Bathymetry	high	high	high	high	high	high	high	high
	Selectivity	Size at Mat	med	med	med	med	med	unk	unk	high
		Max Size	high	med	high	med	high	med	med	med
		Desirability	med	low	high	med	med	med	low	med
	Post Capture Mortality	high	high	high	high	high	high	high	high	
	Susceptibility Score	2.42	2.25	2.50	2.42	2.42	2.58	2.42	2.67	
	Overall Risk Score	3.23	2.74	3.29	3.23	3.23	3.64	3.05	3.33	
Risk Ranking	High	Med	High	High	High	High	Med	High		
Overfishing	no	no	no	no	yes	unk	unk	unk		
Overfished (Depleted)	no	no	no	undef	yes	undef	undef	undef		

unk = unknown attribute values are treated with precaution and assigned high risk; stock status unknown
 undef = status determination criteria not defined low, med, high = risk score for attribute value
RED = overfished and overfishing is occurring

		Reef Fish Resources (Snapper Species)							
		Silk Snapper	Mutton Snapper	Lane Snapper	Red Snapper	Mangrove Snapper	Yellowtail Snapper	Vermilion Snapper	
Productivity	Age at maturity	high	med	low	med	med	low	med	
	Size at maturity	med	med	low	med	low	low	low	
	Maximum age	high	high	med	high	med	med	med	
	Maximum size	med	med	med	low	med	med	med	
	Fecundity	unk	low	low	low	low	low	low	
	Reproductive strategy	low	low	low	low	low	low	low	
	Trophic level	high	high	high	high	high	med	high	
	Productivity Score	2.43	2.00	1.57	2.00	1.71	1.43	1.71	
Susceptibility	Availability	Global Dist	med	high	med	med	high	med	med
		Behavior	high	high	high	high	high	high	high
	Encounterability	Habitat	high	high	high	high	high	high	high
		Bathymetry	high	high	high	high	high	high	high
	Selectivity	Size at Mat	med	med	med	low	med	low	low
		Max Size	med	med	med	low	med	med	med
		Desirability	high	med	med	high	med	high	med
	Post Capture Mortality	high	high	high	high	high	high	high	
Susceptibility Score	2.54	2.58	2.54	2.71	2.67	2.46	2.54		
Overall Risk Score	3.52	3.27	2.99	3.37	3.17	2.84	3.07		
Risk Ranking	High	High	Med	High	Med	Med	Med		
Overfishing	unk	no	unk	yes	unk	no	no		
Overfished (Depleted)	undef	no	undef	yes	undef	no	no		

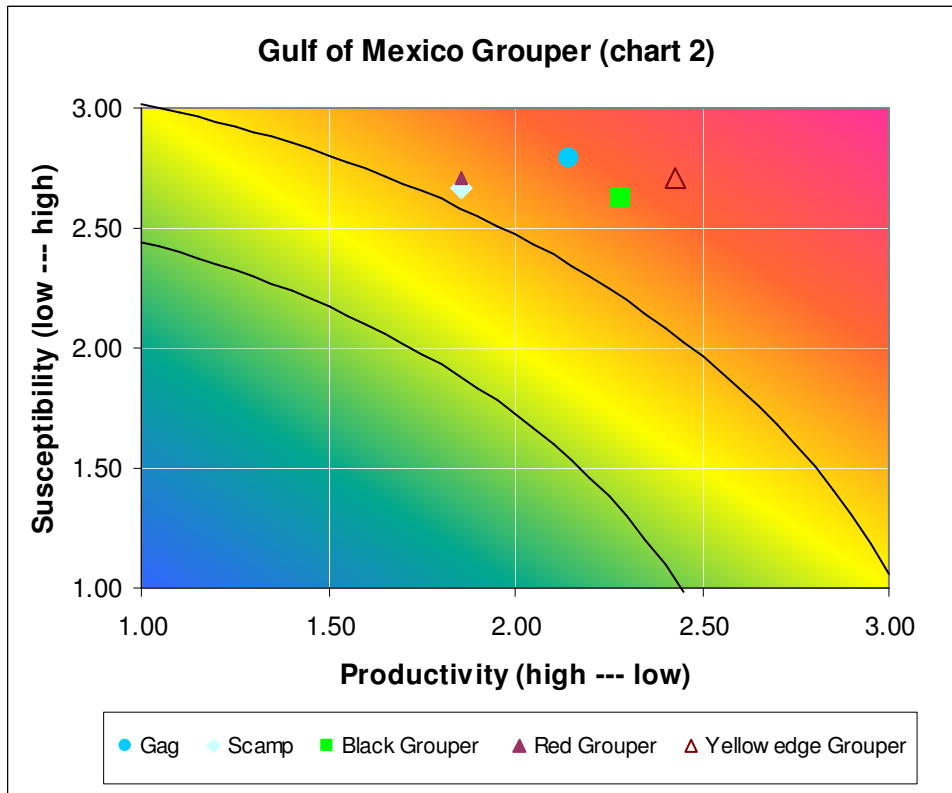
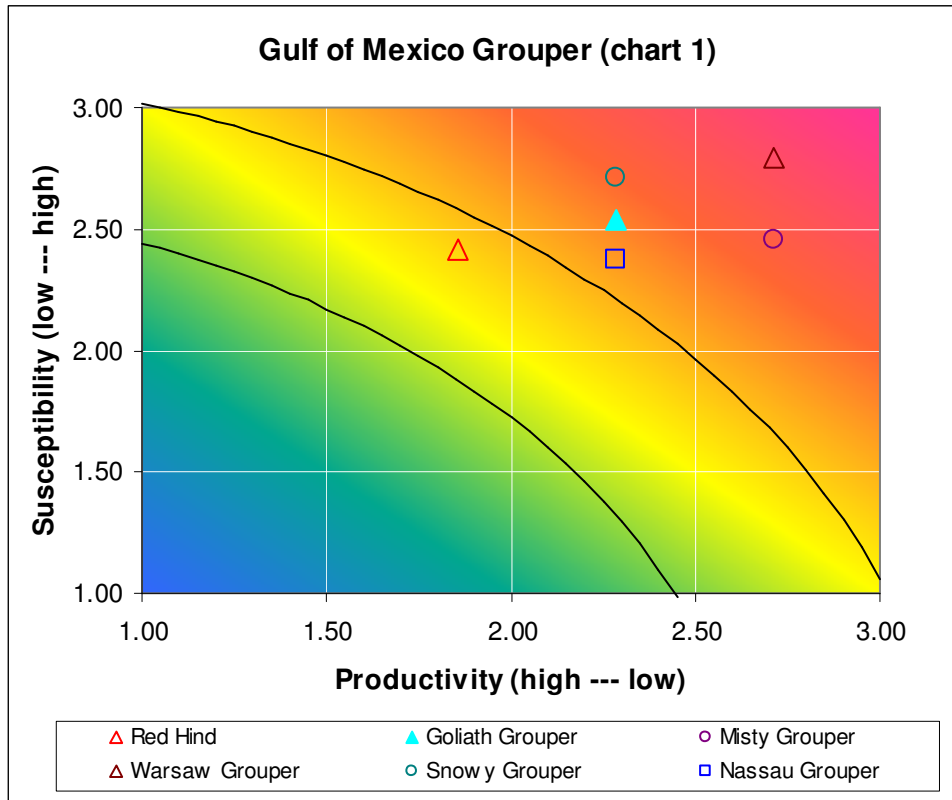
unk = unknown attribute values are treated with precaution and assigned high risk; stock status unknown

undef = status determination criteria not defined

low, med, high = risk score for attribute value

RED = overfished and overfishing is occurring

Reef Fish Resources, Grouper: Red Hind, Goliath Grouper, Misty Grouper, Warsaw Grouper, Snowy Grouper, Nassau Grouper, Gag, Scamp, Black Grouper, Red Grouper, Yellowedge Grouper



		Reef Fish Resources (Grouper Species)											
		Red Grouper	Yellowedge Grouper	Red Hind	Goliath Grouper	Misty Grouper	Warsaw Grouper	Snowy Grouper	Nassau Grouper	Gag	Scamp	Black Grouper	
Productivity	Age at maturity	med	high	unk	med	unk	high	high	high	med	med	high	
	Size at maturity	med	med	low	high	high	unk	med	med	high	med	high	
	Maximum age	med	high	med	high	unk	high	med	med	high	med	high	
	Maximum size	med	med	med	high	high	high	med	med	med	med	med	
	Fecundity	low	unk	low	low	unk	unk	unk	unk	low	low	low	
	Reproductive strategy	low	low	low	low	low	low	low	low	low	low	low	
	Trophic level	high	high	high	high	high	high	high	high	high	high	high	
Productivity Score		1.86	2.43	1.86	2.29	2.71	2.71	2.29	2.29	2.14	1.86	2.29	
Susceptibility	Availability	Global Dist	med	med	high	med	high	med	med	med	med	high	med
		Behavior	high	high	high	high	unk	high	high	high	high	high	high
	Encounterability	Habitat	high	high	high	high	high	high	high	high	high	high	high
		Bathymetry	high	high	high	high	high	high	high	high	high	high	high
	Selectivity	Size at Mat	med	med	low	high	high	unk	med	med	high	med	med
		Max Size	med	med	med	high	high	high	med	med	med	med	med
		Desirability	high	high	low	low	low	med	high	low	high	high	high
	Post Capture Mortality		high	high	high	high	high	high	high	high	high	high	high
Susceptibility Score		2.71	2.71	2.42	2.54	2.46	2.79	2.71	2.38	2.79	2.67	2.63	
Overall Risk Score		3.28	3.64	3.05	3.42	3.66	3.89	3.54	3.30	3.52	3.25	3.48	
Risk Ranking		High	High	Med	High	High	High	High	High	High	High	High	
Overfishing		no	unk	unk	no	unk	unk	unk	no	yes	unk	unk	
Overfished (Depleted)		no	undef	undef	unk	undef	undef	undef	undef	undef	undef	undef	

unk = unknown attribute values are treated with precaution and assigned high risk; stock status unknown

undef = status determination criteria not defined low, med, high = risk score for attribute value