

Final Report

Regional Fishery Management Councils
Summary of Risk Policies or Equivalents

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Acronyms

ABC	Acceptable biological catch
ACL	Annual catch limit
ACT	Annual catch target
AM	Accountability measure
BSAI	Bering Sea and Aleutian Islands
CFMC	Caribbean Fishery Management Council
CMP	Coastal migratory pelagic
CPS	Coastal pelagic species
CV	Coefficient of variation
EA	Environmental assessment
EEZ	Exclusive economic zone
FEP	Fishery ecosystem plan
FMP	Fishery management plan
GHL	Guideline harvest limit
GMFMC	Gulf of Mexico Fishery Management Council
GOA	Gulf of Alaska
GPT	Groundfish plan team
HCR	Harvest control rule
HMS	Highly migratory species
MAFMC	Mid-Atlantic Fishery Management Council
MFMT	Maximum fishing mortality threshold
MSA	Magnuson-Stevens Act
MSY	Maximum sustainable yield
NEFMC	New England Fishery Management Council
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
NS	National Standard
OFL	Overfishing limit
OY	Optimum yield
PDF	Probability density function
PFMC	Pacific Fishery Management Council
PSC	Pacific Salmon Commission
PST	Pacific Salmon Treaty
P*	Probability of overfishing
SAFE	Stock Assessment and Fishery Evaluation
SAFMC	South Atlantic Fishery Management Council
SDC	Status determination criteria
SEEM	Social, economic, ecological and management uncertainty considerations
SSC	Scientific and statistical committee
SYL	Sustainable yield level
TAC	Total allowable catch
WPRFMC	Western Pacific Regional Fishery Management Council

Introduction

The purpose of this document is to provide background information to the New England Fishery Management Council's (NEFMC) Risk Policy Working Group. This Working Group will be reconvened in 2023 to review the NEFMC's current risk policy, which was implemented in 2016 as part of their [Risk Policy Roadmap](#). In addition to this document, a literature review was prepared to inform the deliberations of the Working Group.

This document provides information on each of the other seven regional fishery management councils' risk policies (or equivalents). It is important to note there are different interpretations of a risk policy among regional fishery management councils. Some councils consider acceptable biological catch (ABC) control rules or harvest control rules (HCRs) as their risk policy, while others have independent risk policies, and some have both. Information was collected by reviewing fishery management plans (FMPs), stock assessment and fishery evaluation (SAFE) reports, and other regulations for each council, as well as meetings with council staff.

In 2006, the Magnuson-Stevens Act (MSA) was reauthorized and included new requirements for annual catch limits (ACLs), accountability measures (AMs), and other measures to end overfishing. In addition, the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) revised guidance for implementing National Standard (NS) 1. To comply with these new requirements, all the regional councils implemented new or revised ABC control rules and/or risk policies in 2010 and 2011. Prior to this time, some councils adopted control rules in the late 1990s, following the enactment of the Sustainable Fisheries Act of 1996. Most of the councils have either evaluated and revised their risk policies since 2010/2011, or are in the process of a current evaluation.

As mentioned above, the term, **risk policy**, is applied differently by the regional fishery management councils. While NS1 may imply a definition of risk policy, it is not formally defined in statute. Some councils define risk policy as the Council's acceptable probability of overfishing associated with the current biomass level compared to the biomass target. They may refer to their ABC control rules or HCRs as their risk policy. Other councils take a broader approach and apply more general risk statements to multiple council decisions.

For reference, the definition for an **ABC control rule** in NS1 – Optimum Yield (OY) (50 CFR 600.310(f)(2)(i)) is:

For stocks and stock complexes required to have an ABC, each Council must establish an ABC control rule that accounts for scientific uncertainty in the [overfishing limit] OFL and for the Council's risk policy, and that is based on a comprehensive analysis that shows how the control rule prevents overfishing. The Council's risk policy could be based on an acceptable probability (at least 50 percent) that catch equal to the stock's ABC will not result in overfishing, but other appropriate methods can be used. When determining

the risk policy, Councils could consider the economic, social, and ecological trade-offs between being more or less risk averse. The Council's choice of a risk policy cannot result in an ABC that exceeds the OFL. The process of establishing an ABC control rule may involve science advisors or the peer review process established under Magnuson-Stevens Act section 302(g)(1)(E).

The [Mid-Atlantic Fishery Management Council's website](#) provides a more general description of an ABC control rule and the process to make ABC recommendations.

An ABC control rule is an established policy set by the Council, in consultation with its Scientific and Statistical Committee (SSC), that articulates how the ABC will be set compared to the OFL. When making an ABC recommendation, the SSC applies the ABC control rule that accounts for scientific uncertainty as well as the Council's risk policy. Because the ABC cannot exceed the OFL estimate, the ABC control rule generally specifies the amount by which the ABC should be reduced from the OFL, based on the level of scientific uncertainty and the application of the risk policy. The Council may not recommend an ABC that is greater than that recommended by the SSC.

This document is not meant to be an inventory of ABC control rules, and rather focuses on risk policies (where available). For councils with FMP-specific policies (rather than policies included in omnibus or comprehensive amendments), this report only covers one representative FMP in detail, and provides higher level information for the other FMPs. Each Section (1-7) provides an overview of the risk policy (or equivalent), information and links to FMPs and regulatory documents that support the policy, and a summary of any recent evaluation of the policies (if applicable). Appendices 1-7 provide information on the actual risk policies and control rules. A summary table at the end of the report (Appendix 8) provides a side-by-side comparison of risk policies and control rules for the regional fishery management councils.

1. Pacific Fishery Management Council

1.1 PFMC – Risk Policies

The Pacific Fishery Management Council (PFMC) does not have a stand-alone risk policy. However, Council staff indicated that the PFMC is risk averse, and has many steps to build in precaution, from assessment review, to HCRs, and monitoring to reduce risk. Each of their FMPs identify an ABC control rule and/or HCR, with the Groundfish FMP implementing a tiered HCR. These are all described at a high level in the subsections below. Only the tiered control rule for the Groundfish FMP is discussed in more detail as a representative example.

The following excerpt from Amendment 24 to the Groundfish FMP (2015), described further in Section 1.2.1, provides a concise summary of the overall specification setting process and reference points:

Harvest specifications are established for each managed stock or stock complex in the Groundfish FMP. Specifications include the OFL, the ABC, and the ACL. Catch above the OFL constitutes overfishing. The ABC is a precautionary reduction from the OFL designed to account for scientific uncertainty in the OFL. Section 4.4 in the Groundfish FMP describes the methods generally used to determine the ABC. ABCs are based on the SSC's recommended framework, which is referred to as the P* approach. The SSC recommends a precautionary reduction referred to as the sigma value. The Council considers the SSC recommended sigma reduction from the OFL, combined with an additional reduction referred to as the P* value (probability of overfishing). Together, the sigma value and P* value define the corresponding fraction to be used to reduce the OFL to derive an ABC. A lower P* is more risk averse than a higher value, meaning that the probability of the ABC being greater than the "true" OFL is lower. A formula incorporating these two values produces a percentage value representing the precautionary reduction. The Groundfish FMP restricts the P* value from exceeding 0.45. Overall catch is managed to the ACL. For most stocks, the ACL is set equal to the ABC, but the ACL may be set below the ABC for a variety of reasons. The Council may also set an [annual catch target] ACT to establish a higher level of precaution, particularly if there is greater uncertainty about the true level of catch due to an estimation error.

Appendix 1 provides more details on all elements of the PFMC's process, including tables for the stock categories (Category 1 = data rich, 2 = data moderate, and 3 = data poor), sigma values, P* approach, and a figure of the sloping HCR.

1.2 PFMC – Fishery Management Plans and Regulatory Documents

1.2.1 Groundfish

The Pacific groundfish fishery has 100% at-sea monitoring, which further minimizes risk.

This current Pacific Coast Groundfish FMP – [The Pacific Groundfish FMP for the California, Oregon, and Washington Groundfish Fishery](#) (August 2022) – includes revisions through Amendment 28. Section 4.4 of this FMP, starting on page 25, provides information on the Council’s approach to determining OFLs and ABCs based on Categories 1-3 of assessment data availability: data rich, data moderate, and data poor; the P* process; and sigma values.

[Amendment 24 to the Pacific Groundfish FMP](#) (January 2015) established default HCRs for decision making in future biennial cycles and clarified the scope of new and routine management measures that would be considered during the biennial process.

- The final rule for this action was effective as of March 10, 2015 ([80 CFR 12567](#))

[Amendment 23 to the Pacific Groundfish FMP](#) (December 2010) amended the harvest specifications framework to meet requirements in the MSA regarding ACLs and AMs and NS1 guidelines.

- The final rule for this action was effective as of May 11, 2011 ([76 FR 27507](#))

The most recent SAFE report – [Status of the Pacific Coast Groundfish Fishery, Stock Assessment and Fishery Evaluation \(Description of the Fishery\)](#) (July 2022) – describes stock assessments, stock status, and harvest specifications, amongst other management and economic information, for all the groundfish stocks. Section 2.8, starting on page 312, provides more details on the groundfish harvest specification framework and harvest specifications for fisheries in 2023 and beyond.

1.2.2 Salmon

Salmon management in the Pacific is shared between the states, tribes, PFMC, and the Pacific Salmon Commission (PSC). The PSC was established to implement the 1985 Pacific Salmon Treaty (PST) between the U.S. and Canada. Because many of the stocks under the jurisdiction of the Council are significantly affected by management actions taken in Canadian and Alaskan waters, considerable interaction between the Council and the PSC occurs at both the policy and technical levels.¹ ABCs and ACLs are not specified for stocks that are managed under an international agreement. The tribes manage tribal fisheries in coordination with the PFMC. The PFMC manages fisheries in Federal (ocean) waters, but works closely with states and tribes on fisheries in other areas.²

The remainder of this section provides high level information on the PFMC’s Salmon FMP.

The current [Pacific Coast Salmon FMP](#) includes amendments through Amendment 23 (2022), and Section 3.3 starting on page 28, reviews the current harvest controls and reference points.

¹ <https://www.pcouncil.org/documents/2022/02/review-of-2021-ocean-salmon-fisheries.pdf/>

² <https://www.pcouncil.org/fact-sheet-salmon/>

[Amendment 16 to the Salmon FMP](#) (2011) applied new requirements of the MSA and revised NS1 guidelines as well as revision of status determination criteria (SDC). The alternatives Section 2.3, starting on page 40, describes reference points and the ABC control rule.

The following two excerpts are derived from the [Preseason Report I: Stock Abundance Analysis and Environmental Assessment Part 1 for the 2022 Ocean Salmon Fishery Regulations](#) (March 2022). The salmon ABC control rule is described below (Section 1.2.1, starting on page 5), as is the ACL approach (Section 1.2.2, starting on page 6):

For salmon, ABC is defined in terms of spawner escapement (S_{ABC}), which is determined annually based on stock abundance, in spawner equivalent units (N) and the exploitation rate F_{ABC} . $S_{ABC} = N \times (1 - F_{ABC})$. The ABC control rule defines F_{ABC} as a fixed exploitation rate reduced from $F_{\text{Maximum Sustainable Yield (MSY)}}$ to account for scientific uncertainty. The degree of the reduction in F between F_{ABC} and F_{MSY} depends on whether F_{MSY} is directly estimated (tier 1 stock) or a proxy value is used (tier 2 stock). For tier 1 stocks, F_{ABC} equals F_{MSY} reduced by five percent. For tier 2 stocks, F_{ABC} equals F_{MSY} reduced by ten percent.

- Tier-1: $F_{ABC} = F_{MSY} \times 0.95$.
- Tier-2: $F_{ABC} = F_{MSY} \times 0.90$.

ACLs are also defined in terms of spawner escapement (S_{ACL}) based on N and the corresponding exploitation rate (F_{ACL}), where the exploitation rate is a fixed value that does not change on an annual basis. F_{ACL} is equivalent to F_{ABC} and $S_{ACL} = N \times (1 - F_{ACL})$, which results in $S_{ACL} = S_{ABC}$ for each management year. During the annual preseason salmon management process, S_{ACL} is estimated using the fixed F_{ACL} exploitation rate and the preseason forecast of N. Thus, fishery management measures must result in an expected spawning escapement greater than or equal to this preseason estimate of S_{ACL} .

1.2.3 Coastal Pelagic Species

HCRs in the Coastal Pelagic Species (CPS) fishery may vary depending on the nature of the fishery, management goals, assessment and monitoring capabilities, and available information. Under the framework management approach used for CPS, it is not necessary to amend the CPS FMP in order to develop or modify HCRs or definitions of overfishing.

The current [CPS FMP](#) includes amendments through Amendment 18 (January 2021). Section 4.6, starting on page 36, describes the HCR, and how it is applied across actively-managed stocks and monitored stocks. Actively managed stocks must have stock-specific HCRs, whereas monitored stocks may use a generic HCR. The Council has a default HCR (Section 4.6.1) that may be used for a monitored stocks unless a better species-specific rule is available. The default HCR can be modified under framework management procedures. The [CPS FMP – Amendment 13](#) (2011) applied new requirements of the MSA and revised NS1 guidelines as well as revision of SDC.

The 2021 SAFE report, [Status of the Pacific Coast Coastal Pelagic Species Fishery and Recommended Acceptable Biological Catches](#), provides more details on the actual HCRs and how they are applied for actively managed stocks and monitored stocks. Section 3.6, starting on page 27, provides general information on HCRs in the CPS FMPs, and the subsequent sections describe the harvest guidelines and actual control rules by species, including the default control rule for monitored stocks.

1.2.4 Highly Migratory Species

Most Highly Migratory Species (HMS) management is international, and for the majority of the HMS stocks managed by the PFMC, only a small percentage of the harvest is taken within U.S. waters.³ The PFMC applies certain management measures to the domestic fishery within Exclusive Economic Zone (EEZ), for example, bag limits, area closures, gear, etc. Due to the shared management authority, control rules for some species are decided by international agreement. For other species, the PFMC decides on a control rule or develops proxy reference points through SSC review.⁴

The current [FMP for U.S. West Coast Fisheries for Highly Migratory Species includes amendments through Amendment 7](#) (2022). Section 4.1, starting on page 21, describes reference points. [Highly Migratory Species FMP – Amendment 2](#) (2011) applied new requirements of the MSA and revised NS1 guidelines as well as revision of SDC. Section 2.5.2, starting on page 15, describes reference points, and Alternative 5 (Section 2.7.5, page 22) is the Council-preferred alternative that describes the process for revising reference points.

1.3 – PFMC Evaluation

This section focuses on the Groundfish FMP as the representative example. As mentioned in Section 1.2, the original PFMC policies were implemented in 2011 through Amendment 23. The HCRs were then evaluated and revised in 2015 through Amendment 24.

In November of 2018, the SSC held a meeting to start the process to review analyses relating to the scientific uncertainty in estimating the OFL, denoted sigma (σ). The final report from this process, [Scientific and Statistical Committee Report on New Methodology Informing Sigma Values – Final Adoption](#) (March 2019), provides details on the evaluation of the sigma values and the final recommended revisions. Excerpts from this report are included here:

Sigma, in combination with the Council’s policy choice for the overfishing probability (P^*), determines the size of the buffer between the OFL and ABC for groundfish. The Council’s original sigma values were based on analysis by Ralston et al. (2011) that estimated among-assessment variation in historical spawning biomass for a set of groundfish and CPS stock assessments completed through 2009. That analysis was

³ <https://www.pcouncil.org/fact-sheet-highly-migratory-species/>

⁴ Personal communication by Zoom meeting with John DeVore, November 22, 2022.

based on spawning biomass and not OFL and did not directly account for increases in scientific uncertainty that accrue as assessment results are projected into the future.

The SSC recommends a baseline sigma value of 0.50 (= $0.439 \times (0.389/0.342)$) for category 1 groundfish and CPS stocks. As in the 2011 recommendation, the SSC recommends baseline sigma values of twice the category 1 value for category 2 stocks (1.0) and four times that value for category 3 stocks (2.0).

The SSC recommends using the analysis with all species included, and applying the relative rate of increase in sigma (7.5% of the baseline value with each additional year) to the baseline category 1 and 2 sigmas of 0.5 and 1.0, i.e.:

$$\text{Sigma (years since assessment)} = (\text{baseline sigma}) * (1.0 + (\text{years since assessment} - 1) * 0.075).$$

2. North Pacific Fishery Management Council

Some of the revisions in the Magnuson-Stevens Reauthorization Act in 2006 were based on the North Pacific Fishery Management Council's (NPFMC) groundfish FMP, which has had ABC control rules since the 1990s.

2.1 NPFMC Risk Policies

The NPFMC does not have a specific, overarching risk policy that applies to all Council decisions; however, they do have a number of [management policies](#) that guide their approach to conservation and management. The 'Harvest Specifications Policies' include an 'ABC and total allowable catch (TAC) Setting Policy', which provides context for this section, and states:

At its October 2018 meeting, the Council clarified its policy on the basis for ABC setting vs TAC setting. Specifically:

"The Council clarifies its policy is that the planning team develop and recommend ABC's which are based on biological and environmental scientific information through the stock assessment and Tier process. Socio-economic factors should be considered during the TAC setting process at the Council and not incorporated into the ABC recommendations."

This statement from the Council was issued in the context of a September 2018 Groundfish Plan Team review of criteria for recommending when ABC could be set below the maximum permissible ABC under the Council's tier-system approach. At the October 2018 meeting, the Council's SSC reviewed a risk matrix approach that included a suite of biological and ecosystem conditions that may support the reduction of ABC

below max ABC. In response to that review, the SSC stated that “...economic considerations should NOT contribute to ABC reductions, but should instead be considered during the TAC setting process.”

The NPFMC also has an Ecosystem Policy, which discusses how uncertainty and risk around climate change and environmental variables should be taken into consideration. The following excerpts from the Council website provide additional details:

In February 2014, the NPFMC adopted an Ecosystem Policy that shall be given effect through all of the Council’s work, including long-term planning initiatives, fishery management actions, and science planning to support ecosystem-based fishery management. The Ecosystem Policy includes three parts: a value statement, a vision statement, and an implementation strategy.

Value Statement – The Gulf of Alaska, Bering Sea, and the Aleutian Islands are some of the most biologically productive and unique marine ecosystems in the world, supporting globally significant populations of marine mammals, seabirds, fish, and shellfish. This region produces over half the nation’s seafood and supports robust fishing communities, recreational fisheries, and a subsistence way of life. The Arctic ecosystem is a dynamic environment that is experiencing an unprecedented rate of loss of sea ice and other effects of climate change, resulting in elevated levels of risk and uncertainty. The North Pacific Fishery Management Council has an important stewardship responsibility for these resources, their productivity, and their sustainability for future generations.

Vision Statement – The Council envisions sustainable fisheries that provide benefits for harvesters, processors, recreational and subsistence users, and fishing communities, which (1) are maintained by healthy, productive, biodiverse, resilient marine ecosystems that support a range of services; (2) support robust populations of marine species at all trophic levels, including marine mammals and seabirds; and (3) are managed using a precautionary, transparent, and inclusive process that allows for analyses of tradeoffs, accounts for changing conditions, and mitigates threats.

Implementation Strategy – The Council intends that fishery management explicitly take into account environmental variability and uncertainty, changes and trends in climate and oceanographic conditions, fluctuations in productivity for managed species, and associated ecosystem components, such as habitats and non-managed species, and relationships between marine species. Implementation will be responsive to changes in the ecosystem, and our understanding of those dynamics, incorporate the best available science, including local and traditional knowledge, and engage scientists, managers, and the public.

In addition to these management policies, the NPFMC utilizes risk tables and a tiered control rule system to account for uncertainty in decision making.

The NPFMC has risk tables that the SSC recommends using for all full assessments of groundfish stocks and stock complexes in the fishery. Information in the risk tables come either from the assessment itself, in the case of assessment uncertainty and population dynamics or, in the case of environmental/ecosystem information, from two main sources: the ecosystem status report, and the species-specific ecosystem and socioeconomic profiles that are available for some North Pacific stocks. The initial risk levels are assigned by the assessment authors and included in the draft stock assessments. They are then reviewed and adjusted through the same annual review process as the stock assessment. The resulting risk scores are specific to a stock or stock complex. The SSC recommends that considerations of reductions in ABCs below the maximum permissible be made on case-by-case basis with justification based on the risk scoring. The risk table is included in Appendix 2A.

The groundfish tier system is used by the NPFMC to specify the OFL and ABC for stocks and stock complexes in the groundfish FMPs for the Bering Sea and Aleutian Islands (BSAI) and the Gulf of Alaska (GOA). The groundfish tiers range from one to six and are structured according to the availability of information about the stock, and the ability to reliably estimate management quantities such as MSY and stock-recruit relationships (see Appendix 2B). The SSC's intent is that the tier system should be regarded as the primary basis for establishing the ABC. The sloping HCR for the ABC will substantially reduce the harvest rate when the stock is at a low abundance, and provide a built-in response to concerns related to low stock abundance. The risk table evaluates whether there is either additional uncertainty in the assessment and/or additional risks to the stock that are not adequately taken into account by the default precautionary settings.

An explicit part of the NPFMC stock assessment process is an evaluation of whether it is appropriate to reduce the ABC from the ABC resulting from the application of the control rules in the tier system. As described in both the BSAI and GOA groundfish FMPs (2020), groundfish stock assessments should:

Determine whether conditions exist that warrant setting ABC at a value lower than the maximum permissible value (such conditions may include – but are not limited to – data uncertainty, recruitment variability, and declining population trend) and, if so:

- A) Document those conditions,
- B) Recommend an ABC lower than the maximum permissible value, and
- C) Explain why the recommended value is appropriate.

The above steps are undertaken first by the assessment authors in the individual chapters of the SAFE report. The Plan Team then reviews the SAFE report and makes its own recommendation. The SSC then reviews the SAFE report and Plan Team recommendation, and makes its own recommendation to the Council. The Council then reviews the SAFE report, Plan Team recommendation, and SSC recommendation; then

makes its own recommendation to the Secretary, with the constraint that the Council's recommended ABC cannot exceed the SSC's recommended ABC.

For more background information on the NPFMC's approach, and an evaluation of how this approach is working, refer to this SSC report: [Preliminary Draft for Full SSC Review SSC Workshop on Risk Tables for ABC Advice to Council Compiled by the North Pacific Fishery Management Council's Scientific and Statistical Committee June 2021](#)

2.2 NPFMC Fishery Management Plans and Regulatory Documents

The NPFMC ABC control rules vary based on the fishery, some of which include a tiered system approach, are referred to below. This paper uses the BSAI groundfish FMP as a representative example of control rules and the risk table for the NPFMC. Other FMP control rules are summarized at a high level with references to where to find more information.

2.2.1 Groundfish

[FMP for Groundfish of the Bering Sea and Aleutian Islands \(BSAI\) Management Area](#) (November 2020). Section 3.2.3.3 (starting on page 18) describes the ABC and ACL approaches, including the HCR with six tiers that relate to the different levels of information available. See details of the HCR in Appendix 2B. The most recent draft SAFE reports (as of December 2022) for North Pacific BSAI groundfish stock assessments are available online, and provide information of the application of the risk tables and tiers for specific stocks: https://apps-afsc.fisheries.noaa.gov/Plan_Team/2022/assessments.htm

[FMP for Groundfish of the Gulf of Alaska \(GOA\)](#) (November 2020). Section 3.2.3 (starting on page 15) describes the ABC and ACL approaches, including the HCR with six tiers that relate to the different levels of information available. These are the same as the BSAI groundfish FMP, except for the following:

For groundfish species identified as key prey of Steller sea lions (i.e., walleye pollock, Pacific cod, and Atka mackerel), directed fishing is prohibited in the event that the spawning biomass of such a species is projected in the stock assessment to fall below $B_{20\%}$ in the coming year. However, this does not change the specification of ABC or OFL.

The most recent draft SAFE reports (as of December 2022) for North Pacific GOA groundfish stock assessments are available online, and provide information of the application of the risk tables and tiers for specific stocks: https://apps-afsc.fisheries.noaa.gov/Plan_Team/2022/assessments.htm

2.2.2 King and Tanner Crab

[Bering Sea/Aleutian Islands King and Tanner Crab FMP](#) (October 2011; updated by amendments through March 2021). Section 6 describes the SDC and ACLs using the five-tier system. Crab is managed jointly between the NPFMC and the State of Alaska.

Excerpts from the introduction to the most recent [SAFE Report for King and Tanner Crab Fisheries of the BSAI \(2022\)](#) describe the SDC, including the control rule:

Status Determination Criteria for crab stocks are calculated using a five-tier system that accommodates varying levels of uncertainty of information. The five-tier system incorporates new scientific information and provides a mechanism to continually improve the SDC as new information becomes available. Under the five-tier system, overfishing and overfished criteria and ABC levels for most stocks are annually formulated. The ACL for each stock equals the ABC for that stock. Each crab stock is annually assessed to determine its status and whether (1) overfishing is occurring or the rate or level of fishing mortality for the stock is approaching overfishing, (2) the stock is overfished, or the stock is approaching an overfished condition, and (3) the catch has exceeded the ACL.

For crab stocks, the OFL equals the MSY and is derived through the annual assessment process, under the framework of the tier system. Fisheries specifications, OFL and ABC, are set using the fishing mortality rate associated with the OFL (F_{OFL}) as estimated from the current assessment, compared with mature male biomass projected forward to the time of mating in the next fishing season.

The figure below (Figure 1, *as cited in the SAFE Report for King and Tanner Crab Fisheries of the BSAI*) provides a graphic description of the control rule for Tiers 1-4, as an example. See tables 2 and 3 in the 2022 SAFE report for more information on the five-tier system.

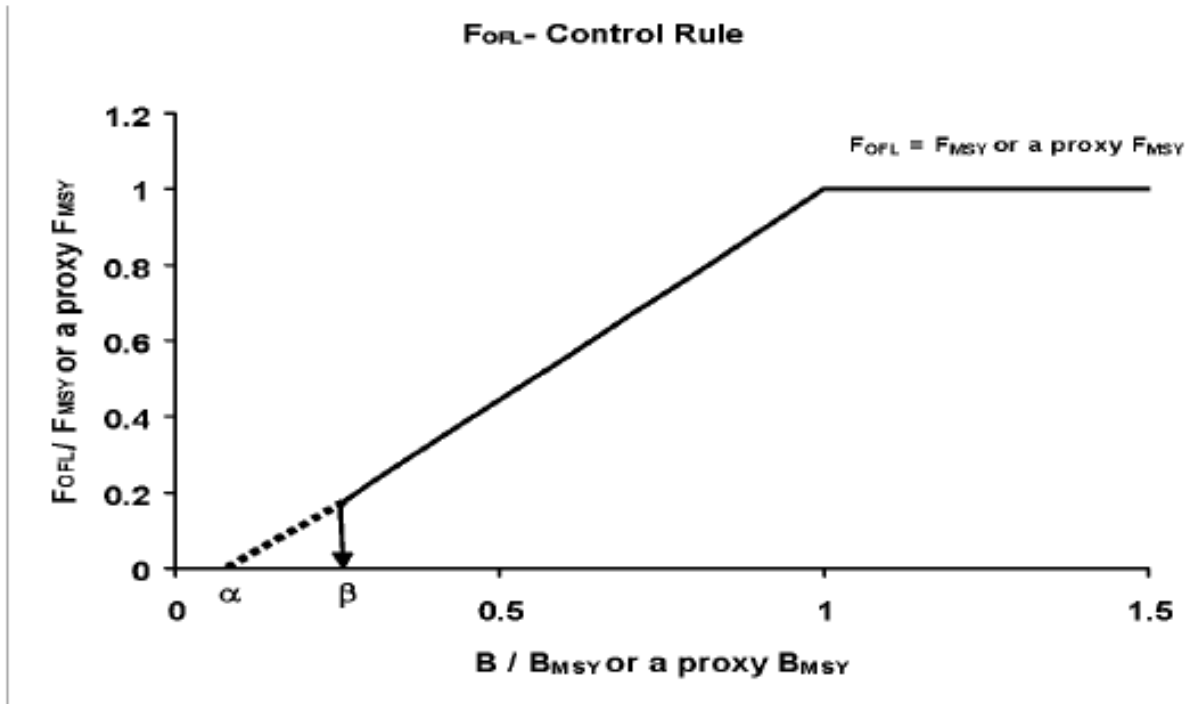


Figure 1. Overfishing control rule for Tiers 1 through 4. Directed fishing mortality is 0 below β .

2.2.3 Scallop

The [scallop fishery](#) in Alaska is jointly managed by the federal government and the State of Alaska and the under the Alaska Scallop FMP. The State has authority over most aspects of fishery management, while limited access and other federal requirements are under the jurisdiction of the federal government. The fishery is managed using limited entry, Guideline Harvest Levels (GHLs), crab bycatch limits and habitat closures, and the fishery is closed when GHLs or bycatch limits are met.

The recent [Scallop SAFE Report](#) from April 2022 specifies the ABC control rule. There are no stock assessments for scallops off the coast of Alaska, therefore the ABC control rule for weathervane scallops calculates a maximum statewide ABC at 90% of the OFL, providing a 10% buffer to account for scientific uncertainty in estimation of the OFL. Historically, the ABC has not been fully harvested.

Section 3.1.1.2 of the [FMP for the Scallop Fishery off Alaska \(2014\)](#) details reference points for weathervane scallops (the only commercially targeted species), including the following ABC control rule:

The ABC control rule is the specified approach for setting the maximum ABC for weathervane scallops. The ABC control rule calculates a statewide maximum ABC at 90 percent of the OFL, which provides a 10 percent buffer to account for scientific uncertainty in the estimation of the OFL. Lacking a stock assessment model, the sources

of scientific uncertainty in the weathervane scallop OFL estimate are not directly quantifiable at this time. The 10 percent buffer incorporates scientific uncertainty and limits the risk of overfishing occurring in the weathervane scallop fishery.

2.2.4 Halibut

Halibut is managed by International Pacific Halibut Commission, which conducts the stock assessment and sets allocations. The NPFMC is only responsible for developing [halibut bycatch limits](#) and the following [catch sharing plans](#):

- [Halibut/Sablefish IFQ](#) (Commercial)
- [Charter Halibut Catch Sharing Plan](#) (Charter)
- [Subsistence Halibut Program](#)

2.2.5 Salmon

The NPFMC doesn't manage the salmon fishery as the State of Alaska has primary authority; however, the Council does manage bycatch of chinook and chum salmon in federal waters. The salmon FMP delegates management of the commercial troll fishery in Southeast Alaska to the [State of Alaska](#) and, under the [Pacific Salmon Treaty](#), the [U.S.-Canada Pacific Salmon Commission](#). The NOAA Fisheries West Coast Regional office has jurisdiction over salmon species listed as endangered or threatened under the Endangered Species Act.

The Council's existing [FMP for the Salmon Fisheries off the EEZ in Alaska \(2018\)](#) divides federal waters off Alaska into two management areas, East and West, with a boundary line at Cape Suckling. The FMP delegates management of salmon sport fishing and commercial trolling in the East Area to the State and prohibits all commercial salmon harvest in the West Area. Commercial salmon fishing in federal water portions of the traditional net areas would be prohibited since they partially overlap with federal waters of the West Area but these areas are specifically excluded from the federal FMP. This arrangement was facilitated by the Council through [Amendment 12 to the Salmon FMP](#) in 2012, recognizing the State's superior ability to respond to in-season data by quickly and continually adjusting run-specific harvest measures. The FMP was most recently revised in 2018 through Amendment 13, which updated descriptions of Essential Fish Habitat for Pacific salmon.

- Chapter 6 of the FMP details the SDC, and three tiers for different stocks and management authorities.

2.3 NPFMC Evaluation

The NPFMC has conducted a thorough evaluation of their risk table and ABC control rule in 2021. The following excerpts are from the [SSC report](#) referenced above in Section 2.1:

In February 2021, the SSC convened a workshop to: evaluate how the risk table process was working; address consistency issues with the risk table as identified by the GPTs,

authors, and SSC; and to provide guidance for moving forward. The SSC appreciates hearing about the challenges the authors and [Joint] GPT have found with the risk table process. The workshop objectives were to:

1. Assess the progress and value of species-specific risk tables for all stocks
2. Evaluate risk table consistency among species and highlight challenges
3. Define “risk” and “uncertainty”
4. Compare ABC and OFL buffers for scientific uncertainty with ABC reductions due to the risk table
5. Discuss future options

The preliminary guidance and SSC recommendations from this workshop and subsequent meetings include the following:

1. The SSC concluded that the risk table framework is working well. The tables have expanded communication among assessment authors and between assessment authors and ecosystem/process researchers. The framework is intended to provide a clear and transparent basis for communicating assessment-related and stock condition concerns that are not directly captured in model-based uncertainty, the tier system, or HCRs.
2. The SSC recognizes that within the context of the risk tables, “risk” is the risk of the ABC exceeding the true (but unknown) OFL. The risk tables are intended to inform the process of adjusting the ABC from the maximum permissible when needed. Recommendations of an ABC reduction from the maximum permissible requires justification. The risk tables provide an avenue for articulating that justification.
3. The SSC recommends that risk tables are produced for all full assessments of groundfish (and perhaps crab) stocks and stock complexes in the fishery. Risk tables can be produced in other years at the discretion of the lead author. The SSC requests that the authors consider if there have been any changes to previous conditions and update the tables accordingly. The SSC recommends that authors of stock complexes consider the most abundant species and any other species of concern within the complex when formulating advice.
4. Risk scores should be specific to a given stock or stock complex. While comparison across species (e.g., within a tier, with similar life histories) or stocks is useful for consistency, the SSC does not support trying to prescribe a common reduction from the maximum permissible ABC for a given risk score across species or stocks because the processes underlying the score may differ among species and stocks. The SSC recommends that considerations of reductions in ABCs below the maximum permissible be made on a case-by-case basis with justification based on risk scoring. The risk table rankings include qualitative information that requires a certain amount of subjective but well-informed interpretation of the available data by the author(s), the Plan Teams and the SSC, and as such, the SSC feels that blanket comparisons across species or stocks for

the purpose of explicitly defining reductions in ABC below the maximum permissible are not prudent.

5. The SSC recommends that the fishery/community performance column should focus on information that would inform the biological status of the resource (e.g., an unexplained drop in CPUE that could indicate un-modelled stock decline, or a spatial shift indicating changes in species' range), and not the effects of proposed ABCs on the fishery or communities or bycatch-related considerations. The SSC recognizes that the community impact information is critical for informed decision making for TAC setting and recommends this information be included in other Council documents such as the Annual Community Engagement and Participation Overview and/or the Economic SAFE.

6. The SSC encourages the inclusion of local knowledge/tribal knowledge/subsistence as a source of knowledge about the condition of the stock.

7. The SSC appreciates the discussion of avoiding double-counting information, in the assessment/Tier system and risk table, or among columns of the risk table. The SSC agrees that authors should avoid inclusion of stock trends/processes that are incorporated in the assessment or reflected in the Tier when scoring the risk tables. For cases where a process external to the assessment is relevant to two or more risk categories, the SSC recommends that the narrative reflect the interconnected relationships that exist between rankings among risk categories.

8. The SSC suggests a potential revision to the category levels: from the existing four to three categories (normal, increased, extreme).

9. The SSC reiterates that reductions in ABC below the maximum permissible should be applied sparingly and that the tier system should be regarded as the primary basis for establishing the ABC. If they begin to become commonplace, that should warrant further review of the assessment and/or the Tier system.

Since this report was issued in June 2021, there have been ongoing meetings and discussion on these recommendations. Recently, in November and December of 2022, the Joint GPTs and the SSC identified a need for a workgroup to address the current policies for the application of HCRs for groundfish, and new approaches for accounting for changes in ecosystems related to climate change. While both the Plan Teams and the SSC identified several topics of interest related to this general topic, the recommendation was to allow the February 2023 SSC workshop to inform the specific scope and focus of a potential workgroup. Refer to [this website](#) for the SSC report from the December 2022 for additional information (*the final meeting report was not available at the time this report was finalized*).

3. Western Pacific Regional Fishery Management Council

3.1 WPRFMC Policies

The Western Pacific Regional Fishery Management Council (WPRFMC) does not have a stand-alone risk policy; however, they implemented a tiered ABC control rule in 2011 through their Omnibus Amendment for the Western Pacific Region. This rule applies the same to all of the Council's Fishery Ecosystem Plans (FEPs):

- FEP for the Pacific Remote Island Areas
- FEP for the American Samoa Archipelago
- FEP for the Hawaii Archipelago
- FEP for the Pacific Pelagic Fisheries of the Western Pacific Region
- FEP for the Mariana Archipelago.

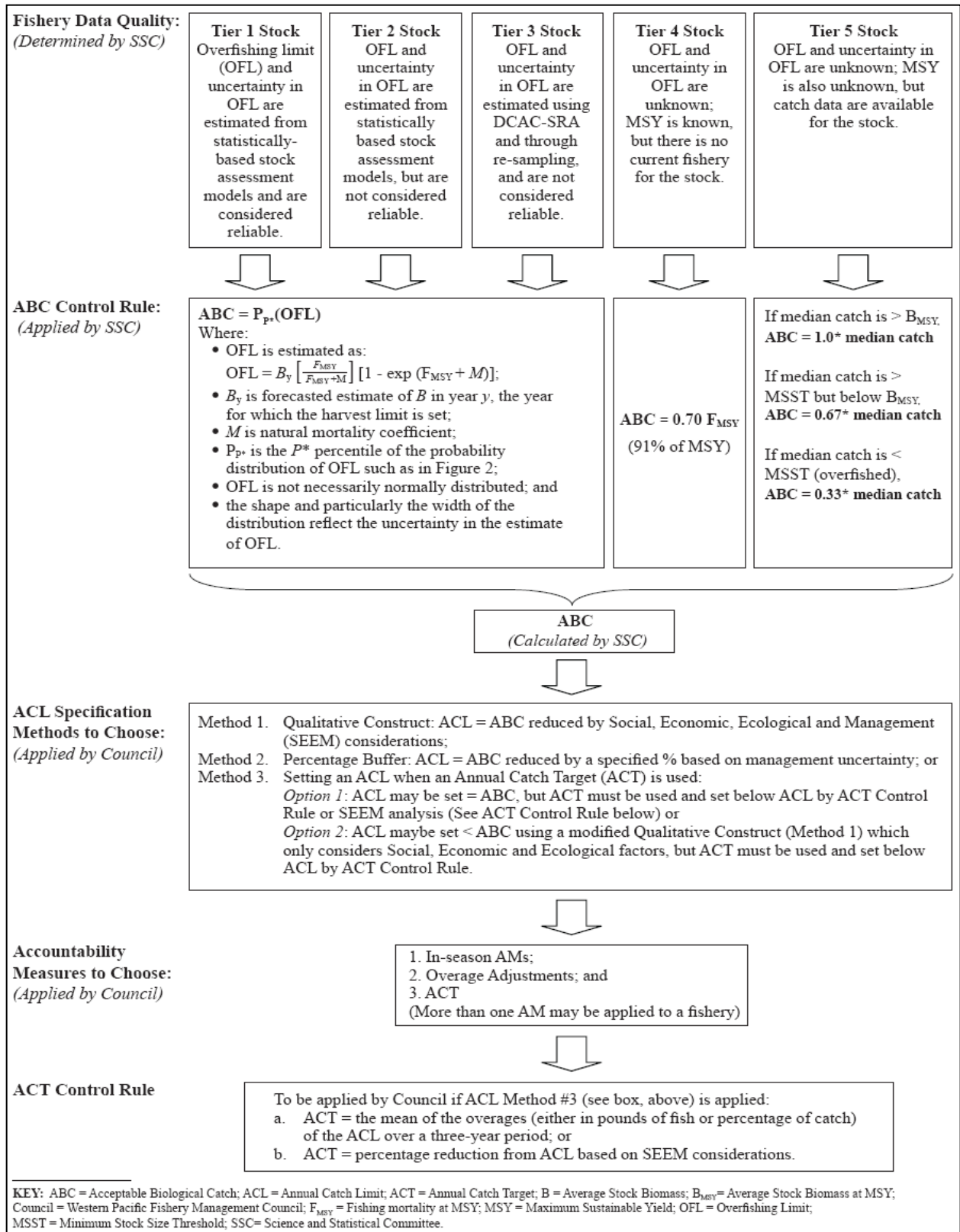
The WPRFMC has had the same ABC control rule in place since the implementation of the original Omnibus Amendment in 2011. Since this Amendment addressed new requirements under the MSA reauthorization for specifying ACLs, AMs, and ACT control rule, these elements are also included. This Omnibus Amendment established a tiered system of control rules that the SSC uses to calculate ABCs, with Tier 1 being the highest for data rich species/stocks to Tier 5, the lowest for data poor species/stocks. It also integrates a qualitative method for determining the acceptable probability of risk that a catch equal to ABC would result in overfishing (P*). Further, it specifies several methods for setting ACLs to incorporate social and economic factors, pertinent ecological considerations, and management uncertainty, referred to by the acronym SEEM. See Appendix 3 for more details on their tiered control rule system.

3.2 WPRFMC Fishery Management Plans and Regulatory Documents

The [Omnibus Amendment for the Western Pacific Region to Establish a Process for Specifying Annual Catch Limits and Accountability Measures, Including an Environmental Assessment](#) was finalized in February of 2011. Action 1, in Section 3.1, starting on page 25, describes the process for specifying ACLs, including ABCs and AMs. Alternative 2 is the preferred alternative, and Figure 3 in the Amendment (also included in this Section) provides a schematic flowchart of this process.

- The final rule published on June 27, 2011 ([76 FR 37285](#)) and the regulations are codified in 50 CFR Subpart A: Section 665.4 (ACLs), Section 665.12 (Definitions), Section 665.15 (Prohibitions).⁵

⁵ <https://www.ecfr.gov/current/title-50/chapter-VI/part-665?toc=1>



Schematic of preferred method for specifying ABC, ACL, and AMs, including ACT (Figure 3, as cited in the Omnibus Amendment, 2011).

3.3 WPRFMC Evaluation

The WPRFMC has not evaluated their ABC control rule since it was implemented in 2011. However, they are planning to start a process to develop a separate risk policy in 2023.

4. Gulf of Mexico Fishery Management Council

4.1 GMFMC Policies

The Gulf of Mexico Fishery Management Council (GMFMC or Gulf Council) implemented their original ABC control rule in 2012. See Section 4.2 for more information on the Generic ACLs/AMs Amendment for the Red Drum, Reef Fish, Shrimp, Coral and Coral Reefs FMPs (2011/2012). The GMFMC also drafted an options paper for ABC control rule revisions in March of 2017, and a draft generic amendment to develop carry-over provisions within the ABC control rule in May of 2019. However, the draft generic amendment is currently on hold, as the scope of this carry-over provision amendment will be expanded and will also incorporate revisions to the control rule, starting in late 2022/early 2023. While there is a risk policy component of their ABC control rule, the Gulf Council does not have a separate general risk policy.

The Gulf Council's original ABC control rule is used to determine the appropriate level of risk and/or buffer to set between the OFL and ABC. In all cases the annual estimate of MSY is the OFL. The control rule offers three tiers of guidance for setting ABC based on the amount of information for a given stock. With less information there is greater scientific uncertainty, and therefore the buffer between the OFL and ABC will be greater. The three tiers include the following, and are described in detail in the table in Appendix 4:

- Tier 1 – is for stocks that have undergone a quantitative assessment that has produced an estimate of MSY and a probability distribution around the estimate.
- Tier 2 – is for stocks that have not had a quantitative assessment that produces an estimate of MSY or MSY proxy.
- Tier 3a – is for stocks that have not been assessed, but are stable over time, or in the judgment of the SSC the stock or stock complex is unlikely to undergo overfishing at current average levels or at levels moderately higher than current average levels.
- Tier 3b - is for stocks that do not meet the requirements of either Tier 1 or Tier 2, and in the judgment of the SSC the current fishing levels may not be sustainable over time.⁶

The 2017 options paper (linked in Section 4.2) proposes alternatives for a revised control rule. The paper describes that their approach to an ABC control rule is divided into three parts: 1) Risk policy, 2), ABC control rule (base), and 3) Add-ons. The SSC recommended alternatives for

⁶ <https://gulfcouncil.org/wp-content/uploads/Final-Generic-ACL-AM-Amendment-September-9-2011-v.pdf>

further consideration of a revised risk policy; however, these will all be reconsidered in the development of a new generic amendment.

4.2 GMFMC Fishery Management Plans and Regulatory Documents

[Carryover Provisions and Framework Modifications – Draft generic amendment to the FMPs for red fish, red drum, coastal migratory pelagics, coral and coral reefs, and spiny lobster](#) (June 2019). Action 1, in Section 2.1 of this draft amendment identifies Alternative 2, as the preferred alternative, and details how the carryover provisions would apply, starting on page 11. These section references are provided for reference; however, as noted above, these actions and alternatives will be expanded and revised in the new generic amendment. Currently, only species included in the fishery management unit for the Reef Fish and Coastal Migratory Pelagic (CMP) FMPs are being included in the carryover provision considered in this amendment. The CMP FMP is co-managed by the Gulf Council and South Atlantic Council with separate ABCs for each stock; only the Gulf of Mexico stock is being considered in the FMP.

[ABC Control Rule Revisions – Options paper for a generic amendment to the FMPs for red fish, red drum, coastal migratory pelagics, coral and coral reefs, spiny lobster and shrimp](#) (Draft action - March 2017). Action 1, in Section 2.1 of this options paper details six alternatives for the Gulf Council’s risk policy, starting on page 6. Action 2, in Section 2.2 provides alternatives for the base ABC control rule, starting on page 19. Action 3, in Section 2.3, includes add-ons, or adjustments to the ABC determined by Action 2. These section references are provided for reference; however, as noted above, these actions and alternatives will be expanded and revised in the new generic amendment.

[The Gulf Council’s ABC control rule was established by their final 2011 Generic Annual Catch Limits/Accountability Measures Amendment for the Gulf of Mexico Fishery Management Council’s Red Drum, Reef Fish, Shrimp, Coral and Coral Reefs, FMPs](#) (September 2011). In Action 4, the preferred alternative (Alternative 2) adopts revised tiered ABC control rules, which are described in Table 2.4.1, starting on page 50.

- [Final Rule](#) (effective: 1/30/2012, 76 FR 82043)

The ABC control rule was also established by Amendment 18 to the FMP for Coastal Migratory Pelagic Resources of the Gulf of Mexico and Atlantic.

- [Final Rule](#) (effective 1/30/2012, 76 FR 82057)

The ABC control rule was also established by Amendment 10 to the FMP for Spiny Lobster in the Gulf of Mexico and South Atlantic.

- [Final Rule](#) (effective 1/03/2012, 76 FR 75488)

4.3 GMFMC Evaluation

The GMFMC started to evaluate their control rule soon after it was implemented. The 2017 options paper for ABC control rule revisions provides a rationale for the evaluation and revisions:

The current ABC control rule was implemented in 2012 as part of the Generic Annual Catch Limits/Accountability Measures Amendment (GMFMC 2011a), Coastal Migratory Pelagics (CMP) Amendment 18, and Spiny Lobster Amendment 10. Almost immediately, Tier 1 (ABC for stocks with a stock assessment) of this control rule, produced ABCs that, for most stocks, were just 2% to 6% below the OFLs. Both the SSC and the Council thought the ABCs were too close to the OFLs to adequately account for scientific uncertainty, or to provide an ABC that was significantly different from the OFL. For several stocks, the SSC recommended ABCs based on the formula $ABC = \text{yield at } 75\% * F_{MSY}$ (the fishing mortality level at MSY) instead of the control rule. Consequently, the SSC began working on revisions to the ABC control rule.

From 2012 until 2014, the SSC, along with an ABC Control Rule Working Group composed of SSC members, Council staff, and NMFS staff, evaluated modifications and alternatives to the existing ABC control rule. In September 2014, the SSC settled on recommending two options for replacing the existing ABC control rule. Option 1 was adapted from a method used by the Pacific Fishery Management Council (Pacific Council) and was based on a method described by Ralston et al. (2011). This method is similar to the current Tier 1 method in that both are based on a P^* and probability distribution function. However, this method uses externally derived coefficient of variation (CV) rather than one derived from varying selected parameters of the assessment. This change allows this method to be used even with data-limited stocks. Option 2 used a formula to calculate ABC that is similar to the formula used to calculate OY: $ABC = \text{yield at } 0.75 * F_{MSY}$ (or F_{MSY} proxy), or, if F_{MSY} (or proxy) cannot be calculated, $ABC = 75\%$ of the OFL.

The SSC recommendations were presented to the Council in October 2014. However, due to higher priority issues and limited staff time, work on revising the ABC control rule was suspended. In the interim, there has been a turnover of approximately half the SSC membership, and new NS1 guidelines were published in October 2016. Some new management methods allowed through the new NS1 guidelines include carrying over unused quota from one year to the next, and phasing in changes to the ABC. In addition, the NS1 guidelines state that “economic, social, or ecological trade-offs” could be evaluated when determining the risk policy for an ABC control rule. To ensure that revisions to the ABC control rule are in compliance with the new guidelines, the scope of alternatives has been expanded beyond those previously recommended by the SSC.

As mentioned above, the prior actions to revise the ABC control rule and develop carry-over provisions will be replaced with a new amendment. In speaking with GMFMC staff, the SSC

plans to discuss the new action in January of 2023, and work on developing the new amendment is planned to begin around June of 2023, with final action expected approximately one-year later.

5. Mid-Atlantic Fishery Management Council

5.1 MAFMC Policies

The Mid-Atlantic Fishery Management Council (MAFMC) has both a risk policy and ABC control rule. The [MAFMC risk policy webpage](#) provides background information on their recent process to modify these policies:

The Omnibus Risk Policy Framework modifies the MAFMC's ABC control rule and risk policy (2011). The Council took final action on this framework in December 2019, and a final rule was published in December 2020 (see links in Section 5.2).

The revised risk policy is intended to prevent stocks from being overfished by reducing the probability of overfishing as stock size falls below the target biomass, while also allowing for increased risk and greater economic benefit under higher stock biomass conditions, particularly at very high levels such as those currently found with scup and black sea bass. The Framework also removes the typical/atypical species distinction currently included in the risk policy.

The risk policy is summarized as a linear ramping with a maximum P^* of 0.45 when the B/B_{MSY} ratio is less than or equal to 1.0, and a linear ramping to a maximum of 0.49 when the B/B_{MSY} ratio is equal to or greater than 1.5 and a stock replenishment threshold (i.e., no fishing, P^* equal to 0) when the B/B_{MSY} ratio less than or equal to 0.1. See Appendix 5A for more details on the risk policy.

Excerpts from the regulatory text provides an overview of the control rule (50 CFR 648.20(a-d):

The SSC shall review the following criteria, and any additional relevant information, to assign managed stocks to one of four types of control rules based on the species' assessments and its treatment of uncertainty when developing ABC recommendations. The SSC shall review the ABC control rule assignment for stocks each time an ABC is recommended. ABCs may be recommended for up to three years for all stocks, with the exception of five years for spiny dogfish. The SCC may specify constant, multi-year ABCs, derived from the average of ABCs (or average risk of overfishing) if the average probability of overfishing remains between zero and 40 percent, and does not exceed a 50-percent probability in any given year. The average ABCs may remain constant for up to three years for all stocks, with the exception of five years for spiny dogfish. The SSC may deviate from the control rule methods and recommend an ABC that differs from the result of the ABC control rule application; however, any such deviation must include

the following: A description of why the deviation is warranted; description of the methods used to derive the alternative ABC; and an explanation of how the deviation is consistent with National Standard 2.

The four control rule types include the following:

1. ABC control rule for a stock with an OFL probability distribution that is analytically-derived and accepted by the SSC.
2. ABC control rule for a stock with an OFL probability distribution that is modified by the assessment team and accepted by the SSC.
3. ABC control rule for a stock with an OFL probability distribution that is modified by the SSC.
4. ABC control rule for when an OFL cannot be specified.

Appendix 5B provides the regulatory text for the ABC control rule, including details and scenarios for each of the four types of control rules. In addition, the SSC has to consider nine decision criteria to help define an appropriate OFL CV when setting new or revised ABC recommendations. The June 2020 SSC report linked in Section 5.2 describes these criteria.

5.2 MAFMC Fishery Management Plans and Regulatory Documents

For general information about their process and all meeting and decision documents, visit their website: <https://www.mafmc.org/actions/risk-policy-framework>

The [regulations](#) describe both the ABC control rule and the risk policy, and are included as part of the Mackerel, Squid, and Butterfish regs, but they apply to all MAFMC FMPs.

- [Final rule](#) (effective date 12/15/20, 81 FR 81152)
- [Proposed rule](#) (effective date 11/12/20, 85 FR 71873)

The [Omnibus Acceptable Biological Catch and Risk Policy Framework Adjustment Final environmental assessment](#) (EA) (October 2020) modified the following FMPs: Atlantic Mackerel, Squid, and Butterfish; Bluefish; Summer Flounder, Scup, and Black Sea Bass; Surf Clam and Ocean Quahog; Tilefish; and Spiny Dogfish. Section 1.2 of the EA provides a summary of the risk policy alternatives in Table 1 and a description of the typical/atypical designation alternatives in Table 2, starting on page 4. A more detailed review of these alternatives is included in Section 5, and the preferred alternatives for the relevant management alternatives are 9A (Section 5.9, starting on page 32) and 2B (Section 5.11, starting on page 34).

In June 2020, the SSC created a report, [Mid-Atlantic Fishery Management Council Scientific and Statistical Committee OFL CV Guidance Document](#), that summarizes the nine decision criteria to help define an appropriate OFL CV when setting new or revised ABC recommendations

In 2017, the MAFMC conducted a management strategy evaluation (MSE) to consider the biological and fishery yield implications of different risk policy alternatives was conducted by Dr. John Wiedenmann from Rutgers University (Wiedenmann 2018). The MSE included an evaluation of five different alternatives, including the current risk policy, assuming two different OFL CV distributions (60% and 100%) with variable natural mortality, recruitment, and stock assessment data for summer flounder, scup, and butterfish. In 2019, Dr. Wiedenmann updated the MSE with new information and alternatives, and was also linked to an economic model (Doug Lipton and Cyrus Teng). See the following reports for more information:

- 2017 – [Evaluating alternatives for the Mid-Atlantic ABC Control Rule](#) (see attachment 1 for the MSE summary)
- 2019 – [Fine-tuning the ABC control rule for Mid-Atlantic fisheries report](#) (Dr. John Wiedenmann)
- 2019 - [Economic Trade-offs of Additional Alternative ABC Control Rules for Summer Flounder and Implications for Scup and Butterfish draft report](#) (Cyrus Teng and Dr. Doug Lipton)

In 2016, the SSC wrote a white paper, [Description and Foundation of the Mid-Atlantic Fishery Management Council’s Acceptable Biological Catch Control Rule](#), which explains the process and approach for the control rule component of the risk policy.

5.3 MAFMC Evaluation

The MAFMC evaluated its risk policy five years after implementation. The Council agreed to conduct a review of its risk policy and determine if any modifications were necessary to meet the Council’s goals and objectives for its managed fisheries. In 2017, during the initial risk policy review, the Council agreed to postpone final action until after the completion of additional analyses which more fully consider the social and economic impacts and trade-offs of different risk policy alternatives. The Council specified that the evaluation should assess the short and long-term trade-offs between stock biomass protection, fishery yield, and economic benefits. Development of the Omnibus Risk Policy Framework was reinitiated in 2019. The current 2020 Framework has a requirement to review the revised risk policy in no more than 10 years.

6. South Atlantic Fishery Management Council

6.1 SAFMC Policies

The South Atlantic Fishery Management Council (SAFMC) does not have a separate general risk policy, although they have ABC control rules, which are currently being revised. The SAFMC’s ABC control rule was originally specified by their 2011 Comprehensive Amendment for Snapper Grouper, Dolphin Wahoo, and Sargassum FMPs. Amendment 29 (approved in 2015) to the Snapper Grouper FMP implemented a revision that the level category 4 can be used for stocks within that FMP.

The SAFMC is in the close to the end of the process of revising their ABC control rule, which has been ongoing since 2016. The Comprehensive ABC Control Rule Amendment is in the final approval stages following public hearings and the Council selection of preferred alternatives and approval of all actions in 2022. Final action to approve this Amendment for secretarial review occurred at their December 5, 2022 Council meeting. Implementation is expected in early 2023.

The proposed ABC control rule for the Dolphin Wahoo, Golden Crab, and Snapper Grouper FMPs categorizes stocks based on the available information and scientific uncertainty evaluation (Categories 1 – 4) and incorporates the Council’s risk tolerance policy through an accepted probability of overfishing (P*). The Council will specify the P* based on relative stock biomass (low-, moderate-, high-biomass) and a stock risk rating (low-, medium-, high-risk of overfishing). Appendix 6 provides details on the control rule and risk policy.

6.2 SAFMC Fishery Management Plans and Regulatory Documents

The [Comprehensive ABC Control Rule Amendment](#) includes: Dolphin Wahoo Amendment 11, Golden Crab Amendment 11, and Snapper Grouper Amendment 45. Excerpts from the Council’s website provide the purpose and summary of this Amendment:

The purpose of the proposed Amendment is to modify the ABC control rule to address flexibility allowed under the MSA and revise how uncertainty and risk tolerance are addressed in setting ABCs. A summary of this action is to modify the ABC control rule, including specification of scientific uncertainty and management risk components, application of the control rule to rebuilding stocks, criteria and procedures for phase-in of ABC changes, criteria and procedures for carry-over of unused portions of the ACL, and establishment a framework procedure to allow carry-overs.

On December 5, 2022, the Council took final action to approve the Comprehensive ABC Control Rule Amendment and submit documents for secretarial review. The Council prepared the [Draft Environmental Assessment, Regulatory Flexibility Act Analysis, and Regulatory Impact Review for the Comprehensive Acceptable Biological Catch Control Rule Amendment](#) (Revisions to the ABC Control Rule and Specifications for Carry-Over and Phase-Ins) for this meeting. Actions 1-4 in Chapter 2 detail the preferred alternatives, which are included in Appendix 6.

The SAFMC has several FMPs that are not included in this Comprehensive Amendment: CMPs, Shrimp, Spiny Lobster, Coral, and Sargassum.

- [Spiny Lobster](#) – The SAFMC and GMFMC have joint authority over the Spiny Lobster FMP, and utilize the Gulf Council’s ABC control rule.
- [CMPs](#) – The SAFMC and GMFMC have joint management authority, and utilize the Gulf Council’s ABC control rule.

- [Sargassum](#) – The ABC control rule for Sargassum is included in Section 2.5 of the 2011 Comprehensive ACL Amendment for the South Atlantic Region, starting on page 171.
- Shrimp – The ABC control rule for shrimp is included in Section 3.1.6 of Amendment 6 to the Shrimp FMP (2004), starting on page 41 (*this document is not available online*).

6.3 SAFMC Evaluation

The original comprehensive ABC control rules were implemented in 2011 and 2015, and started to be evaluated in 2016. In applying the current ABC control rules, as specified in the Comprehensive ACL Amendment and Snapper Grouper Amendment 29, to different stocks and assessments from 2012-2016, the SSC began to express concerns that the rules lacked adequate resolution to distinguish differences in uncertainty levels across assessments, did not address continued developments in data poor assessment methods, and mixed uncertainty evaluation (a SSC role under the MSA) and risk tolerance determination (a Council role under the MSA). Additionally, the existing CR does not provide a means to make use of 2020 guidance for NS1 that increased the flexibility available to regional fishery management councils for managing catch limits by allowing phasing in of ABC changes and carry-over of unharvested portions of the ACL. Based on these findings, the SAFMC is in the final stages of modifying their policies.

7. Caribbean Fishery Management Council

7.1 CFMC Policies

The Caribbean Fishery Management Council (CFMC) does not have a separate, general risk policy; however, their recently finalized Island-Based FMPs replace the previous ABC control rules, and have both a 4-tier and 3-step approach to setting the ABCs and other management reference points based on different levels of data availability and uncertainty. The control rule is the same across all the FMPs. The following excerpts from the final rule in September of 2022 provides an overview (87 FR 56204):

The island-based FMPs establish SDC and other management reference points for all stocks and stock complexes to be included for island-based management, which were defined following a 3-step process.

- Step 1 adopts and applies a 4-tiered ABC control rule to specify MSY, SDC, and ABC depending on differing levels of data availability.
- Step 2 establishes a proxy to use when the fishing mortality that would produce MSY (F_{MSY}) cannot be determined.
- Step 3 applies a reduction factor, reflecting the Council's estimate of management uncertainty, to the ABC for each stock or stock complex to specify the ACL for the stock or stock complex. The OY would be set equal to the ACL for each stock or stock complex.

Under the ABC control rule in each island-based FMP, Tier 1 applies to stocks with the most data available, while each subsequent tier operates with less available data than the preceding tier. Tier 4, the final tier, is the most data limited and applies when no accepted quantitative assessment is available.

See Appendix 7 for more details about the ABC control rule, including more information about the tiers.

7.2 CFMC Fishery Management Plans and Regulatory Documents

The CFMC proposed ABC control rules in their [Island Based FMPs](#) in December of 2019. There are three Comprehensive FMPs, which include EAs, regulatory impact reviews, and fishery impact statements:

1. [Puerto Rico EEZ](#)
The EA for the Puerto Rico EEZ FMP identifies Alternative 3 as the preferred alternative (in Action 4), and table 2.4.1 (starting on page 74) details the ABC control rule, tiers, and steps 1-3.
2. [St. Croix EEZ](#)
The EA for the St. Croix EEZ FMP identifies Alternative 2 as the preferred alternative (in Action 4), and table 2.4.1 (starting on page 62) details the ABC control rule, tiers, and steps 1-3.
3. [St. Thomas/St. John](#)
The EA for the St. Thomas/St. John EEZ FMP identifies Alternative 2 as the preferred alternative (in Action 4), and table 2.4.1 (starting on page 64) details the ABC control rule, tiers, and steps 1-3.

The decision documents and rules for these comprehensive FMPs were published in the federal register on:

- June 26, 2020 – Notice of Availability for the three island-based FMPs (83 FR 38350)
- September 22, 2020 – NOAA/Secretary of Commerce approved the FMPs under section 304(a)(3) of the MSA.
- May 19, 2022 – [Proposed rule](#) published in the Federal Register (87 FR 30730)
- September 13, 2022 – [Final rule](#) published in the Federal Register (87 FR 56204)

The final rule implementing the three new FMPs explains their tier- and stepwise approach for ABC control rules, which are detailed in Appendix 7.

7.3 CFMC Evaluation

The final rule became effective October 13, 2022, so an evaluation is not yet necessary. Prior to this revision, an ABC Control Rule Work Group convened in 2016 to evaluate the existing policies and make recommendations to the SSC. These recommendations were integrated into the Island-Based FMPs. Contact the CFMC for more information on the evaluation, as the report of the Work Group is not available online.

Appendices

1 – PFMC Harvest Control Rule for Groundfish

The following excerpts from Sections 2.8.2 and 2.8.3 of the [Status of the Pacific Coast Groundfish Fishery SAFE report](#) (July 2022) describe the PFMC's process for determining ABCs:

The ABC is an annual catch specification that is the stock or stock complex's OFL reduced by an amount associated with the scientific uncertainty in estimating the OFL. Under the FMP harvest specification framework, scientific advice that is relatively more uncertain will result in ABCs that are relatively lower, all other things being equal (i.e., a precautionary reduction in catch will occur due purely to scientific uncertainty in estimating the OFL). The ABC is an SSC-recommended catch level that ACLs may not exceed. As explained in more detail below, the SSC developed a two-step approach referred to as the P* approach for determining ABCs. In the P* approach, the SSC determines the amount of scientific uncertainty associated with estimating the OFL in stock assessments, referred to as the sigma (σ) value. The Council then chooses its preferred level of risk of overfishing, a policy decision, which is designated as the overfishing probability (P*). The SSC then applies the P* value to the sigma value to determine the amount by which the OFL is reduced to establish the ABC. The SSC's recommendations for sigma and the reductions from OFL associated with different P* values are science-based recommendations; therefore, alternatives to these values are not analyzed.

Sigma values and the associated ABC buffers are greater for stocks with greater uncertainty in the OFL estimate. The SSC assigned each species in the groundfish fishery to one of three categories based on the level of information available about the species. Table 2-26 [*as cited in the July 2022 SAFE report*] shows the criteria used by the SSC to categorize stocks. Sigma values and the associated ABC buffers are highest for relatively data-limited category 3 stocks, lesser for data-moderate category 2 stocks, with data-rich category 1 stocks having the lowest sigma values and smallest ABC buffers.

Table 2-26. Criteria used by the SSC to categorize stocks based on the quantity and quality of data informing the estimate of OFL. Stock categories are used in deciding 2021 and 2022 ABCs that accommodate the uncertainty in estimating OFLs [as cited in the Pacific Groundfish SAFE report, July 2022].

Category	Sub-category	Criteria
Category 1 - Data rich stocks. OFL based on F_{MSY} or F_{MSY} proxy from model output. ABC based on P* buffer.		
1	a	Reliable compositional (age and/or size) data sufficient to resolve year-class strength and growth characteristics. Only fishery-dependent trend information available. Age/size structured assessment model.
1	b	As in 1a, but trend information also available from surveys. Age/size structured assessment model.
1	c	Age/size structured assessment model with reliable estimation of the stock-recruit relationship.
Category 2 - Data moderate. OFL derived from model output (or natural mortality).		
2	a	M* survey biomass assessment (as in Rogers 1996).
2	b	Historical catches, fishery-dependent trend information only. An aggregate population model is fit to the available information.
2	c	Historical catches, survey trend information, or at least one absolute abundance estimate. An aggregate population model is fit to the available information.
2	d	Full age-structured assessment, but results are substantially more uncertain than assessments used in the calculation of the P* buffer. The SSC will provide a rationale for each stock placed in this category. Reasons could include that assessment results are very sensitive to model and data assumptions, or that the assessment has not been updated for many years.
Category 3 - Data poor. OFL derived from data-limited methods using historical catch.		
3	a	No reliable catch history. No basis for establishing OFL.
3	b	Reliable catch estimates only for recent years. OFL is average catch during a period when stock is considered to be stable and close to B_{MSY} equilibrium on the basis of expert judgment.
3	c	Reliable aggregate catches during period of fishery development and approximate values for natural mortality. Default analytical approach DCAC.
3	d	Reliable annual historical catches and approximate values for natural mortality and age at 50% maturity. Default analytical approach DB-SRA.

Time-varying sigmas apply to ABCs for category 1 and 2 stocks beginning in 2021. The OFLs from category 3 analyses are constant; therefore, time-varying sigmas do not apply to category 3 stocks. The SSC recommended applying the relative rate of increase in sigma (7.5 percent of the baseline value with each additional year) to the baseline category 1 and 2 sigmas of 0.5 and 1.0, i.e.,

$$\text{Sigma (years since assessment)} = (\text{baseline sigma}) * (1.0 + (\text{years since assessment} - 1) * 0.075).$$

The projection year resets to 1 when a full or update assessment is conducted; the projection year will not reset following a catch-only projection. Table 2-27 [*as cited in the Pacific Groundfish SAFE report, July 2022*] describes the relationship between P* and the percent reduction of the OFL for deciding the ABCs in 2021 and beyond for category 1, 2, and 3 stocks. Sigmas and ABC buffers increase with the number of years since the last assessment for category 1 and 2 stocks.

Year since assessment	Category 1 (baseline $\sigma = 0.5$)				
	P*				
	0.45	0.4	0.35	0.3	0.25
1	6.1%	11.9%	17.5%	23.1%	28.6%
2	6.5%	12.7%	18.7%	24.6%	30.4%
3	7.0%	13.6%	19.9%	26.0%	32.1%
4	7.4%	14.4%	21.0%	27.5%	33.8%
5	7.8%	15.2%	22.2%	28.9%	35.5%
6	8.3%	16.0%	23.3%	30.3%	37.1%
7	8.7%	16.8%	24.4%	31.6%	38.7%
8	9.1%	17.6%	25.5%	33.0%	40.2%
9	9.6%	18.3%	26.5%	34.3%	41.7%
10	10.0%	19.1%	27.6%	35.5%	43.2%
11	10.4%	19.9%	28.6%	36.8%	44.6%
12	10.8%	20.6%	29.6%	38.0%	46.0%
13	11.3%	21.4%	30.7%	39.2%	47.3%
14	11.7%	22.1%	31.6%	40.4%	48.6%
15	12.1%	22.9%	32.6%	41.6%	49.9%
Year since assessment	Category 2 (baseline $\sigma = 1.0$)				
	P*				
	0.45	0.4	0.35	0.3	0.25
1	11.8%	22.4%	32.0%	40.8%	49.1%
2	12.6%	23.8%	33.9%	43.1%	51.6%
3	13.5%	25.3%	35.8%	45.3%	54.0%
4	14.3%	26.7%	37.6%	47.4%	56.2%
5	15.1%	28.1%	39.4%	49.4%	58.4%
6	15.9%	29.4%	41.1%	51.4%	60.4%
7	16.7%	30.7%	42.8%	53.3%	62.4%
8	17.4%	32.0%	44.4%	55.1%	64.2%
9	18.2%	33.3%	46.0%	56.8%	66.0%
10	19.0%	34.6%	47.6%	58.5%	67.7%
11	19.7%	35.8%	49.0%	60.1%	69.3%
12	20.5%	37.0%	50.5%	61.6%	70.8%
13	21.2%	38.2%	51.9%	63.1%	72.2%
14	22.0%	39.4%	53.3%	64.5%	73.6%
15	22.7%	40.5%	54.6%	65.9%	74.9%

Table 2-27. Relationship between P* and the percent reduction of the OFL for deciding the ABCs in 2021 and beyond for category 1, category 2, and category 3 stocks. Sigmas and ABC buffers increase with the number of years since the last assessment for category 1 and 2 stocks [as cited in the Pacific Groundfish SAFE report, July 2022].

Category 3 (constant $\sigma = 2.0$)					
P*					
0.45	0.4	0.35	0.3	0.25	
22.2%	39.8%	53.7%	65.0%	74.0%	

West Coast groundfish stocks are managed with HCRs that calculate ACLs below the ABCs when spawning biomass is estimated to be in the precautionary zone. These HCRs are designed to prevent a stock from becoming overfished. The FMP defines the 40- 10 HCR for stocks with a B_{MSY} proxy of $B_{40\%}$ that are in the precautionary zone. The analogous HCR for assessed flatfish stocks is the 25-5 HCR. Both ACL HCRs are applied after the ABC deduction is made. The further the stock biomass is below the precautionary threshold, the greater the reduction in ACL relative to the ABC, until at $B_{10\%}$ for a stock with a B_{MSY} proxy of $B_{40\%}$ or $B_{5\%}$ for a stock with a B_{MSY} proxy of $B_{25\%}$, the ACL would be set at zero [see figure below, Figure 2-137 as cited in the Pacific Groundfish SAFE report, July 2022].⁷ These harvest policies foster a quicker return to the B_{MSY} level and serve as an interim rebuilding policy for stocks that are below the MSST. The Council may recommend setting the ACL higher than what the default ACL HCR specifies as long as the ACL does not exceed the ABC, complies with the requirements of the MSA, and is consistent with the FMP and NS Guidelines. Additional precautionary adjustments may be made to an ACL if necessary to address management uncertainty, conservation concerns, socioeconomic concerns, ecological considerations, and the other factors that are considered when setting ACLs.

⁷ The lower the $B_{10\%}$ and $B_{5\%}$ thresholds in the precautionary ACL harvest control rules are used to establish the slope of the ACL curve in Figure 2-137. These precautionary ACL control rules only apply for stocks in the precautionary zone ($B_{MSY} > B_{Current} > MSST$). A rebuilding plan governs the ACL harvest control rule for any stock that falls below the MSST and is designated as overfished.

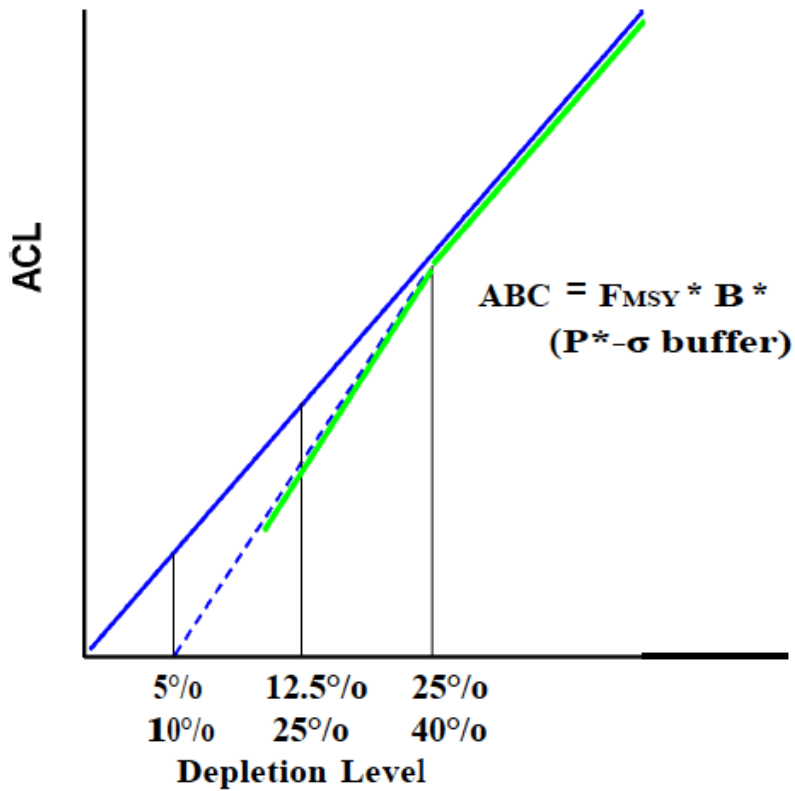


Figure 2-137. Conceptual diagram of the 25-5 and 40-10 ACL harvest control rules used to manage assessed West Coast flatfish and other groundfish species, respectively, that are in the precautionary zone [as cited in the Pacific Groundfish SAFE report, July 2022].

2 – North Pacific Fishery Management Council
 2A – NPFMC Risk Classification Table

Risk classification table for assessment, population dynamics, and environmental/ecosystem considerations (*as cited in* a 2021 report that summarizes the [SSC response to Draft Report for the SSC Risk Table Workshop](#), which was developed by a subcommittee).

	Assessment-related considerations	Population dynamics considerations	Environmental/ecosystem considerations	Fishery Performance
Level 1: Normal	Typical to moderately increased uncertainty/minor unresolved issues in assessment.	Stock trends are typical for the stock; recent recruitment is within normal range.	No apparent environmental/ecosystem concerns	No apparent fishery/resource-use performance and/or behavior concerns
Level 2: Substantially increased concerns	Substantially increased assessment uncertainty/ unresolved issues.	Stock trends are unusual; abundance increasing or decreasing faster than has been seen recently, or recruitment pattern is atypical.	Some indicators showing an adverse signals relevant to the stock but the pattern is not consistent across all indicators.	Some indicators showing adverse signals but the pattern is not consistent across all indicators
Level 3: Major Concern	Major problems with the stock assessment; very poor fits to data; high level of uncertainty; strong retrospective bias.	Stock trends are highly unusual; very rapid changes in stock abundance, or highly atypical recruitment patterns.	Multiple indicators showing consistent adverse signals a) across the same trophic level as the stock, and/or b) up or down trophic levels (i.e., predators and prey of the stock)	Multiple indicators showing consistent adverse signals a) across different sectors, and/or b) different gear types
Level 4: Extreme concern	Severe problems with the stock assessment; severe retrospective bias. Assessment considered unreliable.	Stock trends are unprecedented. More rapid changes in stock abundance than have ever been seen previously, or a very long stretch of poor recruitment compared to previous patterns.	Extreme anomalies in multiple ecosystem indicators that are highly likely to impact the stock. Potential for cascading effects on other ecosystem components	Extreme anomalies in multiple performance indicators that are highly likely to impact the stock

The above steps are undertaken first by the assessment authors in the individual chapters of the SAFE report. The Plan Team then reviews the SAFE report and makes its own recommendation. The SSC then reviews the SAFE report and Plan Team recommendation, and makes its own recommendation to the Council. The Council then reviews the SAFE report, Plan Team recommendation, and SSC recommendation; and makes its own recommendation to the Secretary, with the constraint that the Council’s recommended ABC cannot exceed the SSC’s recommended ABC.

Excerpts from [NPFMC BSAI Groundfish Fisheries webpage](#) provide a summary of the ABC control rule (definitions of terms and information requirements for the six tiers are identical to those used in the OFL control rule):

OFL Control Rule (Tier System)

Specification of OFL begins with the Maximum Fishing Mortality Threshold (MFMT), also known as the OFL control rule. The MFMT is prescribed through a set of six tiers which are listed below in descending order of preference, corresponding to descending order of information availability. The SSC will have final authority for determining whether a given item of information is “reliable” for the purpose of this definition, and may use either objective or subjective criteria in making such determinations.

For tier (1), a “pdf” refers to a probability density function. For tiers 1 and 2, if a reliable pdf of B_{MSY} is available, the preferred point estimate of B_{MSY} is the geometric mean of its pdf. For tiers 1 to 5, if a reliable pdf of B is available, the preferred point estimate is the geometric mean of its pdf. For tiers 1 to 3, the coefficient a is set at a default value of 0.05. This default value was established by applying the 10 percent rule suggested by Rosenberg et al. (1994) to the $1/2 B_{MSY}$ reference point. However, the SSC may establish a different value for a specific stock or stock complex as merited by the best available scientific information. For tiers, 2 to 4, a designation of the form “ $F_{X\%}$ ” refers to the fishing mortality rate (F) associated with an equilibrium level of spawning per recruit equal to $X\%$ of the equilibrium level of spawning per recruit in the absence of any fishing. If reliable information sufficient to characterize the entire maturity schedule of a species is not available, the SSC may choose to view spawning per recruit calculations based on a knife-edge maturity assumption as reliable. For tier 3, the term $B_{40\%}$ refers to the long-term average biomass that would be expected under average recruitment and $F=F_{40\%}$.

Tier 1 Information available: reliable point estimates of B and B_{MSY} and reliable pdf of F_{MSY} .

1a) Stock status: $B/B_{MSY} > 1$

$F_{OFL} = mA$, the arithmetic mean of the pdf

1b) Stock status: $a < B/B_{MSY} \leq 1$

$F_{OFL} = mA \times (B/B_{MSY} - a)/(1 - a)$

1c) Stock status: $B/B_{MSY} \leq a$

$F_{OFL} = 0$

Tier 2 Information available: reliable point estimates of B , B_{MSY} , F_{MSY} , $F_{35\%}$, and $F_{40\%}$.

2a) Stock status: $B/B_{MSY} > 1$

$$F_{OFL} = F_{MSY}$$

2b) Stock status: $a < B/B_{MSY} \leq 1$

$$F_{OFL} = F_{MSY} \times (B/B_{MSY} - a)/(1 - a)$$

2c) Stock status: $B/B_{MSY} \leq a$

$$F_{OFL} = 0$$

Tier 3 Information available: reliable point estimates of B , $B_{40\%}$, $F_{35\%}$, and $F_{40\%}$.

3a) Stock status: $B/B_{40\%} > 1$

$$F_{OFL} = F_{35\%}$$

3b) Stock status: $a < B/B_{40\%} \leq 1$

$$F_{OFL} = F_{35\%} \times (B/B_{40\%} - a)/(1 - a)$$

3c) Stock status: $B/B_{40\%} \leq a$

$$F_{OFL} = 0$$

Tier 4 Information available: reliable point estimates of B , $F_{35\%}$, and $F_{40\%}$.

$$F_{OFL} = F_{35\%}$$

Tier 5 Information available: reliable point estimates of B and natural mortality rate M .

$$F_{OFL} = M$$

Tier 6 Information available: reliable catch history from 1978 through 1995.

OFL = the average catch from 1978 through 1995, unless an alternative value is established by the SSC on the basis of the best available scientific information.

The [FMP for Groundfish of the Gulf of Alaska \(GOA\) \(November 2020\)](#) provides additional context (and the BSAI FMP has the same language):

The above control rule is intended to account for scientific uncertainty in two ways: First, the control rule is structured explicitly in terms of the type of information available, which is related qualitatively to the amount of scientific uncertainty. Second, the size of the buffer between $maxF_{ABC}$ in Tier 1 of the ABC control rule and F_{OFL} in Tier 1 of the OFL control rule varies directly with the amount of scientific uncertainty. For the information levels associated with the remaining tiers, relating the buffer between $maxF_{ABC}$ and F_{OFL} to the amount of scientific uncertainty is more difficult because the amount of scientific uncertainty is harder to quantify, so buffers of fixed size are used instead.

3 – WPRFMC ABC Control Rule

The following excerpts are from Section 3.1.1.1 of the [Omnibus Amendment for the Western Pacific Region to Establish a Process for Specifying Annual Catch Limits and Accountability Measures, Including an Environmental Assessment \(2011\)](#):

Under the preferred alternative, for stocks and stock complexes required to have an ABC, the Council will utilize a five-tiered system of ABC control rules that allows for different levels of scientific information to be considered when calculating ABC. The control rules are organized from data rich down to data poor, with Tier 1 being the highest (data rich) and Tier 5 being the lowest (data poor). Tiers 1-2 involve data rich to data moderate situations and include levels of uncertainty derived from model-based stock assessments. Tiers 3-5 involve data poor situations and include levels of uncertainty derived from ad-hoc procedures including simulation models or expert opinion.

When calculating an ABC for a stock or stock complex, the SSC must first evaluate the information available for the stock and assign the stock or stock complex into one of the five tiers. The SSC must then apply the control rule assigned to that tier to determine the ABC. The SSC may recommend an ABC that differs from the result of the control rule calculation based on factors such as data uncertainty, recruitment variability, declining trends in population variables, and other factors determined relevant by the SSC, but must explain their rationale. The tiered system of ABC control rules is described below.

Tier 1. Model-Based Probabilistic Approach to Estimating ABCs

In this tier, the data used are reliable and complete enough to be able to utilize statistical-based stock assessment models (e.g., Stock Synthesis 2 (or 3), Multifan-CL, C++ Algorithmic Stock Assessment Laboratory, and Bayesian production models). From these stock assessments, reliable estimates of MSY , F_{MSY} , B_{MSY} , and B_t are available. Of special relevance to being included in this tier, measures of the uncertainty of F_{MSY} , B_t and B_{t+k} and OFL_{t+k} must be available directly.

In plain English:

ABC is the maximum value for which the probability “p” of exceeding OFL is less than P^* .

Or, in conceptual mathematical terms:

$$ABC = \max(x \mid p(x > OFL) < P^*)$$

Or, as commonly estimated:

$$ABC = P_{p^*}(OFL)$$

Where:

- OFL is estimated as $OFL = B_y \left[\frac{F_{MSY}}{F_{MSY} + M} \right] [1 - \exp(-F_{MSY} + M)]$;

- B_y is forecasted estimate of B in year y , the year for which the harvest limit is set;
- M is natural mortality coefficient;
- P_{p^*} is the P^* percentile of the probability distribution of OFL such as in Figure 2;
- OFL is not necessarily normally distributed; and
- the shape and particularly the width of the distribution reflect the uncertainty in the estimate of OFL.

The Council must advise the SSC on the acceptable P^* (see Section 3.1.1.2 [of the omnibus amendment] for a discussion on determining P^*) to use prior to calculating and recommending the ABC. If the SSC determines that the uncertainty of OFL is underestimated (due to underestimating the uncertainty of F_{MSY} and/or the forecasted estimated B_t), the SSC could appropriately rescale the width of the OFL distribution.

Tier 2. Quasi-Probabilistic Approach to Estimating ABCs

The key difference between assessments in Tier 1 and Tier 2 is that in Tier 2, measures of uncertainty of OFL are not as reliable or are not available from a single, integrated stock assessment model. Reliable data must still be available to be included in this tier, but those used are obtained through some separate analysis or analyses. The methods often involve re-sampling or ad hoc methods. While the statistical-based model characteristic of Tier 1 can occur here, the common assessments are Yield-per-Recruit (Y/R) and Spawning-per-Recruit (SPR). Such assessments involve the use of F_{MSY} proxies, usually $F_{30\%}$ and $F_{60\%}$. The data in Tier 2 may not be as reliable or complete as in Tier 1, though still of sufficient quality to provide fully usable stock assessments.

$F_{30\%}$ = Fishing at the rate that reduces spawning biomass per recruit to 30% of the unfished value. Used as a substitute for F_{MSY} when using Y/R and SPR stock assessments. $F_{60\%}$, as well as others, has also commonly been used.

ABC is estimated using the equation in Tier 1 above, with the uncertainty estimates coming from re-sampling (i.e., method for estimating and re-estimating probability distributions such as bootstrapping). The Council must advise the SSC on the acceptable P^* ...to use prior to calculating and recommending the ABC.

Tier 3. Data-poor Probabilistic Approach to Setting ABCs

In this tier, the available data are not sufficient for the use of model-based assessment tools. Data are sufficient to apply the Depletion-Corrected Average Catch – Stock Reduction Analysis (DCAC-SRA) (McCall 2009) with information on the biology of the stock, or DCAC, in which there is some estimate of natural mortality (M), but other life history information is lacking. In these circumstances, the uncertainty of OFL (the probability distribution of OFL) can be estimated using the Monte Carlo simulation (i.e., a technique that uses algorithms that rely on repeated random sampling to compute results). These tools are to be applied to long-lived species where the natural mortality coefficient M should be less than 0.20 and recruitment should not be highly episodic.

ABC is estimated using the equation in Tier 1 above, with the uncertainty estimates established by the Monte Carlo simulation. Again, the Council must advise the SSC on the acceptable P^* ...to use prior to calculating and recommending the ABC.

Tier 4. ABC Control Rule for Species without Current Harvest

This ABC control rule is for species or species assemblages with stock assessments and/or MSY estimates, but no current harvest, such as deepwater shrimp (*Heterocarpus*). The ABC is set at $0.70 F_{MSY}$ (= yield 91% OFL = 91% MSY = ABC; see Walters et al. 2005) as a precautionary measure to maximize yield while minimizing biomass impacts and accounting for scientific uncertainty. An alternative target fishing mortality value may be specified if additional data or modeling is available to support it, or the Council chooses to be more precautionary.

Walters et al. (2005) provided an example through the modeling tool, ECOSIM, in which $k = 0.7$ represents a precautionary factor in setting the target fishing mortality (F_{MSY}), which is predicted to have little impact on yield. When $k = 0.7$, the ECOSIM simulations implied a sustainable yield of around 0.9 MSY. “ k ” is a factor that a fishery modeler can vary to represent varying levels of precaution for F_{MSY} within the ECOSIM model. Similarly, NMFS Technical Guidance on implementing NS1 by Restrepo et al. (1998) recommended a default fishing mortality target of 25% below MFMT, or $0.75 F_{MSY}$, which results in an equilibrium yield of 94% MSY or higher. This Tier 4 control rule adopted by the WPFMC is more precautionary than the control rule recommended by Restrepo et al. (1998) and in line with the results of Walters et al. (2005). As Tier 4 involves a fishery with no current harvest, this ABC control rule does not include consideration of P^* ; however, if harvest occurs, the fishery may be moved into higher tier where P^* would be need to be considered.

Tier 5. Data-poor Ad-hoc Approach to Setting ABCs

In this tier, catches may be small and/or the catch history may contain gaps or be too variable. Catch history may also be lacking in consistently stable periods or periods with consistent trends for using DCAC-SRA or DCAC. Hence, there is no basis for estimating a reliable MSY or OFL.

For these data poor fisheries, a multiplier of the long-term median catch history will be used. The multiplier will be determined by the biological knowledge of the stock or stock complex, in light of the guidance provided by Restrepo et al. (*Section 2.2.2: Data Poor Situations*). The guidance recommends that the default control rule be implemented by multiplying the average catch from a time period where there is no quantitative or qualitative evidence of declining abundance (“Recent Catch”) by a factor based on a qualitative estimate of relative stock size. The following guidelines were provided:

Above B_{MSY}	Limit catch = $1.00 * \text{Recent Catch}$
Above MSST but below B_{MSY}	Limit catch = $0.67 * \text{Recent Catch}$

Below MSST (i.e., overfished)

Limit catch = 0.33*Recent Catch

However, Restrepo et al. (1998) advises that because it will probably not be possible to analytically determine stock status relative to B_{MSY} for data poor stocks, an approach based on informed judgment will be necessary. The authors further state (*Section 3.3.1: Data Poor Defaults*) that “in cases of severe data limitations, qualitative approaches may be necessary, including expert opinion and consensus-building methods.” As Tier 5 involves data poor situations, this ABC control rule does not include consideration of P^* .

The following excerpts are from Section 3.1.1.2 of the Omnibus Amendment (2011):

The ABC control rule for Tier 1-3 fisheries requires the Council to advise the SSC on the acceptable probability of overfishing (P^*) in order for the SSC to calculate and recommend the ABC. As discussed above, P^* refers to the acceptable probability or risk that actual catch equal to the ABC would exceed the OFL and thus, result in overfishing. NS1 guidelines require that the probability that overfishing will occur cannot exceed 50% and should be a lower value. Consequently, the Council adopted a maximum P^* value of 50%; however, under the preferred alternative, where adequate scientific information is available on the stock or stock complex, the Council will utilize a qualitative method for determining an appropriate P^* that is lower than the maximum of 50%. This qualitative approach is described below.

Qualitative Analysis for Determining P^*

The Council developed a process by which the risk of overfishing can be reduced from the 50% maximum P^* . This approach, based on the approach developed by the South Atlantic FMC, is a qualitative method of determining P^* that considers the amount of information available on the stock or stock complex, including scientific uncertainty, for the following dimensions: 1) assessment information, 2) assessment uncertainty, 3) stock status, and 4) productivity and susceptibility. Information on the four dimensions will be compiled and analyzed by a team that may include Council and SSC members, Council staff, and other individuals knowledgeable in the fishery, including stock assessment experts. Team members will use their knowledge and expertise to assign a single score for each dimension based on the criteria below. The maximum value for each dimension is 12.5 and the sum of the four dimensions has a maximum value of 50. The scores for each dimension will be added together for a final score, then be reduced from the maximum risk of overfishing (P^*_{MAX}) of 50. The team’s analysis will be vetted through the Council process with the Council ultimately deciding the final P^* value. The Council-approved P^* would then be utilized in the calculation of the recommended ABC. An example of the qualitative analysis is provided below, but the exact criteria and scoring values used may change as deemed appropriate by the team for each assessed stock.

1) Assessment Information

Criteria	Score	
Quantitative assessment provides estimates of exploitation and B; includes MSY-derived benchmarks	0.0	
Reliable measures of exploitation or B, no MSY benchmarks, proxy reference points	2.5	X
Relative measures of exploitation or B, absolute measures of stock unavailable, proxy reference points	5.0	
Reliable catch history	7.5	
Scarce or unreliable catch records	12.5	

2) Assessment Uncertainty

Criteria	Score	
Complete. Key determinant – uncertainty in both assessment inputs and environmental conditions included	0.0	
High. Key determinant – reflects more than just uncertainty in future recruitment	2.5	
Medium. Uncertainties are addressed using statistical techniques and sensitivities, but full uncertainty is not carried forward in projections	5.0	X
Low. Distributions of F_{MSY} and MSY are lacking	7.5	
None. Only single point estimates; no sensitivities or uncertainty evaluations	12.5	

3) Stock Status

Criteria	Score	
Neither overfished nor overfishing. Stock is at high B and low exploitation relative to benchmark values	0.0	
Neither overfished nor overfishing. Stock may be in close proximity to benchmark values	2.5	X
Stock is either overfished or overfishing is occurring	5.0	
Stock is overfished and overfishing is occurring	7.5	
Either status criterion is unknown	12.5	

4) Productivity and Susceptibility

Criteria	Score	
Low risk. High productivity, low vulnerability, low susceptibility	0.0	
Medium risk. Moderate productivity, vulnerability, and susceptibility	5.0	X
High risk. Low productivity, high vulnerability, high susceptibility	12.5	

SCORE SUMMARY

Dimensions	Score
Assessment information	2.5
Assessment uncertainty	5.0
Stock status	2.5
PSA	5.0
Total Score	15.0
Risk of overfishing: ($P^* = 50$ minus Total Score, where 50 equals P^*_{MAX})	35

In the example above, the resulting P^* of 35 could then be used in the ABC control rule equations available for stocks in any of the tiers 1 through 3, presented in section 3.1.1.1. Benefits of this alternative include the following: 1) it brings together multiple experts to determine the risk of overfishing based on their diverse knowledge; 2) it can be applied in both data rich and data poor situations, i.e., whether formal stock assessments can be conducted or not; and 3) it need not be repeated annually unless information suggests that circumstances have changed significantly.

The following excerpts are from Section 3.1.2 of the Omnibus Amendment (2011):

NS1 guidelines require the Council to determine an ACL that may not exceed the SSC-recommended ABC; however, NS1 does not provide guidance on how to set an ACL below the SSC-recommended ABC. This section describes the methods the Council will use to set ACLs starting in 2011.

Under the preferred alternative, ACL will be set by the Council after considering the ABC provided by the SSC, as well as social and economic factors, pertinent ecological considerations, and management uncertainty. Management uncertainty stems from insufficient information about true catch (e.g., late reporting, underreporting and misreporting of landings), lack of management precision, and/or the ability to close a fishery before a catch limit is exceeded. NS1 guidelines suggest management uncertainty be accounted for during the establishment of AMs for a fishery, including ACTs; however, nothing precludes the Council from accounting for management uncertainty at the ACL step.

Method 1: Qualitative Construct for Setting an ACL

The ACL qualitative construct uses an approach similar to the P^* qualitative construct outlined in Section 3.1.1.2. While the P^* qualitative construct considers the amount of biological information (scientific uncertainty) available on the stock or stock complex, the ACL qualitative construct considers the amount of socio-economic information (management uncertainty) on the fishery that targets the stock or stock complex. Specifically, the dimensions that will be used for the ACL qualitative construct would

include the following factors: 1) Social; 2) Economic; 3) Ecological; and 4) Management uncertainty (SEEM). Aspects of the SEEM dimensions could include the importance of the fishery both socially and economically; consideration of the ecological importance of the stock or stock complex targeted by the fishery (e.g., is the stock a key indicator species of ecological health of the ocean), and whether managers can effectively constrain catch to planned levels.

Information on the SEEM dimensions will be compiled and analyzed by a team that may include Council and SSC members, Council staff, and other individuals knowledgeable in the fishery. This team will also be responsible for developing the criteria and scoring values regarding the quality and completeness of the information for each dimension. Like the P* qualitative construct, the scores for each dimension will be added together so that the total score is subtracted from a default value of 100% ABC (i.e., 100). Because SEEM analyses will be unique for each fishery, there are no specifics given at this time for the criteria or scoring values within the dimensions.

Method 2: Percentage Buffer for Setting an ACL

Under this method, the ACL would be set as a percentage of the ABC (e.g., ACL = 10% to 100% of the ABC) with the actual percentage dependent upon the amount of management uncertainty that exists in the fishery. For example, if management uncertainty is low, the ACL would be set close to 100% of the ABC. Alternatively, if management uncertainty is high, ACL would be set as a lower percentage. Factors that the Council will consider when selecting the percentage include late reporting, underreporting, and misreporting of landings in the fishery, as these factors contribute to the possibility that the true catch may actually exceed the ABC and ultimately the OFL of a fishery, thus resulting in overfishing. The justification for using this method over method 1 would need to be clearly identified by the Council when setting the ACL, as it is not a quantitative decision. However, it is useful to note that the ACL is a management decision for the Council to make, not necessarily a numerically-derived limit.

Method 3: Setting an ACL when an ACT will be Utilized

An 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. When an ACT is used, it should be set lower than the ACL with a large enough buffer between the two reference points such that risk of exceeding the ACL is low. NS1 guidelines recommend ACTs in the system of AMs so that ACL is not exceeded. See Section 3.1.3 [of the Omnibus Amendment] for a description of setting the ACT.

If the Council decides to use an ACT as a means to ensure an ACL is not exceeded, there are two options the Council may use in setting an ACL. Under the first option, the Council could simply set the ACL equal to the ABC. If this option is taken, management uncertainty will be accounted for at the ACT level using the ACT control rule described in

Section 3.1.3. Under this option, in addition to management uncertainty, the Council could also consider social, economic and ecological factors to set the ACT and thus could apply the entire SEEM analysis described under Method 1 to set the ACT below the ACL. While NS1 guidelines do not require social, economic or ecological factors to be considered in setting the ACT, nothing precludes the Council from doing so, although the resulting ACT would be more precautionary than NS1 intends.

Under the second option, the Council would set the ACL less than the ABC using a modified Method 1 (Qualitative construct for setting ACLs) described above whereby the analysis for setting the ACL will only consider sociological, economic, and/or ecological factors. Under this option, management uncertainty will be accounted for at the ACT level using the ACT control rule (3-year running average) described in Section 3.1.3 [of the Omnibus Amendment].

As a performance measure for all ACL managed fisheries, if landings exceed the ACL for any stock or stock complex more than once in a four-year period, the Council will re-evaluate the system of ACLs and AMs for the fishery and modify the system as necessary to improve its performance and effectiveness.

4 – GMFMC ABC Control Rule

The GMFMC’s ABC control rule, as approved in the [Generic ACL/AM Amendment for the GMFMC’s Red Drum, Reef Fish, Shrimp, Coral and Coral Reefs, FMPs](#) (2011) is detailed in this table (Table 2.3.1, *as cited in the Generic ACL/AM Amendment*):

Tier 1 Acceptable Biological Catch Control Rule	
Condition for Use	A quantitative assessment provides both an estimate of overfishing limit based on maximum sustainable yield or its proxy and a probability density function of overfishing limit that reflects scientific uncertainty. Specific components of scientific uncertainty can be evaluated through a risk determination table.
OFL	OFL = yield resulting from applying F_{MSY} or its proxy to estimated biomass.
ABC	The Council with advice from the SSC will set an appropriate level of risk (P^*) using a risk determination table that calculates a P^* based on the level of information and uncertainty in the stock assessment. ABC = yield at P^* .
Tier 2 Acceptable Biological Catch Control Rule	
Condition for Use*	An assessment exists but does not provide an estimate of MSY or its proxy. Instead, the assessment provides a measure of overfishing limit based on alternative methodology. Additionally, a probability density function can be calculated to estimate scientific uncertainty in the model-derived overfishing limit measure. This density function can be used to approximate the probability of exceeding the overfishing limit, thus providing a buffer between the overfishing limit and acceptable biological catch.
OFL	An overfishing limit measure is available from alternative methodology.
ABC	Calculate a probability density function around the overfishing limit measure that accounts for scientific uncertainty. The buffer between the overfishing limit and acceptable biological catch will be based on that probability density function and the level of risk of exceeding the overfishing limit selected by the Council. <ul style="list-style-type: none"> a. Risk of exceeding OFL = 50% b. Risk of exceeding OFL = 40% c. Risk of exceeding OFL = 30% (default) Set ABC = OFL – buffer at risk of exceeding OFL
Tier 3a Acceptable Biological Catch Control Rule	
Condition for Use*	No assessment is available, but landings data exist. The probability of exceeding the overfishing limit in a given year can be approximated from the variance about the mean of recent landings to produce a buffer between the overfishing limit and acceptable biological catch. Based on expert evaluation of the best scientific information available, recent historical landings are without trend, landings are small relative to stock biomass, or the stock is unlikely to undergo overfishing if future landings are equal to or moderately higher than the mean of recent landings. For stock complexes, the determination of whether a stock complex is in Tier 3a or 3b will be made using all the information available, including stock specific catch trends.
OFL	Set the overfishing limit equal to the mean of recent landings plus two standard deviations. A time series of at least ten years is recommended to compute the mean of recent landings, but a different number of years may be used to attain a representative level of variance in the landings.
ABC	Set acceptable biological catch using a buffer from the overfishing limit that represents an acceptable level of risk due to scientific uncertainty. The buffer will be predetermined for each stock or stock complex by the Council with advice from the SSC as: <ul style="list-style-type: none"> a. ABC = mean of the landings plus 1.5 * standard deviation (risk of exceeding OFL = 31%) b. ABC = mean of the landings plus 1.0 * standard deviation (default) (risk of exceeding OFL = 16%) c. ABC = mean of the landings plus 0.5 * standard deviation (risk of exceeding OFL = 7%) d. ABC = mean of the landings (risk of exceeding OFL = 2.3%)
Tier 3b Acceptable Biological Catch Control Rule	
Condition for Use*	No assessment is available, but landings data exist. Based on expert evaluation of the best scientific information available, recent landings may be unsustainable.
OFL	Set the overfishing limit equal to the mean of landings. A time series of at least ten years is recommended to compute the mean of recent landings, but a different number of years may be used to attain a representative level of variance in the landings.
ABC	Set acceptable biological catch using a buffer from the overfishing limit that represents an acceptable level of risk due to scientific uncertainty. The buffer will be predetermined for each stock or stock complex by the Council with advice from its SSC as: <ul style="list-style-type: none"> e. ABC = 100% of OFL f. ABC = 85% of OFL g. ABC = 75% of OFL (default) h. ABC = 65% of OFL

*Changes in the trend of a stock’s landings or a stock complex’s landings in three consecutive years shall trigger a reevaluation of their acceptable biological catch control rule determination under Tiers 2, 3a, or 3b.

Note: There may be situations in which reliable landings estimates do not exist for a given data-poor stock. The approach and methodology for setting OFL and ABC will be determined on a case-by-case basis, based on expert opinion and the best scientific information available.

An example of how this control rule was applied for kingfish (Tier 1) in 2020 is as follows:

Gulf Kingfish - 2020

$$P^* = \exp \left[-a - b \sum_{i \text{ dimension}} \text{Dimension score}_i \right]$$

P* = 0.398

Maximum Risk **0.50**
Minimum Risk **0.30**

S_{M1}	3.998
a	0.493
b	0.1277793

$$a = -\ln(0.50) \quad b = -\frac{a + \ln(0.30)}{S_{M1}} \quad S_{M1} = \text{highest possible score}$$

Element scores are scaled from zero to a maximum. In this example the maximum is 2.00, but this can be changed.

Dimension	Dimension Wt	Tier No.	Tier Wt	Element Score	Element	Score it	Element Result	Tier Result	Dimension Result
Assessment Information	1	1	1	0.00	Quantitative, age-structured assessment that provides estimates of exploitation and biomass; includes MSY-derived benchmarks.		0.67	0.67	0.67
				0.67	Quantitative, age-structured assessment provides estimates of either exploitation or biomass, but requires proxy reference points.	x			
				1.33	Quantitative, non-age-structured assessment. Reference points may be based on proxy.				
				2.00	Quantitative assessment that provides relative reference points (absolute measures of status are unavailable) and require proxies.				
Characterization of Uncertainty	1	1	.333	0.0	The OFL pdf provided by the assessment model includes an appropriate characterization of "within model" and "between model/model structure" error. The uncertainty in important inputs (such as natural mortality, discard rates, discard mortality, age and growth parameters, landings before consistent reporting) has been described with using Bayesian priors and/or bootstrapping and/or Monte Carlo simulation and the full uncertainty has been carried forward into the projections.		1.33	0.44289	1.11
				0.67	The OFL pdf provided by the assessment model includes an approximation of observation and process error. The uncertainty in important inputs (such as natural mortality, discard rates, discard mortality, age and growth parameters, landings before consistent reporting) has been described with <i>SENSITIVITY RUNS</i> and the full uncertainty has been carried forward into the projections.				
				1.33	The OFL pdf provided by the assessment model includes an incomplete approximation of observation and process error. The uncertainty in important inputs (such as natural mortality, discard rates, discard mortality, age and growth parameters, landings before consistent reporting) has been described with <i>SENSITIVITY RUNS</i> but the full uncertainty <i>HAS NOT</i> been carried forward into the projections.	x			
				2.0	The OFL provided by the assessment <i>DOES NOT</i> include uncertainty in important inputs and parameters.				
		2	.333	0.0	Retrospective patterns have been described, and are not significant.	x	0.0	0	
				1.0	Retrospective patterns have been described and are moderately significant.				
				2.0	Retrospective patterns <i>have not</i> been described or are large.				
		3	0		NOT USED		0	0	
						z			
		4	.333	0.0	Known environmental covariates are accounted for in the assessment.		2.0	0.666	
				1.0	Known environmental covariates are partially accounted for in the assessment.				
				2.0	Known environmental covariates are <i>not</i> accounted for in the assessment.	x			

The MAFMC risk policy is detailed in this regulatory text from the code of federal regulations:

§ 648.21 Mid-Atlantic Fishery Management Council risk policy.

The risk policy shall be used by the SSC in conjunction with the ABC control rules in [§ 648.20\(a\)](#) through [\(d\)](#) to ensure the MAFMC's preferred tolerance for the risk of overfishing is addressed in the ABC development and recommendation process.

(a) ***Stocks under a rebuilding plan.*** The probability of not exceeding the F necessary to rebuild the stock within the specified time frame (rebuilding F or $F_{REBUILD}$) must be at least 50 percent, unless the default level is modified to a higher probability for not exceeding the rebuilding F through the formal stock rebuilding plan. A higher probability of not exceeding the rebuilding F would be expressed as a value greater than 50 percent (e.g., 75-percent probability of not exceeding rebuilding F, which corresponds to a 25-percent probability of exceeding rebuilding F).

(b) ***Stocks not subject to a rebuilding plan.***

(1) For stocks with a ratio of biomass (B) to biomass at MSY (B_{MSY}) of 1.0 or lower, the maximum probability of overfishing as informed by the OFL distribution shall decrease linearly from a maximum value of 45 percent until the probability of overfishing becomes zero at a B/B_{MSY} ratio of 0.10.

(2) For stocks with biomass that exceeds B_{MSY} and the B/B_{MSY} ratio is greater than 1.0, the probability of overfishing shall increase linearly from a probability of overfishing of 45 percent to a maximum probability of overfishing of 49 percent when the B/B_{MSY} ratio is equal to 1.5 or greater.

(c) ***Most restrictive ABC recommendation.***

(1) Unless otherwise allowed in [paragraph \(c\)\(2\)](#) or [\(3\)](#) of this section, for instances in which the application of the risk policy approaches in [paragraph \(b\)](#) of this section using OFL distribution results in a more restrictive ABC recommendation than the calculation of ABC derived from the use of $F_{REBUILD}$ at the MAFMC-specified overfishing risk level as outlined in [paragraph \(a\)](#) of this section, the Scientific and Statistical Committee (SSC) shall recommend to the MAFMC the lower of the ABC values.

(2) The SSC may specify higher 2019-2023 ABCs for Atlantic mackerel based on $F_{REBUILD}$ instead of the methods outlined in [paragraph \(a\)](#) of this section to implement a rebuilding program that would rebuild this stock by 2023.

(3) The SSC may specify higher ABCs for bluefish based on $F_{REBUILD}$, as outlined in [paragraph \(a\)](#) of this section, instead of the risk policy approaches in [paragraph \(b\)](#) of this section in order to implement a rebuilding program that would rebuild this stock by 2028.

(d) Stock without an OFL or OFL proxy.

(1) If an OFL cannot be determined from the stock assessment, or if a proxy is not provided by the SSC during the ABC recommendation process, ABC levels may not be increased until such time that an OFL has been identified.

(2) The SSC may deviate from [paragraph \(d\)\(1\)](#) of this section, provided that the following two criteria are met: Biomass-based reference points indicate that the stock is greater than B_{MSY} and stock biomass is stable or increasing, or if biomass based reference points are not available, best available science indicates that stock biomass is stable or increasing; and the SSC provides a determination that, based on best available science, the recommended increase to the ABC is not expected to result in overfishing. Any such deviation must include a description of why the increase is warranted, description of the methods used to derive the alternative ABC, and a certification that the ABC is not likely to result in overfishing on the stock.

5B – MAFMC ABC Control Rule

The MAFMC ABC control rule is detailed in this regulatory text from the code of federal regulations:

[§ 648.20 Mid-Atlantic Fishery Management Council Acceptable Biological Catch \(ABC\) control rules.](#)

The SSC shall review the following criteria, and any additional relevant information, to assign managed stocks to one of four types of control rules based on the species' assessments and its treatment of uncertainty when developing ABC recommendations. The SSC shall review the ABC control rule assignment for stocks each time an ABC is recommended. ABCs may be recommended for up to three years for all stocks, with the exception of five years for spiny dogfish. The SSC may specify constant, multi-year ABCs, derived from the average of ABCs (or average risk of overfishing) if the average probability of overfishing remains between zero and 40 percent, and does not exceed a 50-percent probability in any given year. The average ABCs may remain constant for up to three years for all stocks, with the exception of five years for spiny dogfish. The SSC may deviate from the control rule methods and recommend an ABC that differs from the result of the ABC control rule application; however, any such deviation must include the following: A description of why the deviation is warranted; description of the methods used to derive the alternative ABC; and an explanation of how the deviation is consistent with NS 2. The four types of ABC control rules are described below.

(a) ABC control rule for a stock with an OFL probability distribution that is analytically-derived and accepted by the SSC.

(1) The SSC determines that the assessment OFL and the assessment's treatment of uncertainty are acceptable, based on the following:

- (i) All important sources of scientific uncertainty are captured in the stock assessment model;
- (ii) The probability distribution of the OFL is calculated within the stock assessment and adequately describes the OFL uncertainty;

- (iii) The stock assessment model structure and treatment of the data prior to use in the model include relevant details of the biology of the stock, fisheries that exploit the stock, and data collection methods;
- (iv) The stock assessment provides the following estimates: Fishing mortality rate (F) at MSY or an acceptable proxy maximum fishing mortality threshold (MFMT) to define OFL, biomass, biological reference points, stock status, OFL, and the respective uncertainties associated with each value; and
- (v) No substantial retrospective patterns exist in the stock assessment estimates of fishing mortality, biomass, and recruitment.

(2) An ABC for stocks with an accepted OFL probability distribution that is analytically-derived will be determined by applying the acceptable probability of overfishing from the MAFMC's risk policy found in [§ 648.21\(a\)](#) through [\(d\)](#) to the probability distribution of the OFL.

(b) ABC control rule for a stock with an OFL probability distribution that is modified by the assessment team and accepted by the SSC.

(1) The SSC determines the assessment OFL is acceptable and the SSC accepts the assessment team's modifications to the analytically-derived OFL probability distribution, based on the following:

- (i) Key features of the stock biology, the fisheries that exploit it, and/or the data collection methods for stock information are missing from, or poorly estimated in, the stock assessment;
- (ii) The stock assessment provides reference points (which may be proxies), stock status, and uncertainties associated with each; however, the uncertainty is not fully promulgated through the stock assessment model and/or some important sources of uncertainty may be lacking;
- (iii) The stock assessment provides estimates of the precision of biomass, fishing mortality, and reference points;
- (iv) The accuracy of the minimum fishing mortality threshold and projected future biomass is estimated in the stock assessment using ad hoc methods; and
- (v) The modified OFL probability distribution provided by the assessment team acceptably addresses the uncertainty of the assessment.

(2) An ABC for stocks with an OFL probability distribution that is modified by the assessment team and accepted by the SSC will be determined by applying the acceptable probability of overfishing from the MAFMC's risk policy found in [§ 648.21\(a\)](#) through [\(d\)](#) to the probability distribution of the OFL as modified by the assessment team.

(c) ABC control rule for a stock with an OFL probability distribution that is modified by the SSC.

(1) The SSC determines the assessment OFL is acceptable but the SSC derives the appropriate uncertainty for OFL based on meta-analysis and other considerations. This requires the SSC to determine that the stock assessment does not contain an estimated

probability distribution of OFL or the OFL probability distribution in the stock assessment is judged by the SSC to not adequately reflect uncertainty in the OFL estimate.

(2) An ABC for stocks with an OFL probability distribution that is modified by the SSC will be determined by either:

(i) Applying the acceptable probability of overfishing from the MAFMC's risk policy found in [§ 648.21\(a\)](#) through [\(d\)](#) to the SSC-adjusted OFL probability distribution.

The SSC will use default assignments of uncertainty in the adjusted OFL probability distribution based on literature review and valuation of control rule performance; or,

(ii) If the SSC cannot develop an OFL probability distribution, a default control rule of 75 percent of the F_{MSY} value will be applied to derive ABC.

(d) *ABC control rule for when an OFL cannot be specified.*

(1) The SSC determines that the OFL cannot be specified given the available information.

(2) An ABC for stocks with an OFL that cannot be specified will be determined by using control rules based on biomass and catch history and application of the MAFMC's risk policy found in [§ 648.21\(a\)](#) through [\(d\)](#).

6 – SAFMC ABC Control Rule

The following excerpts are from Section 2.1.1 in the December 2022 version of the [Comprehensive ABC Control Rule Amendment EA](#), and do not necessarily reflect the final Council-approved language or decisions, which were pending as this report was finalized:

Preferred Alternative 2. Specify an ABC control rule for the Dolphin Wahoo, Golden Crab, and Snapper Grouper FMPs that categorizes stocks based on the available information and scientific uncertainty evaluation and incorporates the Council’s risk tolerance policy through an accepted probability of overfishing (P^*). The Council will specify the P^* based on relative stock biomass and a stock risk rating.

When possible, the SSC Committee will determine the OFL and characterize its uncertainty based on, primarily, the stock assessment or, secondarily, the SSC’s expert opinion. The OFL and its uncertainty would then be used to derive and recommend the ABC, based on the risk tolerance specified by the Council.

ABC for unassessed stocks will be recommended by the SSC based on applicable data-limited methods. Unassessed stocks will be assigned the moderate biomass level unless there is a recommendation from the SSC that justifies a different level.

For overfished stocks, the Council will specify a stock rebuilding plan, considering recommendations from the SSC and FMP advisory panel, which will determine the ABC while the rebuilding plan is in effect. Per requirements of the MSA, the probability of success for rebuilding plans ($1-P^*$) must be at least 50%.

Control rule categories for assessments are described in Table 2.1.1.2 [of the EA]. Default P^* values based on relative biomass and stock risk rating are shown in Table 2.1.1.3 [of the EA].

Preferred Sub-Alternative 2b. Allow the Council to deviate from the default accepted probability of overfishing by up to 10% for an individual stock, based on its expert judgment, new information, or recommendations by the SSC or other expert advisors. Accepted probability of overfishing may not exceed 50%.

Preferred Sub-Alternative 2c. When requested by the Council, the SSC will specify the ABC for up to 5 years as both a constant value across years and as individual annual values for the same period of years.

Preferred Alternative 2

Under **Preferred Alternative 2**, the ABC will be derived by applying P^* to a stock projection analysis for assessed stocks or an OFL estimated using alternative methods for unassessed stocks, when possible (Table 2.1.1.2 [of the EA]). If an OFL cannot be estimated, the SSC will derive the ABC directly.

Table 2.1.1.2 ABC control rule proposed in Action 1 - Preferred Alternative 2 (as cited in the 2022 EA).

Category	Criteria	ABC Determination
Category 1	Stock is assessed; scientific uncertainty is adequately incorporated	The P* is applied to the assessment information to derive ABC.
Category 2	Stock is assessed; scientific uncertainty is not adequately evaluated or some assessment outputs may be lacking.	The SSC will adjust the measures of uncertainty, P* will then be applied to the assessment information.
Category 3	The stock is assessed; scientific uncertainty is not adequately evaluated and cannot be addressed by adjusting the available uncertainty measures.	The SSC will develop uncertainty measures as necessary to apply the P* to the available assessment information. Alternatively, the SSC may apply a direct buffer to the OFL (or an overfishing limit proxy) to derive the ABC.
Category 4	No formal stock assessment accepted to provide OFL and ABC recommendations (reviewed through SEDAR or SSC).	OFL and ABC will be developed according to the strategy proposed by the SSC's Data-Limited Working Group (Appendix J). The SSC will attempt to estimate OFL and its uncertainty using available data, applicable methods, and expert judgement. If an OFL and its uncertainty are defined, the SSC will apply P* to derive ABC. If an OFL is unable to be defined, the SSC will directly recommend an ABC. The process of updating OFLs and ABCs for unassessed stocks will occur over time as directed by the Council. The current OFL and ABC for unassessed species and species complexes will be maintained until updated levels are recommended by the SSC and approved by the Council.

For **Preferred Alternative 2**, the Council, with advice from the SSC and AP, will evaluate management risk for each stock through a stock risk rating. Stock risk ratings include information currently used in the Productivity and Susceptibility Analysis (SAFMC 2011), but also incorporate socio-economic and environmental attributes. These recommendations will be revisited when new information becomes available (for example, a new stock assessment). The Council will then specify the risk rating as low, medium, or high risk of overfishing. A higher risk of overfishing would indicate that risk tolerance (the accepted probability of overfishing) should be lower. These stock risk ratings, along with relative biomass levels, will be used to determine the Council's default risk tolerance for each stock.

The SSC has developed a proposed evaluation method for these ratings based on information currently used in the Productivity and Susceptibility Analysis, but also incorporating socio-economic and environmental attributes. Stock risk ratings would be evaluated with respect to three types of attributes: Biological, Human Dimension, and Environmental. Within each type, are specific attributes that can inform risk of overfishing:

- Biological:
 - Estimated natural mortality
 - Age at maturity
- Human Dimension:
 - Ability to regulate fishery
 - Potential for discard losses
 - Annual commercial value
 - Recreational desirability
 - Social concerns
- Environmental:
 - Ecosystem importance
 - Climate change
 - Other environmental variables

For time-varying or qualitative attributes, risk ratings were designed to address long-term effects. While short-term effects may influence managers' use of flexibility within the ABC control rule, ratings are intended to inform the long-term sustainability of the stock and fishery. Short-term effects that diverge from long-term effects can be noted for Council consideration on a case-by-case basis as P* is determined. Short-term effects are also evaluated for each amendment as part of the National Environmental Policy Act analyses.

After attributes are evaluated on a scale of high (1), medium (2), or low (3) risk, ratings will be averaged by type, and ratings for each type will be averaged for an overall stock risk rating. Attribute ratings will be averaged without weighting, with no penalty for unknown attributes, and with a default type rating of moderate. The scoring system would rank all overall risk scores and divide them into equal thirds (to the nearest 0.1) to categorize stocks as high, medium, or low risk.

The stock risk rating and stock biomass would be used together to derive P*, according to Table 2.1.1.3 [of the EA]. For example, a stock with high biomass and medium stock risk rating would have a P* of 45%. This would be lower than the OFL, in accordance with MSA. The SSC can recommend the Council reconsider the stock risk rating. This could happen, for example, with the emergence of new scientific studies or new information discovered through a stock assessment.

Table 2.1.1.3 Summary table of default risk tolerance levels based on stock risk ratings and relative biomass levels, proposed in Action 1-Alternative 2 (as cited in the 2022 EA).

Stock Risk Rating	High Biomass Biomass exceeds BR_{MSY} (or 110% BR_{MSYR} per Sub-Alternative 2a)	Moderate Biomass Biomass is ABOVE the midpoint between BR_{MSYR} and MSST	Low Biomass Biomass is below the midpoint between BR_{MSYR} and MSST
Low	45%	45%	40%
Medium	45%	40%	30%
High	40%	30%	20%

ABC includes both components of scientific uncertainty and management risk tolerance. Under **Preferred Alternative 2**, the ABC can be increased via greater risk tolerance from the Council (higher P^*) OR less uncertainty in the projection results (i.e., a narrower distribution about OFL) determined by the SSC. The ABC can be decreased via lower risk tolerance from the Council (lower P^*) OR more uncertainty in the projections results (i.e., a wider distribution about OFL) determined by the SSC.

Steps for Stock Risk Rating Use for Assessed Stocks under Preferred Alternative 2

Before an Operational Assessment:

- SSC and AP recommend risk levels for attributes that contribute to the stock risk rating to the Council. The most current attribute ratings and overall stock risk rating will be shown and feedback will be requested on whether any changes are necessary to depict the current state of the stock and fishery.
 - Preliminary stock risk ratings are in Appendix F. Preliminary recommendations will be used to inform future risk determinations but will not impact ABCs that are already in place.
 - Estimates for biological attributes, including natural mortality and age at maturity, should be available from the most recent research track assessment. These values typically would not change prior to the operational assessment, but additional Council review of changes to these values and effects on the overall risk rating can be accommodated on a case-by-case basis.
 - AP input can be gathered as part of Fishery Performance Reports conducted before each assessment.
- The Council reviews SSC and AP recommendations and determines the stock risk rating.

During an Operational Assessment:

- P^* will be derived using an estimate of relative biomass and the Council’s stock risk rating, according to Table 2.1.1.3.

- Projection analyses will be run using $P^*=50\%$ and the P^* value defined by Table 2.1.1.3 to derive estimates of OFL and ABC.

Stock Risk Ratings and ABC Recommendations for Unassessed Stocks

- If **Preferred Alternative 2** is implemented, the SSC will work through groups of unassessed stocks to determine ABC recommendations.
- Prior to the SSC developing an ABC recommendation for a group of unassessed stocks, the SSC and AP will provide input on stock risk rating attributes and the Council will determine stock risk rating, similar to the process described for assessed stocks.
- When possible, OFL will be defined and the ABC control rule will be applied to the OFL and its distribution, similar to the process described for assessed stocks. However, in cases where OFL cannot be defined and the SSC recommends ABC directly, the SSC will describe in their report how they considered the Council's stock risk rating in developing their recommendations.

7 – CFMC ABC Control Rule

Excerpts from the Federal Register notice ([87 FR 56204](#)), effective date October 13, 2022, and regulatory text provide details on the CFMC's ABC control rule:

The ABC control rule contained in each island-based FMP replaces the ABC control rules included in the 2010 Caribbean ACL Amendment and 2011 Caribbean ACL Amendment, as applicable. The island-based FMPs establish SDC and other management reference points for all stocks and stock complexes to be included for island-based management, which were defined following a 3-step process.

Step 1 adopts and applies a 4-tiered ABC control rule to specify MSY, SDC, and ABC depending on differing levels of data availability. Step 2 establishes a proxy to use when the fishing mortality that would produce MSY (F_{MSY}) cannot be determined. Step 3 applies a reduction factor, reflecting the Council's estimate of management uncertainty, to the ABC for each stock or stock complex to specify the ACL for the stock or stock complex. The OY would be set equal to the ACL for each stock or stock complex.

Under the ABC control rule in each island-based FMP, Tier 1 applies to stocks with the most data available, while each subsequent tier operates with less available data than the preceding tier. Tier 4, the final tier, is the most data limited and applies when no accepted quantitative assessment is available. The tiered approach to the ABC control rule positions the Council to take advantage of future improvements in data and analytical methodologies. The higher tiers of the ABC control rule (*i.e.*, 1, 2, or 3) require inputs from a quantitative stock assessment, which in turn require additional data than were available at the time the island-based FMPs were under development. Establishing those tiers now, in anticipation of improvements in data, allows the Council to act more quickly when those data become available than if the Council adopts an ABC control rule that encompasses the Tier 4 process alone.

In Tier 4, the most data-limited of the options, an MSY proxy and MFMT, are defined with respect to assumptions made in Step 2 about fishing mortality rate, but cannot be quantified due to data limitations. In addition, Tier 4 introduces a new reference point, the sustainable yield level (SYL), which is determined under one of two sub-tiers, Tier 4a and Tier 4b, based on the SSC's understanding of the stock's vulnerability to fishing pressure. Tier 4a is less conservative and is applicable when the stock has a relatively low or moderate vulnerability to fishing pressure. Tier 4b is more conservative and is applicable when the stock has relatively high vulnerability to fishing pressure. The SYL is a quantitative estimate of the level of landings that can be sustained over the long term. SYL is intended to be used when quantitative information with which to set MSY or an MSY proxy based on fishing mortality rate is not available. The SYL serves as a proxy for the OFL and a minimum estimate of MSY where MSY is greater than or equal to SYL. Thus, SYL also is an MSY proxy. The ABC is reduced from the SYL depending on the SSC's determination of scientific uncertainty.

When the island-based FMPs were under development, all stocks and stock complexes fell under Tier 4 of the ABC control rule (Step 1). Under the definitions in Tier 4, the MSY proxy is equal to the long-term yield F_{MSY} proxy, the MFMT is equal to F_{MSY} proxy, and the minimum stock size threshold (MSST) is equal to 75 percent of the spawning stock biomass at MFMT. Under Step 2, for all stocks and stock complexes across all island-areas, the Council established a F_{MSY} proxy equal to 30 percent of the maximum spawning potential of a stock under conditions of no fishing mortality ($F_{30\text{ percent SPR}}$).

Applying Tier 4 of the ABC control rule (Step 1), the SSC derived SYLs from a period of stable and sustainable landings, and recommended ABCs based on those SYLs, with certain exceptions discussed in the island-specific sections later in this preamble. Revising or establishing the SDC and other reference points under Tier 4 ensures, based on the best scientific information available, that the SDC and reference points prevent overfishing and achieve OY.

Finally, under Step 3, the Council applied a management uncertainty buffer to the ABCs to specify the ACLs, where the ACL for the stock or stock complex equals OY, as discussed in the island-specific ACL sections later in this preamble.

The following table (2.4.1) from the [Comprehensive FMP for the Puerto Rico EEZ and EA](#) provides details on the tiers:

Tier 1: Data Rich	
Condition for Use	Full stage-structured stock assessment available with reliable time series on (1) catch, (2) stage composition, and (3) index of abundance. The assessment provides estimates of minimum stock size threshold (MSST), maximum fishing mortality threshold (MFMT), and the probability density function (PDF) of the overfishing limit (OFL).
MSY	MSY = long-term yield at F_{MSY} (or, MSY proxy = long-term yield at F_{MSY} proxy); assumes spawner-recruit relationship known.
SDC	MFMT = F_{MSY} or proxy MSST = 0.75*long-term Spawning Stock Biomass at MFMT (SSB_{MFMT}) OFL = Catch at MFMT
ABC	<p>ABC = OFL as reduced (buffered) by scientific uncertainty¹ and reflecting the acceptable probability of overfishing². The buffer is applied to the PDF of OFL (σ), where the PDF is determined from the assessment (where $\sigma > \sigma_{min}$)³.</p> $ABC = d * OFL \text{ where } d = \begin{cases} \text{Scalar} & \text{if } B \geq B_{MSY} \\ \text{Scalar} * (B - B_{critical}) / (B_{MSY} - B_{critical}) & \text{if } B < B_{MSY} \end{cases}$ <p>Scalar = 1 if acceptable probability of overfishing is specified (<0.5), < 1 if not specified (=0.5). $B_{critical}$ is defined as the minimum level of depletion at which fishing would be allowed.</p>
Tier 2: Data Moderate	
Condition for Use, MSY, SDC	Data-moderate approaches where two of the three time series (catch, stage composition, and index of abundance) are deemed informative by the assessment process, and the assessment can provide MSST, MFMT, and PDF of OFL.
ABC	Same as Tier 1, but variation of the PDF of OFL (σ) must be greater than 1.5 σ_{min} (in principle there should be more uncertainty with data-moderate approaches than data-rich approaches).
Tier 3: Data Limited: Accepted Assessment Available	
Condition for Use	Relatively data-limited or out-of-date assessments
MSY	MSY proxy = long-term yield at proxy for F_{MSY}
SDC	MFMT = F_{MSY} proxy MSST = 0.75* SSB_{MFMT} or proxy OFL = Catch at MFMT
ABC	<p>ABC determined from OFL as reduced (buffered) by scientific uncertainty⁴ and reflecting the acceptable probability of overfishing²</p> <p>a. Where the buffer is applied to the PDF of OFL when the PDF is determined from the assessment (with $\sigma \geq 2\sigma_{min}$)</p> <p>OR</p> <p>b. Where ABC = buffer * OFL, where buffer must be ≤ 0.9</p>
Tier 4: Data Limited: No Accepted Assessment Available	
MSY	MSY proxy = long-term yield at proxy for F_{MSY} .
SDC	MFMT = F_{MSY} proxy MSST = 0.75* SSB_{MFMT} Sustainable yield level (SYL) ⁵ = a level of landings that can be sustained over the long-term. OFL proxy = SYL

Tier 4a	No accepted ⁶ assessment, but the stock has relatively low vulnerability to fishing pressure. A stock's vulnerability to fishing pressure is a combination of its productivity and its susceptibility to the fishery. Productivity refers to the capacity of the stock to produce MSY and to recover if the population is depleted. Susceptibility is the potential for the stock to be impacted by the fishery. If SSC consensus ⁷ cannot be reached on the use of Tier 4a, Tier 4b should be used.
Conditions for Use	
SYL	SYL = Scalar * 75 th percentile of reference period landings, where the reference period of landings is chosen by the Council, as recommended by the SSC in consultation with the SEFSC. Scalar ≤ 3 depending on perceived degree of exploitation, life history and ecological function.
ABC	ABC = buffer * SYL, where buffer must be ≤ 0.9 (e.g., 0.9, 0.8, 0.75, 0.70...) based on the SSC's determination of scientific uncertainty ⁸ .
Tier 4b	No accepted ⁶ assessment, but the stock has relatively high vulnerability to fishing pressure (see definition in Tier 4a Condition for Use), or SSC consensus ⁷ cannot be reached on the use of Tier 4a.
Conditions for Use	
SYL	SYL = Scalar * <i>mean</i> of the reference period landings, where the reference period of landings is chosen by the Council, as recommended by the SSC in consultation with the SEFSC. Scalar < 2 depending on perceived degree of exploitation, life history, and ecological function.
ABC	ABC ⁹ = buffer * SYL, where buffer must be ≤ 0.9 (e.g., 0.9, 0.8, 0.75, 0.70...) based on the SSC's determination of scientific uncertainty ⁸ .
Footnotes	¹ Scientific uncertainty would take into account, but not be limited to, the species life history and ecological function. ² Acceptable probability of overfishing determined by Council. ³ σ_{\min} could be equal to coefficient of variation; σ_{\min} is in a log scale. ⁴ Scientific uncertainty would take into account, but not be limited to, the species life history and ecological function, the perceived level of depletion, and vulnerability of the stock to collapse. ⁵ MSY \geq SYL. See Appendix G for a detailed explanation of SYL. ⁶ Accepted means that the assessment was approved by the SSC as being appropriate for management purposes. ⁷ The SSC defines consensus as having 2/3 of the participating members in favor of a Tier 4a assignment, otherwise the assignment would be Tier 4b of the ABC CR. ⁸ Scientific uncertainty would take into account, but not be limited to, deficiencies in landings data, availability of ancillary data, species life history, and ecological function, perceived level of depletion, and vulnerability of the stock to collapse. ⁹ The ABC for a Tier 4b stock should not exceed mean landings during the reference period.

8 – Regional Fishery Management Council Risk Policy Summary Table

The following table summarizes responses to a series of questions for seven regional fishery management councils, not including the NEFMC. This is meant to provide a higher-level overview of risk policies, control rules, and other information detailed in the narrative sections and appendices. Some of these responses are derived directly from meetings with regional council staff, and others are summarized from available documents, websites, and regulations. Similar to the narrative, regional council staff have not necessarily reviewed the content of the table.

Council	Does the Council have a formal risk policy?	What does this policy address: only ABCs, all Council decisions, etc.?	Does the Council also have a separate ABC control rule policy?	When was the current policy adopted? Was this the initial policy, or does it modify an earlier policy?	What is it called (e.g. risk policy, ABC control rule tiers, etc.)?	Is the policy FMP-specific, or does one policy address all FMPs managed by the Council?	How was the policy adopted (e.g. in a plan amendment or other Council action, established as a policy in an operations handbook, etc.)?	Is the policy incorporated into the regulations?	What decisions does the policy address (e.g., determination of ABCs, all management decisions, etc.)?	What factors are included in the policy: biological, economic, environmental, assessment uncertainty, etc.?	Was the policy tested using Management Strategy Evaluation (MSE)?	Does the policy address flexibility in applying its provisions? For example, in a Council with tiered ABC control rules based on assessment uncertainty, can the SSC modify its ABC recommendation in either direction based on other factors?	Does the SSC deviate from the ABC control rules?	Has the Council evaluated its risk policy? What were the key conclusions of that evaluation? Did the Council modify its policy as a result?
MAFMC	Yes	ABC control rule and a default level of uncertainty for the OFL	The Omnibus Amendment addresses both the ABC control rule and risk policy	The current rules were implemented in December of 2020. Prior to this, there was an omnibus framework action in 2018, and an interim framework action to the Mackerel, Squid and Butterfish FMP in 2012. The ABC control rule and risk policy were initially implemented in 2011.	Omnibus ABC and Risk Policy Framework Adjustment	All FMPs	Framework adjustment to the original Omnibus Amendment	Yes (85 FR 81152) and regulations - https://www.ecfr.gov/current/title-50/part-648/subpart-b	ABCs, uncertainty in OFL, and risk policies specific to rebuilding plan.	Control rule - There are 4 Tiers of assessments. The SSC evaluates nine criterion to determine scientific uncertainty - these include ecosystem considerations, data quality, biological factors, and others. The risk policy considers biological implications - MSE reviewed stock productivity sensitivity analysis; and economic - modeled catch levels and net economic gain/loss and stability for comm/rec. Environmental considerations are not in current regs; however, the Council is considering a separate risk policy for Forage species (EAFM guidance doc).	Yes, in two different iterations. In 2017, Dr. John Wiedenmann (Rutgers University) conducted an MSE to consider the biological and fishery yield implications of different risk policy alternatives (Wiedenmann 2018). The MSE included an evaluation of five different alternatives, including the current risk policy, assuming two different OFL CV distributions (60% and 100%) with variable natural mortality, recruitment, and stock assessment data for summer flounder, scup, and butterfish. In 2019, Dr. Wiedenmann updated the MSE with new information and alternatives, and was also linked to an economic model developed by Doug Lipton and Cyrus Teng. (See Section 5.2 of the narrative summary for more information, including links to the reports mentioned above.)	The risk policy is formulaic and does not incorporate flexibility. This is stated in the regs, 50 CFR 648.21(c)(1): "Unless otherwise allowed in paragraph (c)(2) or (3) of this section, for instances in which the application of the risk policy approaches in paragraph (b) of this section using OFL distribution results in a more restrictive ABC recommendation than the calculation of ABC derived from the use of FREETILD at the MAFMC-specified overfishing risk level as outlined in paragraph (a) of this section, the Scientific and Statistical Committee (SSC) shall recommend to the MAFMC the lower of the ABC values." However the risk policy works in concert with the tiered control rule, where the regs state 50 CFR 648.20: "The SSC may deviate from the control rule methods and recommend an ABC that differs from the result of the ABC control rule application; however, any such deviation must include the following: A: description of why the deviation is warranted; description of the methods used to derive the alternative ABC; and an explanation of how the deviation is consistent with National Standard 2."	Yes, the SSC does have the flexibility to deviate from the control rule, although this occurrence is rare. For tiers with an OFL, all fisheries have fallen into Tier 3 - assessments, where the SSC has nine criteria they will evaluate to determine scientific uncertainty, which are detailed in the 2020 SSC report (linked in the narrative summary). The SSC can, and has, modified previous ABC recommendations and has done so in either direction. The SSC does review previous ABC recommendations on an annual basis, although a change in either direction does not happen too often. A change to a previous ABC recommendation typically occurs when compelling new information is available or a new analysis has been completed (e.g., a Canadian assessment for Atlantic mackerel or significant changes in survey or catch information).	Yes, the MAFMC started to evaluate its original policy in 2016. In 2017, during the initial risk policy review, the Council agreed to postpone final action until after the completion of additional analyses, which more fully consider the social and economic impacts and trade-offs of different risk policy alternatives. The conclusion from the MSE stated the Council could take a little additional risk and result in increased economic benefits (e.g., summer flounder). The Council specified that the evaluation should assess the short- and long-term trade-offs between stock biomass protection, fishery yield, and economic benefits. Development of the Omnibus Risk Policy Framework was reintiated in 2019, and the final rule published in 2020.
SAFMC	No, there is not a separate risk policy. The Comprehensive ABC Control Rule incorporates the risk tolerance policy.	N/A	The Comprehensive ABC Control Rule Amendment is the primary risk policy. It includes a new ABC control rule, criteria and procedures for phase-in of ABC changes, and carry-over provisions for unused ACLs.	The revised ABC Control Rule is in the process of being finalized and implemented in early 2023. It modifies the previous policies from 2015 (for the Snapper Grouper FMP only) and 2011 (Comprehensive Amendment).	Comprehensive ABC Control Rule Amendment	It applies to three FMPs: Dolphin Wahoo Fishery, Golden Crab Fishery, and the Snapper Grouper Fishery. It does not apply to the Coastal Migratory Pelagics or Spiny Lobster FMPs, which have shared jurisdiction with the GMFMC, or the Shrimp and Coral/Live bottom habitat FMPs.	A comprehensive amendment to the FMPs.	No, not at the time of this review (as the Amendment is under secretarial review). However, the original ABC Control Rules (2011 and 2015) were incorporated into regulations.	ABC control rules and phase-in of ABC control rules, uncertainty in assessments, and carry-over provisions.	The SSC proposed an evaluation method for developing a stock risk rating that includes biological, human dimensions, and environmental attributes to inform the risk of overfishing. Refer to page 12 of the Draft EA (or Appendix 6 of the narrative summary) for more information.	No, not for determining the ABC control rule. However, there are MSE processes planned for other actions in Dolphin Wahoo FMP (SEFSC-led initiative) and Snapper-Grouper FMP.	Despite not having a separate, formal risk policy, the process that has been proposed in the new ABC control rule (CR) includes flexibility in three areas: 1) SSC assessment of uncertainty when developing ABC recommendations, 2) Council determination of risk tolerance (P*) to apply through the ABC recommendations, and 3) Allowance of carry-over and phase-in for specific situations. These provisions are not explicitly separate from the ABC CR but will be built into the new ABC CR through the amendment.	The SSC may provide an ABC that deviates from strict application of the approved ABC CR if necessary to address scientific uncertainty, recruitment variability, declining population trends, or available information. If the SSC deviates from the ABC CR, it must provide a written explanation describing why the deviation was necessary, how the alternative ABC recommendation is derived, and how the alternative ABC prevents overfishing, addresses scientific uncertainty and the Council's specified risk tolerance level for the stock.	Yes, the original ABC CRs were implemented in 2011 and 2015, and started to be evaluated in 2016. In applying the current ABC CRs (as specified in the Comprehensive ACL Amendment and Snapper Grouper Amendment 29), to different stocks and assessments from 2012-2016, the SSC began to express concerns that the rules lacked adequate resolution to distinguish differences in uncertainty levels across assessments, did not address continued developments in data-poor assessment methods, and mixed uncertainty evaluation (an SSC role under the MSA) and risk tolerance determination (a Council role under the MSA). Additionally, the existing CR does not provide a means to make use of 2020 guidance for National Standard 1 that increased the flexibility available to regional fishery management councils for managing catch limits by allowing phasing in of ABC changes and carry-over of unharvested portions of the ACL. Based on these findings, the SAFMC modified the ABC control rule and took final action in December 2022.

Council	Does the Council have a formal risk policy?	What does this policy address: only ABCs, all Council decisions, etc.?	Does the Council also have a separate ABC control rule policy?	When was the current policy adopted? Was this the initial policy, or does it modify an earlier policy?	What is it called (e.g. risk policy, ABC control rule tiers, etc.)?	Is the policy FMP-specific, or does one policy address all FMPs?	How was the policy adopted (e.g. in a plan amendment or other Council action, established as a policy in an operations handbook, etc.)?	Is the policy incorporated into the regulations?	What decisions does the policy address (e.g., determination of ABCs, all management decisions, etc.)?	What factors are included in the policy: biological, economic, environmental, assessment uncertainty, etc.?	Was the policy tested using Management Strategy Evaluation (MSE)?	Does the policy address flexibility in applying its provisions? For example, in a Council with tiered ABC control rules based on assessment uncertainty, can the SSC modify its ABC recommendation in either direction based on other factors?	Does the SSC deviate from the ABC control rules?	Has the Council evaluated its risk policy? What were the key conclusions of that evaluation? Did the Council modify its policy as a result?	
			Yes, the Groundfish FMP includes a sigma-P* policy to determine the ABC buffer, and harvest control rules (HCRs) to determine the ACL if spawning biomass is estimated to be in the precautionary zone.	The policies in the Groundfish FMP were initially adopted with Amendment 23 in 2011. Since this time, the HCRs were revised in 2015, and the Council adopted new approaches for determining sigma values in 2019, following SSC recommendations.	The Groundfish FMP primarily uses the term harvest control rules (HCRs), as well as sigma values and P* values, which is referred to as the sigma-P* approach.	There is not one policy, as each FMP has unique HCRs. Both the Groundfish and Coastal Pelagics FMPs utilize the sigma-P* approach.	Amendments to the FMP	The SSC recommended method for incorporating scientific uncertainty is referred to as the sigma-P* approach and is discussed in detail in the final rule for the 2011-2012 biennial harvest specifications and management measures (76 FR 27508, May 11, 2011) and 2013-2014 (77 FR 67974, November 12, 2012, and 78 FR 580, January 3, 2013).	The sigma-P* policy addresses the determination of ABCs. The HCRs address the determination of ACLs, if an additional reduction is warranted.			The SSC can only modify ABC recommendations down.	Yes, with good rationale, and typically a short-term deviation to add precaution, although this is rare.	The HCRs were evaluated as part of Amendment 24 to the Pacific Groundfish FMP (2015) to develop default HCRs. In 2018, the SSC held a meeting to start the process to review analyses pertaining to the scientific uncertainty in estimating OFL (sigma). The SSC recommendations for sigma values were adopted by the Council in 2019. These recommendations are referenced in the narrative summary (Section 2.3).	
PFMC	No	N/A		The ABC control rule was implemented in 2011 (effective date in January 2012). This is the original policy, and portions of this are currently being revised in a new amendment that will build on previous efforts, including a draft generic amendment for carryover provisions and framework modifications in 2019. The SSC also started to analyze alternatives to revise the ABC control rule in an options paper in 2017. This effort has been restarted in 2022 and will continue into 2023.		The current ABC control rule was implemented as part of three actions: 1) Generic ACL/AM Amendment for the GMFMC's Red Drum, Reef Fish, Shrimp, Coral, and Coral Reefs FMPs, 2) Amendment 18 to the FMP for Coastal Migratory Pelagic Resources of the Gulf of Mexico and Atlantic, and 3) Amendment 10 to the FMP for Spiny Lobster in the Gulf of Mexico and South Atlantic. There are nuances in which species the control rule applies to for stocks/species with shared management authority.	Amendments to FMPs								
GMFMC	No	N/A	Yes, there is an ABC control rule policy		ABC Control Rule, and ACL/ACT Control Rules		Amendments to FMPs	Yes, see Section 4.2 of the narrative summary for links to the regulations.	Determination of ABCs and ACLs/ACTs	Assessment model composition (i.e., type of assessment - quantitative, age-structured, MSY-derived benchmarks, proxy reference points, etc.) and characterization of scientific uncertainty (i.e., OFL considerations and inputs - e.g., natural mortality, age and growth parameters, discard rates, discard mortality, and use of sensitivity runs, presence of retrospective patterns; and consideration of environmental covariates). See Kingfish example in Appendix 4 of the narrative summary.			Yes; however, it is unlikely that the SSC would make a more liberal decision.	Yes; however, if the SSC is aware of uncertainty unaccounted for by the model, it can deviate from specifications in the ABC control rule to better account for scientific uncertainty.	Yes, see Section 4.3 of the narrative summary for details. The Council is currently in the process of modifying its control rules, and a new amendment will be in progress in 2023.

Council	Does the Council have a formal risk policy?	What does this policy address: only ABCs, all Council decisions, etc.?	Does the Council also have a separate ABC control rule policy?	When was the current policy adopted? Was this the initial policy, or does it modify an earlier policy?	What is it called (e.g. risk policy, ABC control rule tiers, etc.)?	Is the policy FMP-specific, or does one policy address all FMPs managed by the Council?	How was the policy adopted (e.g. in a plan amendment or other Council action, established as a policy in an operations handbook, etc.)?	Is the policy incorporated into the regulations?	What decisions does the policy address (e.g., determination of ABCs, all management decisions, etc.)?	What factors are included in the policy: biological, economic, environmental, assessment uncertainty, etc.?	Was the policy tested using Management Strategy Evaluation (MSE)?	Does the policy address flexibility in applying its provisions? For example, in a Council with tiered ABC control rules based on assessment uncertainty, can the SSC modify its ABC recommendation in either direction based on other factors?	Does the SSC deviate from the ABC control rules?	Has the Council evaluated its risk policy? What were the key conclusions of that evaluation? Did the Council modify its policy as a result?
NPFMC	Yes	The NPFMC has a number of management policies. None of them are specific to risk policies; however, the Harvest Specification Policies include an ABC and TAC setting policy, which is included in Section 2.1 of the narrative summary. The Ecosystem Policy advises the Council to consider environmental variability and uncertainty.	Yes	The initial ABC control rules were approved by the Council as amendments 44/44 to the groundfish FMPs (GOA and BSAI) in 1996, and were effective starting in January 1997. The control rules were then revised by the Council in 1998 as Amendments 56/56. In 2022, the Joint Groundfish Plan Teams and SSC started a workshop to address the current policies, and that work is underway (see Section 2.3 of the narrative summary).	OFL Control Rule (Tier System) - If a stock is in a tier level where biomass can be determined, a sloping harvest control rule is applied.	The OFL Control Rule is FMP specific, for groundfish.	Amendments to FMPs. Also, the housekeeping amendment(s) brought language alignment with the MSA for the ACL and ABC control rule.	Partially, the annual harvest specifications are in rulemaking, categorized by year and area on this website: https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/alaska-groundfish-harvest-specifications , but not the general Control Rule/Tier System approaches, which are in the FMP.	The management policy addresses a number of objectives around decisions. The control rules address setting OFL and ABCs.	The Risk Table incorporates environmental and economic factors (see Appendix 2A in the narrative summary). The Control Rule (Tiers) only considers assessment uncertainty (see Appendix 2B in the narrative summary).	No, although the Goodman et al. (2002) paper on groundfish evaluates the efficacy of the Tier System. (https://ctseerx.ist.psu.edu/document/?repid=rep1&typespfd&doi=30a3bc9298f4fc13d017c697511a1bd11bf739)	The SSC can only modify it down. The maximum permissible ABC is set by the tier and can't go higher, unless the tier changes.	Yes, they can; but only to reduce it.	In November and December 2022, the Joint Groundfish Plan Teams and the SSC identified a need for a workshop to address the current policies for the application of harvest control rules for groundfish, and new approaches for accounting for changes in ecosystems related to climate change. While both the Plan Teams and the SSC identified several topics of interest related to this general topic, the recommendation was to allow the February 2023 SSC workshop to inform the specific scope and focus of a potential workgroup. Previously, the SSC held a workshop on risk tables, and summarized their review of the subgroup recommendations in the June 2021 SSC report (agenda item D4 and Appendix A). See Section 4.3 of the narrative summary for more information.
WPRFMC	No	N/A	Yes, there is a tiered system of ABC control rules.	It was adopted in 2011, and it is the original policy.	Tiered ABC Control Rule	The policy addresses all of the Council's Fishery Ecosystem Plans (FEPs).	Omnibus Amendment for the Western Pacific Region to Establish a Process for Specifying ACLs and AMs. The action started in 2007 with SSC involvement.	Yes, the final rule published on June 27, 2011 (76 FR 3725) + 50 CFR Subpart A: Section 665.4 (ACLs), Section 665.12 (Definitions), Section 665.15 (Prohibitions)	Determination of ABCs, ACLs, and AMs	Assessment uncertainty is taken into account with tiers, and the ABC control rule is focused on biology. The ABC is reduced to the ACL using social, economic, ecological, and management uncertainty (SEEM factors). See the narrative summary, Section 3, for more information on this approach.	No	The SSC can reduce their recommendations, but cannot modify recommendations higher. The SEEM factors are all a reduction from the ABC.	Yes, the SSC can deviate, although only to reduce it. However, in practice, they have not deviated.	No, although the Council is starting conversations about developing a risk policy.
CFMC	No	N/A	Yes, there is an ABC control rule policy. One item the Council has not done is to develop a policy on setting its P _{max} value, which may be viewed within or apart from the ABC CR process as determined by the SSC.	The current rules were adopted in 2022 with the implementation of the Island-Based FMPs. The CFMC modified an original policy from 2010 and 2011, Caribbean ACL amendments.	ABC Control Rule (CR) (Please see the ABC CR Tiers in the Island Based FMPs.)	The ABC CR is implemented through each Island-Based FMP; however, the same rule applies for each FMP.	The Island Based FMPs changed fisheries management in the U.S. Caribbean to three separate FMPs by area: Puerto Rico, St. Thomas/St. John and St. Croix, and USVI. Each included a four-tiered ABC CR used to define management reference points for all species under management.	Yes, the final rule has been effective since October 13, 2022 (87 FR 56204) + regulations are included in multiple subsections within 50 CFR Parts 600 and 622.	Determination of ABCs and ACLs	Assessment uncertainty is addressed by ABC CR Tiers 1-4, and are specifically addressed in sigma-min. Recent discussion on the use of ensemble approaches in the future also address uncertainty. Biological and ecological factors are also considered, especially when dealing with species in Tier 4 (data limited). These factors are also of special interest when considering herbivores and species with spawning aggregating behavior (e.g., groupers). Consideration of expert opinion from the District Advisory Panel members was also integrated in the SSC's development of the ABC CR policy. Economic considerations included the changes brought by hurricanes (Irma and Maria in 2017), an earthquake (2020), and the pandemic (2020). Events that have a great economic impact may be addressed in the future as part of issues with uncertainty. The SSC did however consider economic uncertainty during the development of the ABC CR in determining the validity of the input data to an assessment, and determining whether the assessment is suitable for management advice.	No, but MSE were used in the process of establishing the ABC CR based on the specific Data Limited Models (DLM) explored for setting ABCs.	Yes, the ABCs set under the Island-Based FMPs and the spiny lobster amendment (ongoing) include flexibility in addressing their provisions. The SSC may modify its recommendations in either direction.	The ABC control rule policy was just implemented in October 2022. The CFMC and its SSC have been working on the spiny lobster amendment for re-specifying OFL, ABC, and ACLs.	Yes, they had an ABC Control Rule Work Group that met in 2016 and developed recommendations for the recently implemented ABC CR. These recommendations were presented to the SSC, and the SSC presented the ABC CR to the Council, and it was integrated into the Island-Based FMPs.