New England Fishery Management Council's

Risk Policy Statement and Concept (2025)

Approved September 25, 2024

Implementation started January 1, 2025

Version 1

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2.0 RISK POLICY STATEMENT

New England Fishery Management Council (Council) Risk Policy Statement

The goal of the Council's Risk Policy is to implement a process by which the Council, and its subordinate bodies, accounts for the fact that all fishery management is based on uncertain information, fisheries and the surveys used to monitor marine resources are taking place in a changing environment, and that the decisions of the Council have social and economic impacts on fishing communities.

The purpose of the Council's Risk Policy is to:

1. Provide guidance to the Council and its subordinate bodies on taking account of risk and uncertainty in Fishery Management Plans and specification-setting;
2. Clearly communicate the priorities and preferences of the Council regarding risk and uncertainty, including using a common set of terms and definitions so it is accessible to a wide variety of audiences; and
3. Make the discussion of risk tolerance in the Council's decisions a more forward and fundamental aspect of the management process to support its consistent application.

The application of the Council's Risk Policy will be supported by the following strategic initiatives:

1. Clearly identify sources of uncertainty in management decisions. These could include environmental changes, imperfect fishery independent and dependent data, and unknown stock status.
2. Consider risk at all levels of the fishery management process. This risk policy provides overarching guidance to the Council's application of Fishery Management Plan (FMP)-specific Acceptable Biological Catch (ABC) control rules and/or harvest control rules.
3. Consider stability in the face of uncertain information and inherent variability in ecosystems. This can be achieved by:
    a. Ensuring all rebuilding plans have at least a 50% probability of success, while also acknowledging socio-economic stability.
    b. Minimizing large swings in annual specifications (both high and low) to the extent practicable, acknowledging the requirements of the Magnuson Stevens Act (MSA) and ongoing challenges with variable stock assessments.
    c. Promoting rebuilding within timeframes that allow functioning fisheries.
4. Provide a direct avenue to discuss the implications of ecosystem changes and socio-economic impacts throughout a Council management decision. This includes:
    a. Identifying topics for the Council and its subordinate bodies to consider for incorporating the risk policy early in the decision-making process.
    b. Outlining a process that works within available resources, including the resources of staff, the Council, and its subordinate bodies.

3.0 RISK POLICY

3.1.1 Need and Benefits of a Revised Risk Policy

This Risk Policy replaces the Council's previous Risk Policy Statement (2014) and Roadmap (2016).

The Risk Policy (2025) aims to:

1) Better integrate changing environmental conditions into the Council's assessment of risk.
    a. Factors in the revised risk policy allow for consideration of climate change and the dynamic environment in the Council decision process.
2) Develop a clear path to incorporate social and economic considerations.
    a. Factors in the revised risk policy allow for consideration of socioeconomic concepts in the Council decision process.
        - Establish a process that integrates the consideration of risk throughout the Council's decision-making process, rather than at the end.
        - A clear policy on risk tolerance can guide the development of catch advice and management measures before final decisions. A scoring and weighting method increases transparency in how the Council assesses risk, increases efficiency, and reduces time delays resulting from remands.
3) Support implementation of a revised risk policy with available Council resources.
        - The 2016 Risk Policy Roadmap relied on management strategy evaluations (MSE) to quantify risk. This approach was not successful due to the limited resources and the time-intensive nature of completing MSEs. The Council believes that the 2024 Risk Policy will better match available resources.
        - The Council remains supportive of the application of MSEs, as resources allow, as a tested method to identify common goals, evaluate performance, and analyze potential results of decision making.

3.1.2 Stability

In the 2024 version of its Risk Policy, the Council defines stability in the following way:

Stability can mean several things in fisheries management such as stability of the resource, stability in the management measures, or stability in the economics of the fishery. When assessing stability, baselines matter. Stability can also be considered as an absolute value or as a rate of change.

Given that the ecosystem is inherently dynamic, the Council focused on considering stability to harvesters primarily by avoiding abrupt shifts in fisheries management. The Council notes that abrupt shifts can happen in both directions, leading to significant increases in quota or very restrictive measures, both of which can have negative impacts on the fishing industry. Accounting for stability in decision making will be done in compliance with applicable laws and the ten National Standards. For example, as outlined in National Standard 1, phased-in changes to ABCs can occur over a time period (not to exceed three years) if overfishing is prevented each year. This strategic approach could provide a level of stability to the industry as they adapt to the short-term effects of large swings in catch advice.

3.1.3 Risk Policy Concept

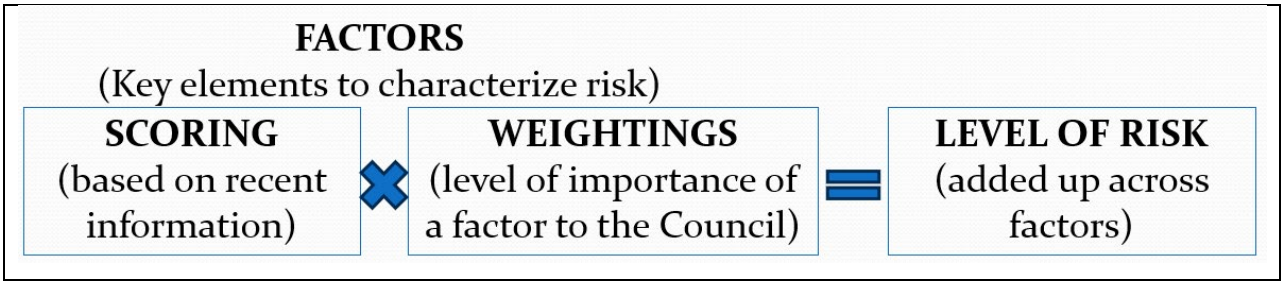
At its core, the Risk Policy aims to systematically account for factors (e.g. climate and socioeconomic impacts) that the Council deems important to determine how risk averse or risk tolerant it wants to be in decision making.

The Council sees value in both a quantitative and qualitative assessment of its risk tolerance. A quantitative assessment of risk may be particularly helpful in discussions surrounding specifications (e.g., appropriate level of risk tolerance for Gulf of Maine haddock ABCs). A qualitative assessment of risk could be useful when considering a range of management measures (e.g., appropriate number of scallop days-at-sea).

3.1.3.1 Factors

The risk policy will be implemented by identifying factors, which are inputs the Council believes are important to determine its level of risk tolerance or risk aversion. Each factor is scored using a rubric by Plan Development Teams (PDTs). Factors also undergo a weightings process, which is used to signify the level of importance of a particular factor by the Council. Weightings are a policy choice determined by the Council, while the scoring by the PDTs is an objective assessment of agreed upon data.

Figure 1 – Outline of overarching risk policy concept, where factors are scored by PDTs and weighted by the Council to identify the Council's level of risk.



3.1.3.2 List of Risk Policy Factors

The Council has identified several key factors (categories used in assessing and characterizing risk tolerance) for initial use in examples of applying the revised Risk Policy. This list is expected to evolve as the Risk Policy is further developed and tested. Seven factors were binned into three groups:

Stock Status and Uncertainty

- Biomass stock status (current productivity)
- Recruitment (future productivity)
- Assessment type and uncertainty

Climate and Ecosystem Considerations

- Climate vulnerability
- Fish condition (ecosystem productivity)

Economic and Community Importance

- Commercial fishery characterization
- Recreational fishery characterization

3.1.3.3 Scoring Factors

When assessing risk, scores for each factor will be determined for a particular stock, species, or species complex. The scoring process is an objective assessment of agreed upon data conducted by the Council's PDTs. The score for each factor reflects the condition of the resource and fishery and is not a policy choice.

The "Biomass stock status" factor is used as an example below. Different descriptions of biomass stock status correspond to different scores (Figure 2). A score greater than zero, in this case associated with a stock that is close to or below its biomass threshold, is associated with greater precaution. A score less than zero, in this case associated with a stock above its biomass target, is associated with less precaution.

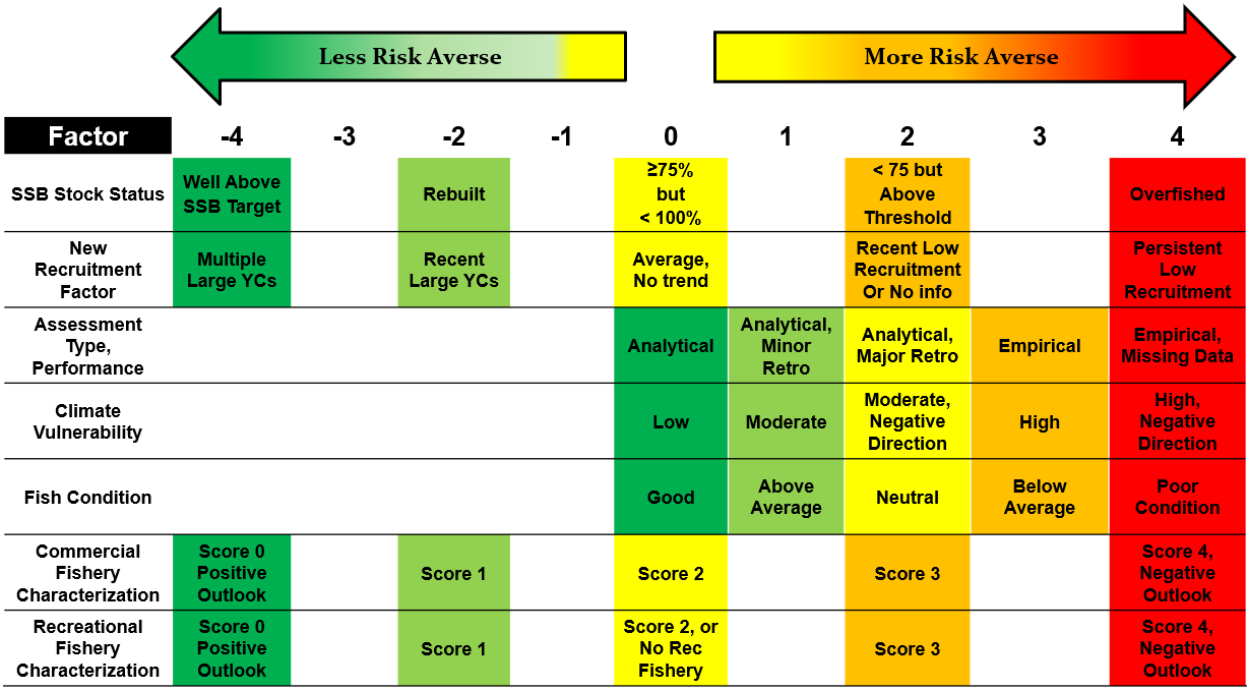
The range of scores for different factors may vary, and all scores will not necessarily lead to a more risk tolerant outcome. While Biomass Stock Status can be scored as a -4, the scores for other factors may range from 0 to 4 (Figure 3). The ranges of scores for a particular factor may be adjusted by the Council.

Instructions for scoring factors and data sources for completing the scoring are provided in Section 5.1; however, it is highlighted that revisions to factors and the underlying data may continue to occur. The Council envisions utilizing the State of the Ecosystem report and other products from the Northeast Fishery Science Center to support and streamline the application of the Risk Policy.

Figure 2 - Example of factors scoring rubric for Biomass Stock Status.

Score	-4	-2	0	2	4
	Well Above SSB Target	Rebuilt	≥75% but < 100%	< 75% but Above Threshold	Overfished
Description	≥ 150% SSB target	≥ SSB target but < 150% SSB target	≥75% SSB target but < 100% SSB target **OR** Unknown status and positive 5-year trend	< 75% SSB target **OR** Unknown status and 5-year trend is neutral/no trend	Below SSB threshold **OR** Unknown status and negative 5-year trend

Figure 3 - Range of scores for the seven factors.



3.1.3.4 Weighting Factors

Weightings are a policy decision made by the Council, which signifies the level of importance of a particular factor by the Council. Weightings are determined by the Council only and do not get developed through the Advisory Panel and Committee structure. It is recommended the weighting process take place at the April Council meeting.

A polling process will be used to identify the importance of factors for the Council. Initially, each Council member will weight each factor on a scale of 0-4. A weight of "0" indicates the factor is not important at all, while a weight of "4" indicates the factor is very important. Responses from Council members will be averaged for each factor, and then divided by the sum of the averages to calculate the weighting for each factor. This ensures that the weightings add up to 1. An example of the process is shown in Table 1. Note that this example does not reflect an actual polling of the Council.

Table 1 - Example of weightings calculation, including score of individual Council members, the average of the scores, and the weighting calculation.

	Stock Status	Recruitment	Assessment Uncertainty	Climate Vulnerability	Fish Condition	Comm Fishery	Rec Fishery	SUM
Council #1	4	3	4	4	2	1	0	
Council #2	3	3	4	4	2	4	4	
Council #3	3	2	3	3	0	4	1	
Council #4	1	4	1	4	1	4	2	
Council #5	3	3	4	4	2	0	0	
AVG	2.80	3.00	3.20	3.80	1.40	2.60	1.40	18.20
Weightings = AVG/Sum of AVG	0.15	0.16	0.18	0.21	0.08	0.14	0.08	1.00

The Council will determine the following details of its weighting process and may adjust the process as it deems necessary. Specifically, the Council will:

- Set guidelines around the participation of Council members in the weightings process. It is currently recommended that voting members are eligible to complete the weightings, and participation is compulsory for eligible Council members.
- Set guidelines on how many times a weight can be assigned to the factors. For example, the Council can determine how many times a Council member can weight factors as "very important."
- Set guidelines on the frequency of the Council setting weights. It is currently recommended that weightings occur every three years.
- Determine appropriate technology/software to support the polling process.

3.1.3.4.1 Scale of Weightings

The scale of weightings does not necessarily need to mirror the scale at which factors are scored. Factors are to be scored at the level at which the stock assessment occurs. An exception to this is skates, which would be best scored at the complex level given a single ABC is set for the multiple skate species. In contrast, weightings can occur at a higher order. The RPWG discussed weightings occurring at the Fishery Management Plan (FMP) level (i.e., herring, groundfish, skates, monkfish, scallops, red crab, Atlantic salmon, small-mesh multispecies). In its initial implementation of the weightings process, the Council may consider weighting each factor generally, to be applied across all FMPs. As comfort is gained, Council members could then consider weighting factors by FMP, with a focus on those FMPs with final action in 2025. This would allow for a comparison of a general factor weighting to FMP-specific weightings to determine if added complexity enhances the articulation of the Council's risk. The Council may revisit this approach.

3.1.3.4.2 Identification of Weightings at a Council Meeting

Identifying weightings is recommended to occur in conjunction with the April Council meeting. This Council meeting typically has fewer items scheduled for final action, which is important to separate any bias between management decisions and the identification of weightings. Further, the State of the Ecosystem report is typically presented at the April Council meeting and would provide useful context, particularly as it directly supports the scoring of several factors.

The language below outlines a process by which weightings would be conducted in-person at a Council meeting. It is recommended that the Council test the technology and resources needed to support this effort.

At the Council meeting, identification of the weightings would occur during a dedicated agenda item. The Council will be supplied with meeting materials to support the weightings process. These materials may include risk policy matrices, the State of the Ecosystem report, MSA National Standards, and annual performance reports for applicable stocks. In addition, a template of the poll will be provided to Council members in materials to encourage consideration of the weights for each FMP ahead of time.

Like other agenda items, written comments from the public will be accepted and provided to the Council as part of meeting materials. The agenda item on weightings will start with an opportunity for oral public comment, followed by an opportunity for discussion between Council members. This is an opportunity for Council members to express thoughts on specific weightings but would not be an opportunity for motions regarding the weightings. Following the discussion, Council members will be polled on the weightings. Following closure of the poll, results will be displayed during the Council meeting, keeping individual responses anonymous. The purpose of allowing for Council discussion before polling and the display of results after polling is to provide greater transparency to the public.

It is recommended that the Council complete the weightings process every three years. It is not expected that weightings would dramatically change from year to year. Conducting weightings every 3 years also balances the time the Council spends on the revised risk policy versus other important priorities.

The weights provided by each Council member will be counted equally.

3.1.3.5 Measure of Risk Aversion

A combination of the scores and weights for each factor are used to measure risk aversion (Figure 1). To begin implementing the Risk Policy, scores and weights are input into a logistic function using the formulas shown in

Equation 1. The output of this function is a Z score (x-axis) that corresponds to a position on the logistic curve that represents a measure of risk aversion (probability of management success) on the y-axis (Figure 4). The higher the Z-score, the greater the risk aversion, and the higher the probability of achieving a desired management outcome.

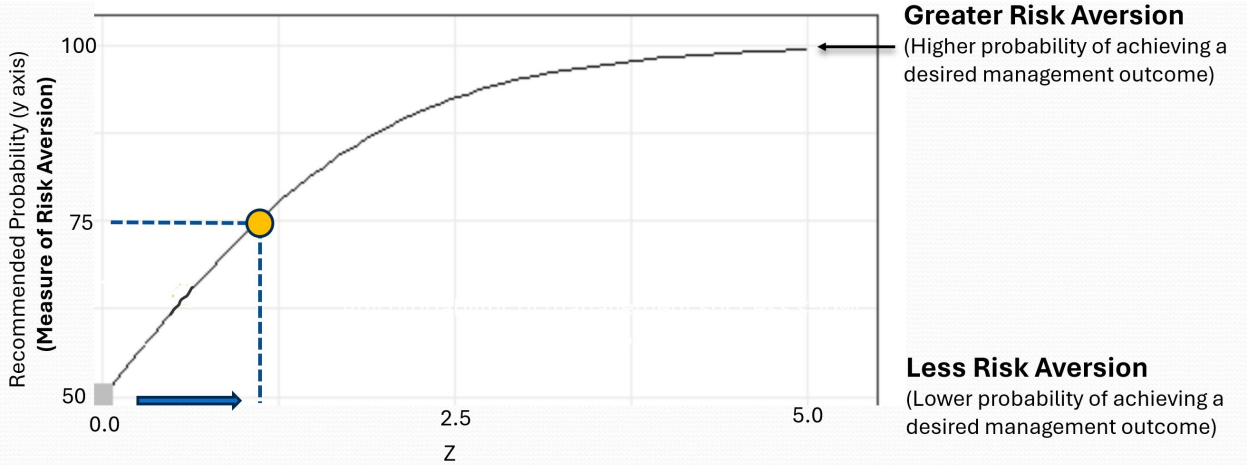
For the Council's purposes, the logistic curve is truncated so that the starting point is a measure of risk equal to 50%, (grey point in Figure 4) because National Standard 1 specifies that there needs to be at least a 50% probability that catch equal to the stock's ABC will not result in overfishing. As scoring of some factors results in greater precaution (or increased risk aversion), the output moves up the curve as indicated by the orange point in Figure 4. In contrast, scores which allow for greater risk (or increased risk tolerance), would move the point down the curve. Any scoring that results in less than 50% probability will default to 50%. The Council can set the starting point (term "a" in Equation 1) for the Risk Policy based on its desired level of risk aversion at levels greater than 50%.

Equation 1 - Risk Policy logistic function with explanation of the scores and weights for each factor.

$$p(Z) = \frac{1}{1 + e^{-Z}}$$

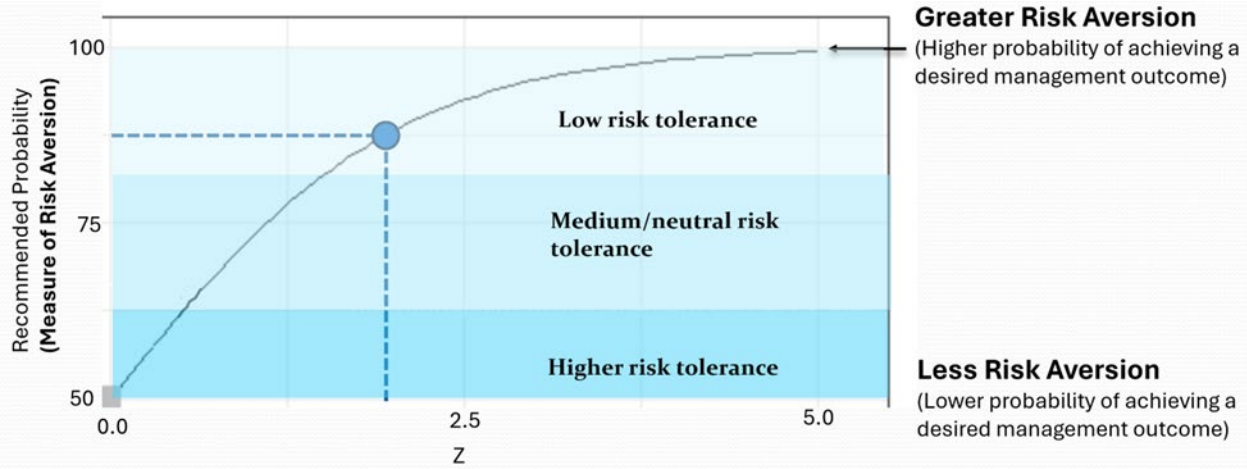
- In this form, the scores from the factors are contained in
$$Z = a + b_1 x_1 + b_2 x_2 + \cdots$$
- So the x_i's are the list of factors (their scores), and,
- The b_i 's are weightings for the factors
  - Setting the intercept term to zero (a=0) equivalent to starting at a probability of 0.5
  - Desired results based on a priori value decisions applied to the coefficients (b_i)

Figure 4 – A visualization of the measure of risk aversion which results from the revised risk policy. The starting point is at 50% (the grey square) and the measure of risk aversion gets progressively higher (so more risk averse) as the Z score increases and one moves upward and to the right on the curve.



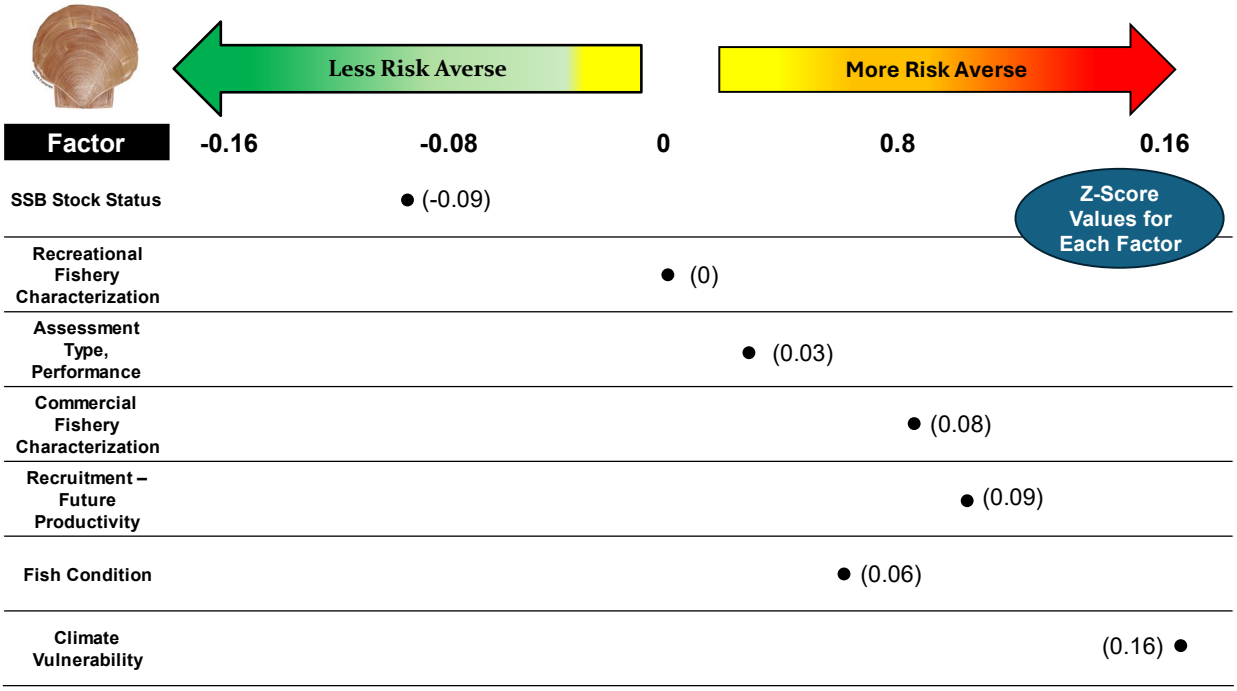
The outputs from the scoring and weighting processes can be interpreted both qualitatively and quantitatively. For qualitative applications of the Risk Policy, the Council can develop and use thresholds to distinguish between levels of high, medium/neutral, and low risk tolerance (Figure 5). The Council notes that stability can be accounted for in this application. For example, if the Council's recommended risk tolerance band for a stock is between 0.5-0.6, then any score within that range could default to a score of 0.55.

Figure 5 - Example of a qualitative application of the Risk Policy, with three levels of risk tolerance.



The Council may consider the outcomes of the scoring and weightings processes to assess risk tolerance and risk aversion at the factor level. An example of this process is shown in Figure 6, where the values presented show the how the combination of scores and weights lead to movement along the logistic curve.

Figure 6 – Example of factor level risk assessment using Z scores, generated using scores and weights.



3.1.3.6 Connection to ABC Control Rules

Each of the Council's FMPs has a different ABC control rule (ABC CR); some of these control rules were extensively developed through an MSE process (i.e., Atlantic herring), some are based on a P* approach (i.e., scallops), and some are structured with tiers based on FMSY (i.e., groundfish). The Council is unique nationally among other fishery management councils in that it has different ABC CRs for each of its fishery management plans. Over time, the Council aims to incorporate the quantitative application of the Risk Policy into its ABC CRs.

When integrating and updating ABC CRs, the Council aims to assess the use of the Risk Policy to adjust the buffer between the OFL and ABC. The National Standards specifically mention a Council's risk policy when determining a stock or stock complex's ABC (see definitions at end of document). Therefore, there is a clear connection between the risk policy and the ABC. An advantage of using the quantitative output of the risk policy to inform the ABC is that it allows for consideration of a more dynamic buffer between the OFL and ABC. This approach could provide clearer and more timely guidance to the SSC on the Council's risk tolerance.

As noted above, having an ABC CR that can receive the quantitative output of the revised risk policy will require modifications to existing control rules. As a result, a phased approach to integrating the quantitative output of the revised risk policy with the Council's various ABC control rules is needed. Because both a qualitative and quantitative assessment of risk is possible under this risk policy, qualitative assessments of risk tolerance can be more quickly and broadly applied to Council decision-making going forward.

For the quantitative assessment of risk, the Council notes that there are advantages to initially focusing on integration of the revised risk policy with the groundfish ABC control rules. The Council has initiated efforts to modify the groundfish ABC control rules already, and the risk policy includes many of the topics discussed by the Council regarding revisions to the groundfish ABC control rule.

The Council does not currently recommend changes to the herring ABC control rule to integrate the quantitative outputs of the revised risk policy. The existing herring ABC control rule was developed through an extensive MSE process and is already accounting for many factors that the Council is including in the risk policy.

3.1.3.7 Process, Roles and Responsibilities

This section outlines roles and responsibilities for implementing the Council's Risk Policy.

3.1.3.7.1 Plan Development Teams

PDTs are responsible for the scoring of factors, including procuring the information needed to complete scoring. PDTs should follow the steps for scoring factors outlined in Section 5.1 and may recommend changes to the scoring rubric if data are not available. For example, the State of the Ecosystem report does not currently include fish condition for scallops, halibut, and red crab. By scoring the factors, the PDTs are contributing to the goal of integrating discussions of risk throughout the Council's decision-making process.

3.1.3.7.2 Science and Statistical Committee

The SSC is responsible for considering the Council's risk tolerance, which is a combination of the scoring and weighting of the factors, during its deliberations. This is particularly pertinent when considering ABCs for Council managed species.

3.1.3.7.3 Council

Voting Council members are responsible for thoughtfully weighting the importance of factors via polling. In this process, the Council should consider comments from the public and the fishery industry. Council members are also responsible for integrating the consideration of risk throughout its decision-making process.

3.1.3.7.4 Northeast Fisheries Science Center (NEFSC)

The Council anticipates that the NEFSC will continue to provide timely updates to the State of the Ecosystem report for use by Plan Development Teams in the completion of factor scoring. The Council also encourages increased collaboration with the NEFSC on risk policy data needs and the development of data products that can directly assist with the risk policy's implementation. This could include clearer identification of factors (i.e., climate change impacts, recruitment assumptions) in stock assessment reports.

3.1.3.7.5. Stakeholders

Stakeholders are encouraged to build familiarity with the revised risk policy as it is implemented across the Council's FMPs. Stakeholders are also responsible for providing written or oral comments during the Council weighting process and integrating the discussion of risk into Advisory Panel discussions.

4.0 DEFINITIONS

Acceptable biological catch (ABC) - a level of a stock or stock complex's annual catch, which is based on an ABC control rule that accounts for the scientific uncertainty in the estimate of OFL, any other scientific uncertainty, and the Council's risk policy. [from eCFR]

Factors – Broad categories which are relevant to characterizing risk and uncertainty for a stock or stock complex, such as 'Assessment Uncertainty' and 'Fish Condition'.

Measure of risk aversion– The output metric resulting from application of the risk policy, which is a characterization of the Council's risk tolerance. A high measure of risk aversion indicates that the Council's risk tolerance is low, and precautionary approaches may result in meeting Council objectives. In contrast, a low measure of risk aversion indicates that the Council's risk tolerance is high, and less precautionary methods are likely to achieve Council objectives.

Scores – The species-specific (or stock complex) answer to the overarching factors. Scores are not policy choices but reflect the stock status, assessment, or other pertinent data sources. Scoring is completed by the Council's Plan Development Teams.

Weightings – A measure of how important each factor is to the managers when assessing risk. Weightings are a policy decision and completed by the Council.

5.0 APPENDICES

5.1 DIRECTIONS FOR SCORING FACTORS (SEPTEMBER 2024)

The following instructions apply to the following seven factors being used by the Council as of September 2024. Modifications to the factors and their underlying data are expected as the risk policy evolves. Plan Development Teams will use this information and the referenced data sources to score factors during the Risk Policy implementation.

Stock Status and Uncertainty

- Biomass Stock Status (current productivity)
- Recruitment (future productivity)
- Assessment type and uncertainty

Climate and Ecosystem Considerations

- Climate vulnerability score
- Fish Condition (ecosystem productivity)

Economic and Community Importance

- Commercial fishery characterization
- Recreational fishery characterization

SSB Stock Status – Current Productivity

Score	-4	-2	0	2	4
	Well Above SSB Target	**Rebuilt**	**≥75% but < 100%**	**< 75% but Above Threshold**	**Overfished**
Description	≥ 150% SSB target	≥ SSB target but < 150% SSB target	≥75% SSB target but < 100% SSB target **OR** Unknown status and positive 5-year trend	< 75% SSB target **OR** Unknown status and 5-year trend is neutral/no trend	Below SSB threshold **OR** Unknown status and negative 5-year trend

Recruitment Factor – Future Productivity

Score	-4	-2	0	2	4
	Multiple Large Year Classes	**Recent Large Year Class**	**Average, No Trend**	**Recent Low Recruitment**	**Persistent Low Recruitment**
Description	There have been multiple large (meaning above average) recruitment events in the last five years	There has been two large (meaning above average) recruitment events in the last five years	Recruitment in the last five years is average **OR** recent changes in recruitment have been accounted for in reference points and/or stock projections	Low (meaning below average) recruitment in at least two of the last five years **OR** there is no information on recruitment	Persistent low (meaning below average) recruitment for more than five years

Notes for Recruitment Factor

- If changes in recruitment are accounted for in the reference points and/or projections, score=0
- If there is no information on recruitment, score=2
- If it has been more than 3 years since the last stock assessment, recruitment trends in the terminal years of the assessment may not be appropriate to consider recent recruitment in the factor. PDTs can consider more recent recruitment information if available.

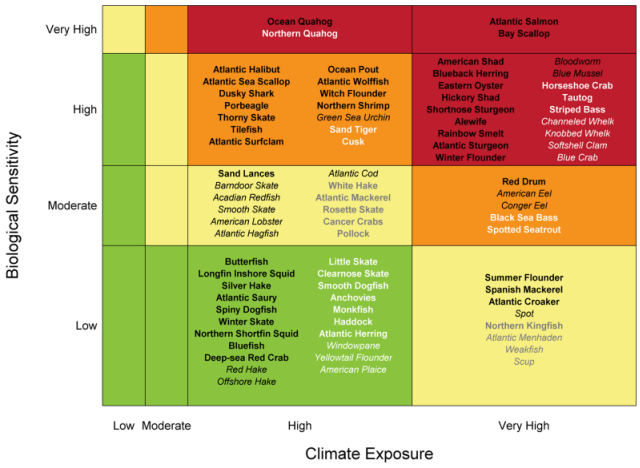
Assessment Uncertainty

Score	0	1	2	3	4
	Analytical	**Analytical, Minor Retro**	**Analytical, Major Retro**	**Empirical**	**Empirical, Missing Survey Data**
Description	Analytical assessment with no retrospective pattern, **OR** state-space model with limited sources of uncertainty as described in assessment report	Analytical assessment with minor retrospective pattern **OR** state-space model with at least two significant sources of uncertainty as described in assessment report	Analytical assessment with major retrospective pattern **OR** state-space model with at least three significant sources of uncertainty as described in assessment report	Empirical assessment approach	Empirical assessment approach with missing data in one of the three most recent years

Climate Vulnerability

Score	0	1	2	3	4
	Low Vulnerability	**Moderate Vulnerability**	**Moderate Vulnerability, Negative Direction**	**High Vulnerability**	**High Vulnerability, Negative Direction**
Description	"Low" vulnerability score	"Moderate" vulnerability score **OR** "Low" vulnerability score and negative climate directional effect	"Moderate" vulnerability score and negative climate directional effect	"Very high" or "high" vulnerability score	"Very high" or "high" vulnerability score and negative climate directional effect

Hare et al (2016) Vulnerability Score



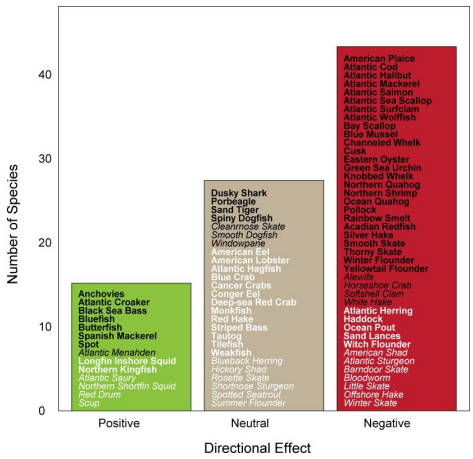
Vulnerability score denoted by color:

- Green = low vulnerability
- Yellow = moderate vulnerability
- Orange = high vulnerability
- Red = very high vulnerability

https://journals.plos.org/plosone/article%3Fid=10.1371/journal.pone.0146756#sec027

Link: https://journals.plos.org/plosone/article%3Fid=10.1371/journal.pone.0146756#sec027

Hare et al (2016) Directional Effect of Climate Change



Directional effect of climate change score denoted by color:

- Green = positive directional effect
- Tan = neutral directional effect
- Red = negative directional effect

https://journals.plos.org/plosone/article%3Fid=10.1371/journal.pone.0146756#sec027

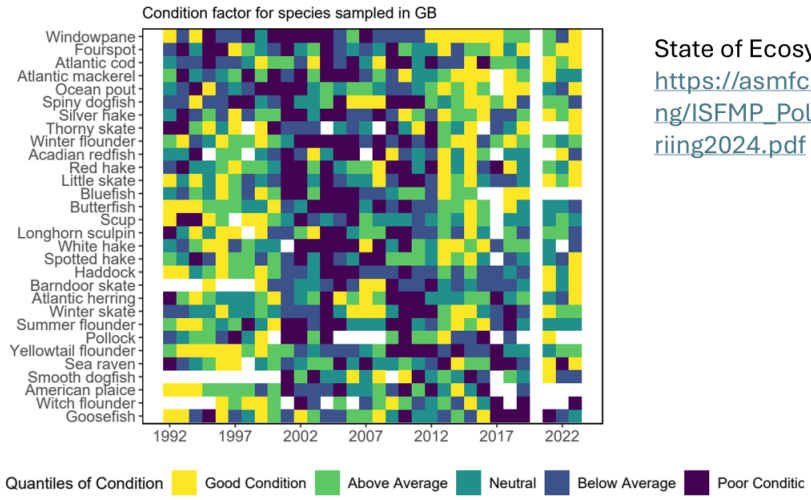
Fish Condition

Score	0	1	2	3	4
	Good Condition	**Above Average**	**Neutral**	**Below Average**	**Poor Condition**
Description	In three most recent years of available data, majority of boxes are scored as "good condition"	In three most recent years of available data, majority of boxes are scored as "above average condition"	In three most recent years of available data, majority of boxes are scored as "neutral condition" **OR** no information on fish condition	In three most recent years of available data, majority of boxes are scored as "below average condition"	In three most recent years of available data, majority of boxes are scored as "poor condition"

Fish Condition Instructions

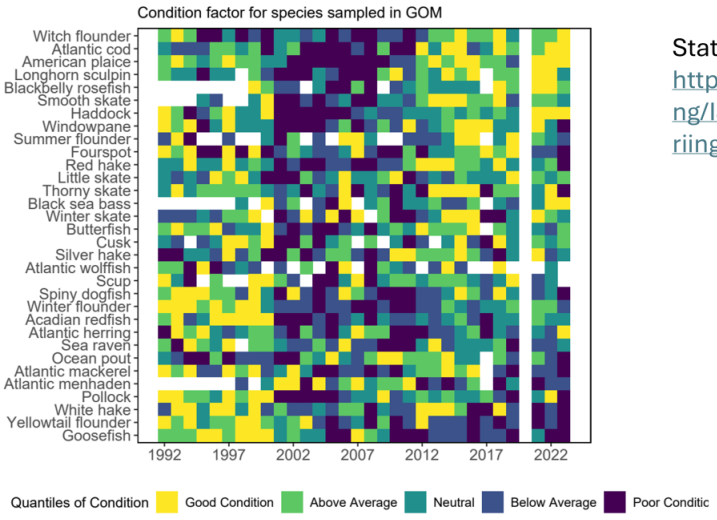
- For a stock that just occurs in one region (e.g. GOM), use the three most recent boxes of data. If all three years are a different fish condition score, select the most recent score.
  - For example, if a stock has scores of "neutral" in 2021, "good condition" in 2022, and "above average" in 2023, the score would be "above average".
- For stocks that extend into multiple regions (GOM, GB, MAB), look at the three most recent boxes in each region and see which fish condition is most common. If two conditions states are equally common, pick whichever is more common in the most recent year of data.
- If fish condition is not reported for the stock in the SOE report, a proxy can be used (e.g. meat-weight anomaly) by the PDT if available.
- If fishery condition is not reported for the stock in the SOE report and there is no information to serve as a proxy, score=2

GB Fish Condition



State of Ecosystem Report:
https://asmfc.org/files/2024SpringMeeting/ISFMP_PolicyBoardSupplemental_Spriing2024.pdf

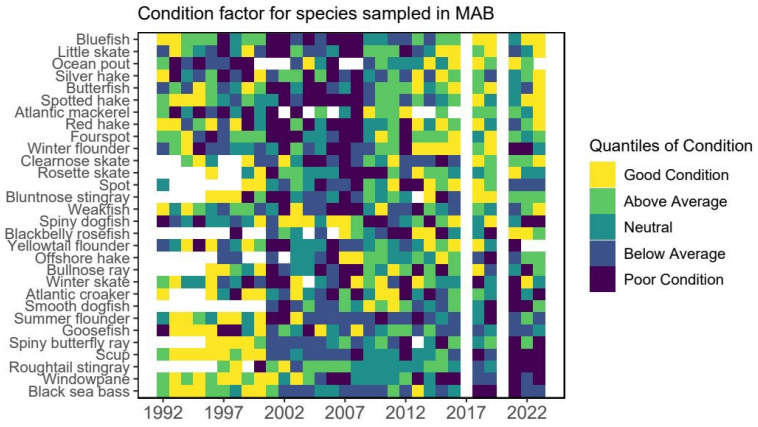
GOM Fish Condition



State of Ecosystem Report:
https://asmfc.org/files/2024SpringMeeting/ISFMP_PolicyBoardSupplemental_Spriing2024.pdf

SOE Report link:
https://asmfc.org/files/2024SpringMeeting/ISFMP_PolicyBoardSupplemental_Spriing2024.pdf

MAB Fish Condition



Commercial Fishery Characterization

- Is revenue concentrated in ports (look at top 3 ports by revenue) with low catch diversity?
- Is the market value decreasing (i.e. price per pound)?
- Does information from the most recent fishing year suggest any warning signs about the fishery?
- Fishery specific Qs:
  - Scallops: Is LPUE decreasing?
  - Groundfish: Are lease prices decreasing?
  - Monkfish: Is DAS usage decreasing?
- If quota for this species is needed to catch another species, move one box to the left

Score	-4	-2	0	2	4
	Score 0	Score 1	Score 2	Score 3	Score 4
Description	Did not answer 'yes' to any of the questions	Answered 'yes' to one of the questions	Answered 'yes' to two of the questions	Answered 'yes' to three of the questions	Answered 'yes' to four of the questions

Recreational Fishery Characterization

- Is recreational fleet diversity from the SOE report declining over last five years?
- Are the number of angler trips targeting the species declining over the last five years? Targeting means MRIP "target" or "secondary target"
- Is the PSE for total catch greater than 30 in the last three years?
- Has there been a change in the recreational regs within the last 12 months?

Score	-4	-2	0	2	4
	Score 0	Score 1	Score 2	Score 3	Score 4
Description	Did not answer 'yes' to any of the questions	Answered 'yes' to one of the questions	Answered 'yes' to two of the questions	Answered 'yes' to three of the questions	Answered 'yes' to four of the questions

Instructions for Rec Fishery Factor

- If there is no recreational fishery for the stock, score=0

Rec Fleet Diversity from SOE Report

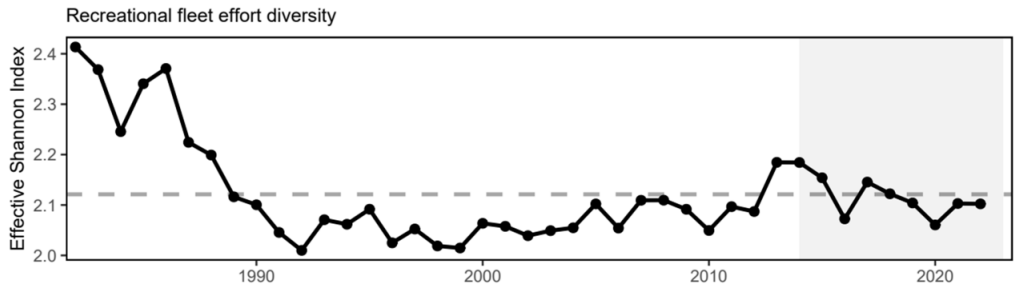


Figure 13: Recreational fleet effort diversity in New England.

State of Ecosystem Report: ISFMP_PolicyBoardSupplemental_Spriing2024.pdf (asmfc.org)

5.2 EXAMPLE: APPLICATION OF RISK POLICY FOR ATLANTIC SEA SCALLOPS

The following example, which applies the 2024 Risk Policy to Atlantic sea scallops, is for illustrative purposes only.

Table 2 provides a summary of the factor scoring using the guidelines provided in Section 5.1. These scores were then input into the 'score' column C of Table 3, and then scaled to a value between 1 and -1 (column D). Weights were generated using the polling exercise described in Section 3.1.3.4 and shown in column B. A "factor level" Z-score (column E) is then calculated by multiplying the scaled score by the weight as noted in Equation 1. The values for each factor in column E are summed to calculate the Z-score. The probability value, shown as 58%, corresponds to moving the distance of the Z-score (0.3375) along the x-axis (see Figure 10).

Figure 7, Figure 8, and Figure 9 illustrate a range of ways to orient scores and weights to risk tolerance and risk aversion. In this example, three factors (recruitment, fish condition, and commercial fishery characterization) were scored as 2, a more risk averse score. Figure 9 illustrates how Council weightings (a policy choice) effect the final Z-score (movement to being more risk averse or more risk tolerant).

Table 2 - Example Scoring of Atlantic Sea Scallops

Factor	Score	Comments/Rationale
SSB Stock Status – Current Productivity	-2	Scallops last assessed in 2020. BMSY = 102,657 t meats, SSB = 147,073 t meats (143% of target) "Rebuilt" (Score -2). Ongoing research track. Recent survey trends suggest population decline.
Recruitment – Future Productivity	2	Recruitment indices from 2020 MT are over 5 years old. No direct estimate of recruitment in annual specs process (score of 0?). Qualitatively measure recruitment – low years (Score = 2).
Assessment Type, Performance	1	Length based assessment model (CASA), with SYM model for reference points. There was a minor to moderate retrospective pattern in the 2020 management track assessment.
Climate Vulnerability	4	Using Hare et al. (2016): High vulnerability (climate exposure and biological sensitivity), and negative directional effect of climate change.
Fish Condition	2	Fish condition data not available in the SOE report for scallops, red crab. Recommended proxy for scallops is an index of meat weight anomalies. With no specific data, scoring calls for 2, which aligns with qualitative assessment of neutral condition.
Commercial Fishery Characterization	2	YES- 75% of revenue concentrated in 2 ports. Revenue considered to be concentrated for scallops, 78% of revenue concentrated in New Bedford (70%) and Cape May (8%). Data: average revenue for each port over 5-years. Market/price per pound has varied considerably. YES – Warning signs in Mid-Atlantic, mortality and meat quality issues. YES – LPUE is decreasing in open bottom and AAs.
Recreational Fishery Characterization	0	No recreational fishery for scallops.

Table 3 - Example of Atlantic Sea Scallop scores (x) and weights (b) for each factor.

A	B	C	D	E
Decision Tool Question (Scoring scale)	**Weight**	**Score**	**Scaled Score (-1 to 1)**	**Weight * Scaled Score**
Biomass Stock Status (-4 to 4)	0.18	-2	-0.5	-0.09
Recruitment (-4 to 4)	0.18	2	0.5	0.09
Assessment Type and Uncertainty (0-4)	0.13	1	0.25	0.0325
Climate Vulnerability (0-4)	0.16	4	1	0.16
Fish Condition (0-4)	0.13	2	0.5	0.065
Commercial Economic Impact (-4 to 4)	0.16	2	0.5	0.08
Rec Economic Impact and Diversity (-4 to 4)	0.05	0	0	0

Z Score	**0.3375**
Probability	**58%**

Figure 7 - Example of Atlantic Sea Scallop Scoring.

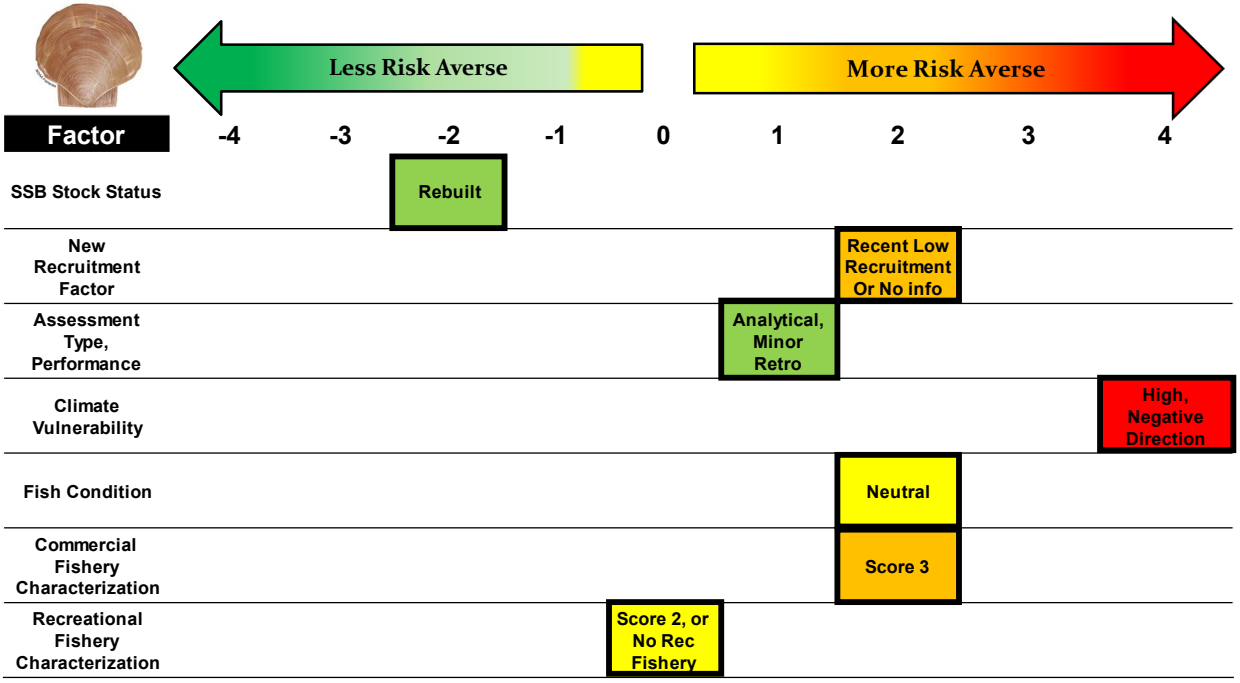


Figure 8 - Factors arranged for less risk averse scores to more risk averse scores, with notation of the weightings for each factor.

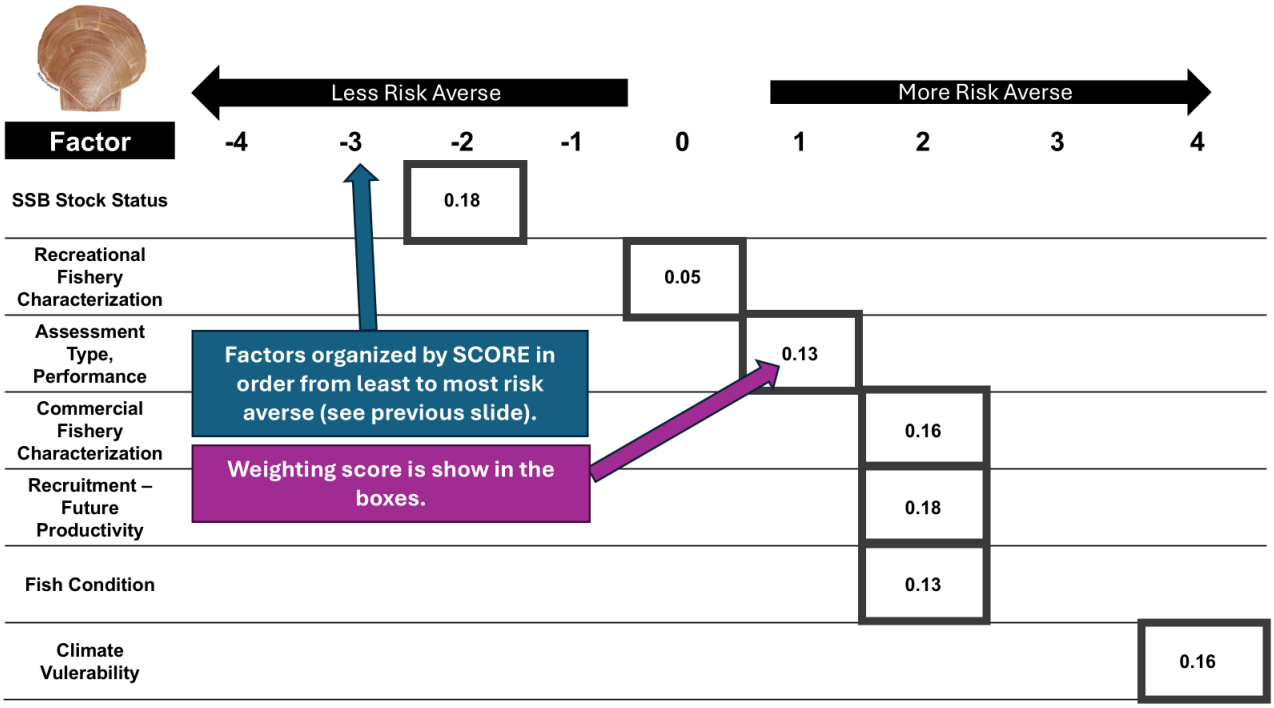


Figure 9 - Scallop example with Z scores for each factor (Column E in Table 3). Factors are arranged in order of scoring from less risk averse to more risk averse. The impact of weightings is shown in factors that were scored 2, with some moving toward more risk averse.

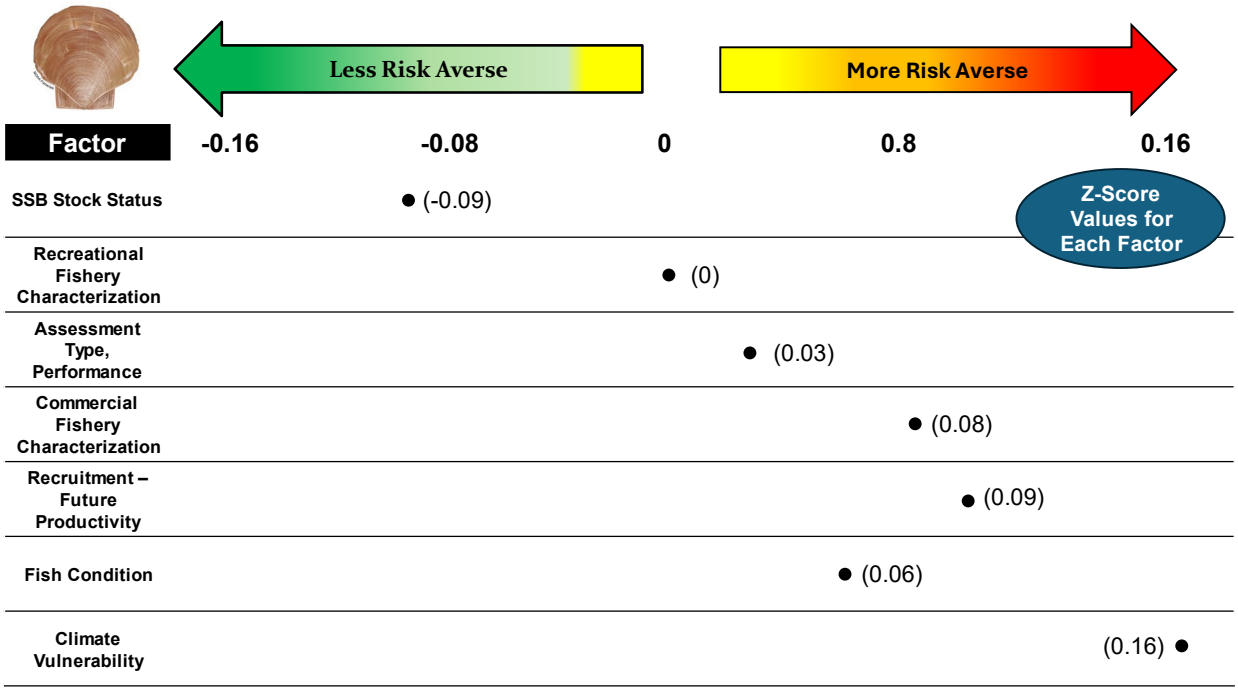


Figure 10 - Scallop example shown on the logistic curve. This example starts at a 50% probability.