

Risk Policy Demonstration

March 30, 2026

Scientific and Statistical Committee



New NEFMC Risk Policy

- Includes 5 risk factors
- Factors are:
 - Weighted (policy choice determining relative importance of each factor)
 - Scored (objective characterization of the stock conditions)
 - Combined into a quantitative measure of recommended risk tolerance
- The output can qualitatively or quantitatively inform the assumed risk tolerance during management decisions, including setting catch limits

Factor Weighting

- Policy decision determining how influential each factor is in risk tolerance
- Weighting will be conducted by the NEFMC

Histogram of mock factor weightings (global, all stocks) across NEFMC members



Risk Policy Mock Factor Weights (NEFMC mean)

Scale	SSB	Recruitment	Climate	Recreational	Commercial
Mean (0-4)	3.29	3.00	2.95	1.90	3.24
Normalized, Sum(weights)=1	0.23	0.21	0.21	0.13	0.23

Factor Scoring

- Objective characterization of the state of each stock
- Scoring will be conducted by Plan Development Teams

← Lower Risk Tolerance
 → Higher Risk Tolerance

FACTOR	-4	-3	-2	-1	0	1	2	3	4
SSB / Stock Status	Below threshold		<75% but above Threshold		Neutral		Rebuilt		Well Above Target
Recruitment	Persistent Low Recruitment		Recent Low Recruitment		Average, No Trend		Recent Large Year Classes		Multiple Large Year Classes
Climate Vulnerability	High Negative Direction	High	Moderate, Negative Direction	Moderate	Low				
Commercial Fishery Characterization					Minimal stress	Low stress	Moderate stress	Elevated stress	High stress
Recreational Fishery Characterization					Minimal stress	Low stress	Moderate stress	Elevated stress	High stress

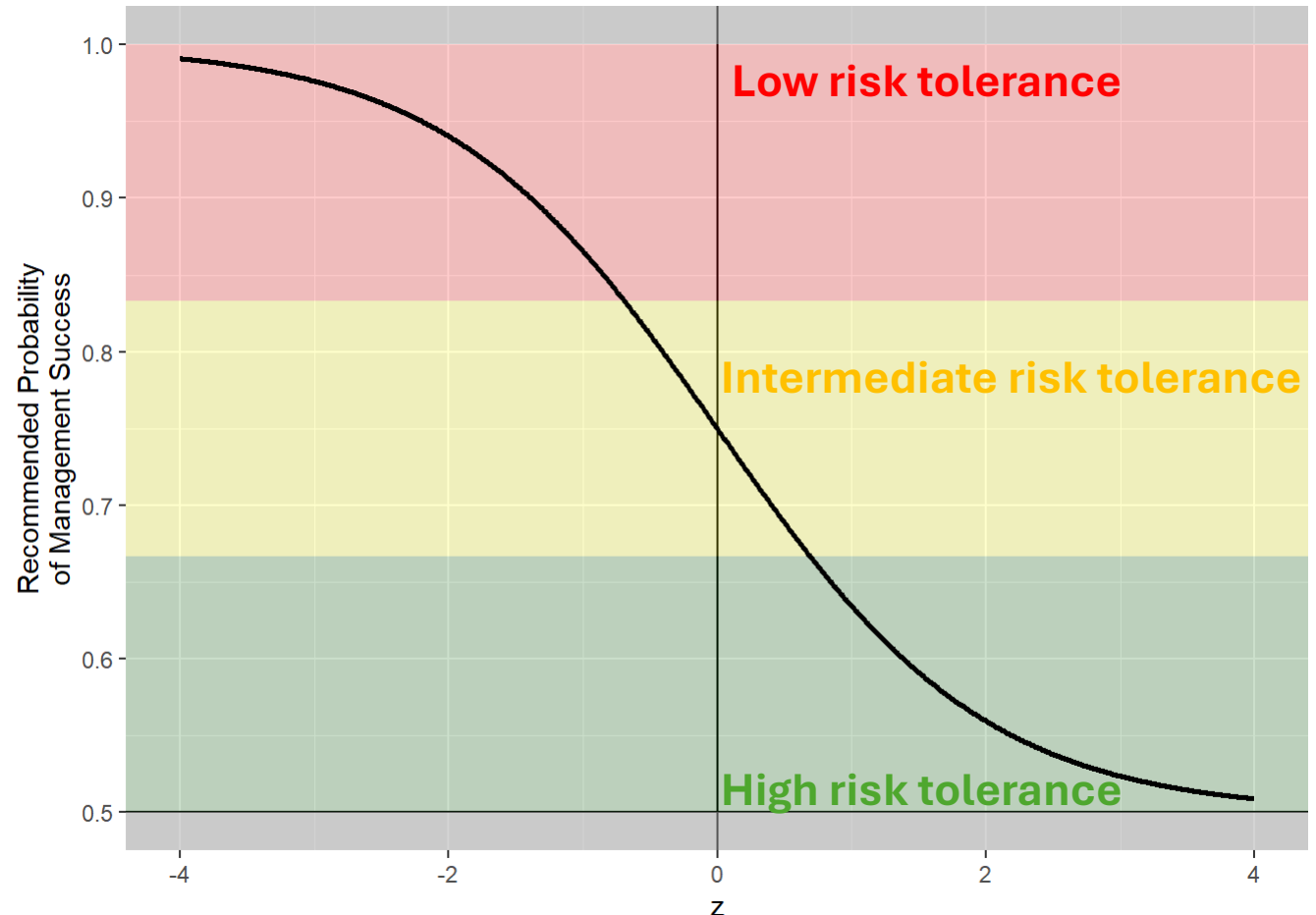
Recommended Probability of Management Success

Factor weights (w_i), which are a policy choice, and scores (s_i), which characterize the state of stock, are combined to calculate an intermediate Z-score

$$Z = \sum (w_i s_i)$$

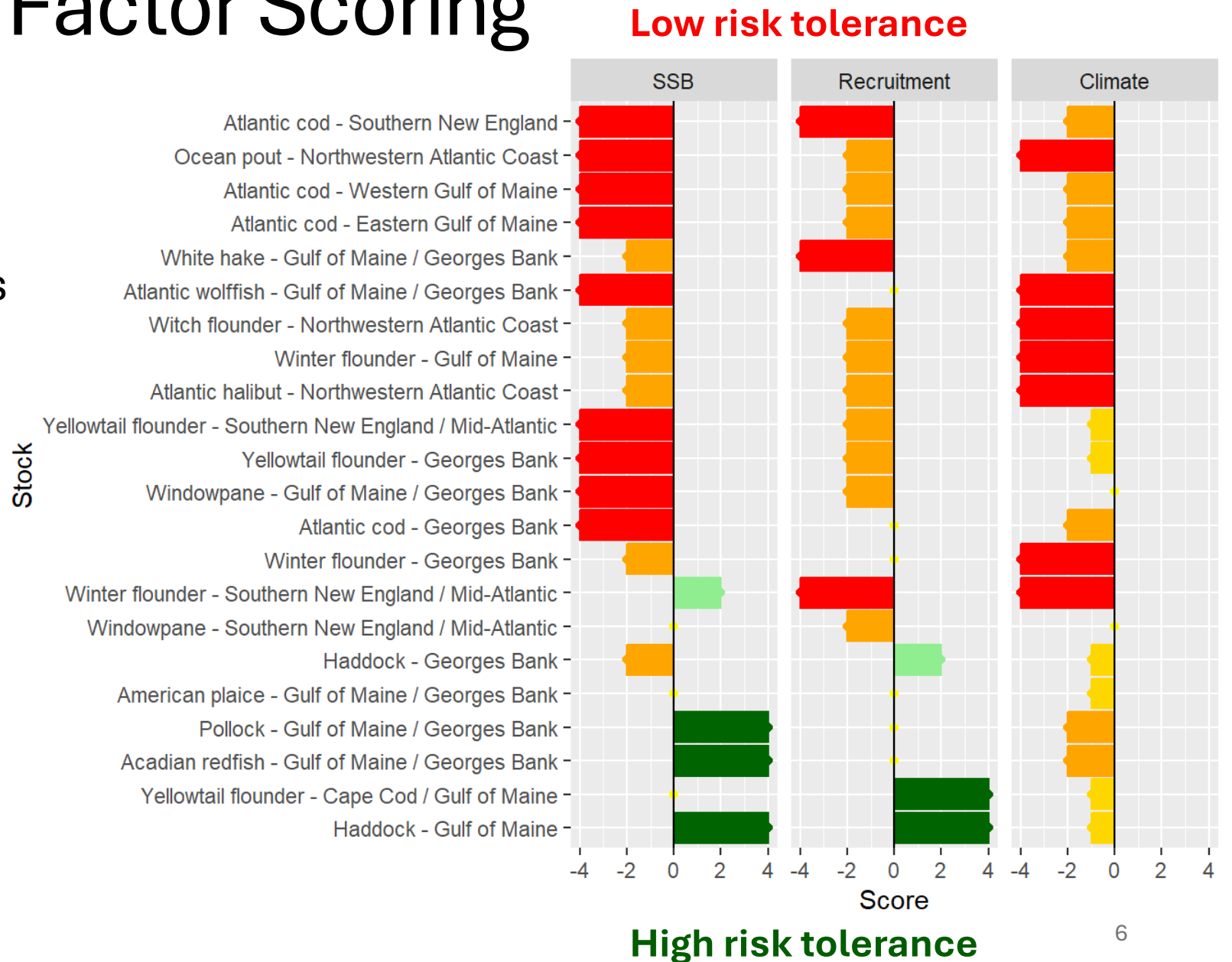
This is used to calculate a target probability of achieving a management goal

$$p(Z) = \frac{0.5}{1 + e^Z} + 0.5$$



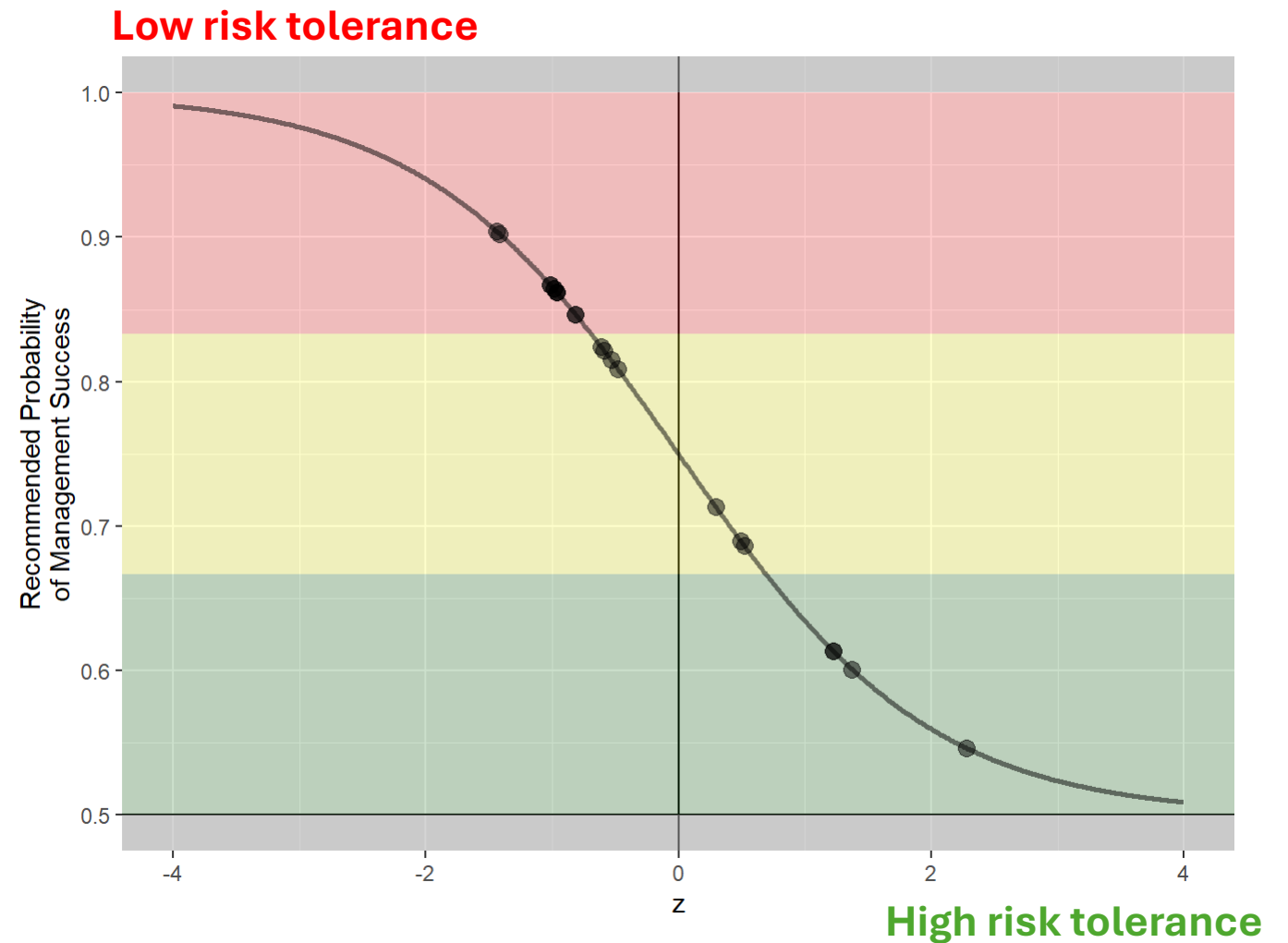
Demonstrated Factor Scoring

- All 22 Northeast Multispecies (Groundfish) stocks
- SSB and Recruitment: most recent assessment results from Stock Smart
- Climate: Hare *et al.*, 2016
- Fishery factors: assumed score of 2



Demonstrated Risk Policy Results

- All 22 Northeast Multispecies (Groundfish) stocks
- SSB and Recruitment: most recent assessment results from Stock Smart
- Climate: Hare *et al.*, 2016
- Fishery factors: assumed an intermediate score of 2



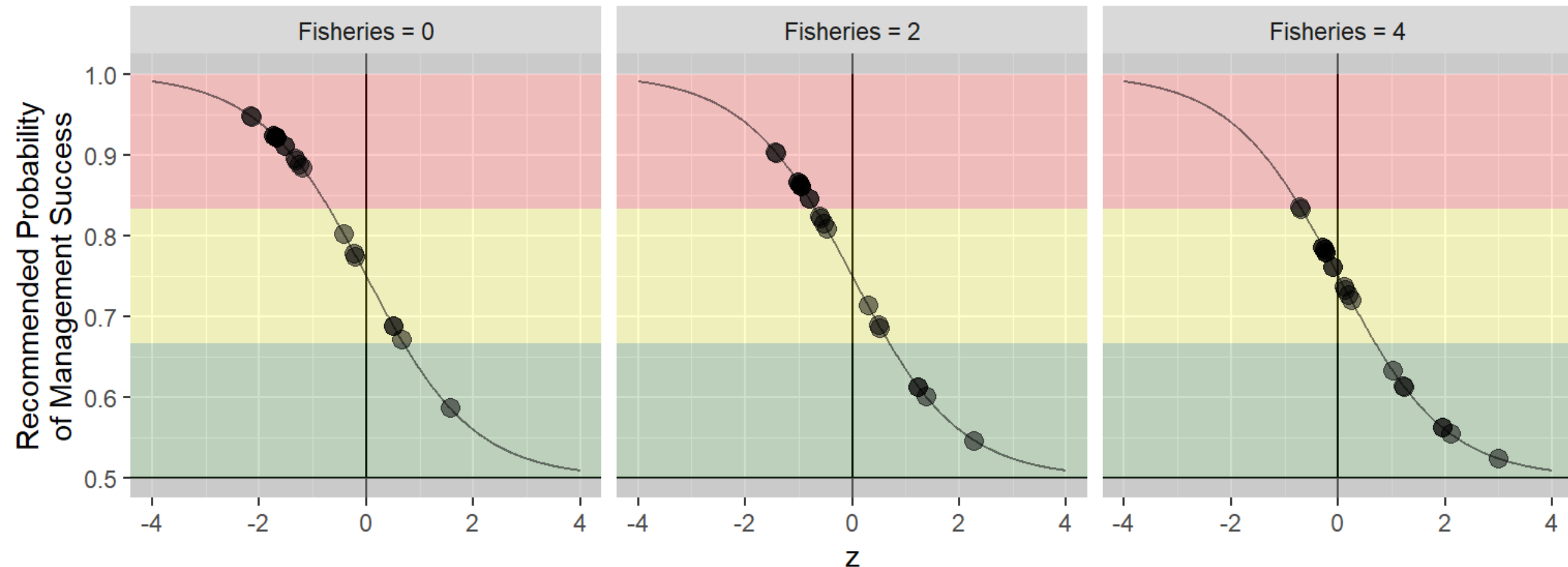
*Risk Tiers are for demonstration. They have not been determined by the Working Group

Demonstrated Risk Policy Results

Minimum risk tolerance
assumption for fishery factors

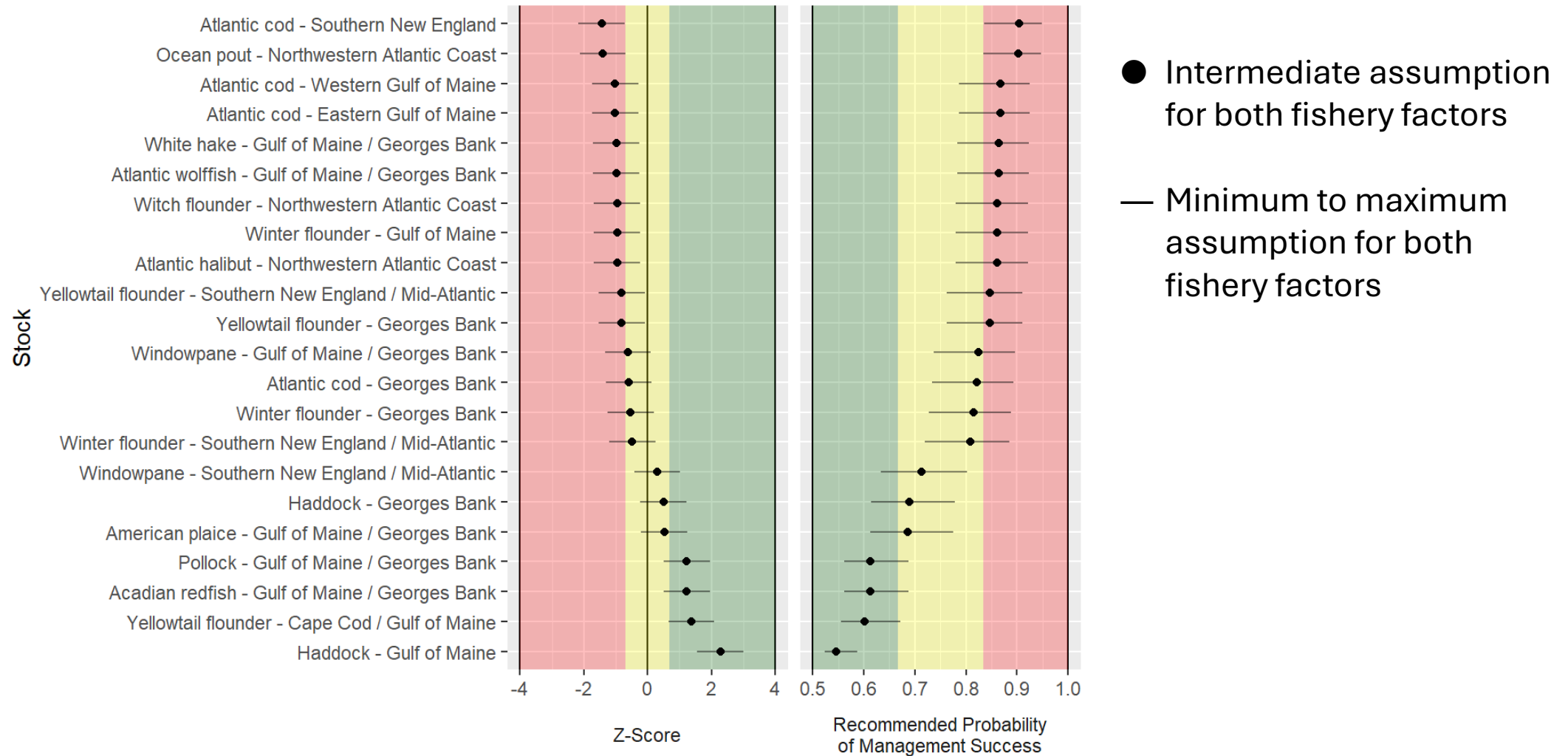
Intermediate risk tolerance
assumption for fishery factors

Maximum risk tolerance
assumption for fishery factors



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Demonstrated Risk Policy Calculations



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Potential Risk Policy Integrated ABC Control Rules

Integrating the Risk Policy into ABC Control Rules Could:

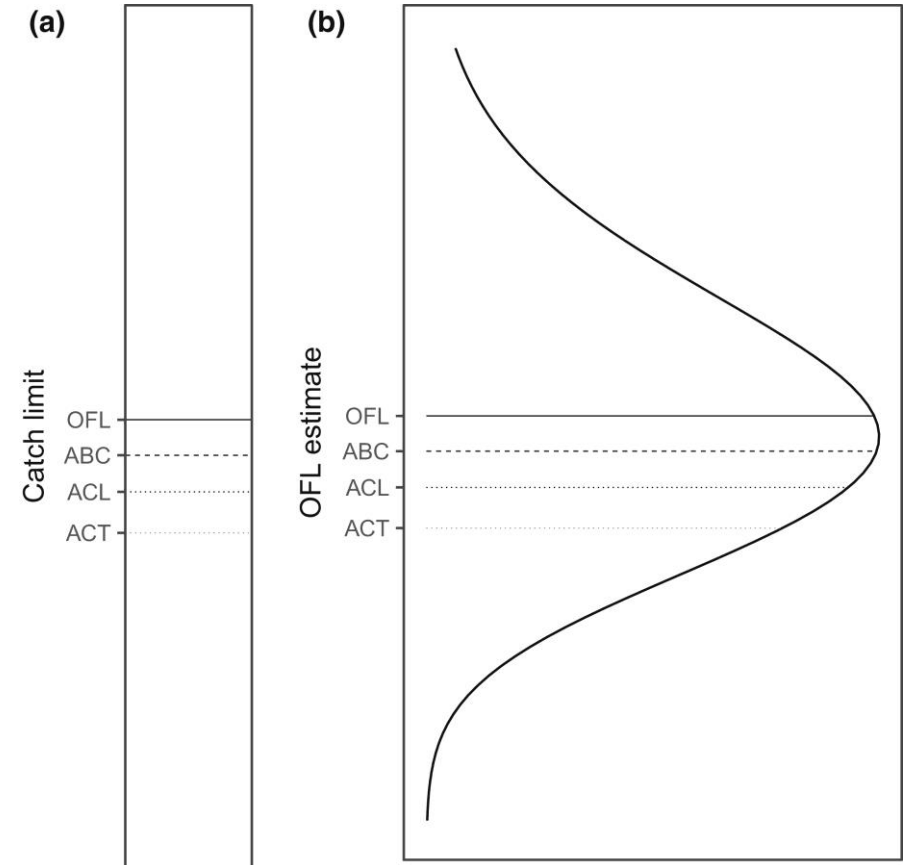
- Directly incorporate a wider range of criteria when setting catch advice, with an opportunity to add more risk factors.
 - Climate impacts on stock dynamics
 - Socioeconomic considerations and importance
 - Assessment type and performance (expected)
 - Broader ecosystem considerations (expected)
- Allow ABC's that are **closer to the OFL** and **farther from the OFL**
 - Might lead to **more fishing opportunities** and **faster rebuilding**
- Provide objective criteria defining when to move in each direction
- There are many potential options

The ABC is set below the OFL to account for scientific uncertainty, which can include:

- Stochastic variability in population dynamics (process error)
- Inherent uncertainty within data collection (observation error)
- Uncertainty associated with the choice in assessment type and model structure
- Error in the estimated and assumed assessment parameters

Two distinct approaches for determining the scientific uncertainty buffer between OFL and ABC

- a) A simple percentage buffer
- For example: the ABC is 75% of the OFL
 - The proportion can change with conditions (e.g., 70% for stocks in rebuilding plans)
- b) A distribution- and probability-based approach
- Define a distribution to represent the scientific uncertainty in the OFL
 - Set an acceptable probability of overfishing (e.g., $P^* = 40\%$)
 - Calculate the ABC as the 40th percentile of the OFL distribution



Both are used by the NEFMC and can quantitatively integrate the revised Risk Policy

Existing NEFMC ABC Control Rules

Non-groundfish stocks

FMP (N stocks)	P*	Biomass-based	ISmooth	LPUE-based
Total (9)	3	3	2	1
Scallops (1)	1			
Herring (1)		1 (% of F_{MSY})		
Monkfish (2)			2	
Red crab (1)				1
Small mesh multispecies (4)	2	2 (exploitation x biomass)		

Large mesh multispecies stocks (N=22)

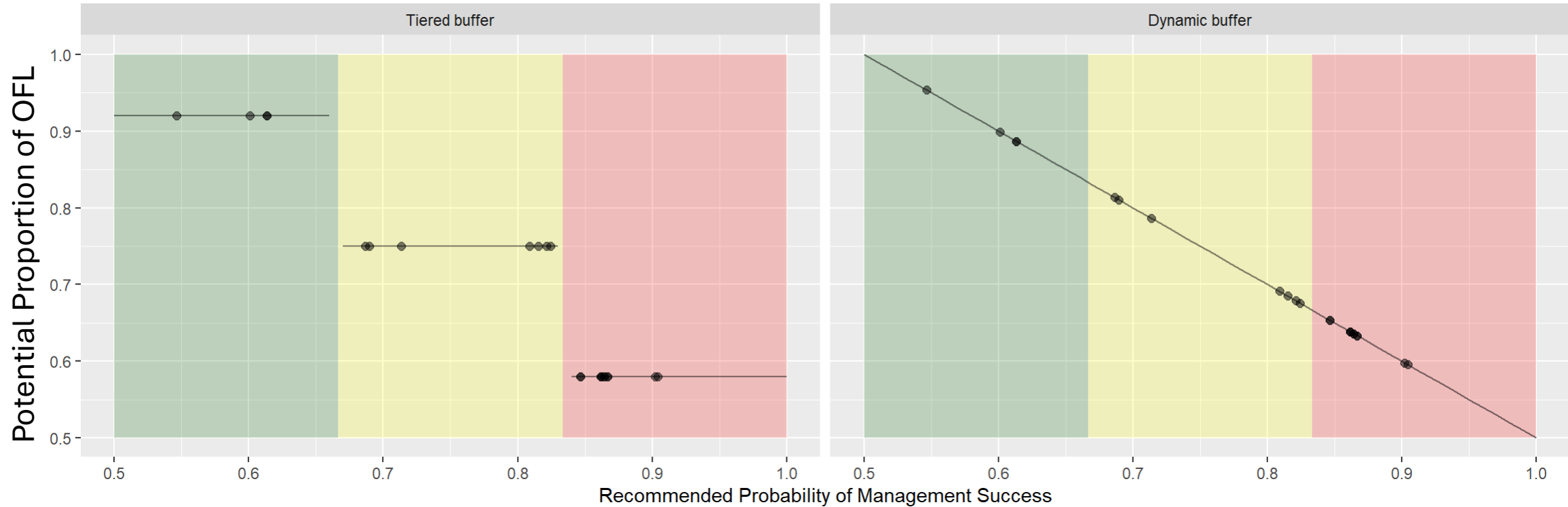
Groundfish Control Rule Option	N Stocks
A: 75% of F_{MSY} or OFL	16
B: $F_{Rebuild} = 70\%$ of F_{MSY}	2
C: Incidental bycatch only	0
D: Unknown status, empirical HCR	4

Existing NEFMC Harvest Control Rules

All NEFMC stocks

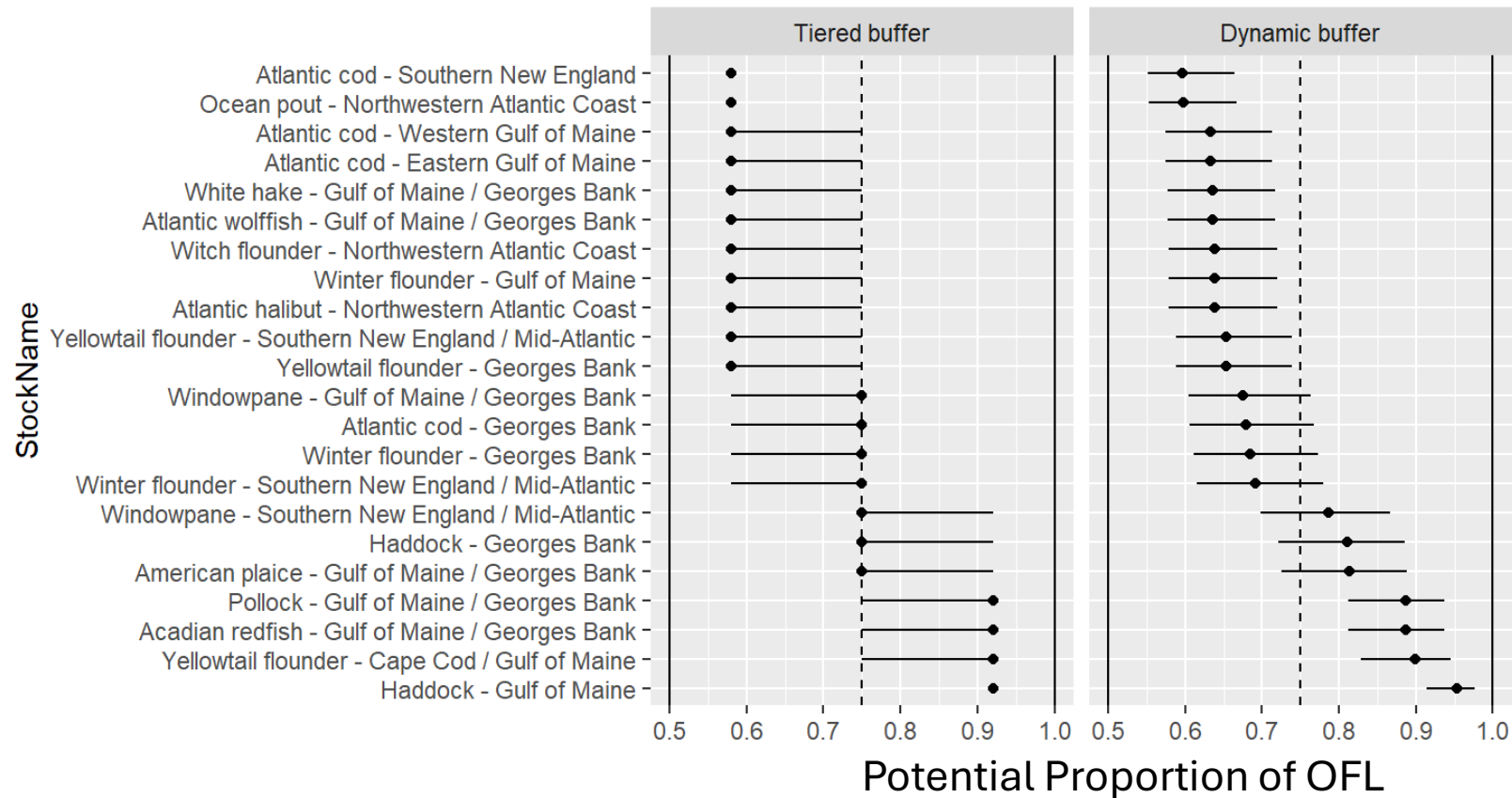
HCR type	Risk Policy Integration	N Stocks (31 total)
ABC defined as a proportion of the OFL	Risk Policy could inform the proportion applied	19
Distribution/probability based (e.g., P^*)	Risk Policy could inform the allowable probability of overfishing (P^*)	3
Stocks with unknown status that apply an exploitation rate	Could be converted to a Risk Policy integrated approach	4
Stocks with unknown status that apply a catch multiplier	Needs consideration, likely possible. Risk Tiers could be helpful.	3
Stocks with unknown status that apply constant catch	Needs consideration, likely possible. Risk Tiers could be helpful.	2

Potential Proportion of OFL Approach



- Risk Policy results could directly inform the %OFL used for the ABC
- The rule could apply fixed proportions in discrete risk tiers (left), or a continuously changing buffer (right)

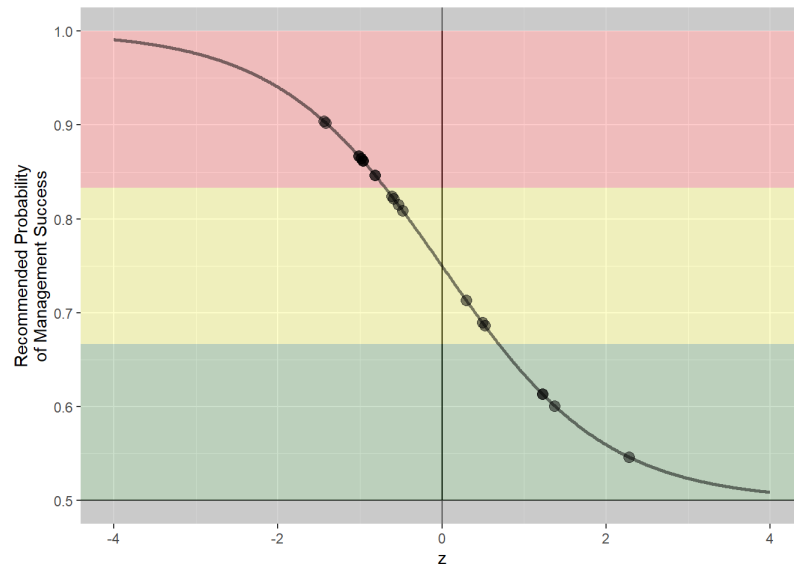
Potential Proportion of OFL Approach



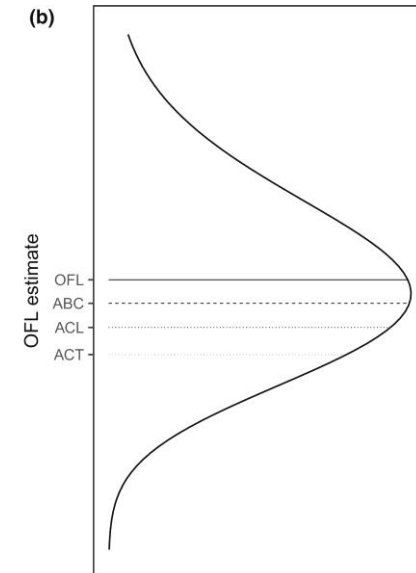
- Intermediate assumption for both fishery factors
- Minimum to maximum assumption for both fishery factors

Potential Probability-Based Approach

- For catch limits, management success is avoiding overfishing
- Risk Policy could inform the acceptable probability of overfishing (P^*)

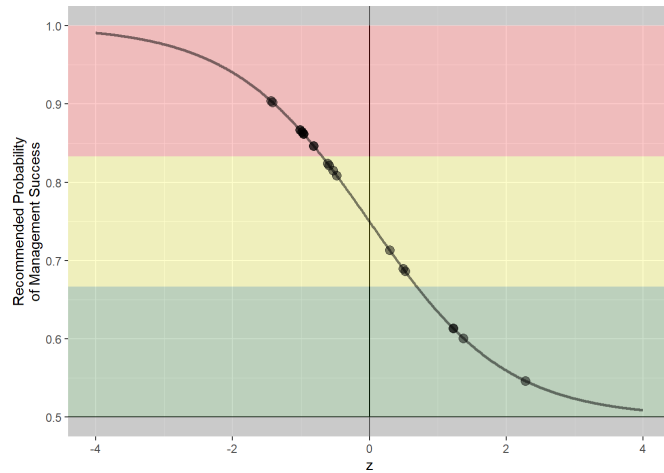


$$P^* = 1 - p(\text{Success})$$

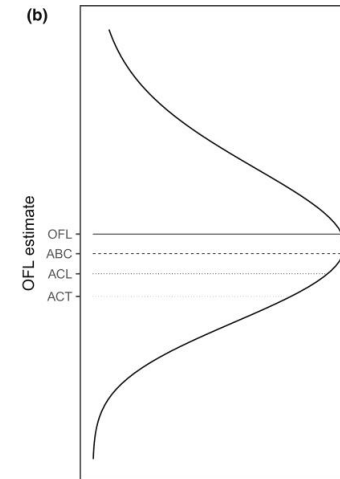


- P^* could be tiered or continuous
- The percentile of the OFL distribution used to set the ABC would vary, according to results of the Risk Policy

Potential Probability-based Approach



P^* informed
by Risk Policy



- The buffer and ABC also depends the assumed distribution around the OFL
- Other council regions use varied approaches. Some options include:
 - SSC selects from fixed CV levels
 - Informed by stock assessment results
 - Stock assessment informs a baseline that is adjusted by the SSC

Summary

- Risk Policy includes 5 factors, considering both biological and socioeconomic criteria
- Provides a stock-specific measure of recommended risk tolerance
- Risk Policy output can be quantitatively integrated into several kinds of control rules, including those that are currently used by the NEFMC
 - Modify the proportion of OFL used for ABC (large-mesh stocks)
 - Determine the acceptable probability of overfishing (i.e., P^* ; scallops and small-mesh stocks)
- The large-mesh multispecies FMP (groundfish) is revising its ABC control rules with several alternative approaches under consideration
- Details of how the risk policy can inform ABC control rules for other FMPs are being refined

Questions?