Risk Policy Mechanics

March 9, 2026

Risk Policy Working Group

Major Decisions

1. Shape – this decision should be based on intended management dynamics
   - Subgroup recommends changing to a full S-shaped curve (modified to constrain probabilities between 0.5 and 1)
2. Directionality of scoring
   - The subgroup recommends inverting the scoring rubrics for more intuitive communication. With the full S-shaped curve, this does not change the quantitative performance.

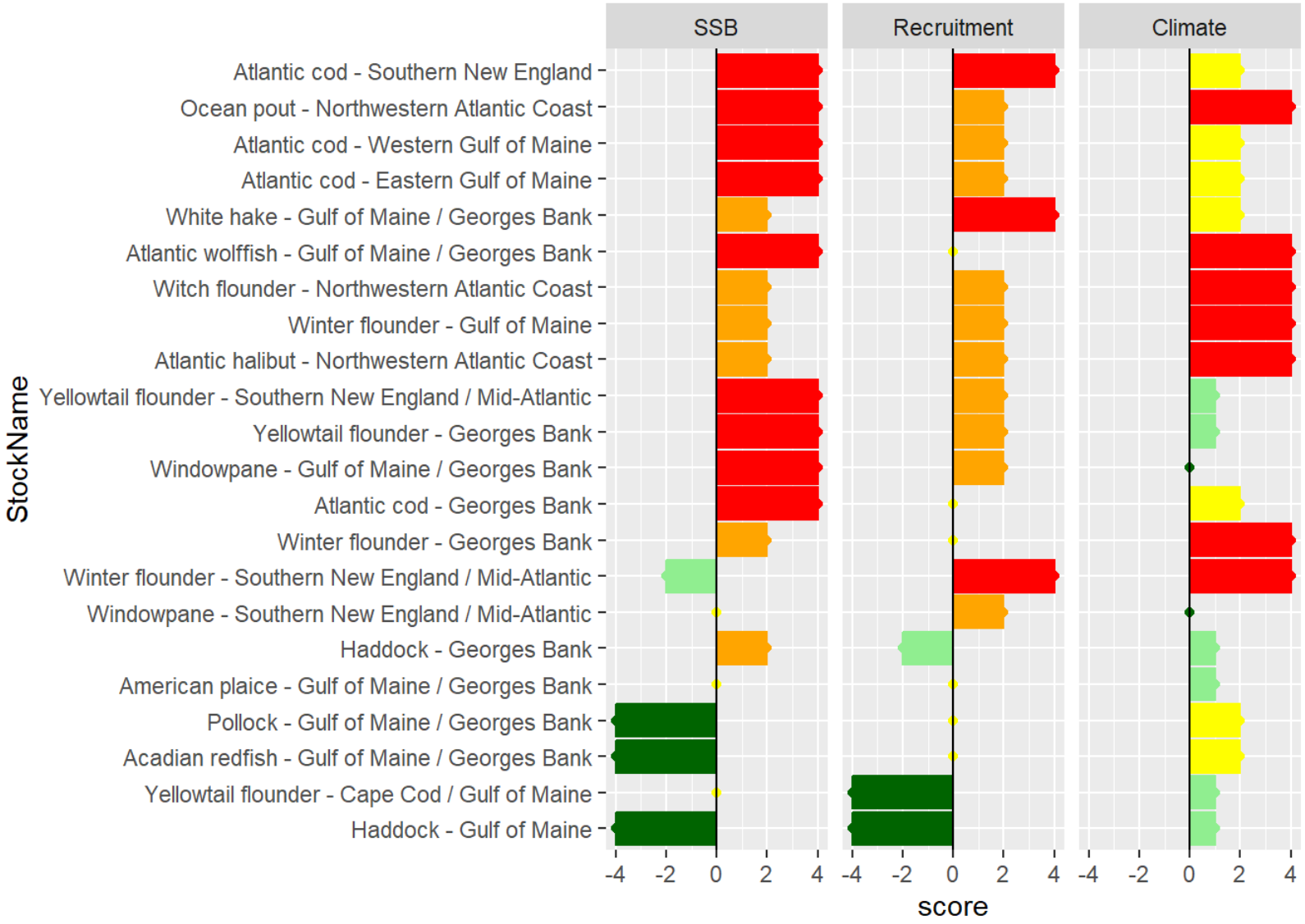
5 Factors

- Scored with revised rubric, weighted by NEFMC
- Combined into a Z-score, which is used in a logistic function

Higher Risk Tolerance ← → Lower Risk Tolerance

FACTOR	-4	-3	-2	-1	0	1	2	3	4
SSB/Stock Status	Well Above SSB Target		Rebuilt		SSB ≥75% but < 100%		< 75% but above Threshold		Overfished
Recruitment	Multiple Large Year Classes		Recent Large Year Class		Average, No Trend		Recent Low Recruitment		Persistent Low Recruitment
Climate Vulnerability					Low	Moderate	Moderate, Negative Direction	High	High Negative Direction
Commercial Fishery Characterization	Negative Outlook		Fishery Signals ⇆		Positive Outlook				
Recreational Fishery Characterization	Negative Outlook		Fishery Signals ⇆		Positive Outlook				

Demonstrated Scoring

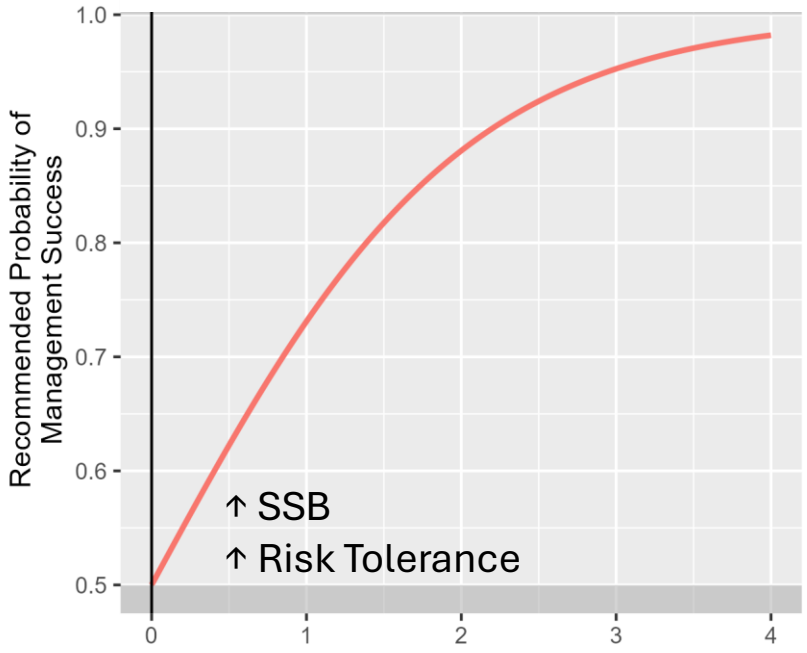


- Updated scoring with revised rubric
- Recruitment uses quantiles to categorize last 5 years
- For fishery factors, assumed:
  - Min = -4
  - Mid = 2
  - Max = 0

3 “shapes” using different parts of the logistic curve

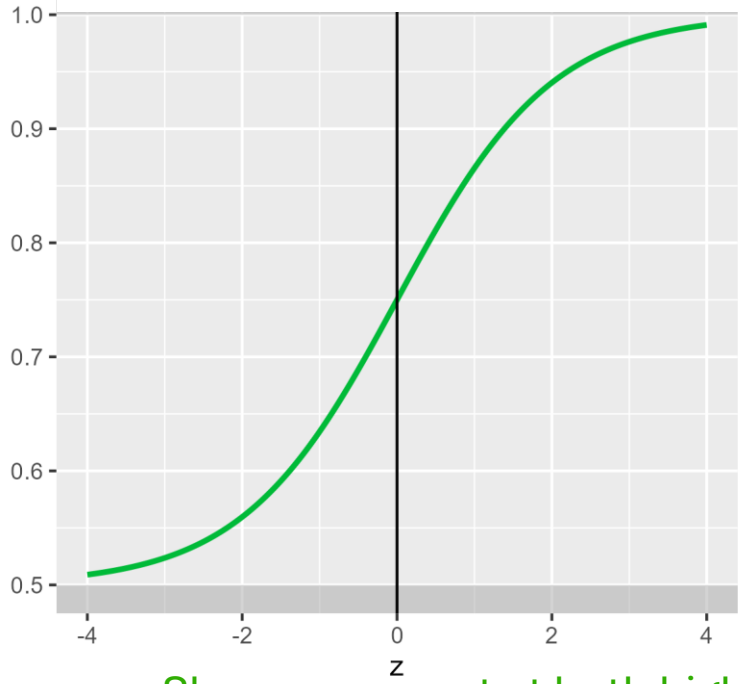
- Decision should be based on intended management dynamics

1) Asymptotic segment, not recommended



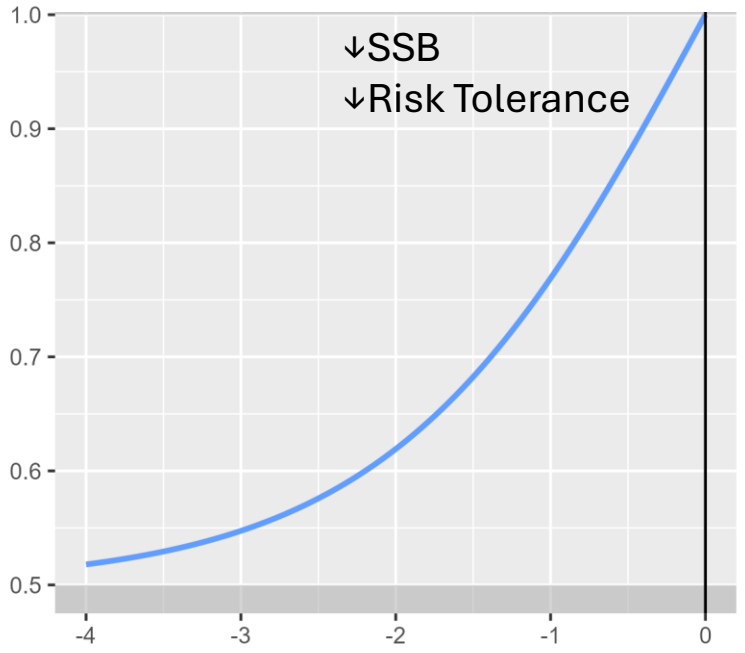
- Slow movement at low risk tolerance
- Fast movement at high risk tolerance

2) S-shaped (constrained), recommended



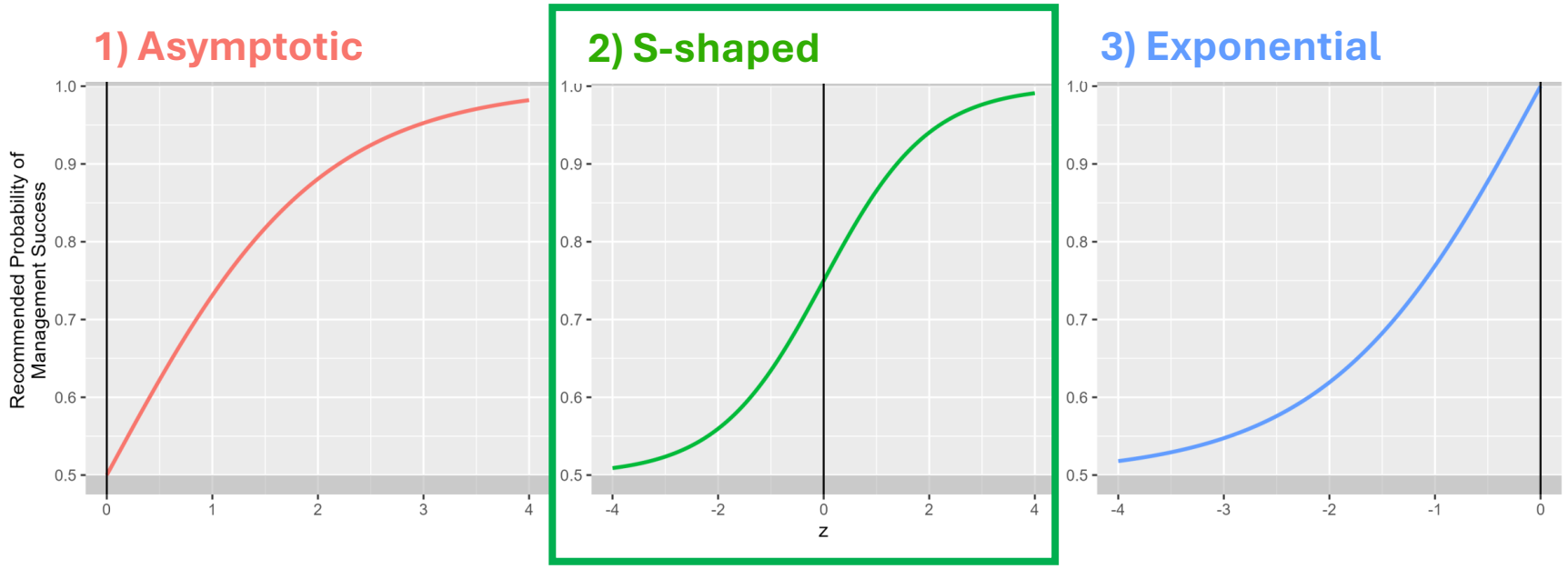
- Slow movement at both high and low risk tolerance
- Fast movement at intermediate risk tolerance

3) Exponential segment, would need development



- Slow movement at high risk tolerance
- Fast movement at low risk tolerance

Recommendation: Full S-shaped Curve



Largely a management decision, but the **full S-shaped curve** is parsimonious and flexible. Symmetry is appealing for

- Management (both extremes are hard to achieve, but stable)
- Rubric clarity (positioning factors around 0)
- Z- Score scaling (more challenging for an asymmetric shape)
- Communication (either scoring direction is possible)
- Transition from current control rules (groundfish and p-star)

Directionality of scoring rubrics

- Current rubrics include non-intuitive directionality
- Inverting the directionality may improve clarity and communication
- This is possible for all shapes, but is easier for some than others
  - With the full S-shaped curve, this rubric change will not alter the quantitative performance

Current, not recommended

Higher Risk Tolerance ← → Lower Risk Tolerance

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Lower Risk Tolerance ← → Higher Risk Tolerance

FACTOR	-4	-3	-2	-1	0	1	2	3	4
SSB/Stock Status	Overfished		< 75% but above Threshold		SSB ≥75% but < 100%		Rebuilt		Well Above SSB Target
Recruitment	Persistent Low Recruitment		Recent Low Recruitment		Average, No Trend		Recent Large Year Class		Multiple Large Year Classes
Climate Vulnerability	High Negative Direction	High	Moderate, Negative Direction	Moderate	Low				
Commercial Fishery Characterization					Positive Outlook		Fishery Signals ⇆		Negative Outlook
Recreational Fishery Characterization					Positive Outlook		Fishery Signals ⇆		Negative Outlook

Inverted, recommended

Recommendation: Invert Directionality

Largely a communication decision, but full logistic offers flexibility. **Inverting the scoring rubrics** may improve clarity and communication

- Negative scores would reflect degraded conditions (e.g., overfished)
- Positive scores would reflect robust conditions (e.g., high SSB)
- Score increases with risk tolerance

Higher Risk Tolerance ← → Lower Risk Tolerance

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Inverted, recommended

Overall Recommendation

- S-shaped curve, constrained so that values stay between 0.5 and 1
  - Risk tolerance changes slowly at high and low levels, but quickly in between

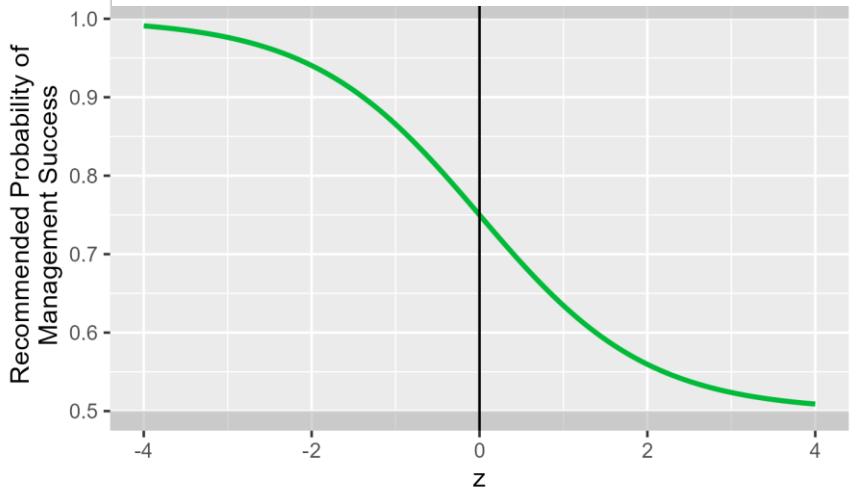
- Invert rubric so high scores represent high risk tolerance:
  - May improve clarity and communication
  - Maintains current dynamics of scoring

Alternatives:

1. S-shaped curve, but maintain current scoring direction
2. Exponential segment (moves quickly at low risk tolerance), but needs further development

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

2) Full S-shaped



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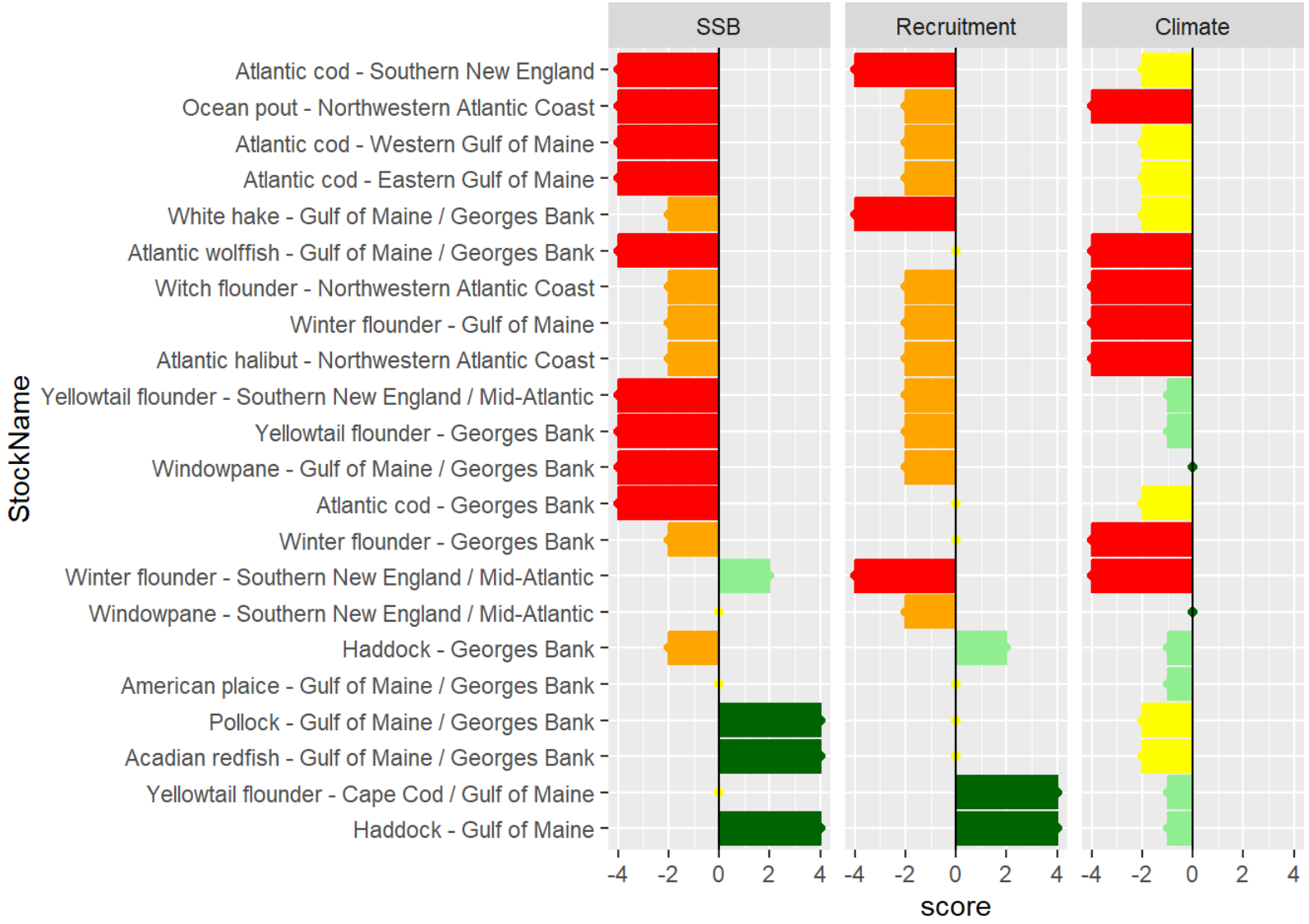
Demonstration of Recommendation



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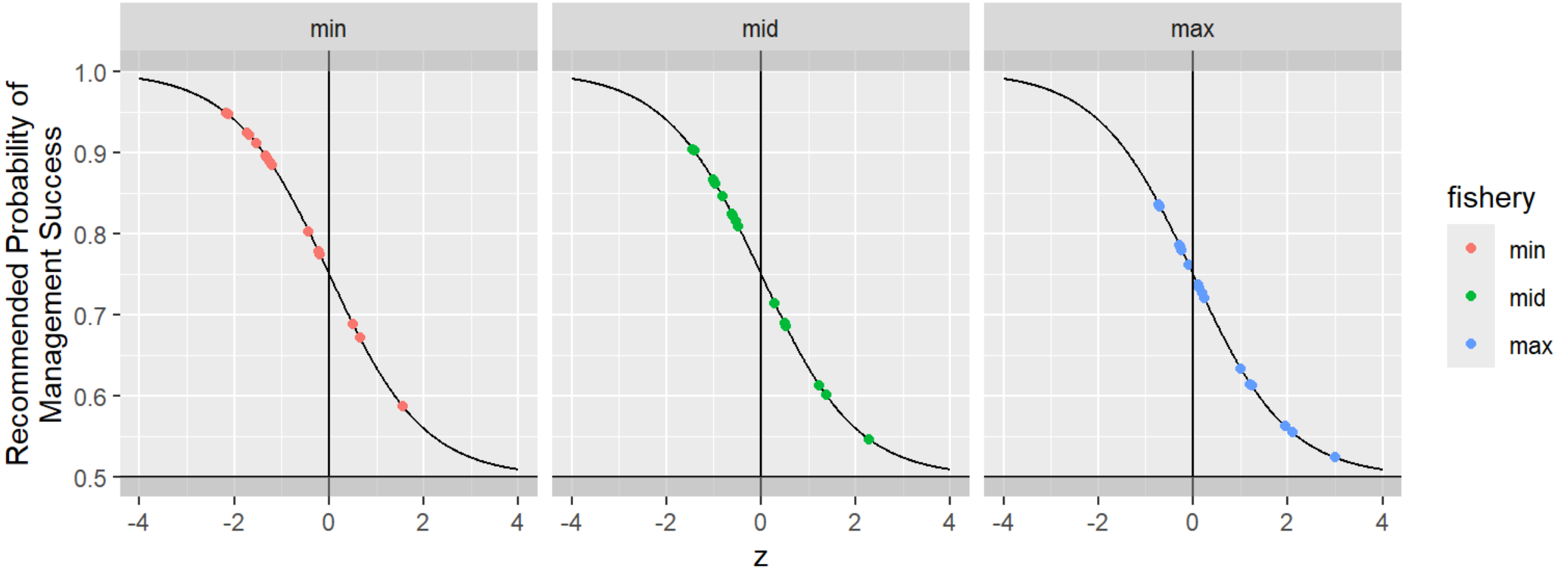

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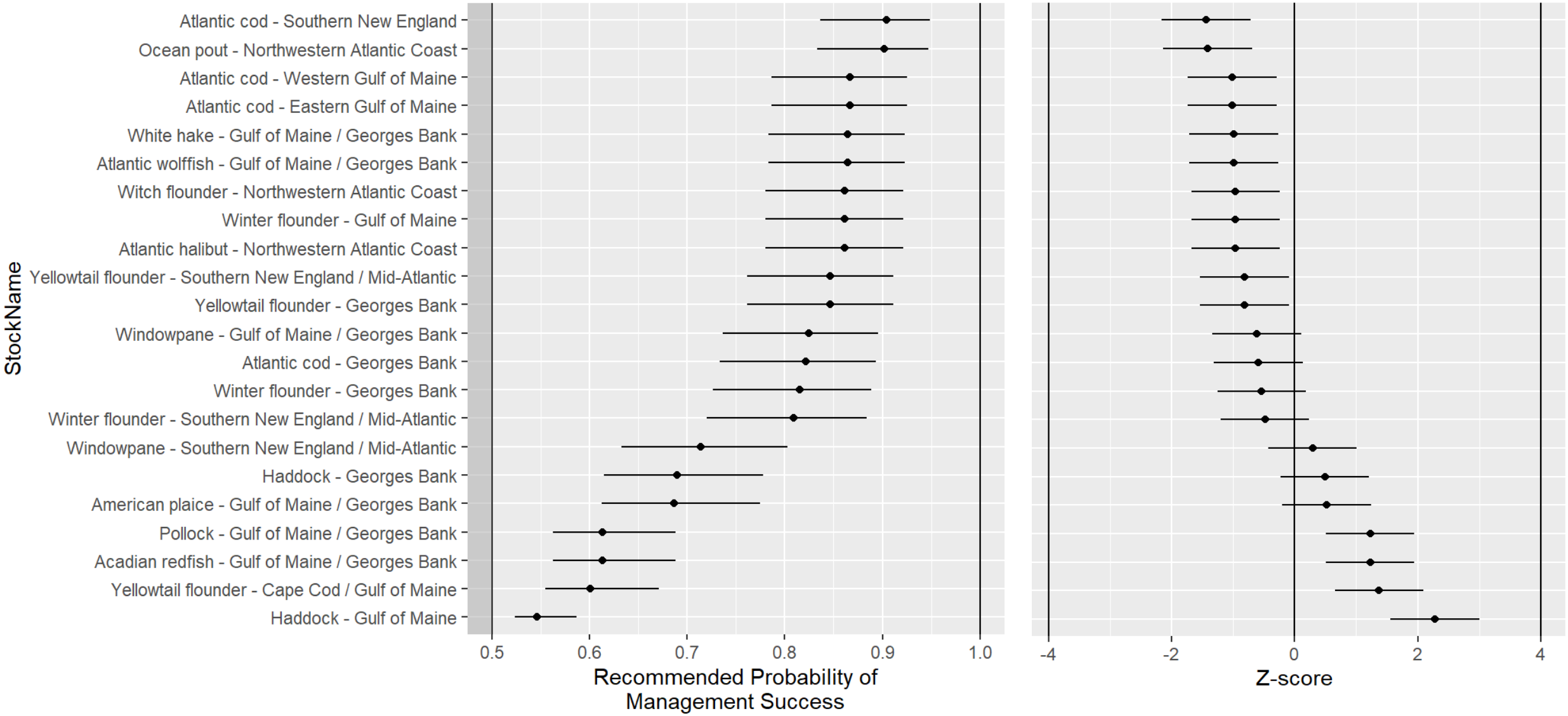
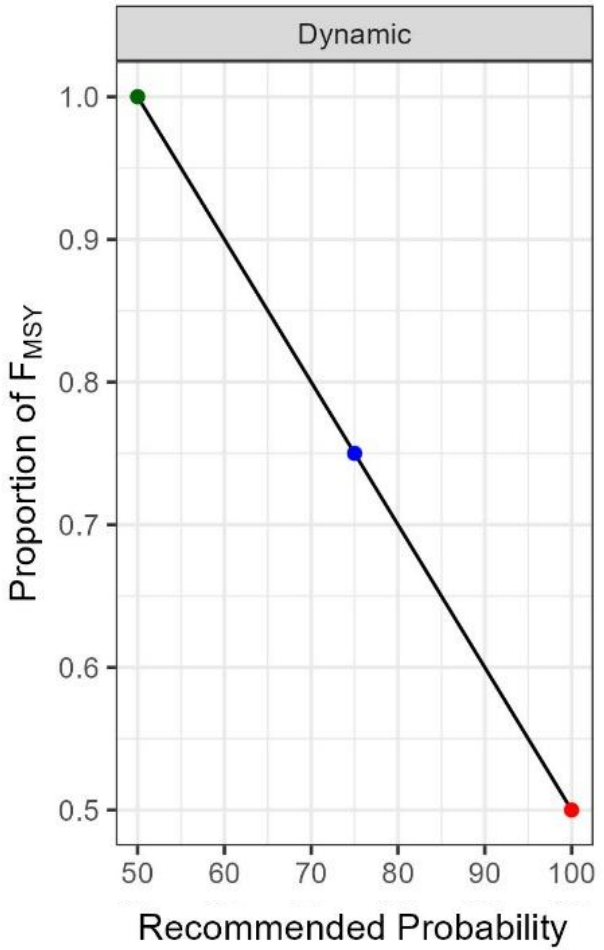


Potential Control Rule Integration (Dynamic Buffer)

Uses Risk Policy results to continuously and dynamically change the percent of F_{MSY}

- ABC = 100% of F_{MSY} at the highest risk tolerance
- ABC = 50% of F_{MSY} at lowest risk tolerance
- Linear relationship in between

This is one potential option



Demonstration of Potential Percentages of F_{MSY}