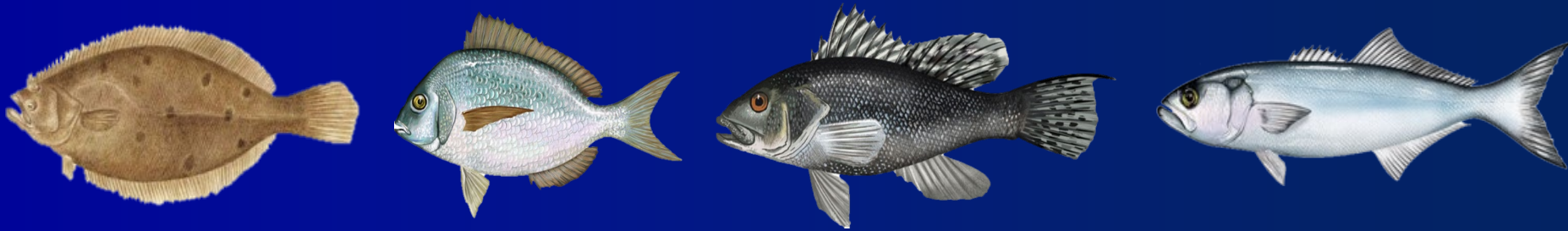




Current Process to Set Rec. Measures & Rec. Reform Initiative Harvest Control Rule Framework/Addendum



SSC sub-group

Recreational fishery models peer review

September 20, 2021

Current Process

- Must aim to prevent ACL overages.
- Lots of flexibility in how we can do that.
- Following slides describe recent process, but the details can vary.



Current Process

Step 1: If measures remained unchanged, what level of coastwide harvest would we expect?

How does that compare to next year's RHL?

Step 2: If notably higher or lower, then recommend changes to measures to achieve a desired overall percentage reduction or liberalization in harvest.

Step 1: Expected Harvest Under Status Quo Measures

- **Bluefish method through 2019: multi-year average of MRIP harvest estimates.**
 - Not including preliminary current year data.
 - Rationale: Measures unchanged for many years through 2019. RHL overages were rare. Decision making in August.
 - Now rebuilding. Change needed for 2020 and beyond.
- **SFSBSB method: projected current year harvest.**
 - Preliminary w1-4 data and proportion of harvest by wave in one or more past years.
 - Usually calculated at state level, then combined. State-level adjustments, if needed.
 - Rationale: Consider preliminary data from current year. Measures changed more frequently than bluefish and more frequent RHL overages. However, decision making in Dec. poses challenges.

Black Sea Bass Projected Harvest Example

State	2018 w1-4 as % of annual harvest	2019 w1-4 harvest	2019 projected w1-6 harvest	Final estimated 2019 w1-6 harvest
ME	N/A	0	0	0
NH	N/A	0	0	0
MA	95%	1,203,200	1,264,469	1,361,110
RI	48%	602,352	1,243,050	1,225,058
CT	76%	620,517	820,038	1,180,400
NY	50%	1,315,315	2,651,282	3,126,473
NJ	75%	853,298	1,131,593	1,117,658
DE	37%	26,501	72,386	61,974
MD	11%	79,918	705,083	156,986
VA	63%	171,585	270,654	371,523
NC	44%	3,700	8,467	11,638
Total	67%	4,876,386	8,167,024	8,612,820

Maintaining Status Quo Measures

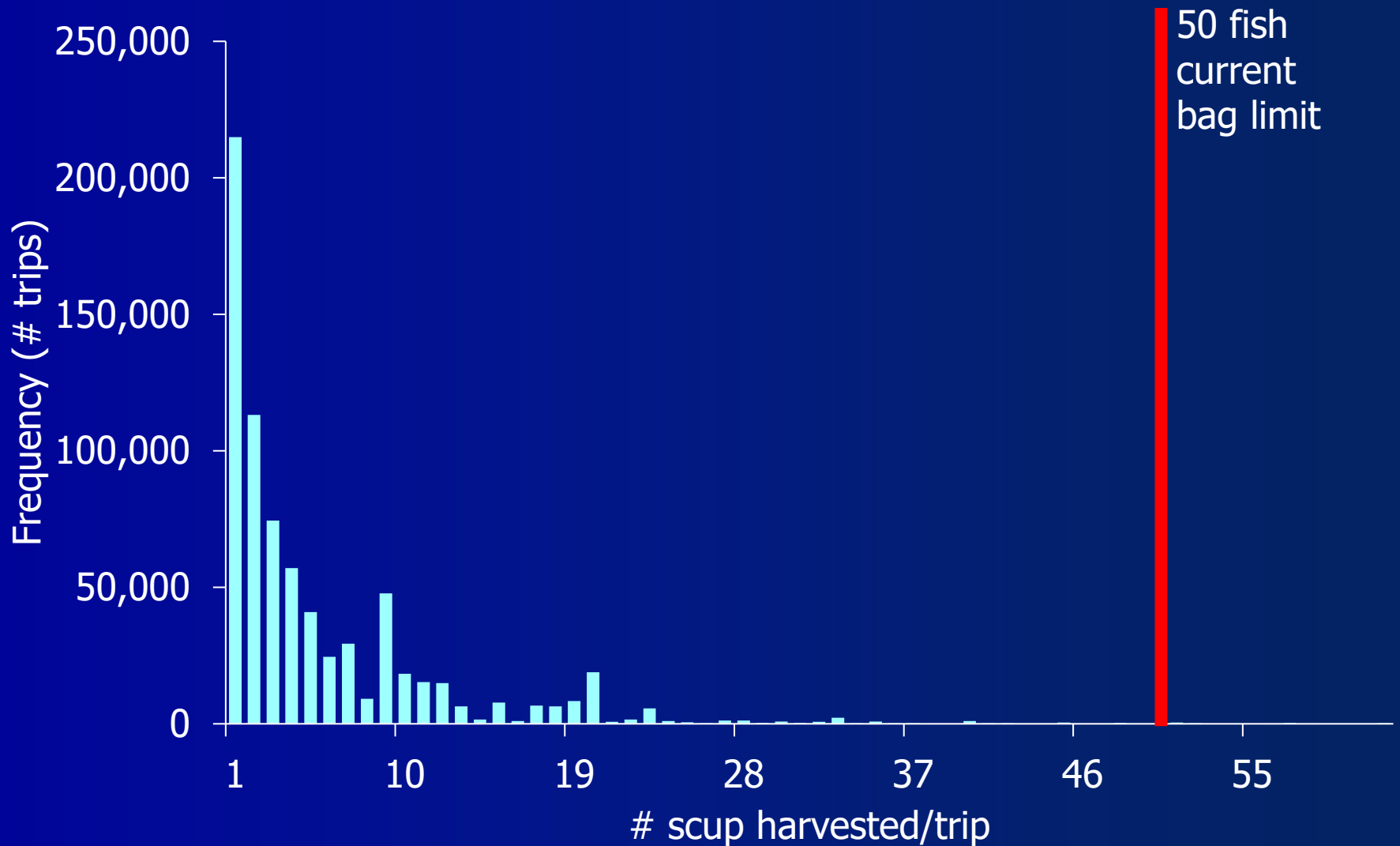
- Status quo generally recommended if harvest within a reasonably small range above and below the RHL.
- Range not pre-defined.
- Often based on coastwide PSE from one or more recent years.

Use MRIP data to change measures, when needed

- Determine desired overall % reduction or liberalization.
- Use recent MRIP harvest trends to predict next year's harvest under different measures.
 - For example...

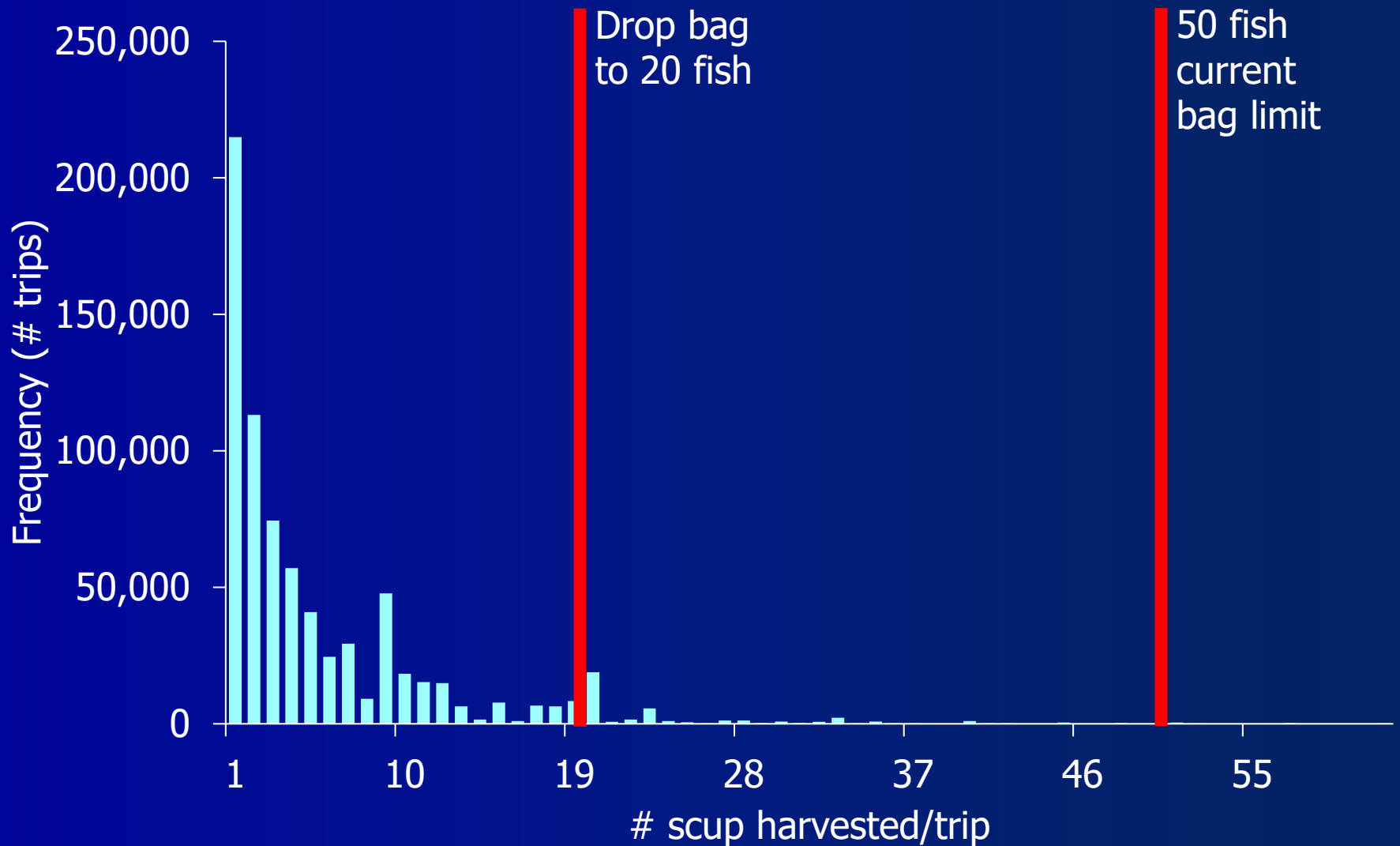
Scup Harvest Per Trip 2015

pre-calibration MRIP data



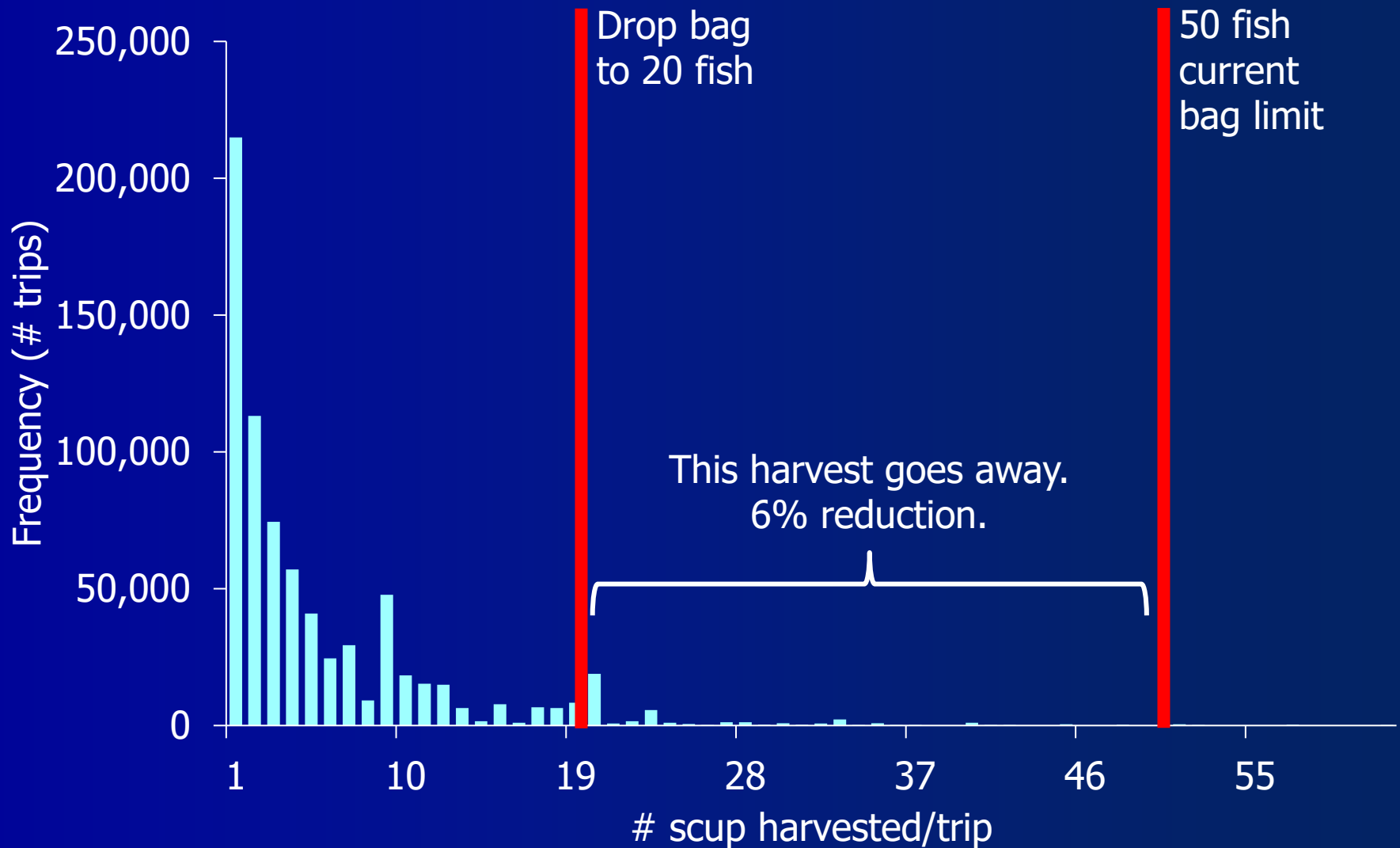
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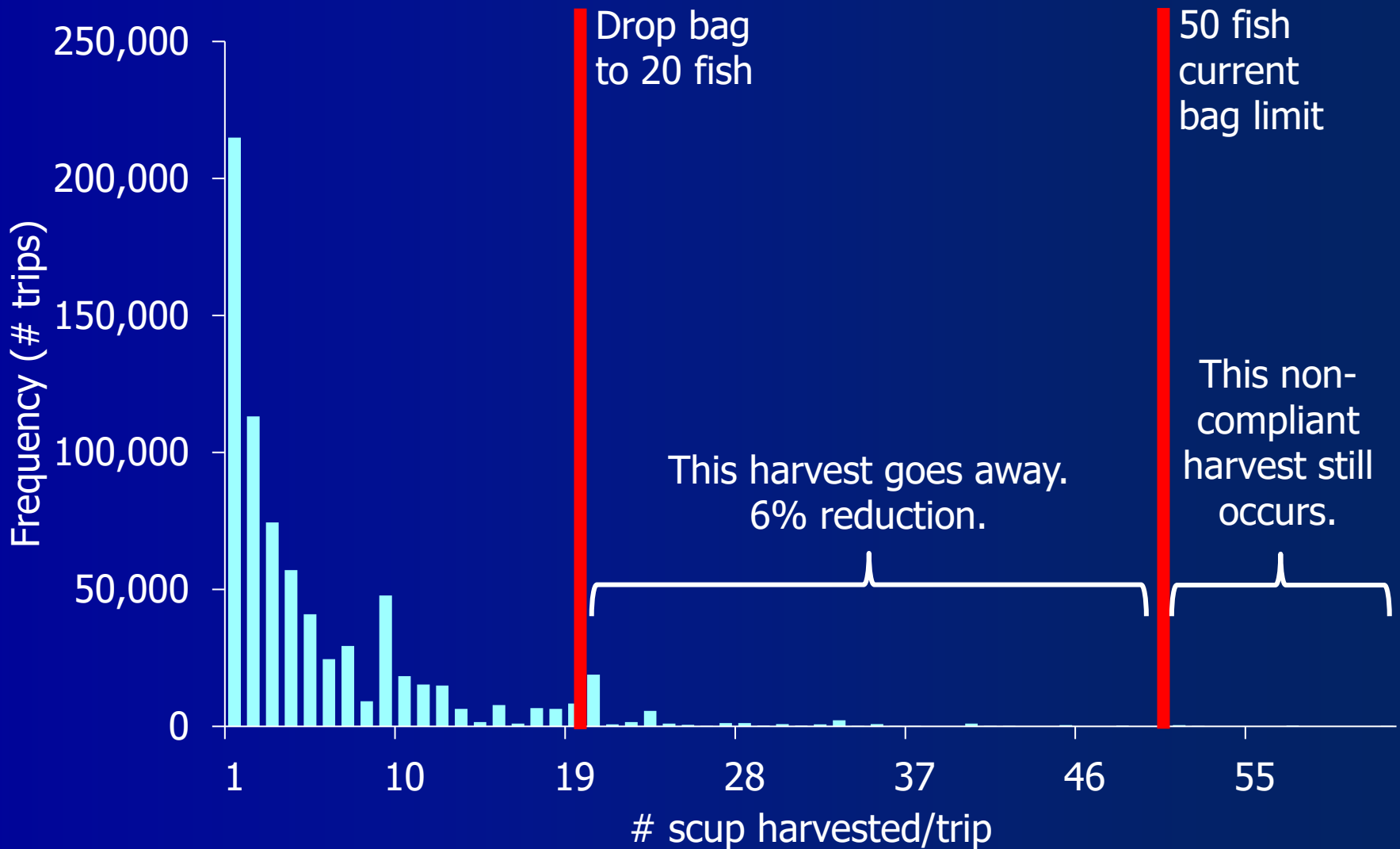
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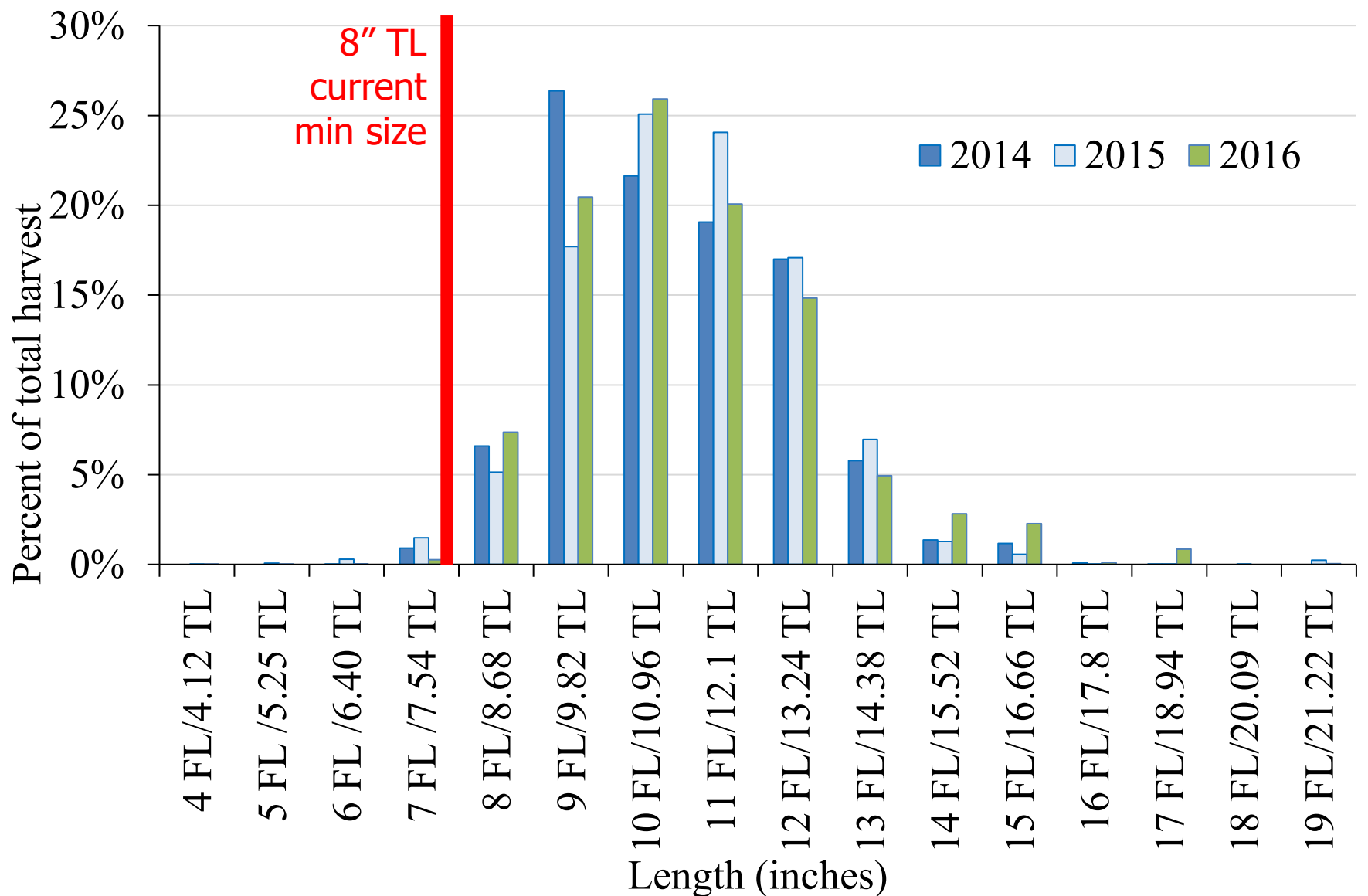
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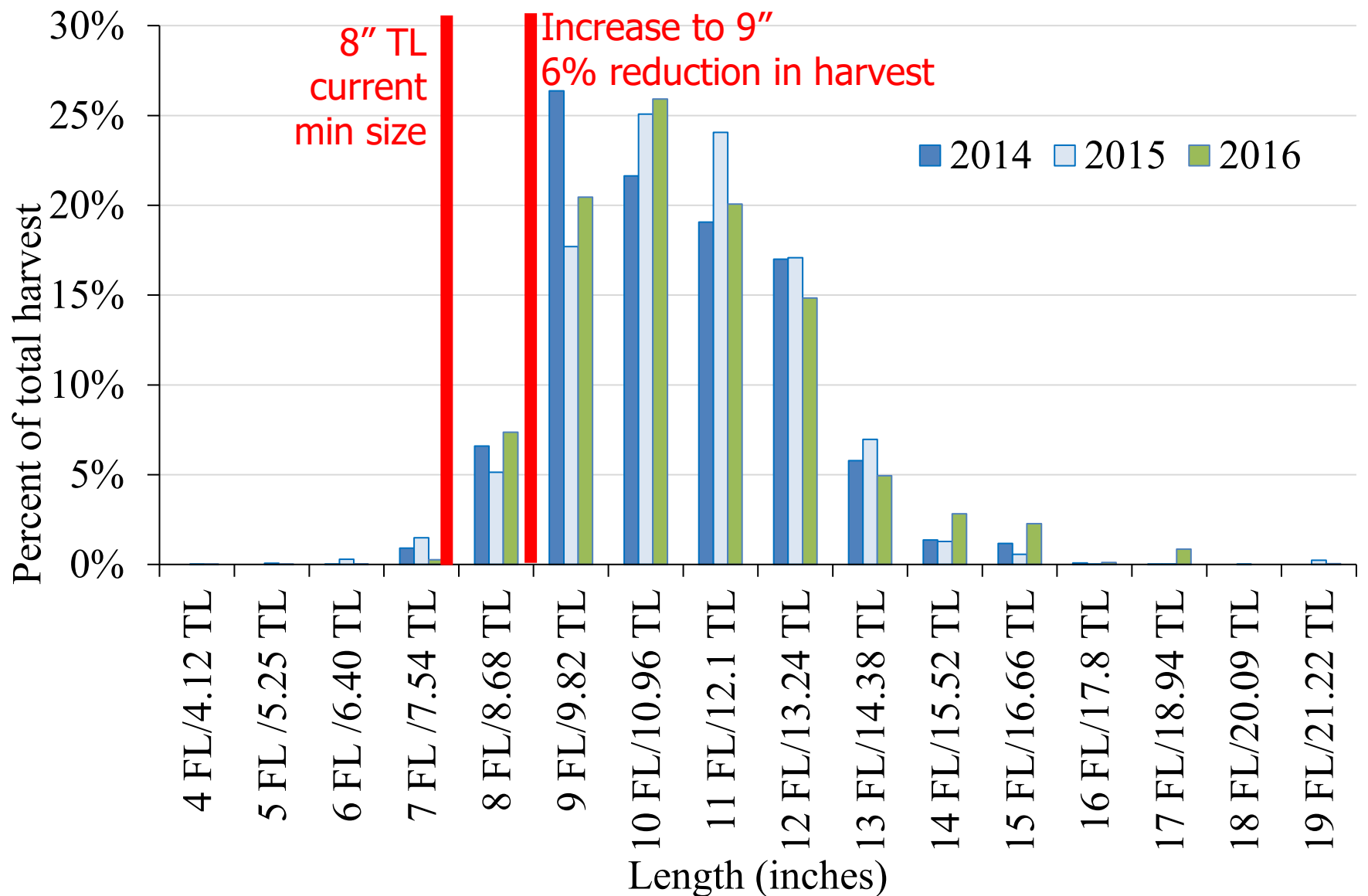
Scup Length Frequencies

pre-calibration MRIP data



Scup Length Frequencies

pre-calibration MRIP data



Changing More than One Measure

- Interaction term: $(x+y)-(x*y)$.
 - x is the percent change for one measure, y is the percent change for a different measure.
 - Scup bag and min. size examples from previous slides.
 - Each a 6% reduction.
 - $(0.06 + 0.06) - (0.06 * 0.06) = 11.6\%$ reduction.

Determining Which Measures to Change

- Which changes will have greatest impact on harvest?
- Which changes are likely to be viewed as somewhat equitable?
 - Potential for disproportionate impacts if different anglers have access to different sizes of fish (e.g., shore vs. for-hire and private vessel modes) or access at different times of year (e.g., bluefish seasonal availability by state).

State Waters Measures

- Can differ from federal waters measures.
- Determined through a separate but similar process.
- Usually aim to collectively result in the previously agreed to overall percentage change.
- Summer flounder federal waters measures typically waived.
- States may implement different measures if deemed “conservationally equivalent.”
 - Demonstrate that measures result in the same level of harvest.
- States always have option of implementing more restrictive measures than federal waters.
 - Can be used to constrain harvest in states with notably higher availability than others.
- Requires using MRIP data at finer scale.

How Well Did Our Process Perform?

Year	Summer flounder		Scup		Black sea bass	
	Desired % change	Actual % change	Desired % change	Actual % change	Desired % change	Actual % change
2015	0%	-36%	*	0%	-28%	+3%
2016	0%	+31%	0%	-3%	-16%	+37%
2017	-41%	-48%	0%	+27%	0%	-20%
2018	+17%	+5%	0%	+4%	0%	-8%
2019	0%	+3%	0%	-4%	0%	-9%

*Bag limit increased from 30 to 50 but not based on a desired % change.

Red = at least 20% difference between desired and actual.

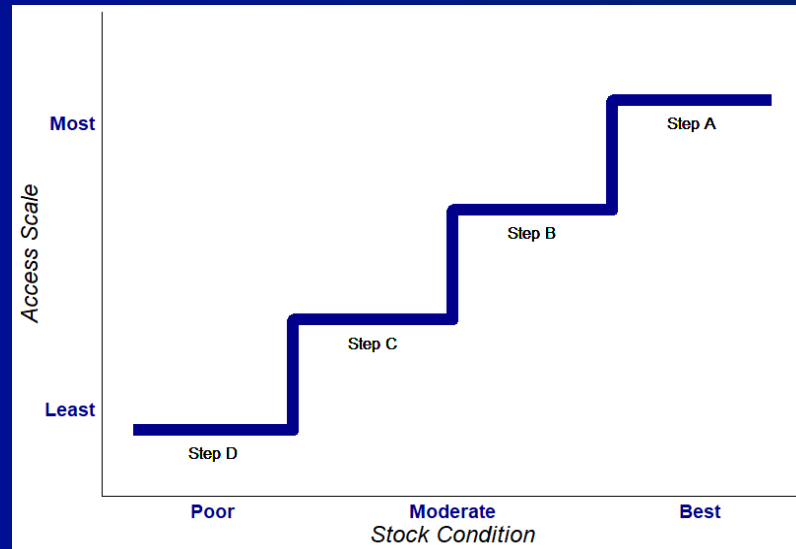
Assumptions

- Past trends in MRIP data are a good predictor of future fishery performance.
 - Total proportions of harvest by wave, size, bag.
 - If measures unchanged, next year's harvest will be similar to this year or a recent multi-year average.
- Fishing behavior will not change under different measures.



Harvest Control Rule Framework/Addendum

- Rely less on MRIP vs. RHL comparison when setting measures.
- Use a more holistic approach with greater emphasis on stock status indicators and trends.
- Pre-determined mgmt. responses to a suite of metrics.



Harvest Control Rule Framework/Addendum

Metrics considered when setting measures vary by alternative.

■ Alternative 1

- MRIP vs. RHL

■ Alternative 2

- CI of MRIP estimate vs. RHL
- Biomass vs. target level

■ Alternative 3

- MRIP vs. RHL
- Biomass vs. target level
- Fishing mortality vs. threshold
- Recent recruitment

■ Alternative 4

- Primary: Biomass vs. target level, fishing mortality vs. threshold
- Secondary: Biomass trend, recruitment
- MRIP vs. RHL or ACL only when $F > F_{msy}$

■ Alternative 5

- Biomass vs. target level
- Biomass trend

Questions/Discussion



Backup slides

Alt 2: Percent Change Alternative

- Maintains MRIP vs. RHL comparison.
 - RHL within, above, or below confidence interval (CI) of MRIP estimate?
- Includes explicit consideration of B/B_{MSY} when determining if measures should be liberalized, restricted, or remain unchanged.
 - Below target, above target but less than 150% of target, or more than 150% of target?
- Amount of change (if any) varies based on magnitude of difference between MRIP and RHL, as well as B/B_{MSY} ratio.

Alt 2: Percent Change Alternative

- One of two approaches used to determine mgmt. measures.
- Binned approach – no change, or a, b, or c% liberalization/reduction.
- Coefficient approach - % difference between RHL and MRIP multiplied by d or e scalar. Response is proportional to difference between RHL and MRIP.

Binned approach:

Future RHL vs MRIP Estimate	B/B _{MSY}	Change in Measures
Future RHL more than X% higher than MRIP estimate (and outside CI)	> 1.5	c% Liberalization
	1 - 1.5	b% Liberalization
	< 1	Status quo
Future RHL up to X% higher than MRIP estimate (and outside CI)	> 1.5	b% Liberalization
	1-1.5	a% Liberalization
	< 1	Status quo
Future RHL within CI of MRIP estimate	> 1.5	a% Liberalization
	1-1.5	Status quo
	< 1	a% Reduction
Future RHL up to X% lower than MRIP estimate (and outside CI)	> 1.5	Status quo
	1-1.5	a% Reduction
	< 1	b% Reduction
Future RHL more than X% lower than MRIP estimate (and outside CI)	> 1.5	Status quo
	1-1.5	b% Reduction
	< 1	c% Reduction

Coefficient approach:

Future RHL vs MRIP Estimate	B/B _{MSY}	Change in Measures
RHL above CI of MRIP estimate	> 1.5	Δ *d% Liberalization
	1 - 1.5	Δ *e% Liberalization
	< 1	Status quo
RHL within CI of MRIP estimate	> 1.5	Δ *e% Liberalization
	1-1.5	Status quo
	< 1	Δ *e% Reduction
RHL below CI of MRIP estimate	> 1.5	Status quo
	1-1.5	Δ *e% Reduction
	< 1	Δ *d% Reduction

Δ = difference between RHL and MRIP estimate.

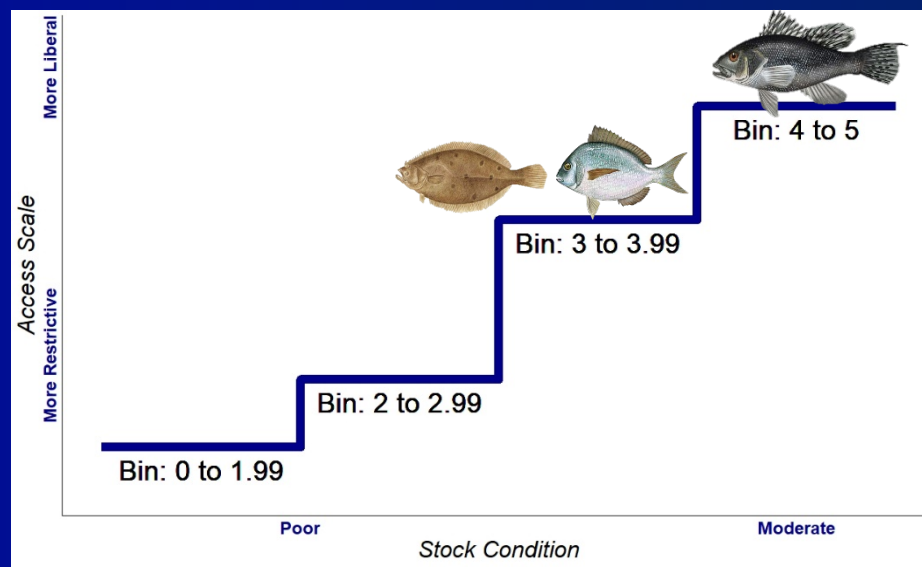
Alt 3: Fishery Score Alternative

- Combine multiple metrics into one fishery score
 - Fishing mortality relative to the threshold level (F_{MSY})
 - Biomass relative to the target (B_{MSY})
 - Recruitment trends
 - Comparison of average harvest to the RHL
- Each metric is weighted according to the relationship it has to harvest
- Provides one, easy to interpret value that encompasses multiple aspects of the fishery

Alt 3: Fishery Score Alternative

$$F/F_{MSY}(W_F) + B/B_{MSY}(W_B) + R \text{ Trend}(W_R) + \text{Fishery performance } (W_{FP}) = \text{Fishery Score}$$

Fishery Score	Level of Concern	Stock Status and Fishery Performance Outlook	Measures
0-1.99	Highest Risk	Very Poor	Most Restrictive
2-2.99	High Risk	Poor	Restrictive
3-3.99	Medium Risk	Moderate	Liberal
4-5	Low Risk	Good	Most Liberal



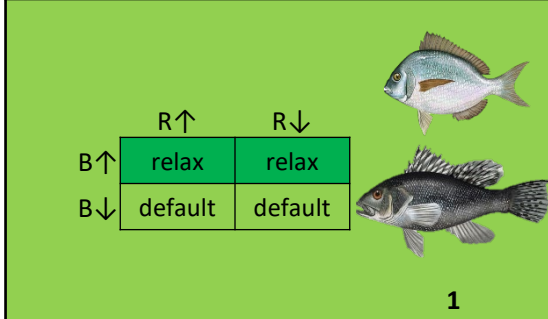
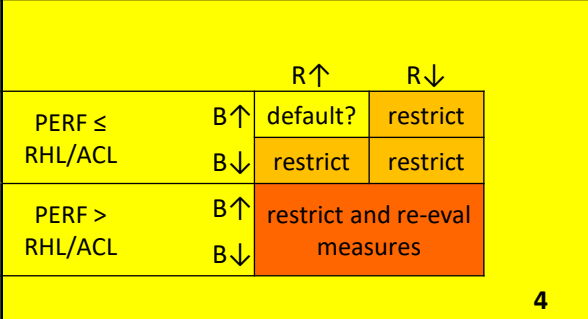
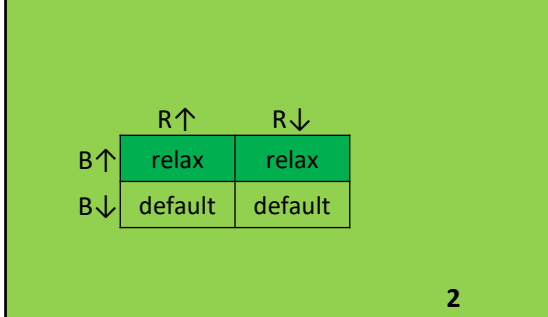
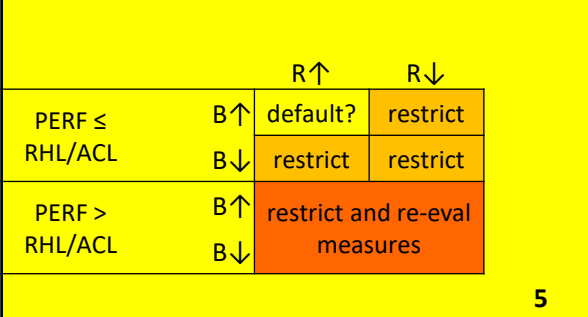
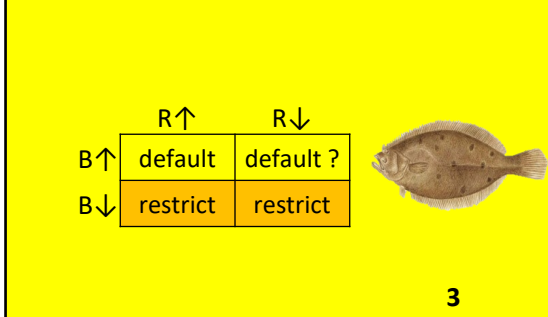
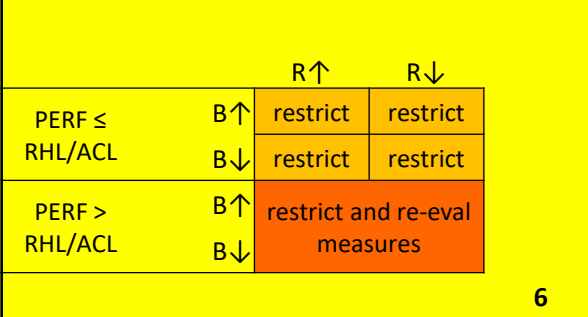

Alt 4: Biological Reference Point Alternative

- Primary metrics are the B/B_{MSY} and F/F_{MSY} from the terminal year of the most recent stock assessment
- F is based on two states, above or below the target
- B/B_{MSY} is defined as one of four states
 - Biomass is greater than or equal to 1.5x the target.
 - Biomass is greater than or equal to the target but less than 1.5x the target.
 - Biomass is less than the target, but greater than or equal to the threshold (the threshold is $\frac{1}{2}$ the target).
 - Biomass is less than the threshold (the stock is overfished).

Alt 4: Biological Reference Point Alternative

- Secondary metrics:
 - Trends in biomass and recruitment
 - Comparison to the RHL (fishery performance)
- Only evaluated when stock conditions remain unchanged between prior and most recent stock assessment
- Can be used to further relax, restrict, or re-evaluate measures

Alt 4: Biological Reference Point Alternative

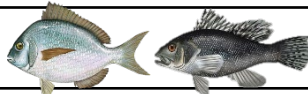


	$F \leq F_{msy}$	$F > F_{msy}$																									
$150\%B_{target} \leq B$	 <table border="1"> <thead> <tr> <th></th> <th>R↑</th> <th>R↓</th> </tr> </thead> <tbody> <tr> <td>B↑</td> <td>relax</td> <td>relax</td> </tr> <tr> <td>B↓</td> <td>default</td> <td>default</td> </tr> </tbody> </table> <p style="text-align: center;">1</p>		R↑	R↓	B↑	relax	relax	B↓	default	default	 <table border="1"> <thead> <tr> <th></th> <th></th> <th>R↑</th> <th>R↓</th> </tr> </thead> <tbody> <tr> <td rowspan="2">PERF ≤ RHL/ACL</td> <td>B↑</td> <td>default?</td> <td>restrict</td> </tr> <tr> <td>B↓</td> <td>restrict</td> <td>restrict</td> </tr> <tr> <td rowspan="2">PERF > RHL/ACL</td> <td>B↑</td> <td colspan="2" rowspan="2">restrict and re-eval measures</td> </tr> <tr> <td>B↓</td> </tr> </tbody> </table> <p style="text-align: center;">4</p>			R↑	R↓	PERF ≤ RHL/ACL	B↑	default?	restrict	B↓	restrict	restrict	PERF > RHL/ACL	B↑	restrict and re-eval measures		B↓
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$B < B_{threshold}$	REBUILDING PLAN																										
																											

Alt 5: Biomass Based Matrix Alternative

- Uses a matrix to set recreational measures based on two factors: B/B_{MSY} and the most recent trend in biomass (increasing, stable, or decreasing)
 - Step A represents optimal conditions while Step F is the worst conditions
- A 3x4 matrix will be used to determine appropriate management measure step

Alt 5: Biomass Based Matrix Alternative

- Abundant = Stock is at least 150% of the target level (B_{MSY})
 - Healthy = Stock is above the target, but less than 150% of the target
 - Below Target = Stock is below target, but above threshold ($\frac{1}{2} B_{MSY}$)
 - Overfished = The stock is below threshold
- Biomass trend – see Appendix B for example method

		Biomass Trend		
		Increasing	Stable	Decreasing
Stock Status	Abundant	Step A		
	Healthy	Step A	Step B	
	Below Target	Step C		Step D
	Overfished	Step E		Step F

Harvest Control Rule FW/Addendum

Next Steps

- Policy Board/Council approve final range of alternatives (Oct)
- Typical rec measures Monitoring Committee & AP mtgs (Nov)
- Public hearings (Nov-Dec)
- Stakeholder workshops on measures (Jan 2022)
- FMAT/PDT, MC, and APs meet to consider recommendations for final action (Jan 2022)
- Board/Council final action on FW/addendum (Feb 2022)
- MC, Board, Council set 2022 recreational management measures (Spring 2022)
- Development of NEPA document for framework and federal rulemaking (mid to late 2022)