

FY 2023-2025 Monkfish OFLs, ABCs, and Discard Estimation Methods

Scientific and Statistical Committee Meeting

Dr. Rachel Feeney

New England Fishery Management Council

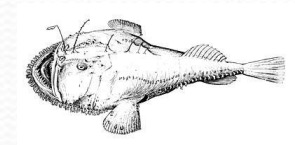
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New England
Fishery Management Council

Framework Adjustment 13

1. Overfishing limit (OFL) and acceptable biological catch for North and South for FY 2023-2025
2. Subsequent specifications (e.g., discard deduction, Total Allowable Landings)
3. Effort controls (e.g., Days-At-Sea, gillnet mesh size)



OFL

ABC = ACL

97% of ACL = ACT

ACT - Discards = TAL

SSC Task today:

1. Recommend OFLs and ABCs
2. Recommend a discard deduction method

Terms of Reference: OFLs, ABCs

1. Review information from the September 2022 management track assessment for monkfish and provided by the Monkfish Plan Development Team (PDT).
2. Comment on the conclusion of the assessment and peer review that the stock status of monkfish is unknown and the applicability of the NOAA Fisheries [Procedural Guidance for Changing Assessed Stock Status from Known to Unknown](#).
3. Recommend overfishing limits (OFLs) and acceptable biological catches (ABCs) for monkfish in both the northern and southern management areas for fishing years (FY) 2023-2025 that will prevent overfishing, meet the objectives of the fishery management plan, and consider the Council's Risk Policy Statement.

What are the FMP Objectives?

Objectives unchanged from original FMP (1998):

1. To end and prevent overfishing; rebuilding and maintaining a healthy spawning stock;
2. To optimize yield and maximize economic benefits to the various fishing sectors;
3. To prevent increased fishing on immature fish;
4. To allow the traditional incidental catch of monkfish to occur.

Overfishing Limit

Table 1. Potential monkfish FY 2023-2025 OFLs for SSC consideration.

Management Area	Status Quo OFL	PDT recommended OFL
Northern	17,805 mt	undetermined
Southern	23,204 mt	undetermined

PDT recommends OFL be undetermined for North and South

- OFL cannot be calculated without absolute biomass and a fishing mortality rate.
- Consistent with the unknown stock status conclusion of last three assessments.
- Status quo OFLs based on an assessment that was invalidated in 2016.

Acceptable Biological Catch

Smooth approach (from 2016, 2019, 2022 assessments)

*Trawl survey multiplier * latest 3-year average catch = catch advice = ABC*

North: $0.829 * 6,425 \text{ mt} = 5,360 \text{ mt}$

South: $0.646 * 5,655 \text{ mt} = 3,653 \text{ mt}$

Recent ABC approach (discussed at 2022 peer review)

*Trawl survey multiplier * latest ABC = catch advice = ABC*

North: $0.829 * 8,098 \text{ mt} = 6,713 \text{ mt}$

South: $0.646 * 12,316 \text{ mt} = 7,956 \text{ mt}$

Acceptable Biological Catch

PDT Consensus: Recommends against use of “Recent ABC” approach.

- FY 2017-2022 ABCs stem from 2013 analytical assessment, invalidated in 2016.
- Set without 2022 discard time series data corrections and mortality assumptions (100% mortality for all gears rather than new 64% mortality for dredge gear).

Acceptable Biological Catch

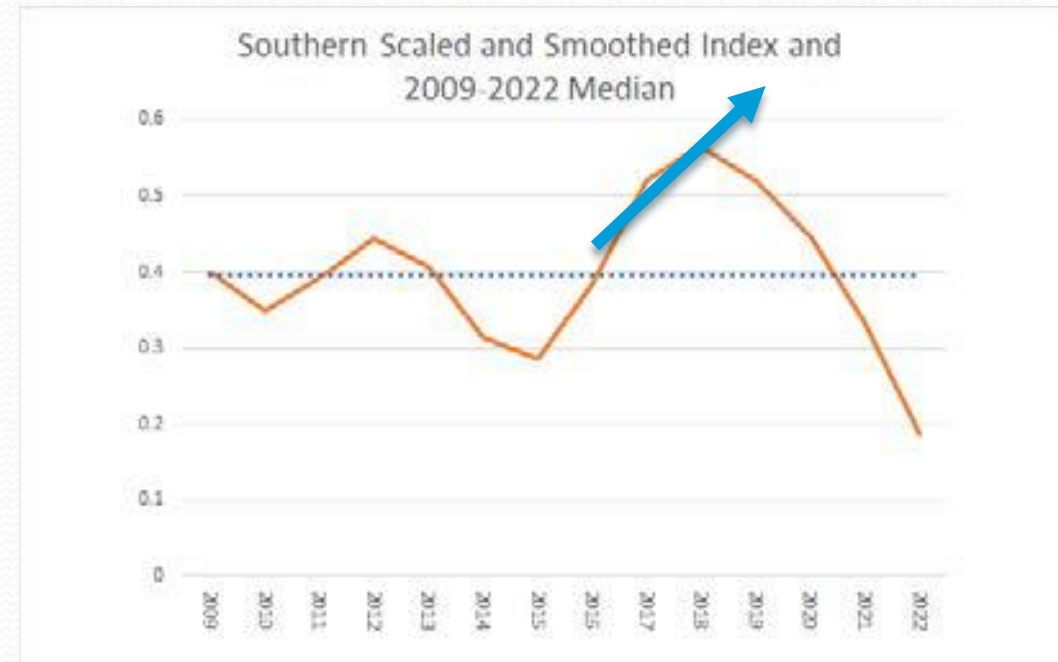
Additional considerations

- Index-based Methods Working Group and Legault et al. (in press) found use of Ismooth likely to prevent overfishing, promote long-term stability of catch and biomass.
- Survey index has been below its mean since 2004 in North, 1990 in South; suggests recent biomass is relatively low.
- Ismooth would result in North ABC > South ABC. Likely appropriate; opposite of “Recent ABC” approach.
- “Chainsweep study” NOT peer-reviewed for use as a monkfish biomass estimate.
 - Suggests biomass in North > South.
 - Suggests recent lower exploitation rates in North, higher in South.

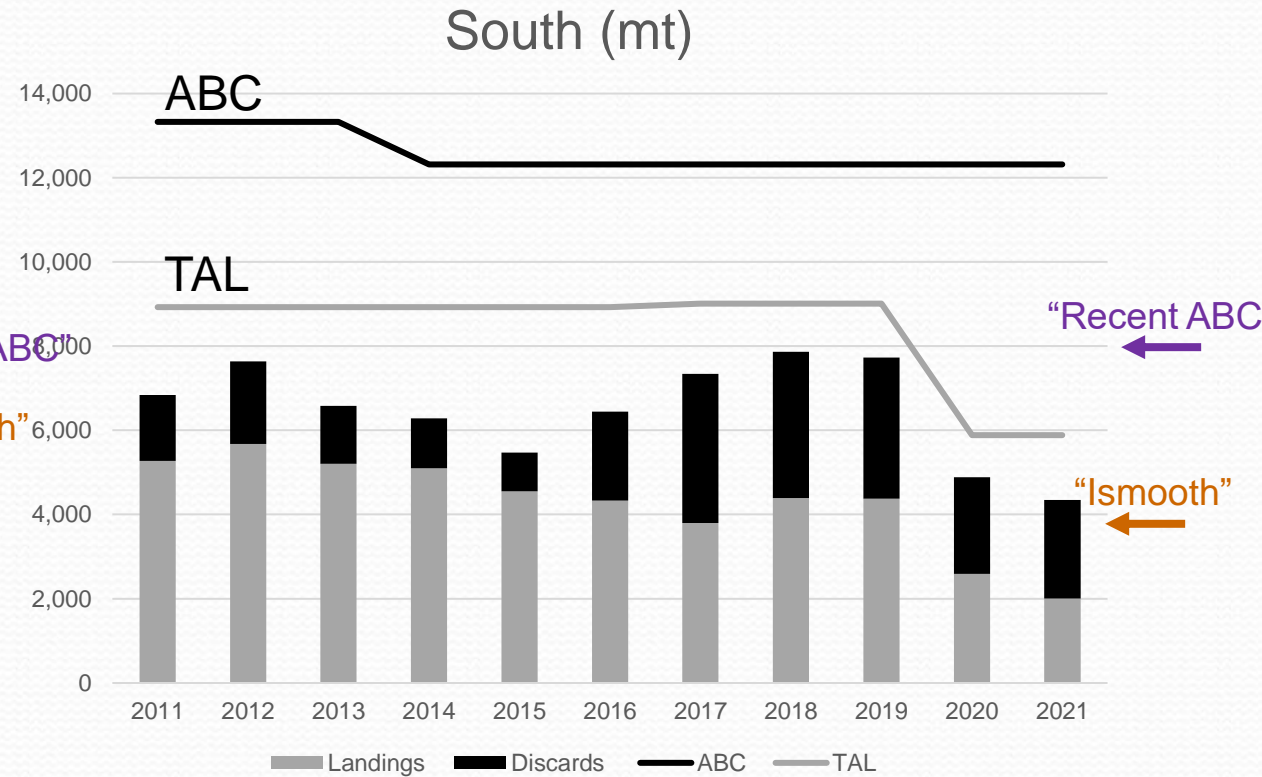
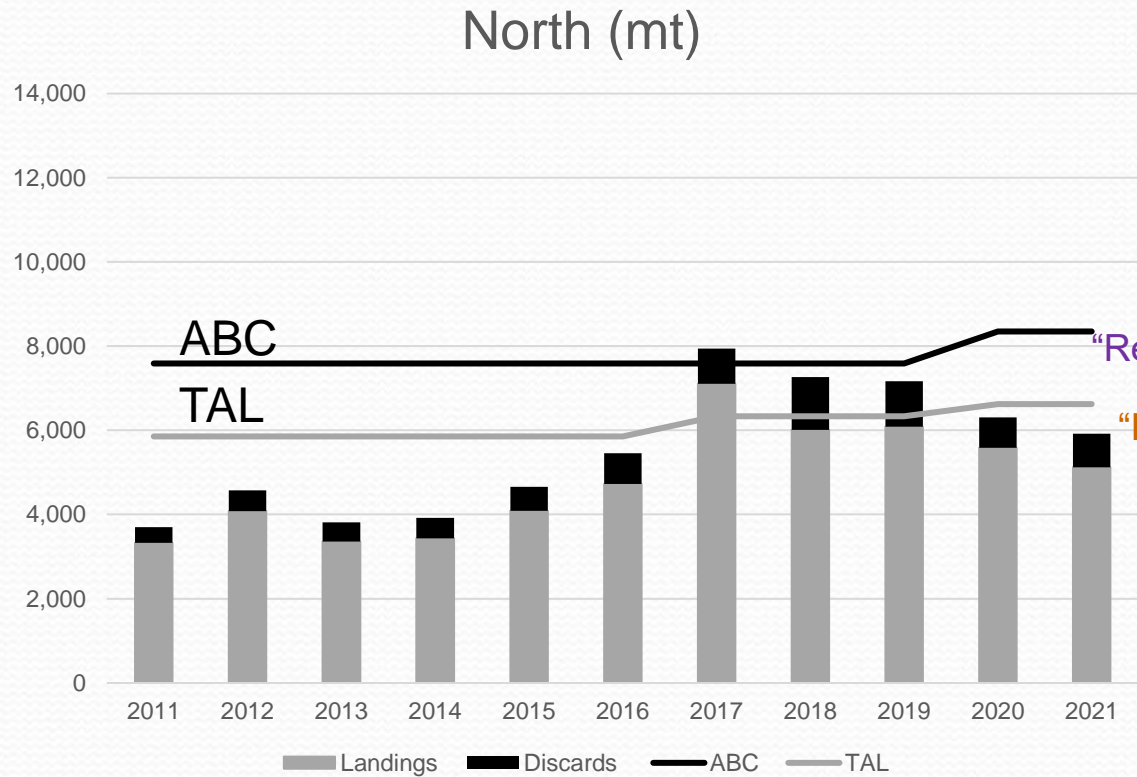
Acceptable Biological Catch

Some concerns about using Ismooth (not consensus)

- There are uncertainties not included in the LOESS-smooth confidence intervals (e.g., trawl survey variability).
- Multiplier based on slope of the last 3 years of LOESS-smooth. With everchanging slopes, catches set may cause substantial over or under harvest (e.g., if 2018 was terminal year).



Fishery Performance



NOTE: Calendar year landings and discards based on 2022 assessment data, not the FY year-end ACL accounting data.



Fishery Performance Report

- **Vessels.** Decrease in vessels with limited access permits: 670 → 562 in past decade
 - 35-48% landed > 1 lb monkfish
 - 9-20% landed > 10,000 lb monkfish
- **Economics.** Generally declined over time
 - \$42.2M → \$10.3M in CY 2005-2021
 - Monthly price/pound declining trend since 2010; uptick recently
 - Reduced demand, some recent uptick
 - Costs increasing, qualified captains/crew decreasing
- **Constraints.** Effort controls creating inefficiencies, low skate possession limits, No fall fishing fall (lack of fish, low price)

SSC recommendations in 2019

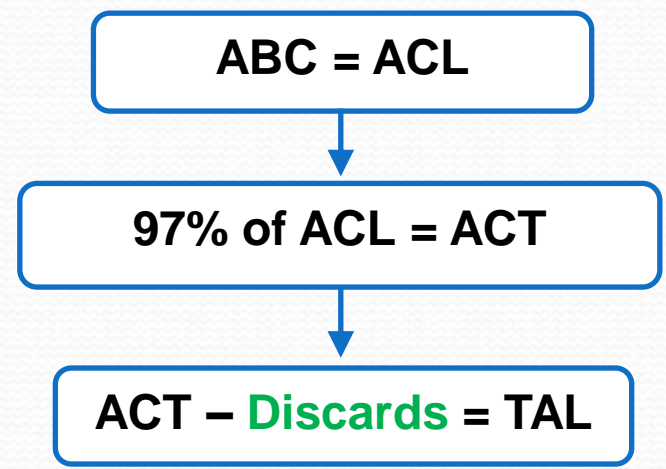
SSC Recommendation	PDT Response
1. Improve age and growth data to help determine stock status and reference points.	Good aging techniques have not yet been found. 2022 peer review suggested more focus on tracking cohorts with length frequency data.
2. Better understand the impacts of 2015 year-class on biomass and discards.	While biomass increased through 2018 likely due to this year-class, data as of 2022 indicate this year-class didn't result in any substantial increase in the adult population. Discards have declined from a peak. Suggests year-class was largely discarded. Hope from seeing higher 2020 recruitment in North tempered by lack of any new measures to prevent juvenile discards. Our knowledge hampered by lower port sampling.

SSC recommendations in 2019

SSC Recommendation	PDT Response
<p>23. Explore other assessment methods: surplus production models, DLM toolkit, ICES tools.</p>	<p>Outside scope of 2022 and 2025 assessments, research track assessment in 2027 though. 2022 reviewer ideas: delay-difference model. Hundreds of methods in DLM toolkit. What/which ICES tools? Anything more specific?</p>
<p>4. Examine interim survey indices for performance to ensure specifications are concordant with abundance. Develop “rumble strip” approach like for scup for determining if and how to adjust.</p>	<p>Survey index not updated in 2020 or 2021. Has not been a regular, annual task of PopDy. No 2020 survey. Staff turnover in PopDy and across PDT. In 2013, MAFMC SSC developed “rumble strip” approaches for multi-year specifications. Ideas for scup were never implemented. Implementing this for monkfish would take substantial multilateral commitment.</p>

Terms of Reference: Discards

1. Review analyses provided by the Monkfish PDT of alternate approaches for setting the discard deduction from the annual catch target (ACT) when setting specifications.
2. Recommend an approach for setting the discard deduction, commenting on the PDT's recommendations.



Project Origins

Current method for setting the discard deduction

Equation 1:	$\text{discard rate} = \text{latest 3-year mean discards} / \text{catch}$
Equation 2:	$\text{expected discards} = (\text{ACT} * \text{discard rate})$
Equation 3:	$\text{TAL} = \text{ACT} - \text{expected discards}$

- For FY 2020-22, discard rate and expected discards increased due to 2015-year class discards in FY2017-19, mostly in dredge gear, mostly in South.
 - North: discard rate 14% to 18%; discards 1,026 to 1,477 mt
 - South: discard rate 25% to 51%; discards 2,936 to 6,065 mt
- Overestimating discards sets TAL unnecessarily low.
- Underestimated discards risks exceeding ACL, triggering future reductions in the ACT for the directed fishery.

Project Origins

- In 2020-2021, Council contracted Fishery Applications Consulting Team, LLC (Dr. O’Keefe) to analyze discard deduction performance and alternate methods. Explored 2, 5, 10-year time series; highest recent discards; recruitment; etc.
- In September 2021, Committee reviewed and preferred to not change methods for the FY 2022 discard deduction, mid-specification cycle.
- In 2022
 - PDT tasked with exploring alternative approaches to consider for Framework 13 FY 2023-25 specifications (and beyond?).
 - Monkfish Committee’s goal of the deduction: “...provide as much stability to the directed fishery as possible (minimizing change between specification cycles).”
 - Council approved not considering recruitment data in the current analyses.
 - PDT feels that the accuracy of the discard prediction is very important to consider.

Alternatives Analyzed

	Time series?	Mean or median?	Discard data?
Alt. 1	3-year	Mean	Discard:catch
Alt. 2	10-year	Mean	Discard:catch
Alt. 3	10-year	Median	Discard:catch
Alt. 4	10-year	Mean	Discards
Alt. 5	10-year	Median	Discards

- Discard:catch may be more appropriate when discards are in the directed fishery (more so in North?).
- Median can reduce weight of outliers. FishApps found similar results between median and mean.
- 10-year time period may decrease effect of anomalies, help with the Committee's stability goal.
- FishApps had explored use of 2- and 5-year approaches, with similar results as 3-year.

Methods

- What would the FY 2023-2025 specifications be under each alternative: 1) keeping FY 2020-22 ACT constant, 2) updated using Ismooth approach (pending SSC recommendations)?
- Hindcast performance: How do estimated and realized discards and TAL compare back to FY 2002?
 - *Accuracy of discards*: Root Mean Squared Error (RMSE) between estimated and realized discards in 3-year specification cycles (mean across each interval), FY 2002-2002 to FY 2020-2022. RMSE then averaged across entire time series. Mean Absolute Percent Error calculated too.
 - *Stability of discards*: Standard deviation (SD) and coefficient of variation (CV).
 - *Stability of TAL*: SD and CV of TAL, calculated with updated assessment data.
 - Explored setting discard deduction annually, using pre-2022 assessment data.

Results – potential specifications

- Holding FY 2020-2022 ACTs constant
 - Discard rates lower than 2020-22 (assessment data, peak discards in 2017-18 lowering).
 - Alt 1 had higher discard rate than 2 and 3, but close.
 - Alt 1 had highest expected discards and lowest TAL.
 - Alt 5 had lowest expected discard and highest TAL.
 - Alt 1 had lowest TAL difference from 2020-22.

	Discard Rate	
	North	South
Alt 1 (3-yr, D:C, mean)	13.5%	47.0%
Alt 2 (10-yr, D:C, mean)	12.3%	38.1%
Alt 3 (10-yr, D:C, median)	12.9%	35.1%
20-22 (3-yr, D:C, mean)	18.2%	50.8%

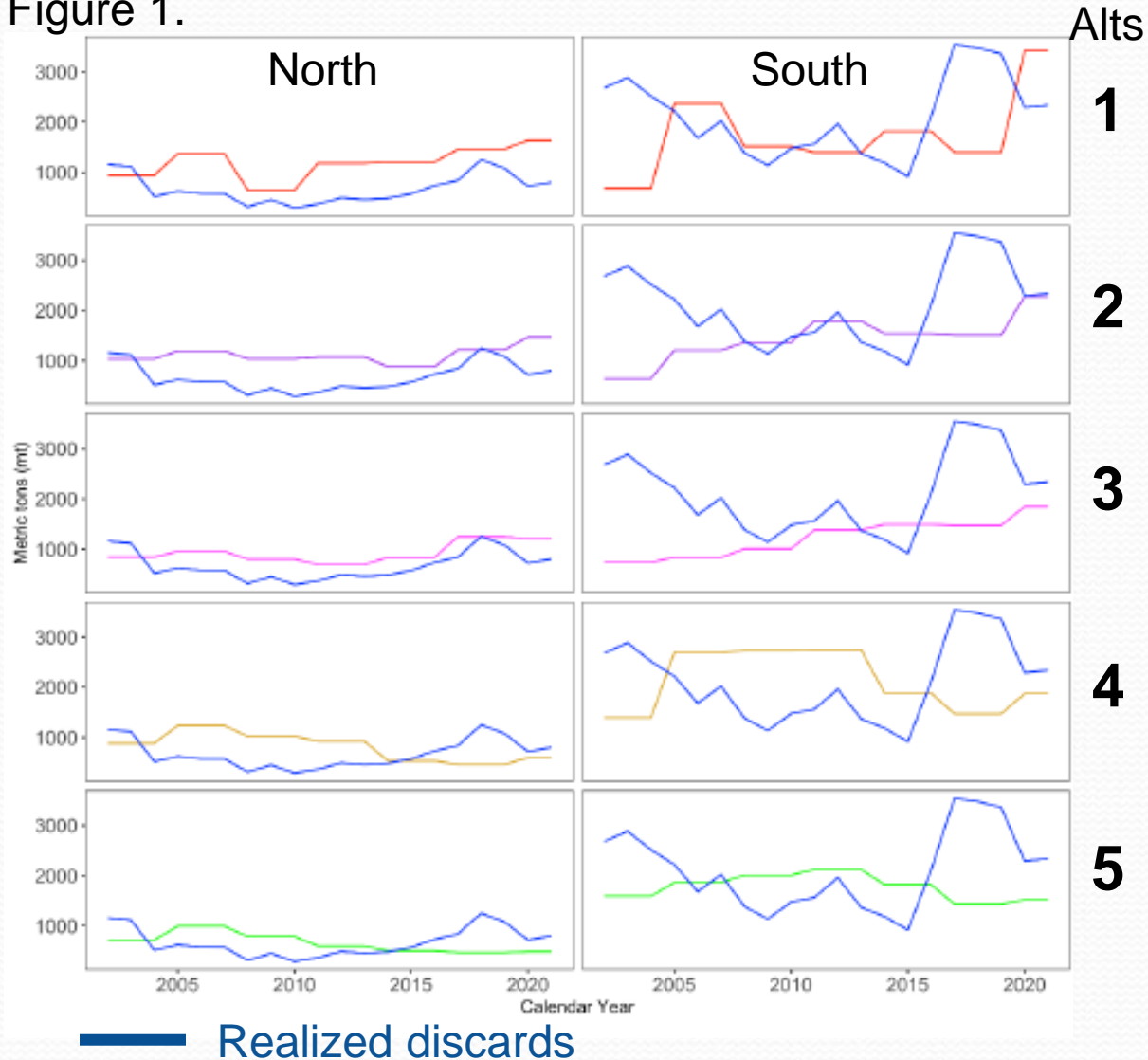
Results – potential specifications

- ACT derived from Ismooth
 - Alt 4 had highest expected discards and lowest TAL.
 - Alt 2 had lowest expected discard and highest TAL.
 - Alt 2 in North and Alt 3 in South had lowest TAL difference from 2020-22.

FY 2023-25 using Ismooth	North	South
ABC	5,360 mt	3,653 mt
ACT	5,199 mt	3,543 mt

Results – hindcast analysis

Figure 1.



- In the NFMA:
 - Alternatives 1-3 tended to overestimate discards relative to realized.
- In SFMA:
 - No alternatives showed either a strong negative or positive bias over time series.
 - Since 2018, estimated discards > realized discards for Alternative 1 only.

Results – hindcast analysis

- Overall accuracy of discard estimates
 - Alt 3 in North, 5 in South had lowest error between estimated and realized discards
- Accuracy of the variables
 - Using **discards** (Alts 4 & 5) had lower error than discard:catch (Alts 1-3) in North and South.
 - Using a time series **median** (Alts 3 & 5) had lower error than mean (Alts 1, 2, 4) in North and South.
 - Using a **10-year** time series (Alts 2-5) had lower error than 3-year (Alt 1).
- Overall stability of discard estimates and TAL
 - Like accuracy, Alt 2 in North, 5 in South had the greatest stability.
 - Like accuracy, a **10-year** time series **median** had more stability.
 - In contrast, use of the discard:catch had more stability in North, opposite in South.

Discussion – PDT recommendation

Adopt Alternative 5 for North and South
(use of latest 10-year median of discards).

- May provide the more accurate and stable discard estimate overall.
- Generally consisted with FishApps findings that a long-term median approach may help reduce uncertainty.
- Other recommendations
 - Keep having the same discard deduction approach in the North and South to simplify management, uncertain if future discards will mimic the past.
 - Keep setting the discard deduction every 3 years, vs setting ACT every three years and updating TAL annually.
 - Use the catch time series from the latest assessment whenever possible.

Discussion

Potential specifications under Ismooth and discard deduction Alternative 5

	NFMA	SFMA
FY 2020-2022 (actual)		
ABC	8,351 mt	12,316 mt
TAL	6,624 mt	5,882 mt
FY 2020-2021 Landings*	5,258 mt	2,106 mt
Potential FY 2023-2025 Specifications		
ABC (using Ismooth)	5,350 mt	3,653 mt
ACT (ABC – 3% of ABC)	5,199 mt	3,543 mt
Expected discards (using Alternative 5)	729 mt	2,205 mt
TAL	4,470 mt	1,338 mt
% change in TAL from FY 2020-2022	-48%	-77%
% change in new TAL vs FY 2020-2021 landings*	-15%	-36%
*Mean of FY 2020-2021 year-end landings from GARFO.		

Management uncertainty buffer helps prevent exceeding ACL.

Currently 3%.

Could be revisited in a future action.