Skate Plan Development Team work on FY2022-2023 Skate ABC

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Outline

- Introduction to skate specification setting and ABC control rule
- Survey indices and stock status
- Proxy for Maximum Sustainable Yield
- PDT approach to developing the FY2022-2023 ABC
- Resulting specifications flow chart
- Other information
  - Fishery data
  - Risk Policy and matrix
  - Response to SSC comments from ABC setting in 2019

Considerations for setting ABC

- Skates have been managed as a complex since the original Skate Fishery Management Plan was implemented (2003).
  - Seven species: barndoor, clearnose, little, rosette, smooth, thorny, winter
  - Due to data issues (speciation in fishery, population dynamics), Maximum Sustainable Yield and an Overfishing Limits have not been determined.
  - Proxies for MSY and $B_{MSY,}$ fishing mortality reference points, and stock status determinations have been based on the time series of the ratio of catch to the NEFSC trawl survey biomass index. Updated annually.
- 2007 = Last stock assessment; lack of stock structure data and species composition of landings hindered modelling. Fishing mortality rates unknown.
- 2009 = Amendment 3 set the current ABC control rule based on long-term median fishery catch and the trawl survey biomass index (kg/tow).
- 2023 = Management track assessment scheduled (postponed from 2021).

Doc 2
p.1, 9

ABC control rule

> "ABC is the median ratio of catch/biomass of each of the seven skate species multiplied by its three-year moving average stratified mean biomass (weight/tow) for skates, summed over the seven skate species in the management unit."

More simply: the long-term median catch of each species (landings plus discards) is adjusted by its ratio of short-term over long-term trawl survey biomass (kg/tow). Results are then summed for a complex-wide ABC.

If following control rule exactly, would use:

- Spring survey data for 2019-2021 for little skate.
- Fall survey data for 2018-2020 for other species.
- Fishery catch data for 2018-2020.

ABC control rule

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p.1, 9

However:

- Missed some stations in 2018; no survey data for 2020;
- NEFSC indicated in January 2021 that only survey data through 2019 will be used while decisions are made on how to handle the survey gaps in 2020.
- PDT developed a modification (again); not the first-time adjustments are needed to account for missed stations, but the degree of missing data is more severe.

Recall, control rule was modified for FY2020-2021 specifications:

- Southern stations missed in fall 2017, so no rosette or clearnose indices. Two-year average used for those species (2016, 2018).
- Missed stations in fall 2017 and 2018 impacted barndoor, thorny, smooth, winter. Three-year average used (2016-2018), adjusted to account for the missing strata.

Survey indices

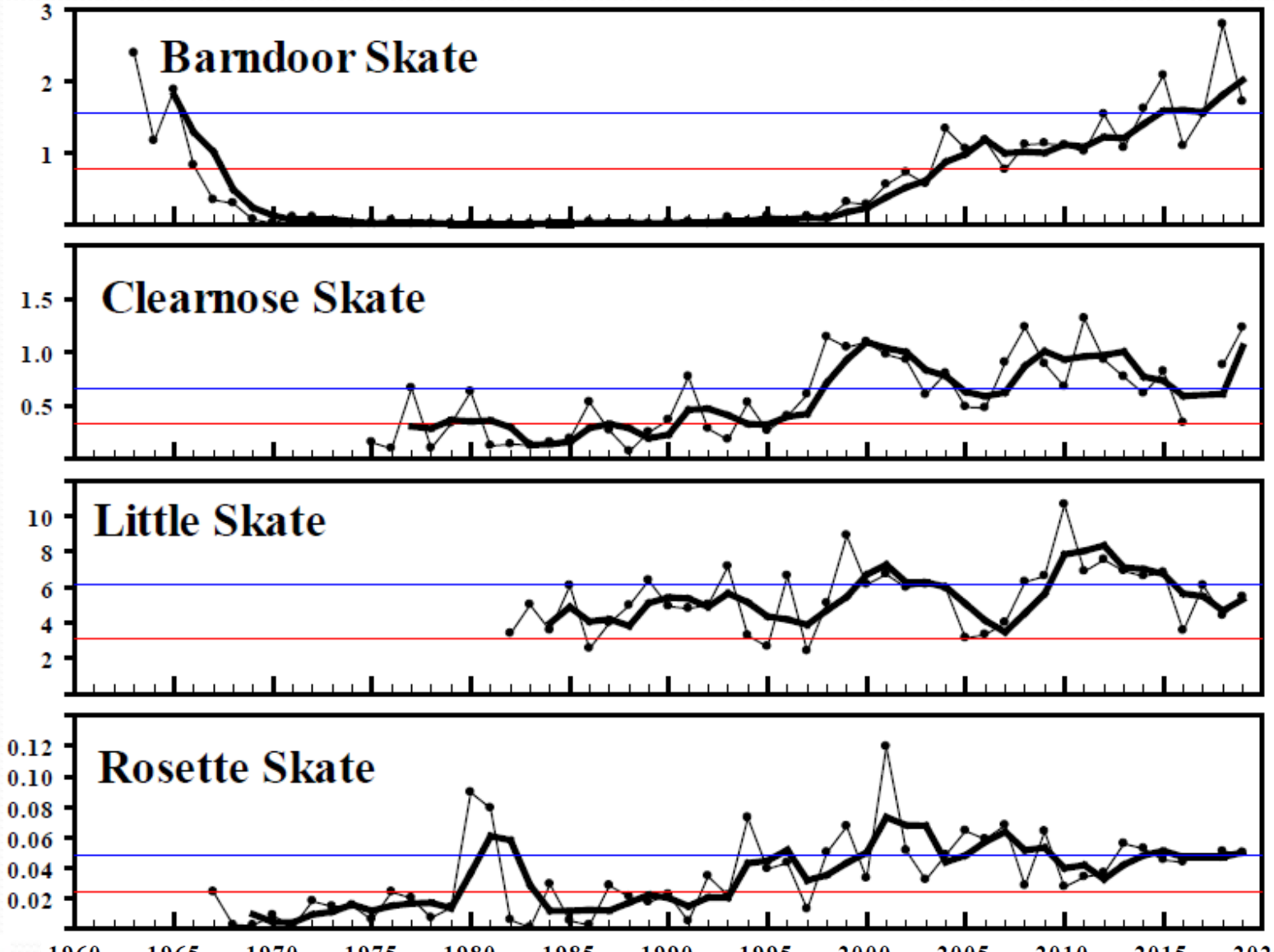
Doc 2
p.4-6

Key points:

- The latest survey data available are 2019.
- For all seven skate species, the 2017-2019 average survey index increased over 2016-2018.
- Little and winter skate continue to dominate survey biomass.
- Most species near or above biomass target.
- Thorny skate persistently below biomass threshold.

Survey indices

PDT memo: Figure 1, Table. NEFSC Biomass Index (kg/tow)



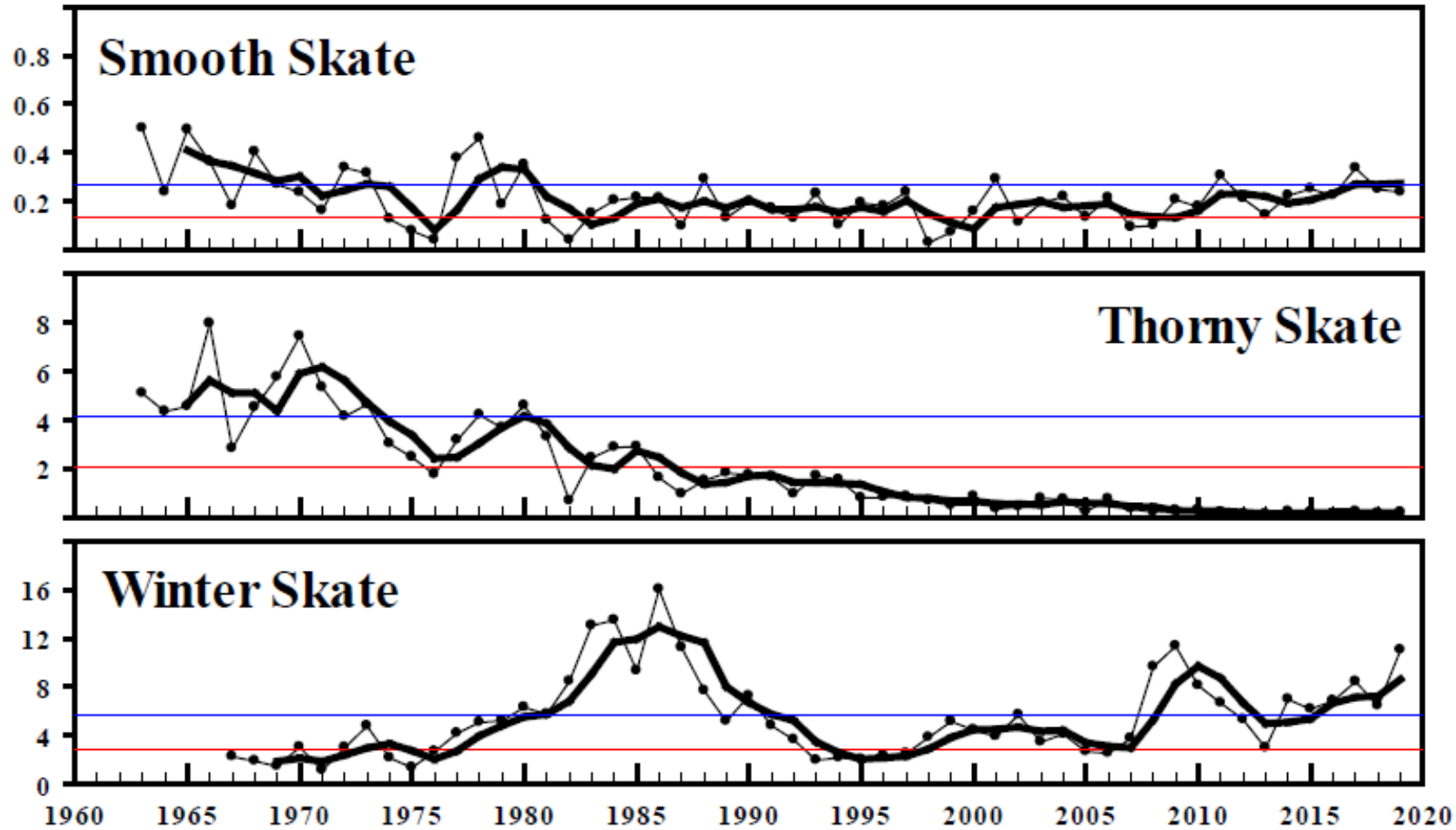
	% change 2017-2019 vs 2016-2018
Barndoor Skate	+11.4%
Clearnose Skate	+73.1%
Little Skate	+13.4%
Rosette Skate	+6.4%

Blue line = biomass target
Red line = biomass threshold

Survey indices

PDT memo: Figure 1, Table. NEFSC Biomass Index (kg/tow)

% change 17-19 vs 16-18



+1.7%

+11.4%

+19.2%

Blue line = biomass target
Red line = biomass threshold

Stock status

Doc 2 p.4

Doc 4 p.6-9

Overfishing? None of the seven skate species.

- *Overfishing* is occurring if three-year moving average of the survey biomass index declines by more than the average coefficient of variation of the survey time series. If so, fishing mortality is assumed to be greater than F_{MSY}.

Overfished? Only thorny skate.

- *Overfished* if the three-year moving average of the survey biomass index is below its biomass threshold reference point ($B_{threshold}$), which is ½ $B_{MSY\ proxy}$.
- $B_{MSYproxy}$ = B_{target} = the 75th percentile (average for barndoor) of its survey biomass index, measured in kg/tow during a specific set of years for each species.*
- Thorny skate has a rebuilding plan; possession prohibited. 25-year rebuilding deadline is in 2028. As of 2019 survey data, thorny skate was at 4% of $B_{MSYproxy}$.

*time series unique to each species. See PDT memo, Table 2.

Proxy for Maximum Sustainable Yield

PDT proposing no change:

- MSY_{proxy} = the median of catch/biomass over the time series* multiplied by the $B_{MSYproxy}$.
- The MSY_{proxy} for each species is summed over all seven species in the complex.
- **MSY_{proxy} = 36,794 mt.** Unchanged since FY 2018-2019 specifications.
  - Using data through 2016; only data through 2019 may be used for these specifications.
  - Adding three more years of data (2017-2019) to a 50+ year time series for most species (44 for clearnose, 37 for little) is unlikely to substantially change the MSY_{proxy}.
  - MSY methods will be reviewed during the stock assessment in 2023, the outcomes of which will inform the development of the FY 2024-2025 specifications.

*time series unique to each species. See PDT memo, Table 2.

ABC development – consensus method

PDT proposing modification:

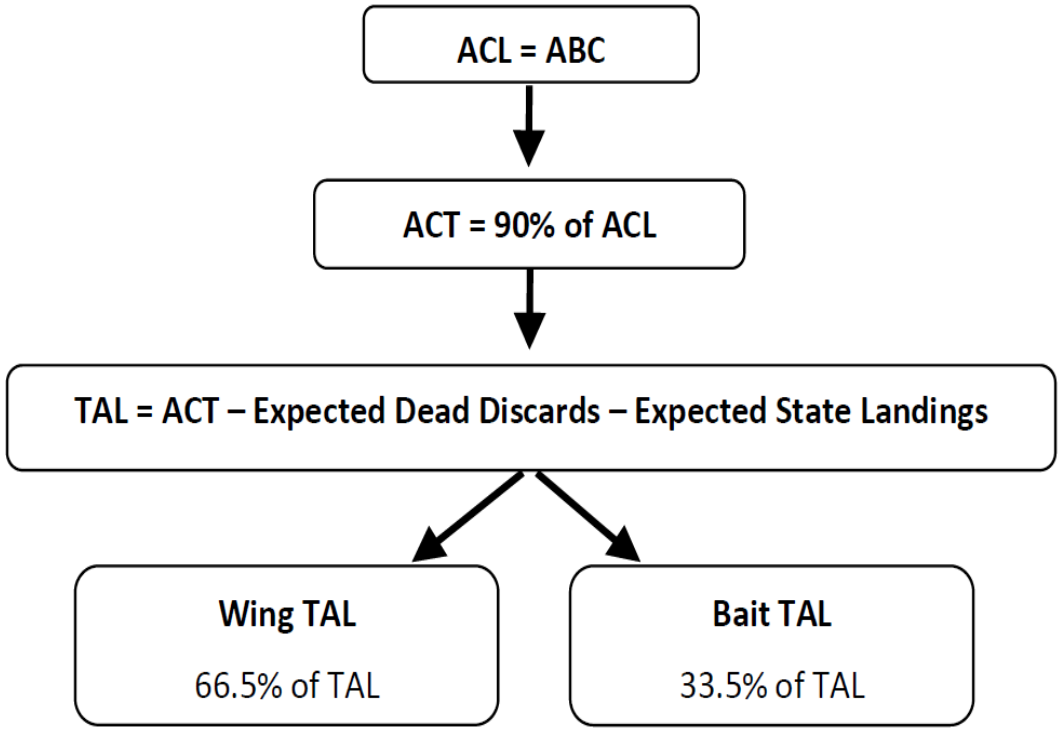
- For survey indices,
  - Continue using three-year average where possible.
    - Little skate = 2017-2019 spring survey data, like for FY 2020-2021.
    - Barndoor, thorny, smooth, and winter skate = data updated to fall 2017-2019.
  - Use two-year average if lack of data.
    - Rosette and clearnose skate = 2018-2019 fall data, no fall 2017 data.
- For catch/biomass time series,
  - Continue using data through 2016. Adding 3 years of data unlikely to shift 50+ year time series.
- Methods likely reevaluated in 2023.

ABC development – consensus method

			Alternative 1 (FY 2020-21)	Control Rule (ideal)	Alternative 2 (DRAFT)
Survey indices	Spring	Little	2017-19	2019-21	2017-19
	Fall	Rosette & clearnose	2016 & 18 (no 2017 data)	2018-20	2018-19
		Barndoor, thorny, smooth, winter	2016-18		2017-19
Catch/biomass time series			Time series to 2016	Not always updated	Times series to 2016
2022-2023 ABC			**32,715 mt**		**37,236 mt**
State & discard deductions*			2016-18	2018-20	2017-19

*For ACL flow chart.

ABC/ACL flow chart

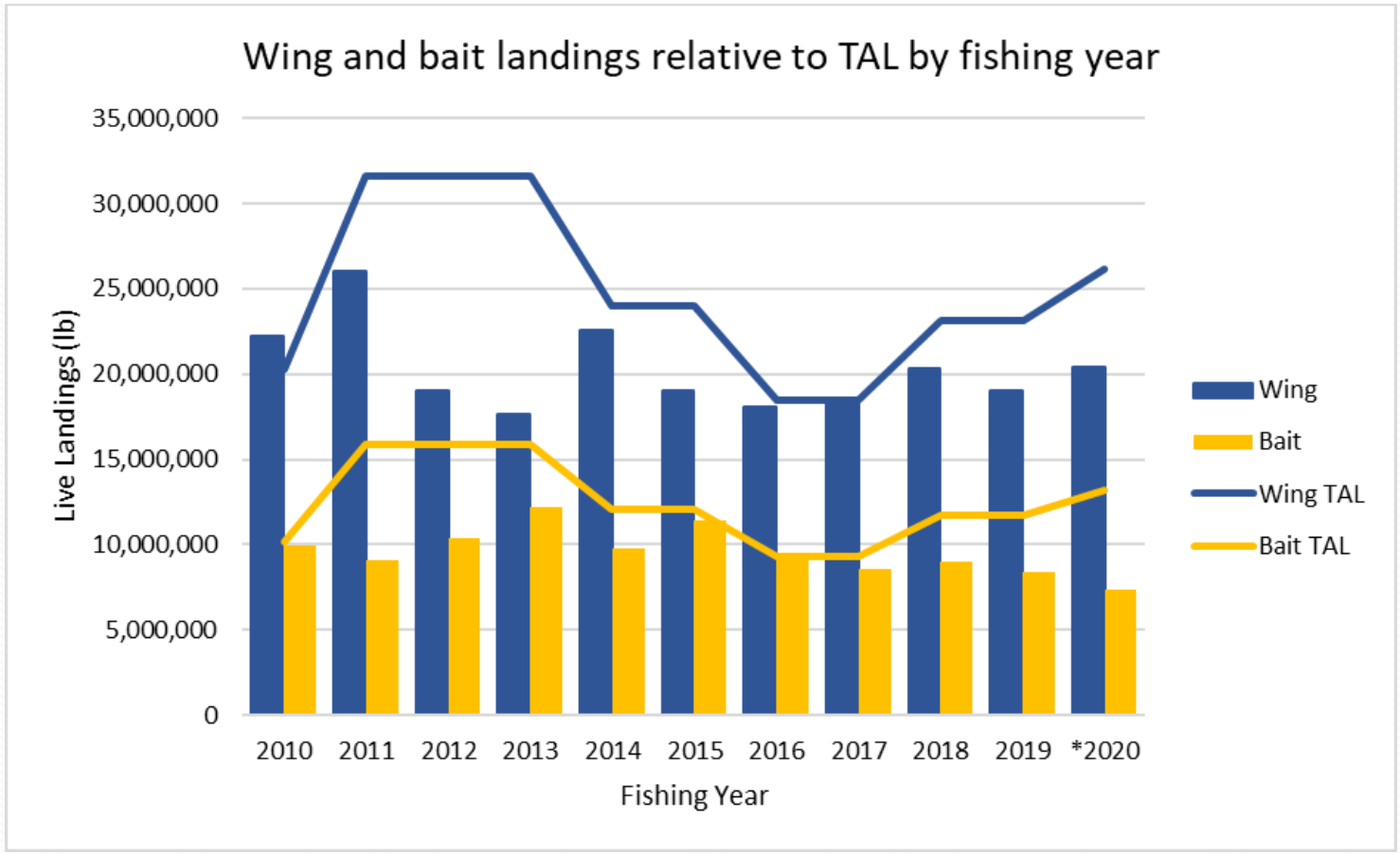


	Alt. 1 (mt)	Alt. 2 (DRAFT, mt)
ABC = ACL	**32,715**	**37,236**
ACT	**29,444**	**33,513**
Dead Discards	10,942	11,856
State Landings	638	515
Federal TAL	**17,864**	**21,142**
Wing TAL	**11,879**	**14,059**
Bait TAL	**5,984**	**7,082**

Fishery Data

Doc 4
p.47-62

Affected Environment: Figure 9, Tables 12, 18, 19



- ACL has never been exceeded.
- 69% of ACL caught in FY 2020, down from FY 2017 (81%).
- TALs not exceeded since FY 2017.
- 71% of TAL landed in FY 2020, down from FY 2017 (99%).
- Landings relatively constant despite TAL changes.
- Bait landgings more constant than wing. Bait is a more directed fishery, wing more incidental.
- Since 2004, <20 bait only vessels/year, 21-80 bait and wing vessels/year (increasing), 700-260 wing only vessels/year (decreasing).

NEFMC Risk Policy

Doc 6 p.4-5

Doc 2 p.5

Policy: *Recognizing that all fishery management is based on uncertain information and that all implementation is imperfect, it is the policy of the NEFMC to weigh the risk of overfishing relative to the greatest expected overall net benefits to the Nation.*

PDT memo: Table 2

	Barndoor	Clearnose	Little	Rosette	Smooth	Thorny	Winter
% change in survey indices, 17-19 vs 16-18	+11.4%	+73.1%	+13.4%	+6.4%	+1.7%	+11.4%	+19.2%
% change for overfishing status determination	-30%	-40%	-20%	-60%	-30%	-20%	-20%

Risk of overfishing is low.

NEFMC Risk Matrix

Doc 3

Major management issues/challenges:

- Overfishing definitions based on trawl survey, not fishing activity.
- Gaps in survey coverage, particularly in 2020.
- Speciation can be difficult in the field; species-specific landings and discard data are extrapolations.
- Most species- and gear-specific discard mortality rates are assumed to be 50% (without specific research).
- Skates last assessed in 2007.
- Assessment postponed from 2021 to 2023.
- Thorny skate biomass remains low.

NEFMC Risk Matrix

Doc 3

Other information:

- Fishery revenue $5-9M since 2010, varying with wing landings more than bait.
- Total active skate vessels declined from 550 in 2010 to 357 in 2019.
- Of 400 total ports active since 2010, 8 primary and 21 secondary, ME to NC.
- Fishery centered in Chatham, New Bedford, Pt. Judith.
- Skates likely to shift distribution with warming conditions.
- Thorny skate contracting and moving northward (Gulf of Maine) and into deeper waters.

PDT Response to 2019 SSC comments

SSC Comment	PDT Response
Present thorny skate research updates.	Tracking 7+ projects. Outcomes should be considered in 2023 assessment. Showing: • Decreased tolerance to elevated temperature and pCO_2. • Declines on Grand Banks attributed to warmer waters, lack of prey, fishing. • Decreasing suitable habitat with warming waters. • Gulf of Maine thorny skate somewhat isolated. • Trawl discard mortality at 25%, other mortality sources likely hindering recovery. Bycatch and genetic work ongoing.

PDT Response to 2019 SSC comments

SSC Comment	PDT Response
Explore excluding thorny skate from ABC since landings are prohibited.	Thorny skates must be discarded. Since there is assumed fishing mortality, it is appropriate to keep thorny in the ABC from which dead discards are subtracted. 2023 assessment should examine.
Addressing survey gaps should be more systematic; gaps may increase in future.	Agree! Issue more pronounced this specifications cycle. NEFSC working on this. 2023 assessment should examine.
Explore alternate abundance indices (e.g., use of longline survey).	2023 assessment should examine.