Shark Stock Complex

BSAI Groundfish Plan Team Presentation
November 2022

Cindy Tribuzio*, Mary Elizabeth Matta, Katy B Echave, Cara Rodgveller, Garrett Dunne and Keith Fuller

OUTLINE

- Combined BSAI/GOA SAFE document

- Stock overview

- Relevant PT and SSC comments

- Status Quo Model

- Alternative Models

- Harvest Recommendations

COMBINED SHARK SAFE

- Combines redundant sections from both FMPs
- Provides separate FMP management advice
- Streamlined
- Reproducible!!!

### 19. Assessment of the Shark Stock Complex in the Bering Sea/Aleutian Islands and Gulf of Alaska

Cindy A. Tribuzio, Mary Elizabeth Matta, Katy B. Echave, Cara Rodgveller, Garrett Dunne and Keith Fuller

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EXECUTIVE SUMMARY

This document presents the assessments for the shark stock somplexes (Pacific spiny dogfish, Pacific sleeper shark, salmon shark and other/unidentified sharks) in the Gulf of Alaska (GOA) and Bering Sea/Aleutian Islands (BSAI) Fishery Management Plan (FMP) areas. Separate management advice is presented for each of the FMP shark stock somplexes and combining the two assessment documents does not change the management structure for the FMP shark stock complexes. The purpose of developing a combined shark stock complex assessment document is to ensure that review bodies have access to

STOCK COMPLEX OVERVIEW
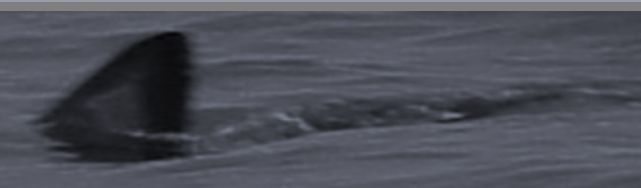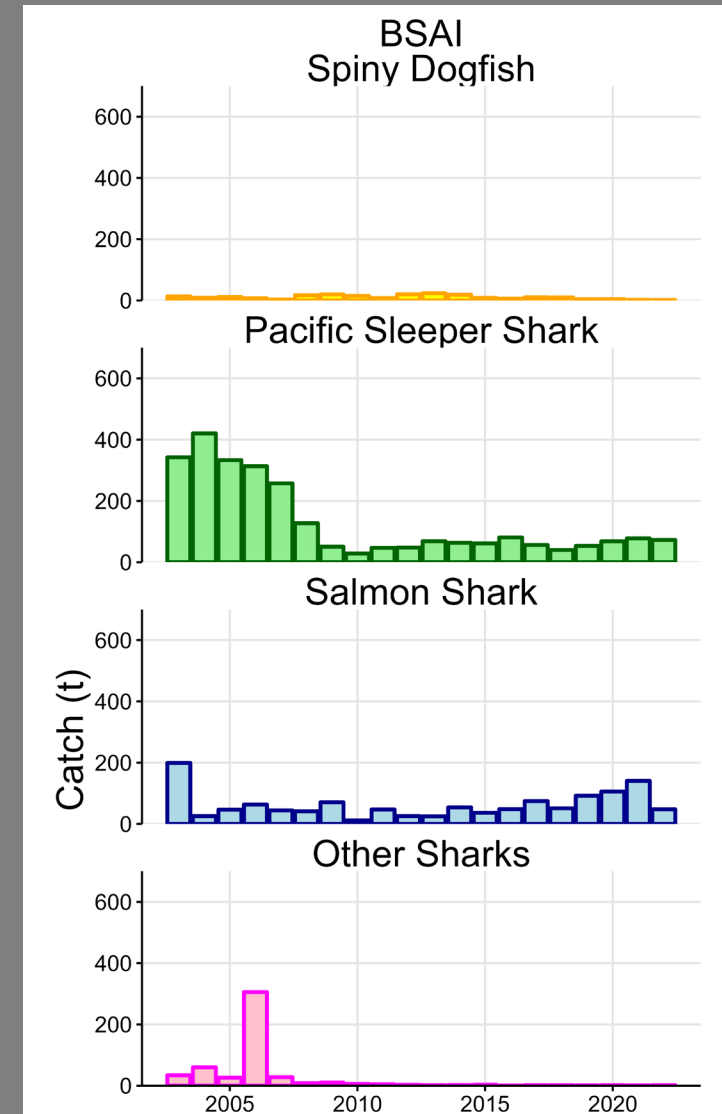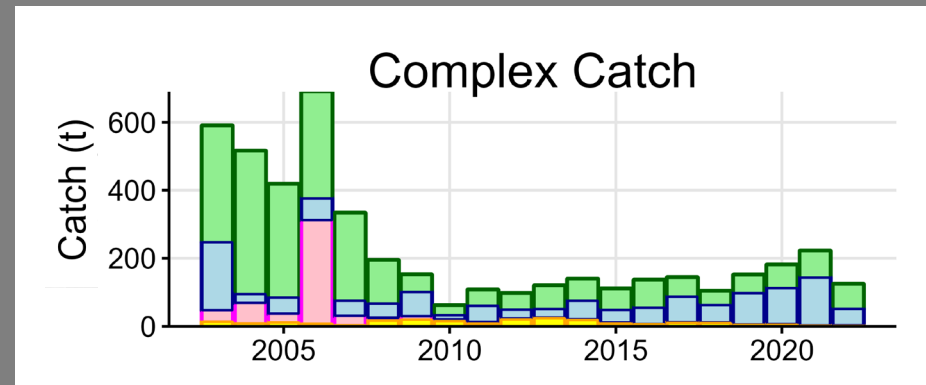
- Tier 6 Stock Complex
    - Pacific sleeper shark
    - Salmon shark
    - Spiny dogfish
    - Other/unidentified sharks
- OFL = 689 t
- ABC = 517 t
- Catch updated
    - 2022 = 123 t (as of Oct 8, 2022)
   - On average catch increases by ~12% after Oct 1

BSAI SHARKS

Complex Catch

BSAI
Spiny Dogfish

Pacific Sleeper Shark

Salmon Shark

Other Sharks

RELEVANT PT AND SSC COMMENTS

- *".......the SSC asks for additional examination and recommendations from the author and GPTs regarding the following [ORCS]:*

  - *SSC1: Whether the 75% ABC buffer is appropriate....... the evaluation ....[of] "fully exploited", and the assumption that all stocks that are fully exploited are at or above BMSY.*

  - *SSC2: the ORCS table of attributes ....do not include any consideration of maturity of individuals caught ......[and how that relates to status].*

  - *SSC3: Is it appropriate to include the "Discard rate" category for a species that is not retained?*

  - *SSC4: Should uncertainty be evaluated only within the ORCS model (percentile scalar is chosen to satisfy risk tolerance and is set based on confidence that the exploitation status is correctly identified) or also outside the model in the risk table, noting that the ORCS scoring criteria also address aspects of risk."* (SSC October 2022)

MODELS – STATUS QUO

Status Quo

- OFL = Max catch 2003 – 2015

- ABC = 0.75 * OFL

- Based on **FULL COMPLEX CATCH**
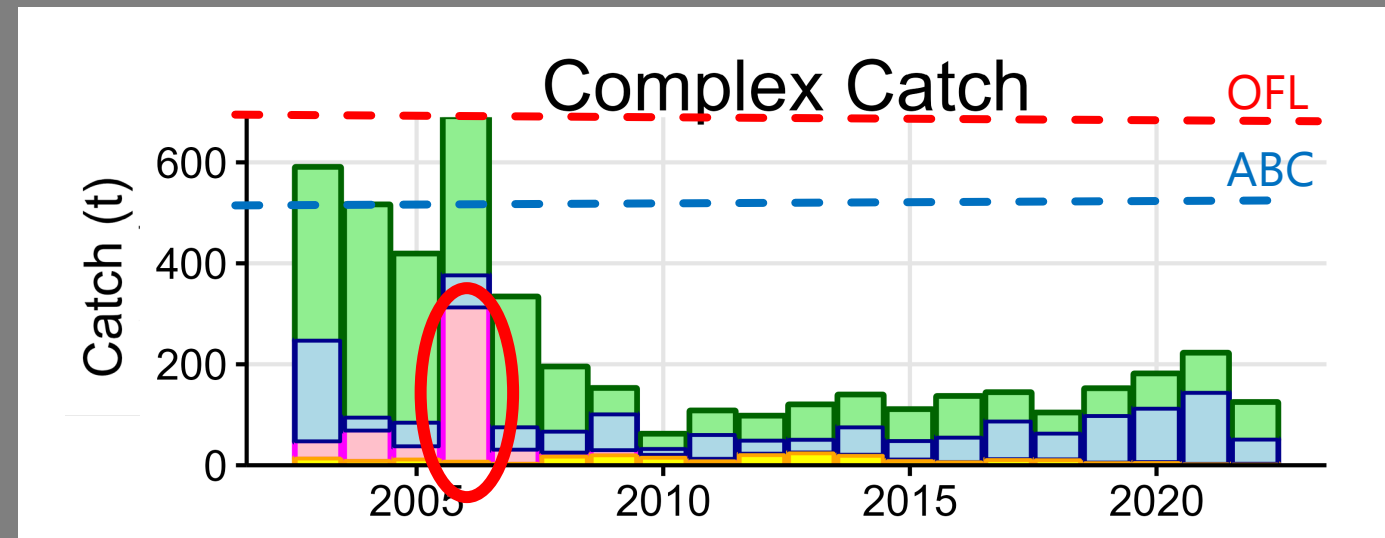
- Dominated by likely erroneous value for exceedingly rare "other/unidentified sharks"

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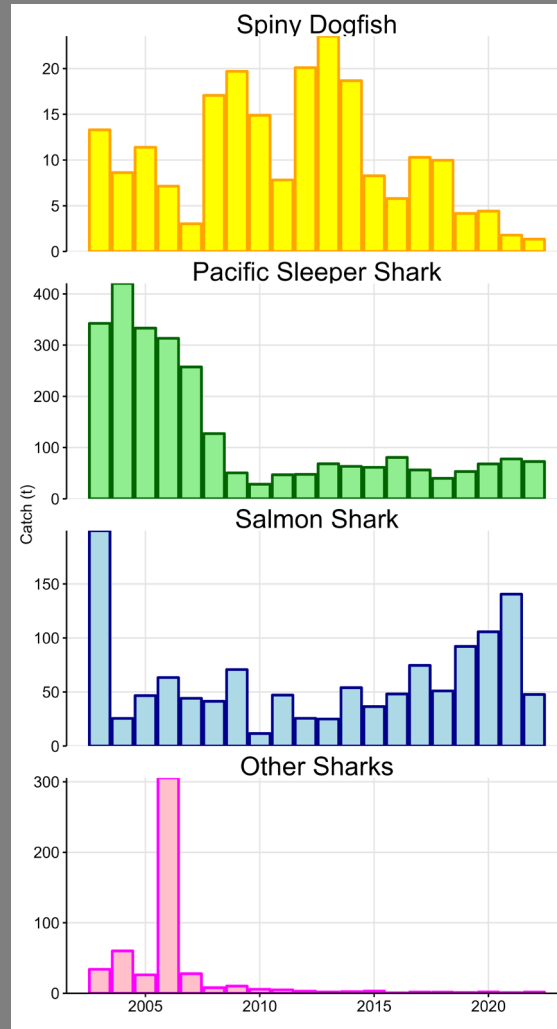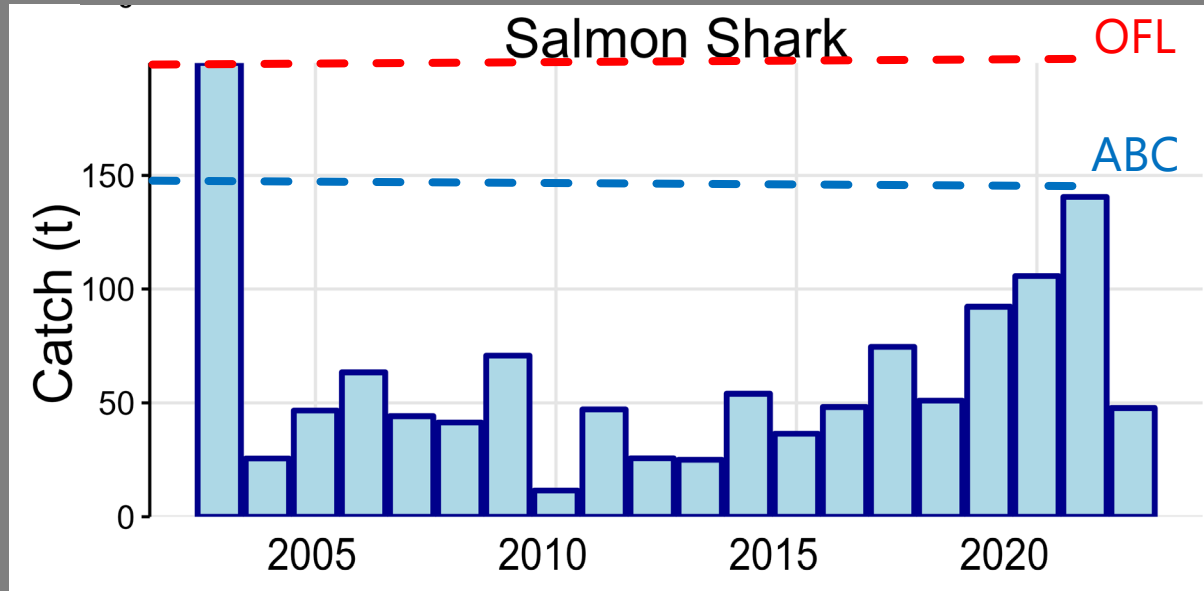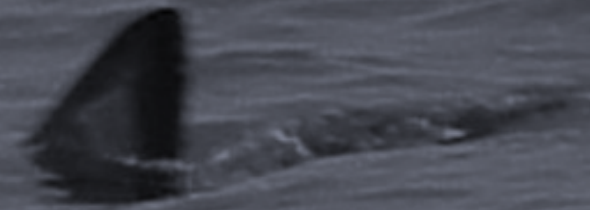

Alternative Models

SPECIES SPECIFIC

- Salmon Shark (SS)

- Other/unidentified Sharks (OS)

- Spiny Dogfish (SD)
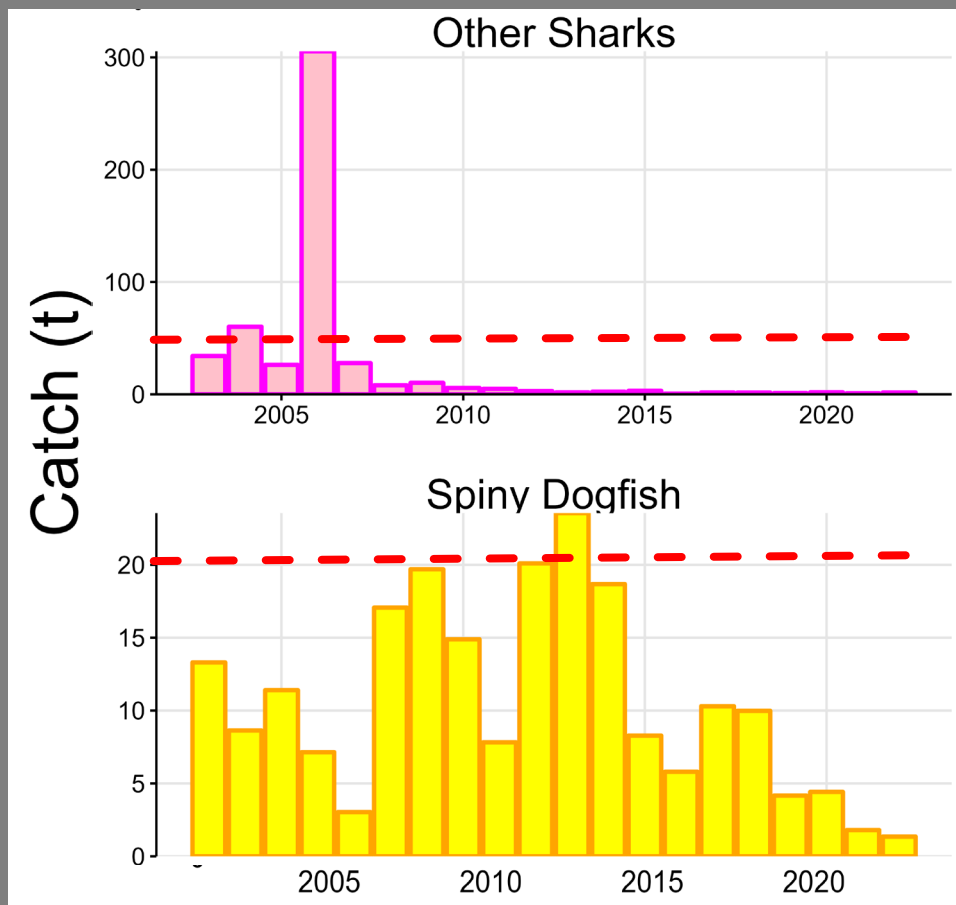
- Pacific Sleeper Shark (PSS)

MODELS – SALMON SHARK

Salmon Shark

Status Quo

- No model change
- Not previously species specific
- OFL = maximum of catch 2003 – 2015
- ABC = 0.75 * OFL
- SS OFL = 199 t, ABC = 149 t

ALT MODELS – OTHER/UNID AND SPINY

90th Percentile

- OFL = 90th percentile of catch 2003 – 2015

- ABC = 0.75 * OFL

- Accounts for likely unreasonable extrapolations

- OS OFL = 55 t, ABC = 41 t

- SD OFL = 20 t, ABC = 15 t

Questions on OS and SD Alternative Models

Up next: Pacific Sleeper Shark alternative models

ALT MODEL – PACIFIC SLEEPER SHARK

NOAA Technical Memorandum NMFS-SEFSC-616

Only Reliable Catch Series (ORCS)

- Used in other federal catch-only stocks

- Expert judgment used to qualitatively score attributes (Table 19.7)

- Flexible to additional attributes

- Robust to assumptions of stock status

- Allows for incorporation of uncertainty of input information

CALCULATING ACCEPTABLE BIOLOGICAL CATCH FOR STOCKS THAT HAVE RELIABLE CATCH DATA ONLY
(Only Reliable Catch Stocks – ORCS)

Fisheries Research 193 (2017) 60–70

Contents lists available at ScienceDirect

Fisheries Research

journal homepage: www.elsevier.com/locate/fishres

Full length article

The refined ORCS approach: A catch-based method for estimating stock status and catch limits for data-poor fish stocks

Christopher M. Free [a,*], Olaf P. Jensen [a], John Wiedenmann [b], Jonathan J. Deroba [c]

[a] Department of Marine and Coastal Sciences, Rutgers University, New Brunswick, NJ, USA
[b] Department of Ecology, Evolution, and Natural Resources, Rutgers University, New Brunswick, NJ, USA
[c] NOAA Fisheries, Northeast Fisheries Science Center, Woods Hole, MA, USA

ALT MODEL – PACIFIC SLEEPER SHARK

	Attribute	Score	Justification
1	Status of assessed stocks in fishery	1	0% of fishery stocks are overfished
2	Behavior affecting capture	2	Species does not exhibit significant aggregating behaviors
3	Discard rate	3	Discard rates are 88%
4	Targeting intensity	1	All sharks are non-targeted
5	M compared to dominant species	3	M is >20% lower than dominant species
6	Occurrence in catch	1	Occurs in <2% of observed hauls

- Table 19.9 and described in detail in model results section

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- **SSC3** ORCS is designed to encompass both discarded and retained stocks, Free et al. (2017) included both in analyses

ALT MODEL – PACIFIC SLEEPER SHARK

	Attribute	Score	Justification
7	Value	1	Little to no market value
8	Recent trend in catch	2	No significant trends
9	Habitat loss	1	Species does not occupy identified threatened habitats
10	Recent trend in effort	2	No significant trends
11	Recent trend in abundance index	NA	No recent BSAI data
12	Proportion of population protected	3	No specific protection measures
13	Life history considerations	3	Low productivity and large proportion of catch is immature

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- **SSC2**: Added to incorporate maturity of catch and species productivity
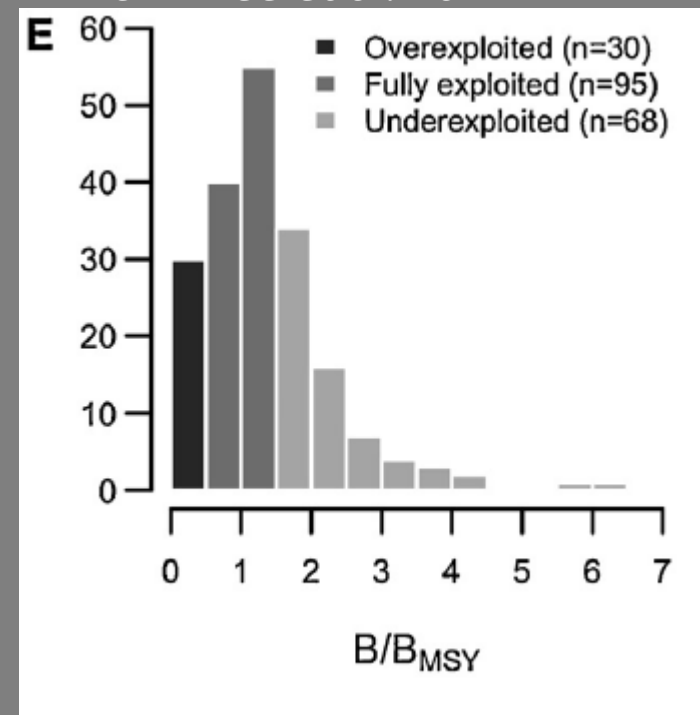
ALT MODEL – PACIFIC SLEEPER SHARK

Mean attribute score determines

(Table 19.8, adapted from Free et al. 2017)

| Mean Score	Stock status	Catch statistic	50th
<1.5	Underexploited	90th percentile, whole time series	1.90
1.5 – 2.5	Fully exploited	25th percentile, previous 10 years	2.16
> 2.5	Overexploited	10th percentile, whole time series	1.56

From Free et al. 2017

SSC1

ALT MODEL – PACIFIC SLEEPER SHARK

Mean Score	1.92
Stock Status	Fully Exploited
Catch Statistic	54 t
Scalar	2.16
OFL	117
ABC	88

Pacific Sleeper Shark
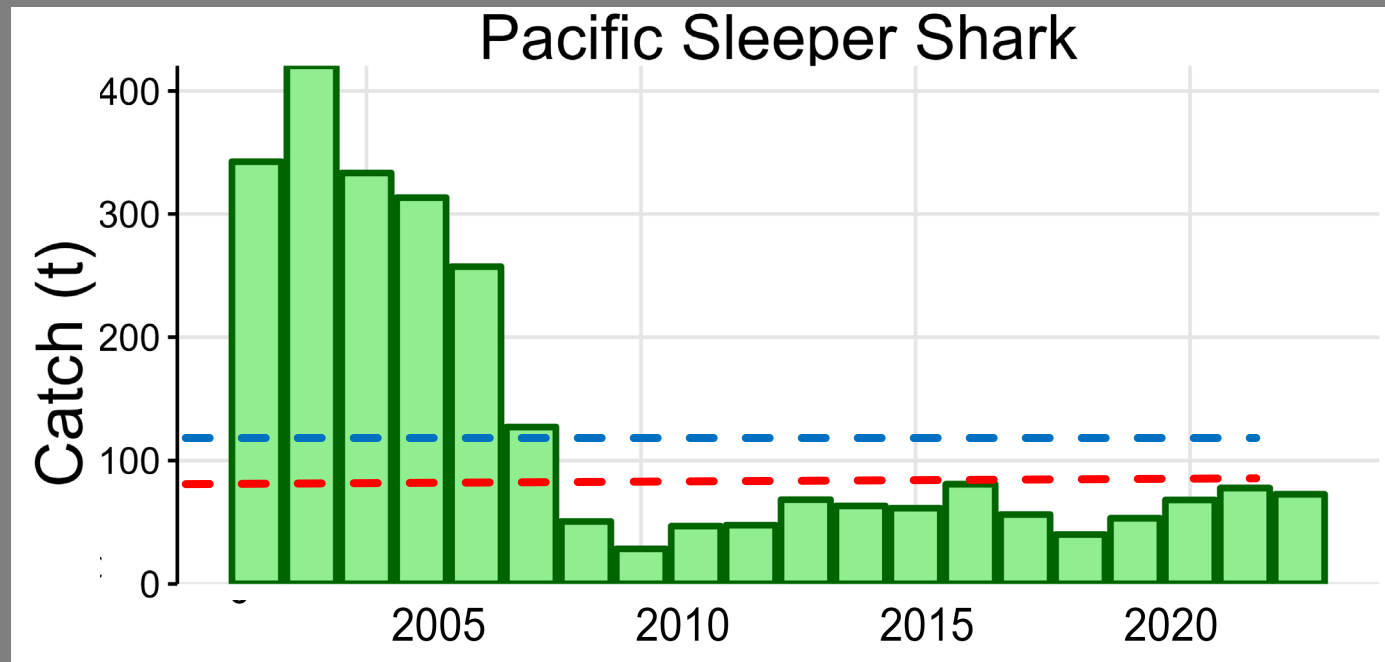
For comparison, if classified as "overexploited" with 50th percentile scalar the ABC/OFL would be 52 t and 70 t
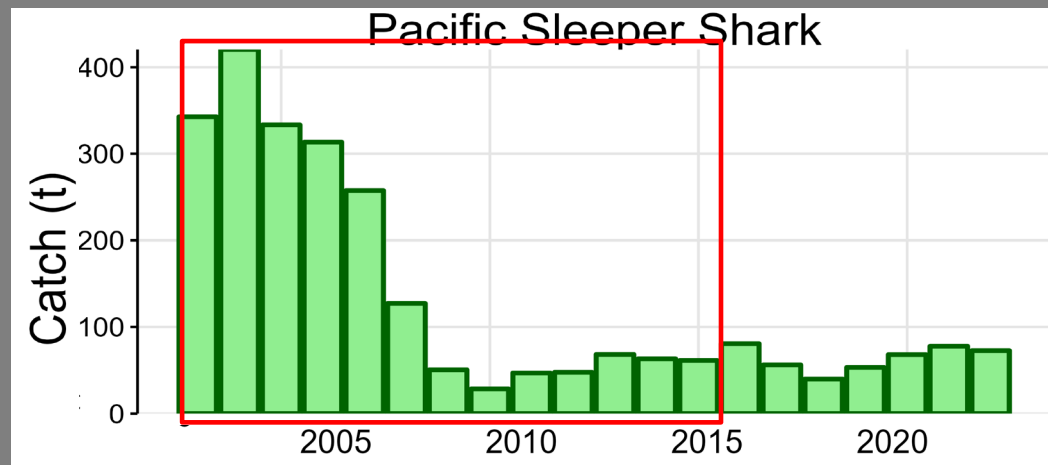
Questions on PSS Alternative Model
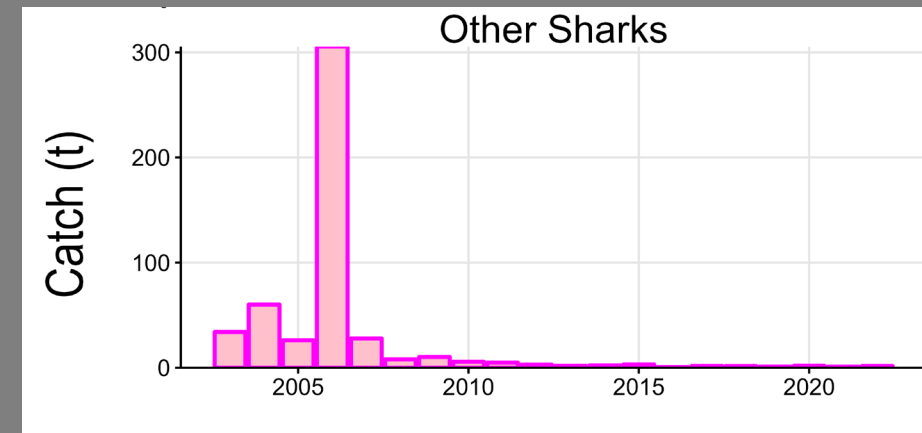
Up next: Recommendations

HARVEST RECOMMENDATIONS

- PSS Status Quo Concerns:

  - Time series needs to be based on period of stable catch

  - Maximum or Mean catch scalars have high risk of overfishing

  - Does not allow for inclusion of other information

Pacific Sleeper Shark

HARVEST RECOMMENDATIONS

- PSS Status Quo Concerns:

  - Time series needs to be based on period of stable catch

  - Maximum or Mean catch scalars have high risk of overfishing

  - Does not allow for inclusion of other information

- Other/Unidentified Sharks Status Quo Concerns:

  - Rare occurrences can result in large catch extrapolations
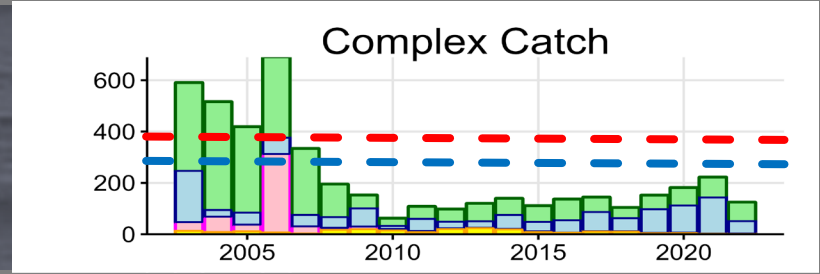

Other Sharks

HARVEST RECOMMENDATIONS

- Alternative models:

  - Account for erroneous catch extrapolations due to extremely rare events

  - Expand information utilized for Pacific sleeper shark, so that the Best Scientific Information Available is being used

- PSS22.0 (ORCS) is a much improved base model, potential future model explorations

  - Adaptable

  - Weighting attributes

  - Expanding time series indices beyond recent 5 years for long lived species
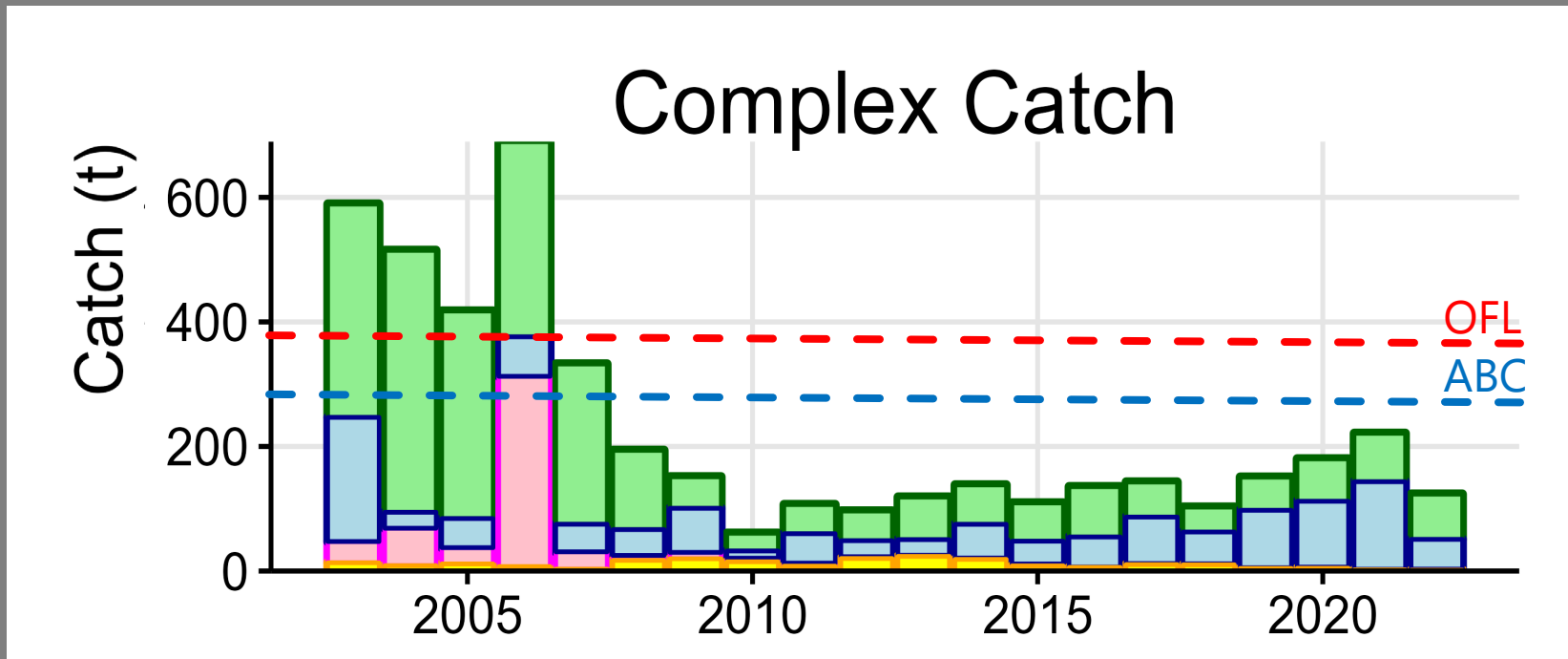
HARVEST RECOMMENDATIONS

Complex Catch

Status Quo

Species	Model	Catch Statistic	OFL (t)	ABC (t)
Pacific Sleeper				
Salmon				
Other/Unid				
Spiny Dogfish				
Shark Stock Complex	16.0	689	**689**	**517**

Alternative Models

Species	Model	Catch Statistic	OFL (t)	ABC (t)
Pacific Sleeper	PSS22.0	54*2.16	117	88
Salmon	SS22.0	199	199	149
Other/Unid	OU22.0	55	55	41
Spiny Dogfish	SD22.0	20	20	15
Shark Stock Complex			**391**	**293**

Complex Catch

HARVEST RECOMMENDATIONS

Risk Tables

Assessment-related	Population dynamics	Enviro/ ecosystem	Fishery Performance
Level 1: no increased concerns	Level 2: Substantially increased concerns	Level 1: no increased concerns	Level 1: no increased concerns

SSC4

- SSC: "risk" is the risk of the ABC exceeding the true (but unknown) OFL

- Different sources of information

- Selection of ORCS OFL scalar does not overlap with risk table

  - ORCS allows for informed OFL choices

  - Risk table adjusts ABC buffer

HARVEST RECOMMENDATIONS

Risk Tables

Assessment-related	Population dynamics	Enviro/ ecosystem	Fishery Performance
Level 1: no increased concerns	Level 2: Substantially increased concerns	Level 1: no increased concerns	Level 1: no increased concerns

SSC1

- Is 75% buffer appropriate?
- The Tier 5/6 HCR does allow for reductions of the buffer
- Bigger question than just sharks

HARVEST RECOMMENDATIONS

Risk Tables

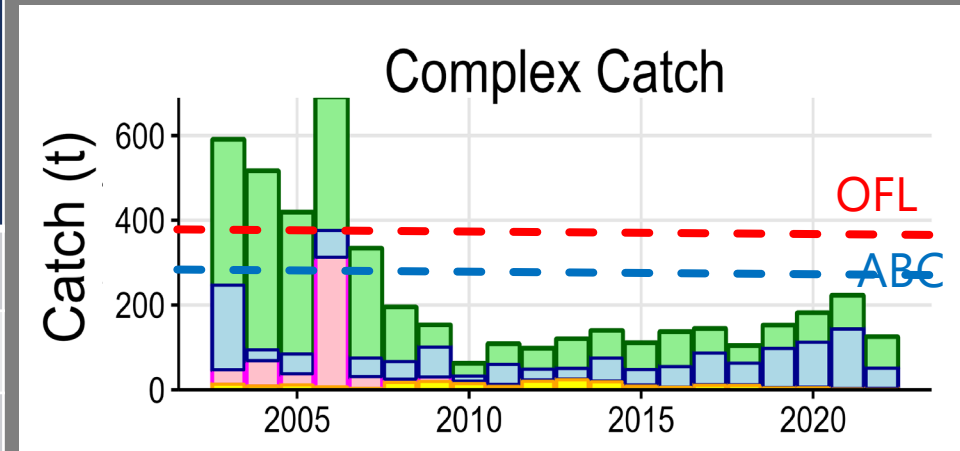| Assessment-related	Population dynamics	Enviro/ ecosystem	Fishery Performance
Level 1: no increased concerns	Level 2: Substantially increased concerns	Level 1: no increased concerns	Level 1: no increased concerns

ABC Reductions

- Available information do not suggest reductions from maximum ABC are necessary

- **IF** alternative models are selected

- Status Quo:
  - Population dynamics to Level 3 due to PSS considerations

HARVEST RECOMMENDATIONS

Quantity	As estimated or specified last year for:		As estimated or recommended this year for:	
	2022	2023	2023	2024
Tier	6	6	6	6
OFL (t)	689	689	**391**	391
maxABC (t)	517	517	293	293
ABC (t)	517	517	**293**	293
	As determined last year for:		As determined this year for:	
Status	2020	2021	2021	2022
Overfishing	No	n/a	No	n/a

Complex Catch

Assessment	Population dynamics	Environ/ ecosystem	Fishery Performance
Level 1: Substantially increased concerns	Level 2: Substantially increased concerns	Level 1: no increased concerns	Level 1: no increased concerns

Questions, comments or feedback

Contact: Cindy.Tribuzio@noaa.gov

- Harvest Recommendations

- SSC requested discussions
  - **SSC1**: 75% buffer, "fully exploited" and BMSY assumption
  - **SSC2**: addition of life history attributes
  - **SSC3**: discard rate attribute
  - **SSC4**: risk in ORCS vs risk in risk tables