C4 Gulf of Alaska Groundfish November 2023 Plan Team Report

Sara Cleaver, Jim Ianelli, and Chris Lunsford

NOAA FISHERIES

December 2023, Presentation to the Council

GF Plan Team Meetings, November 13-17th, 2023

NORTH PACIFIC FISHERY MANAGEMENT COUNCIL

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Report on the Gulf of Alaska

Groundfish Plan Team Meeting

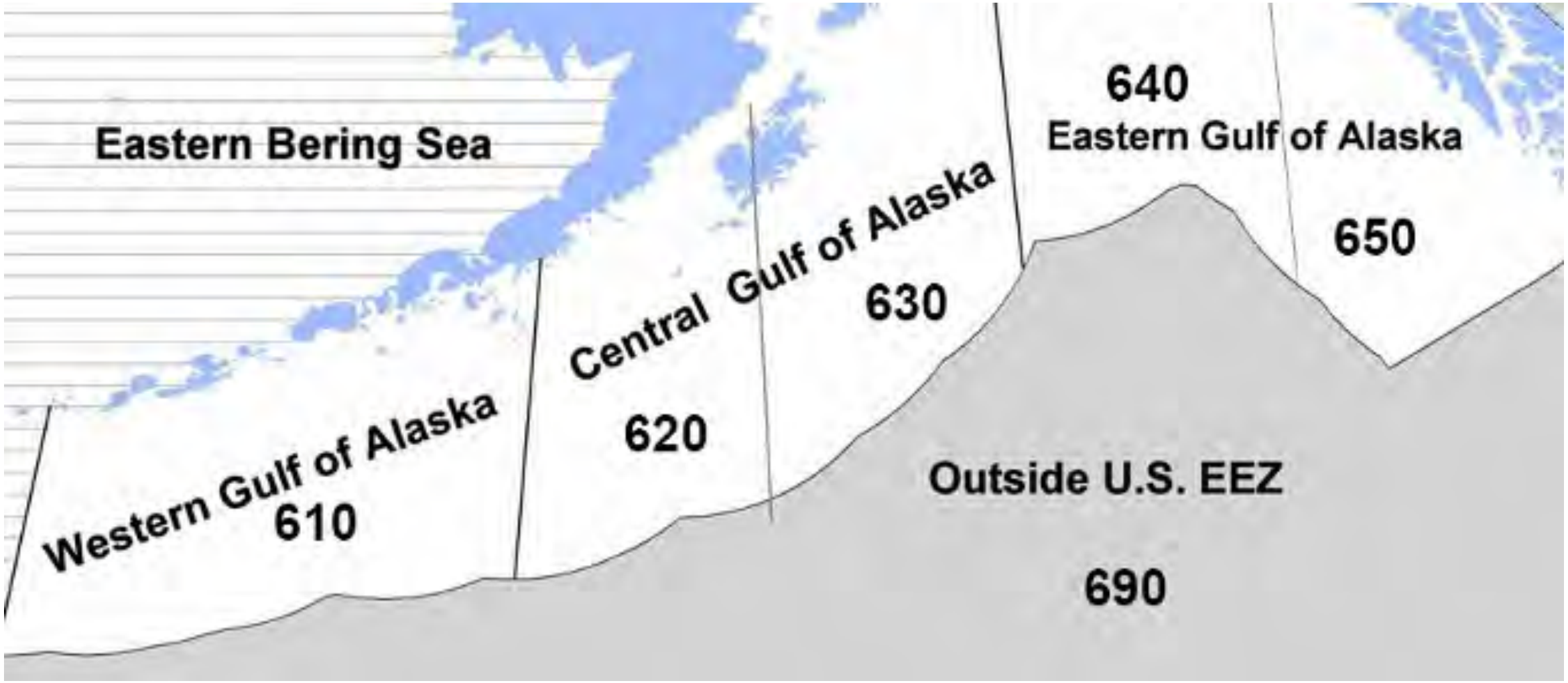
November 14-17, 2023

Members:

Jim Ianelli	AFSC REFM (co-chair)	Sandra Lowe	AFSC REFM
Chris Lunsford	AFSC ABL (co-chair)	Nat Nichols	ADF&G
Sara Cleaver	NPFMC (coordinator)	Jan Rumble	ADF&G
Abby Jahn	NMFS AKRO	Paul Spencer	AFSC REFM
Craig Faunce	AFSC FMA	Kristan Blackhart	NMFS OS&T
Lisa Hillier	WDFW	Ben Williams	AFSC ABL
Pete Hulson	AFSC ABL	Cecilia O'Leary	AFSC RACE

GOA Assessment Overview

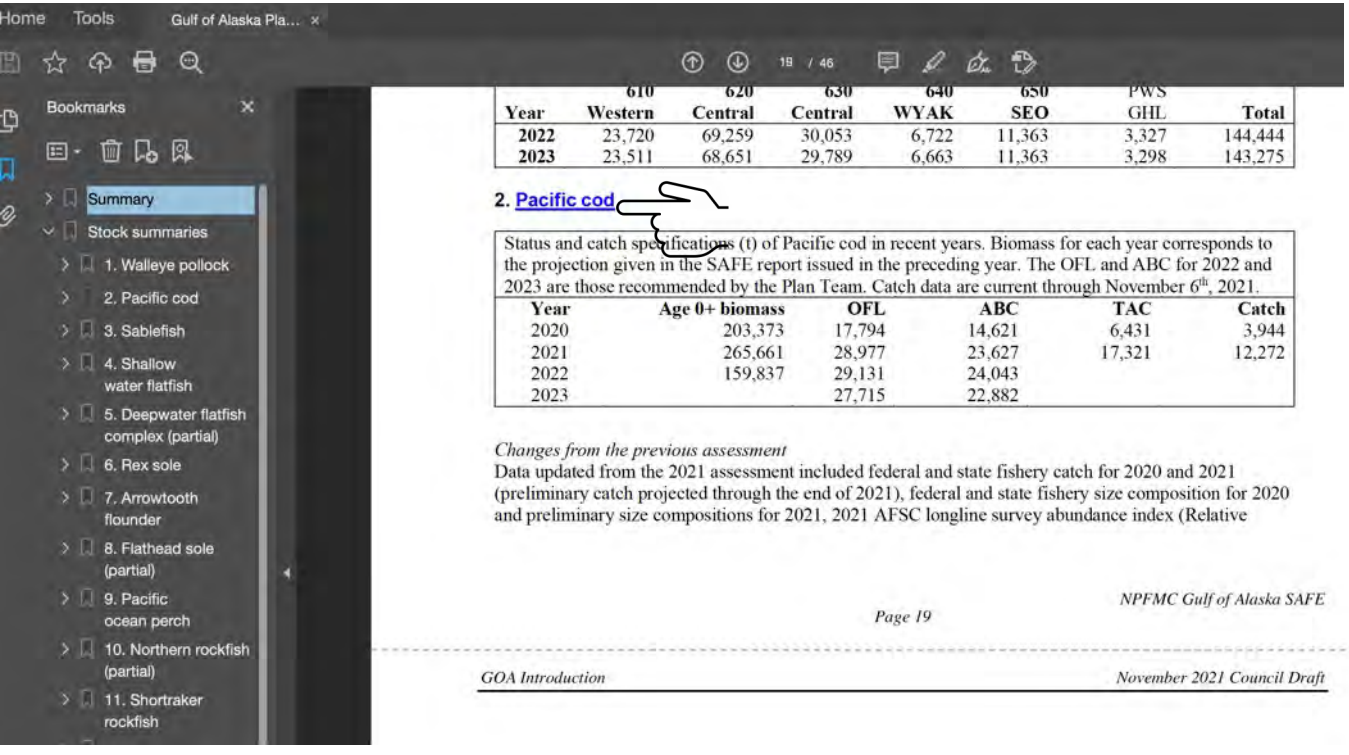
Bottom-trawl survey year for GOA



Stock Assessment and Fishery Evaluate (SAFE) for the NPFMC SSC/Council review
Note, links will become live as documents are completed, please "refresh" browsers, also some assessments are in an "off" year.

Ecosystem status reports:
EBS ESR
Aleutian Islands ESR
GOA ESR

Bering Sea and Aleutian Islands (BSAI)	Gulf of Alaska (GOA)
BSAI Introduction (with links to each chapter) **BSAI Entire SAFE (zip file, 120mb)**	**GOA Introduction (with links to each chapter)** **GOA Entire SAFE (zip file, 131mb)**
Eastern Bering Sea Pollock Muti-species model supplement Aleutian Is. Pollock Bogoslof Pollock	GOA Pollock
Eastern Bering Sea Pacific cod Aleutian Is Pacific cod.	GOA Pacific cod
AK Sablefish	AK Sablefish
BSAI Yellowfin Sole	GOA Shallow-water Flatfish



Year	610 Western	620 Central	630 Central	640 WYAK	650 SEO	PWS GHL	Total
2022	23,720	69,259	30,053	6,722	11,363	3,327	144,444
2023	23,511	68,651	29,789	6,663	11,363	3,298	143,275

2. Pacific cod

Status and catch specifications (t) of Pacific cod in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2022 and 2023 are those recommended by the Plan Team. Catch data are current through November 6th, 2021.

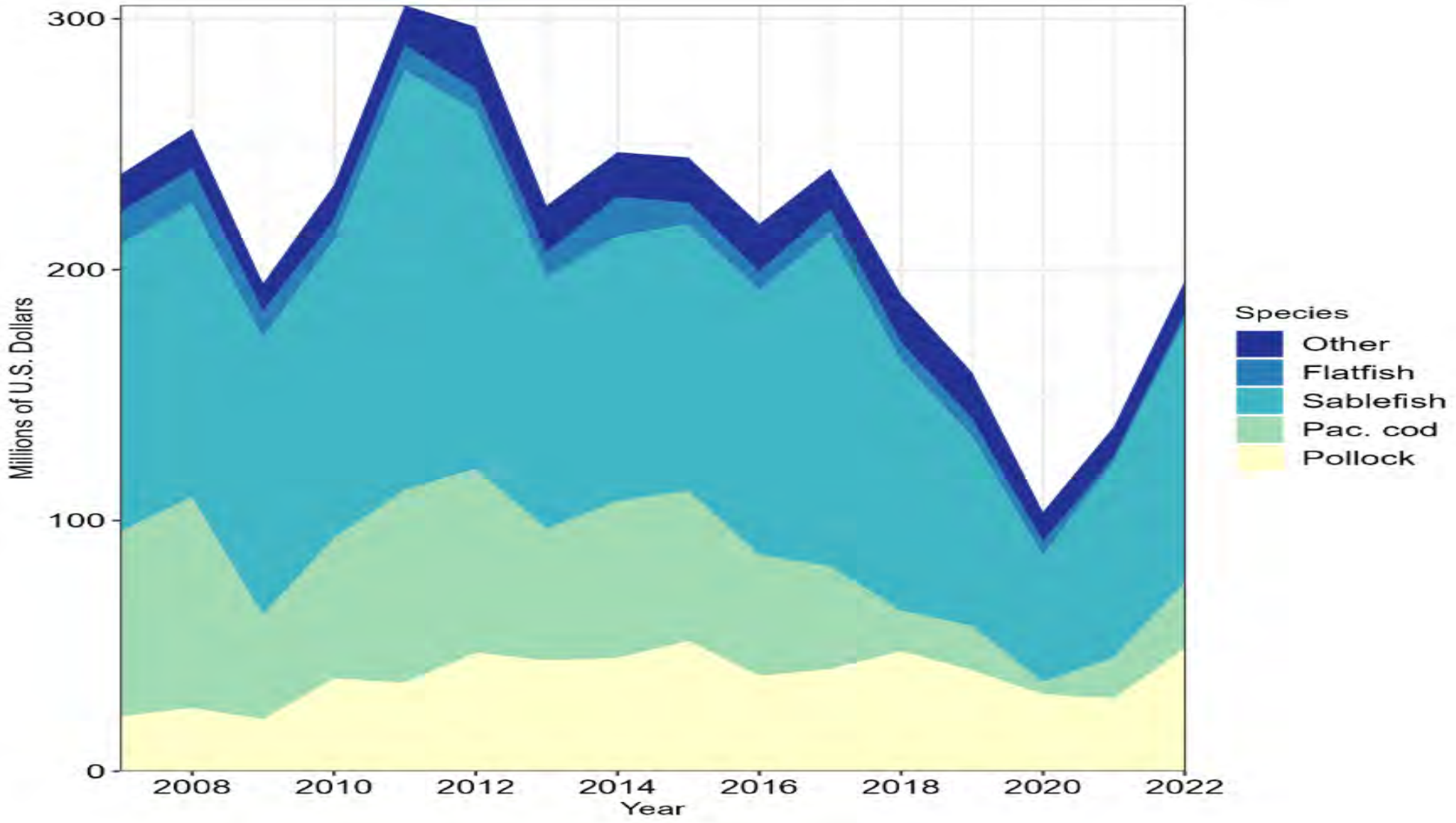
Year	Age 0+ biomass	OFL	ABC	TAC	Catch
2020	203,373	17,794	14,621	6,431	3,944
2021	265,661	28,977	23,627	17,321	12,272
2022	159,837	29,131	24,043		
2023		27,715	22,882		

Changes from the previous assessment
Data updated from the 2021 assessment included federal and state fishery catch for 2020 and 2021 (preliminary catch projected through the end of 2021), federal and state fishery size composition for 2020 and preliminary size compositions for 2021, 2021 AFSC longline survey abundance index (Relative

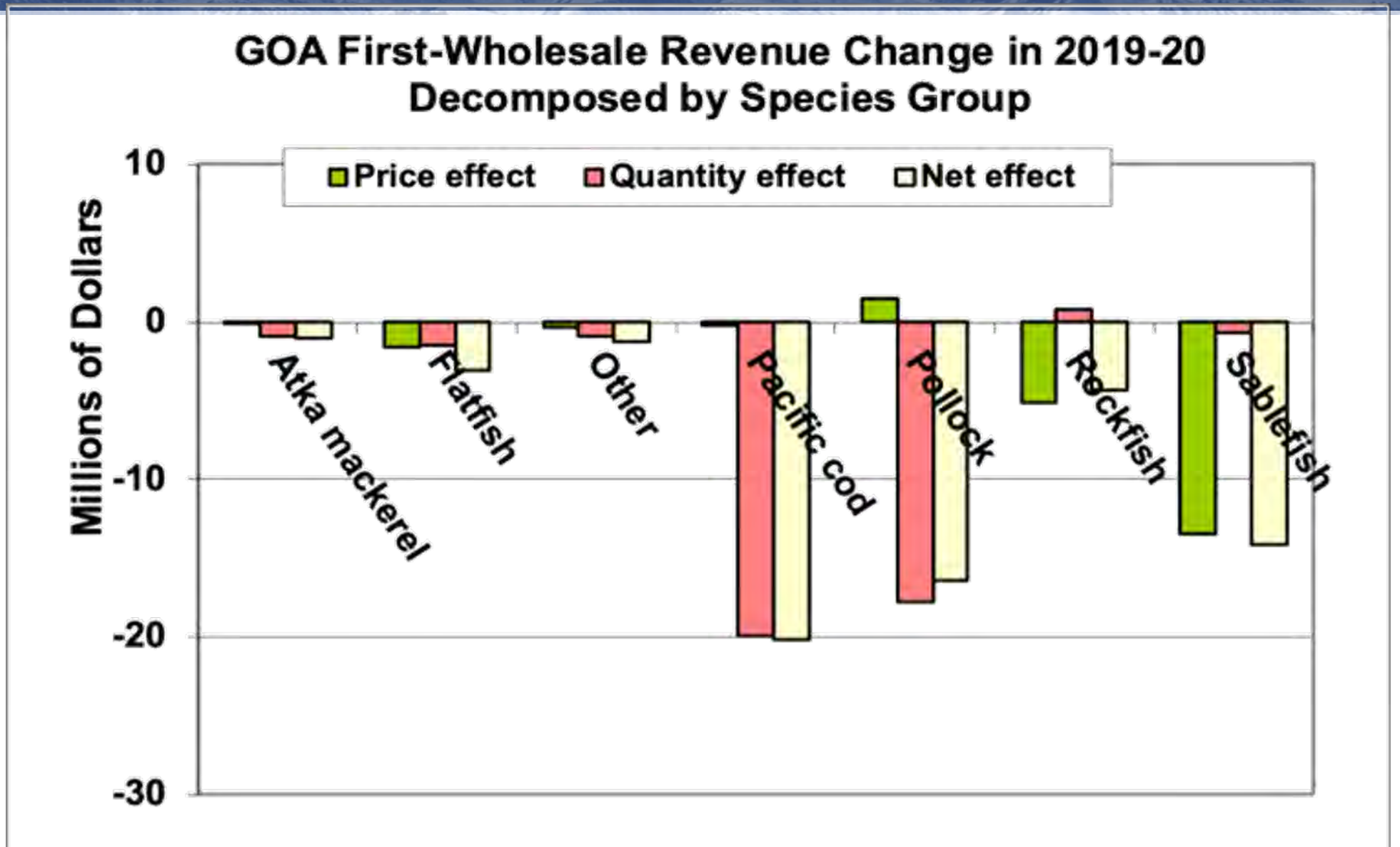
Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Gulf of Alaska

GOA Introduction Contents

GOA Economic synopsis



Revenue changes (and source)



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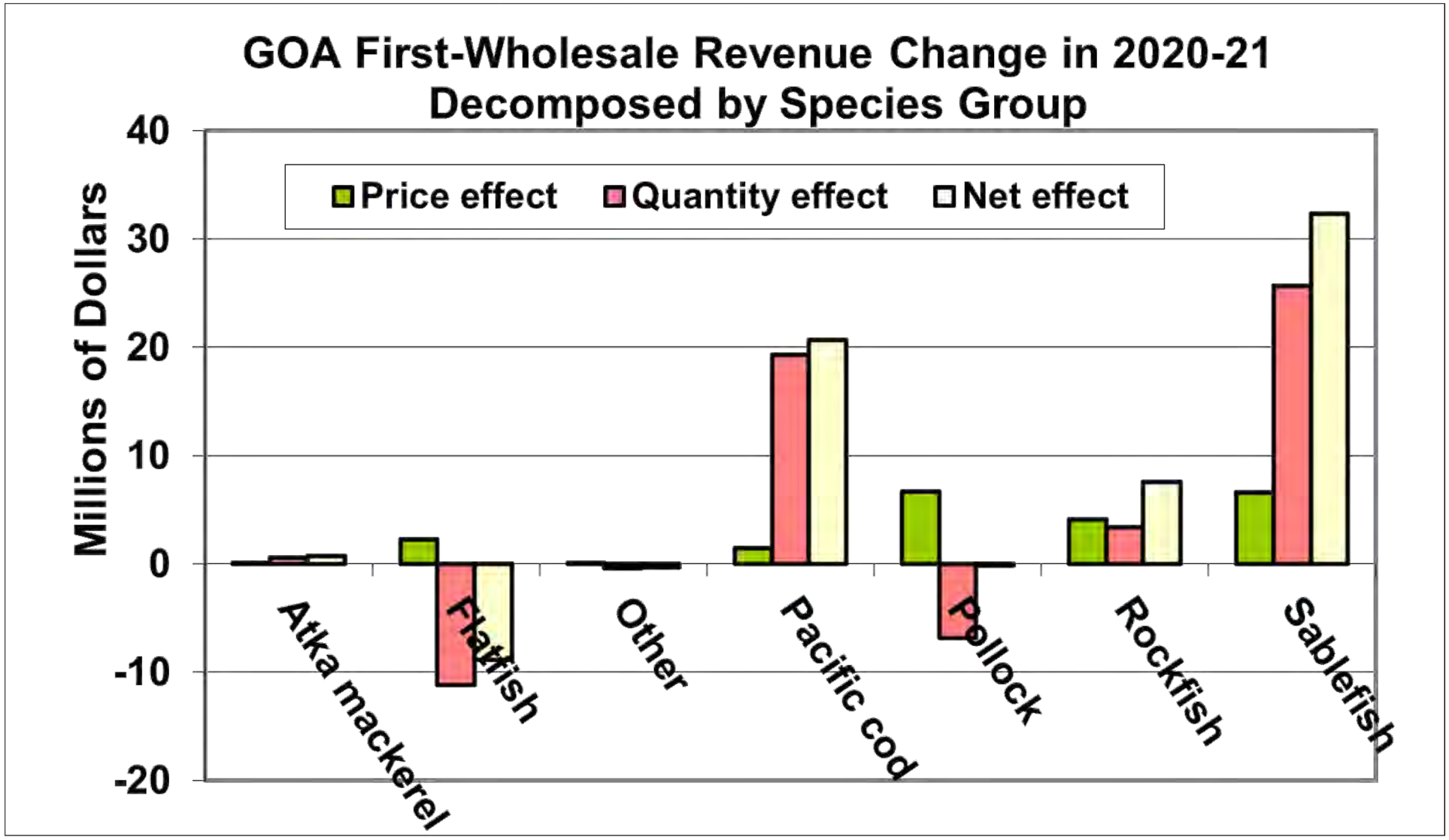

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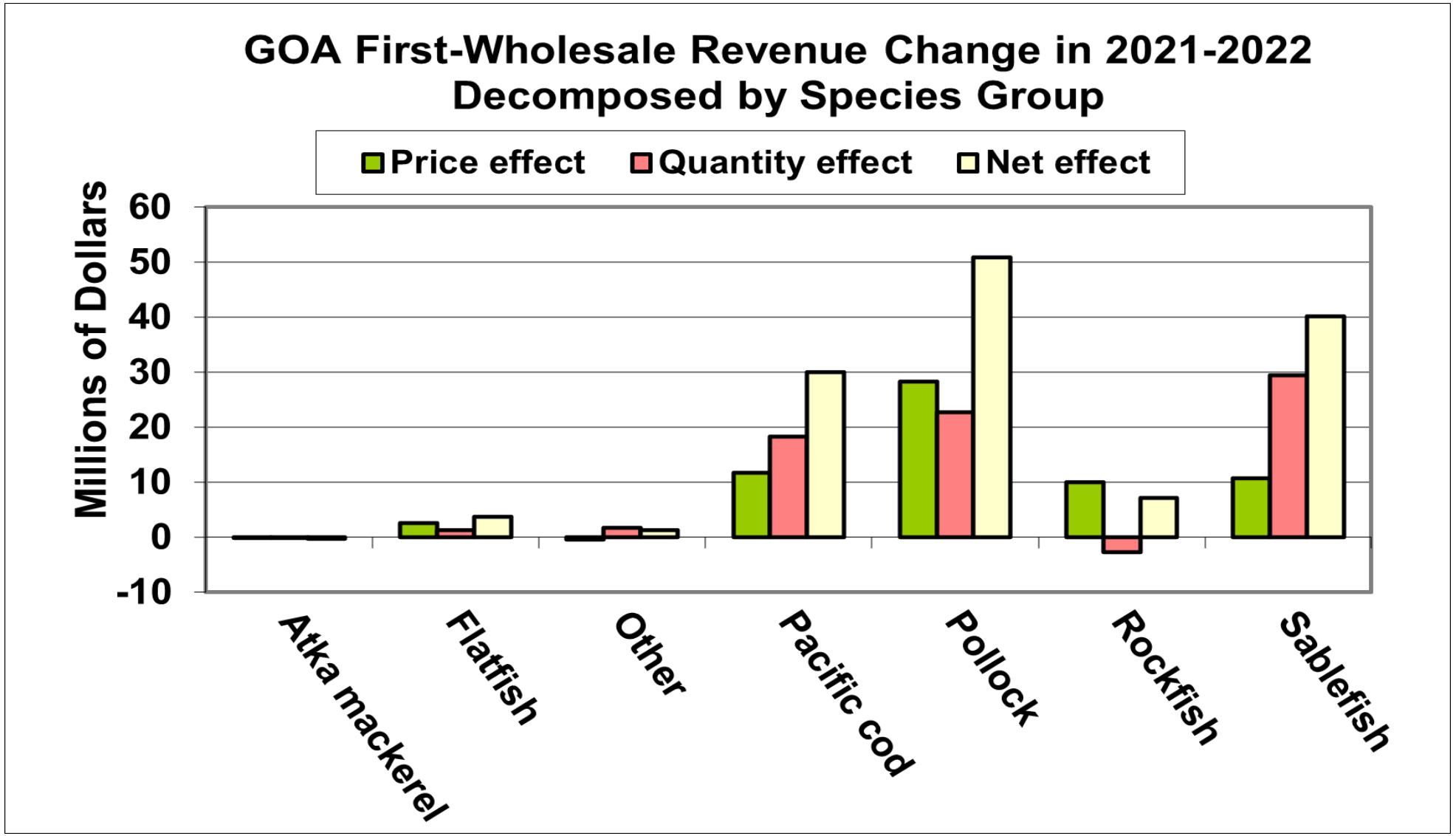
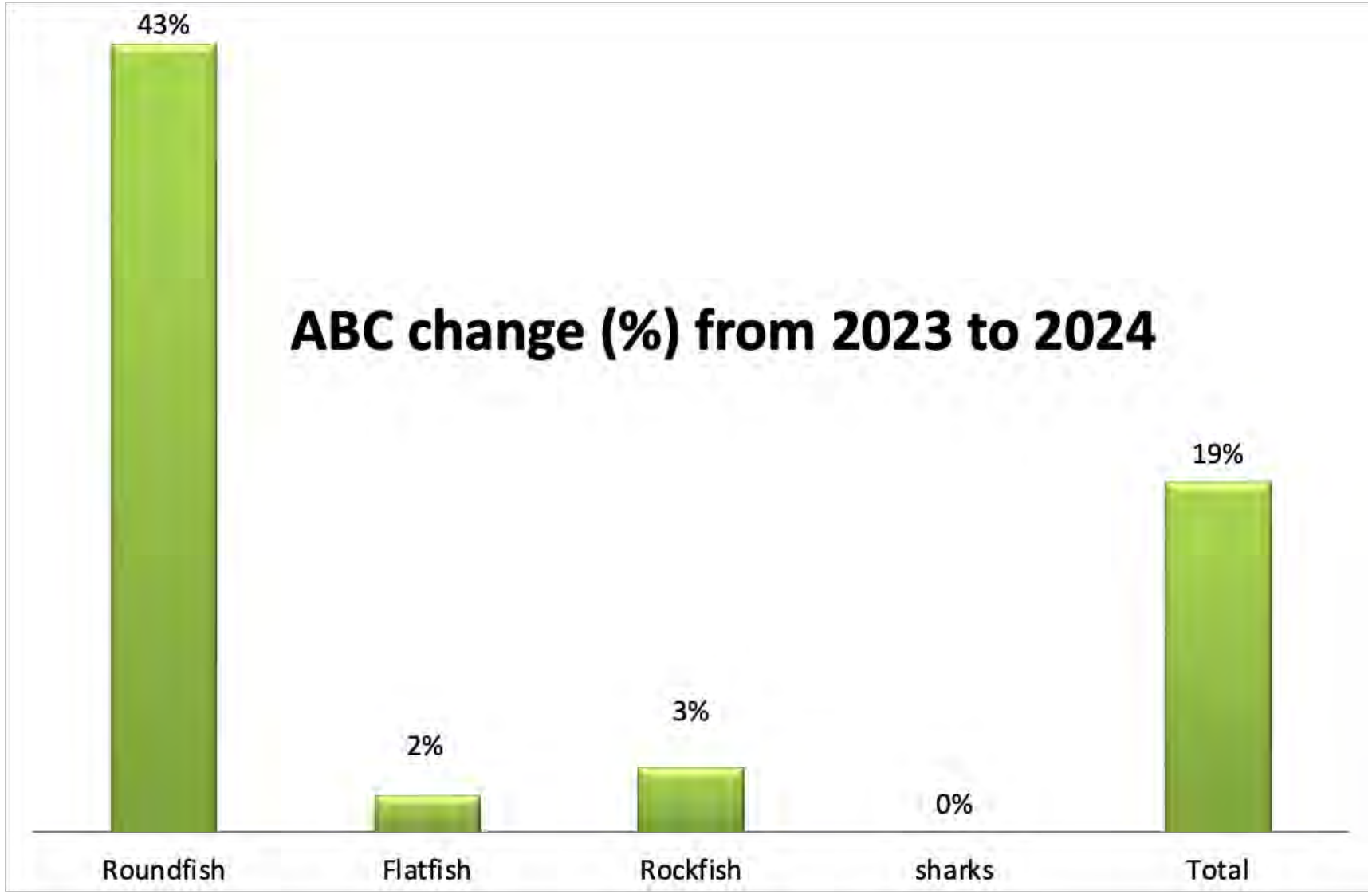
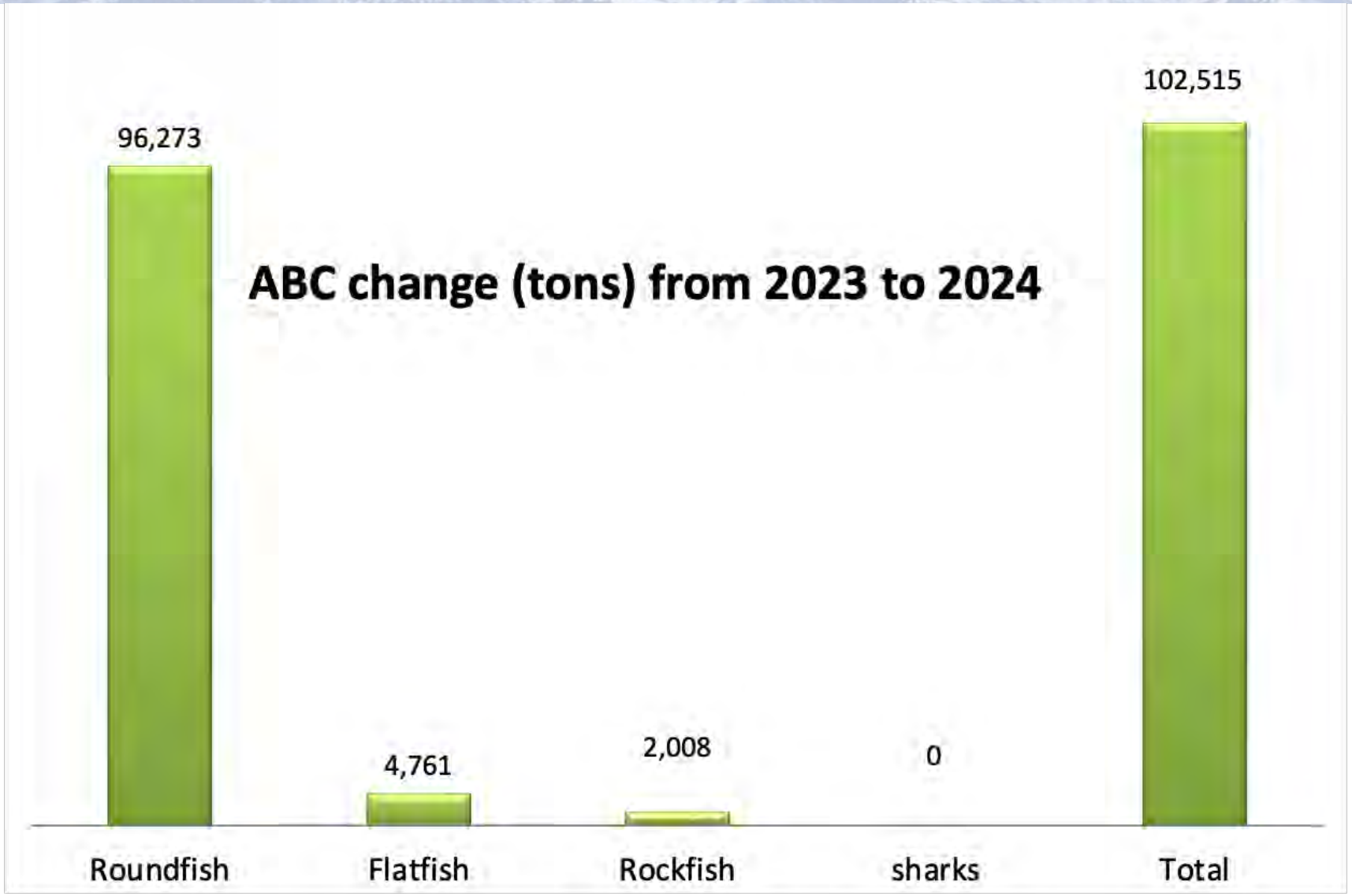


2023-2024 ABC change

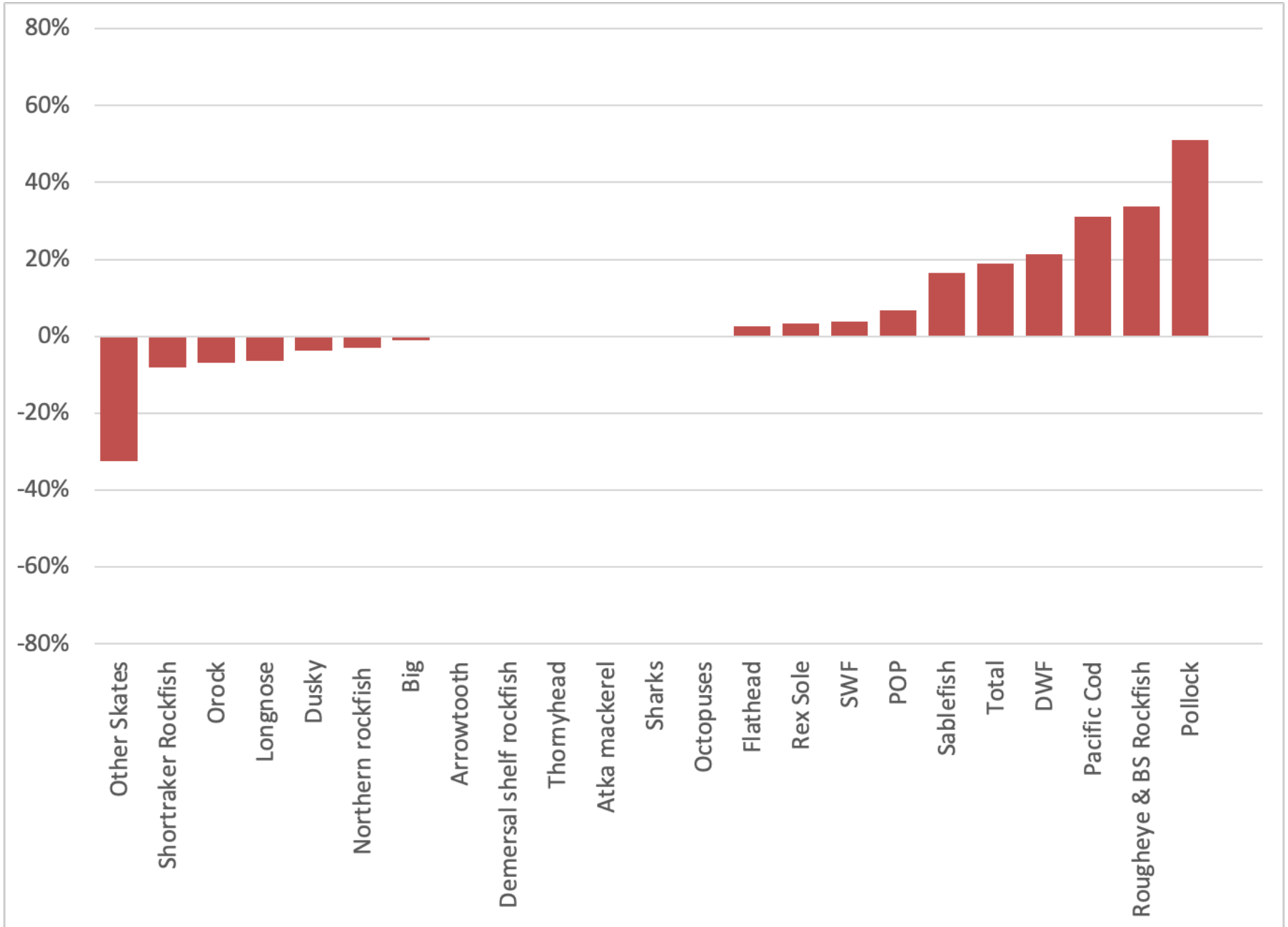


Overall a 19% increase

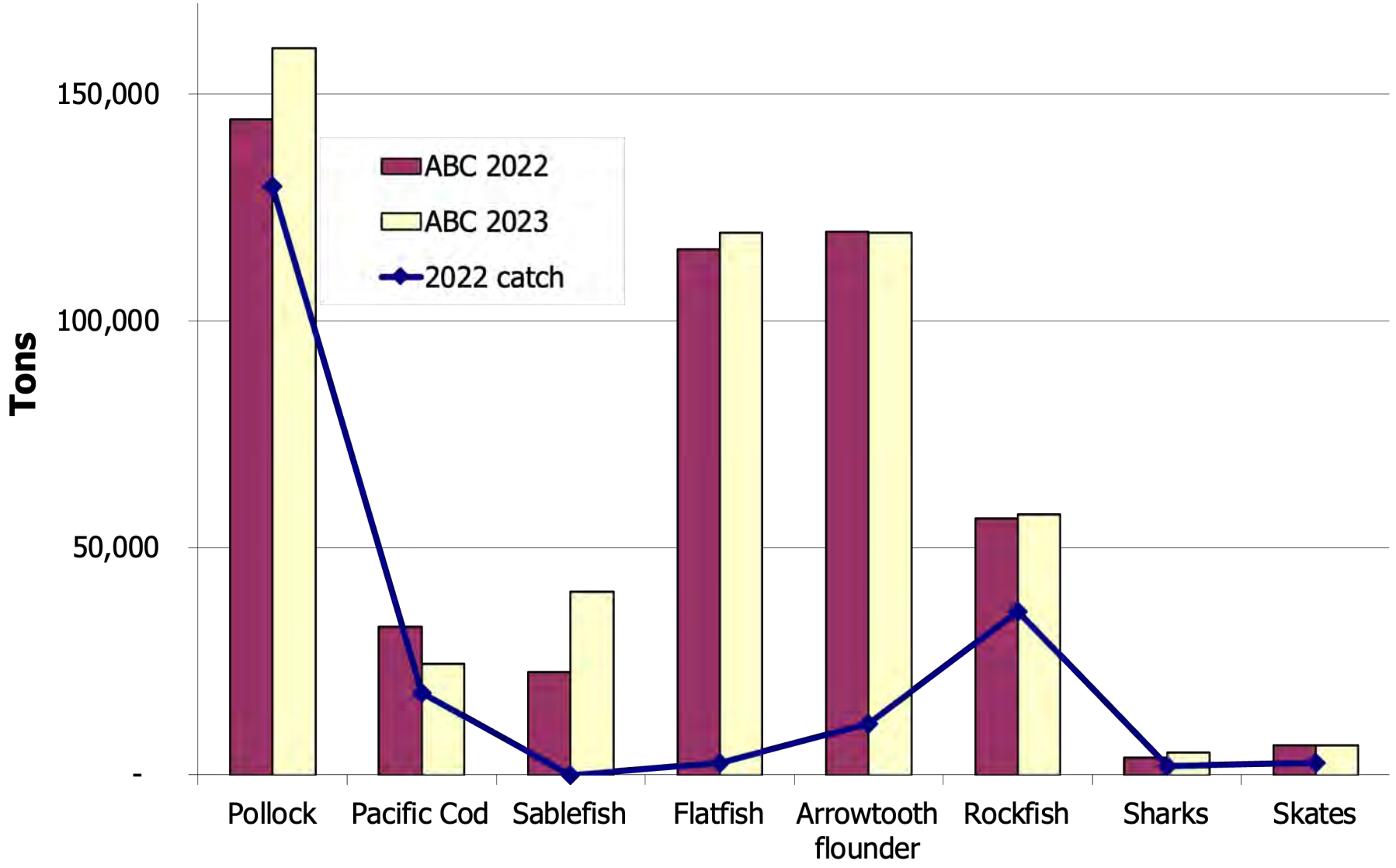
2023-2024 ABC change



Percentage change in ABC, 2023-2024



GOA Catch and ABC levels



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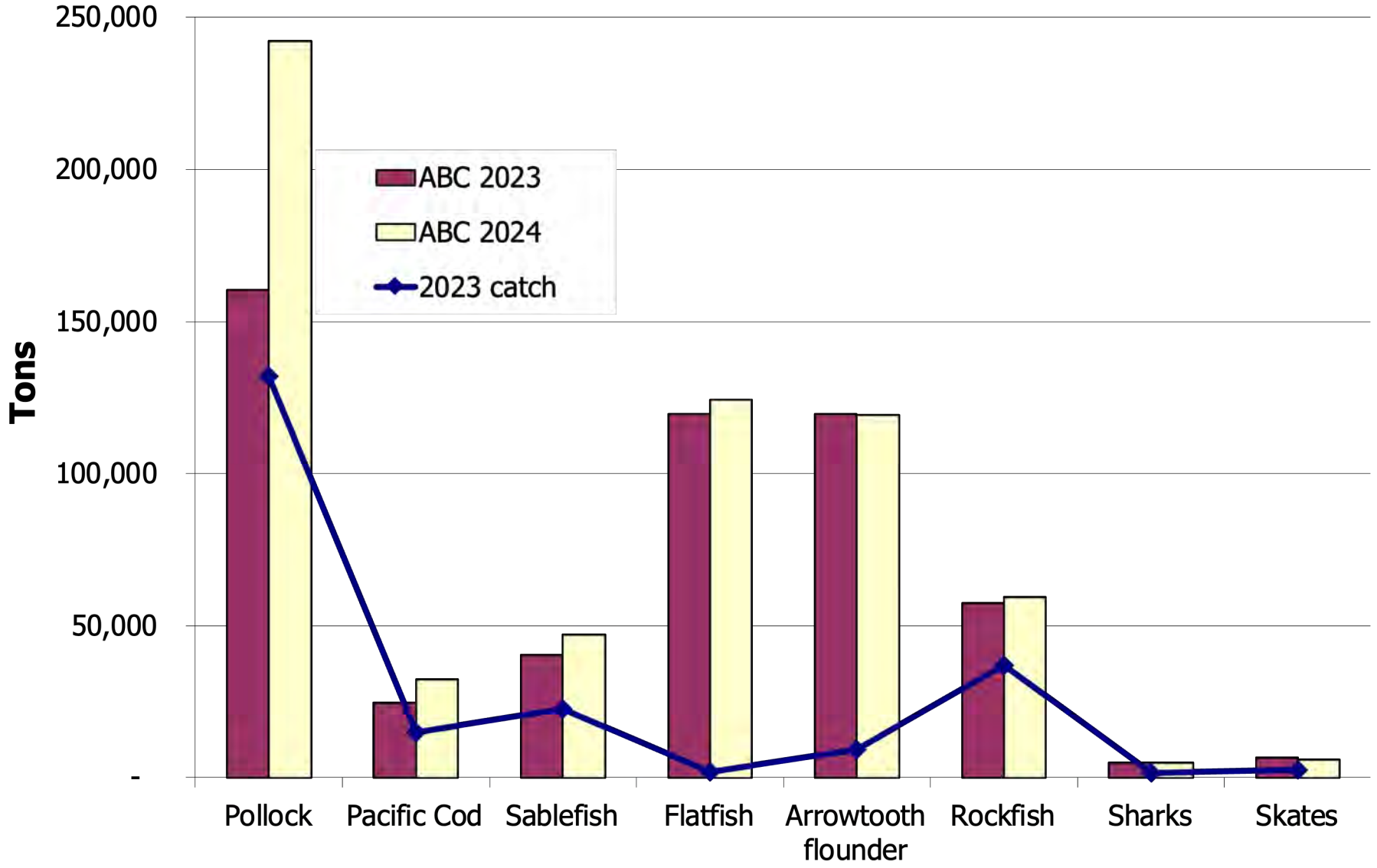
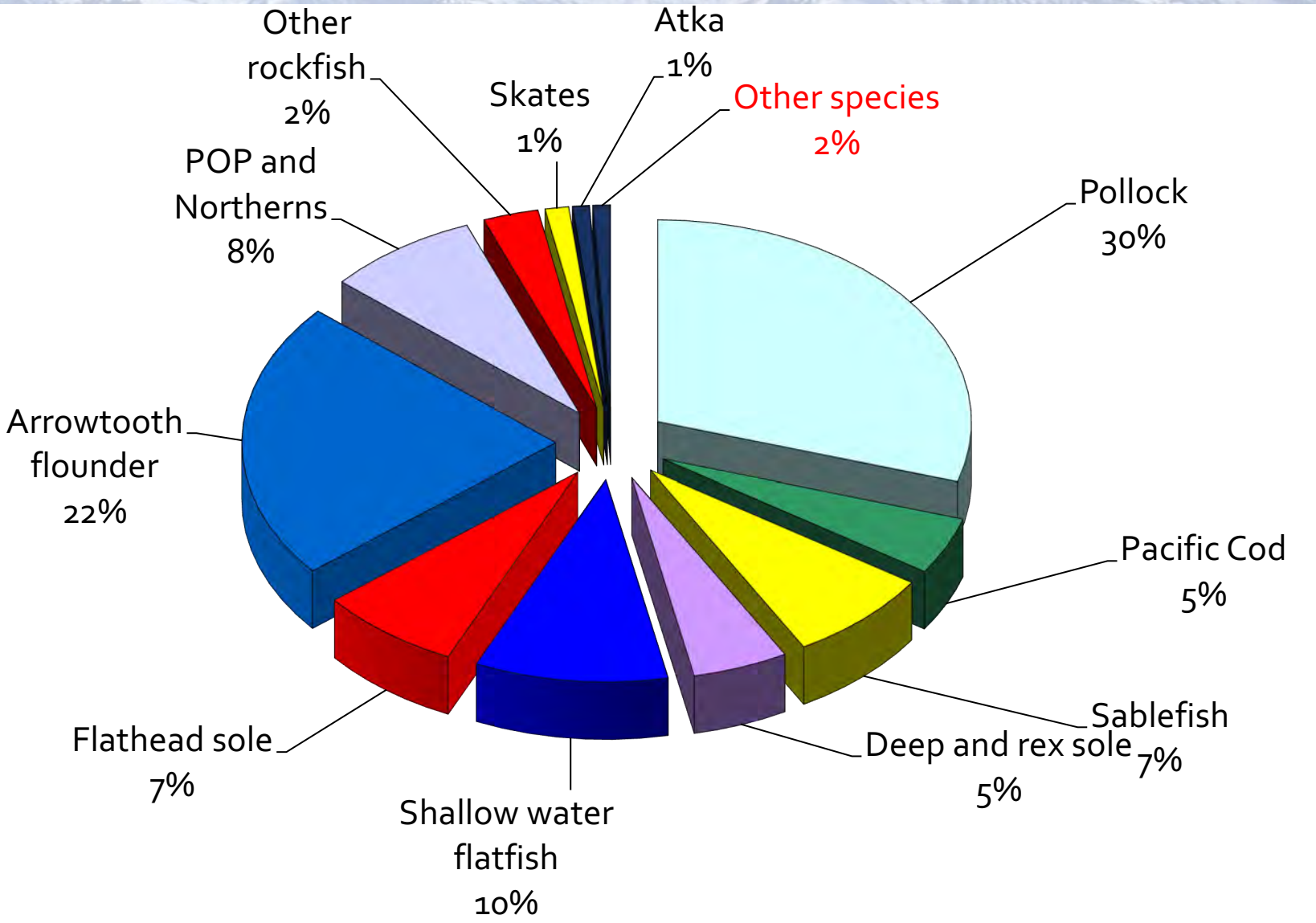
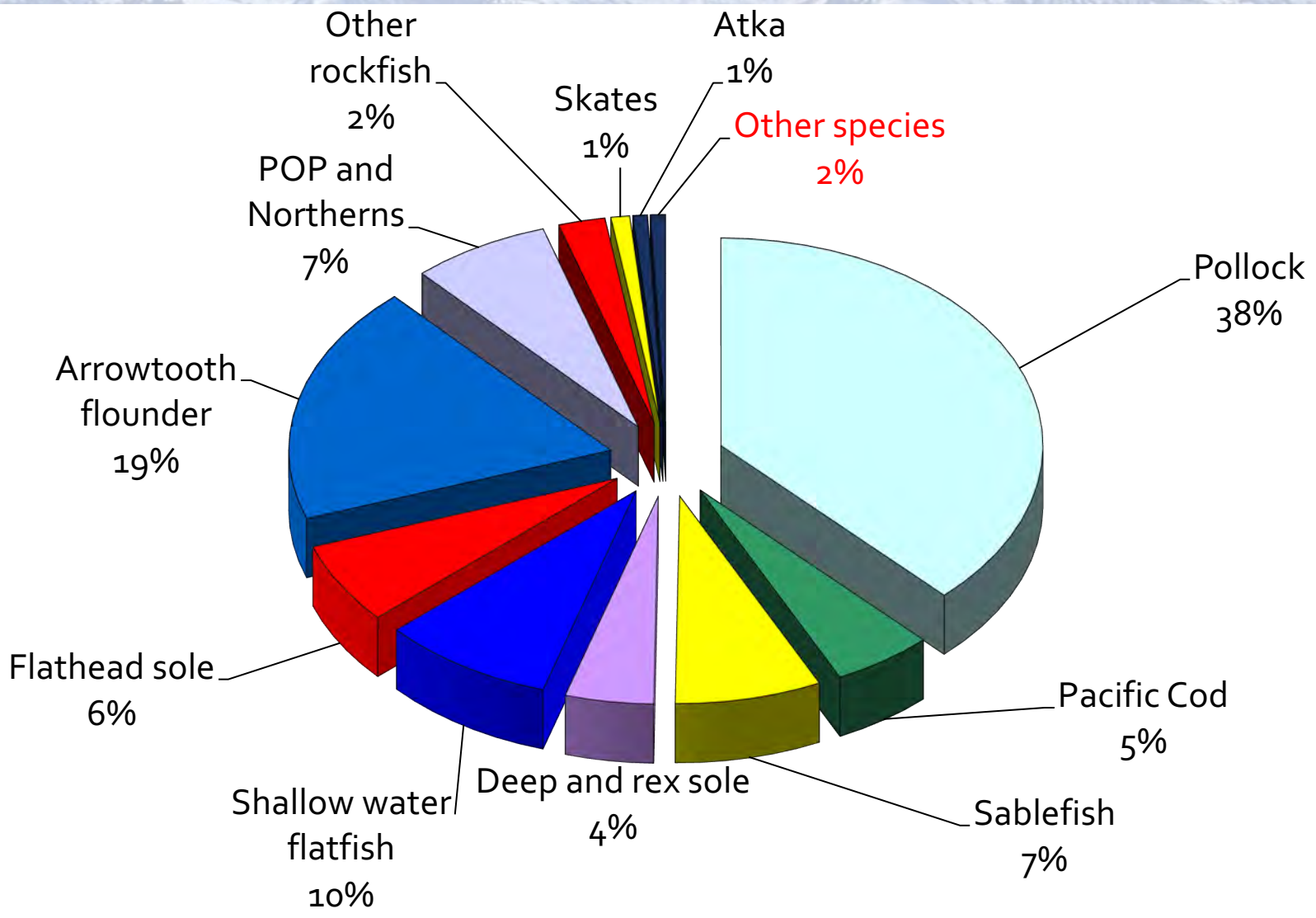


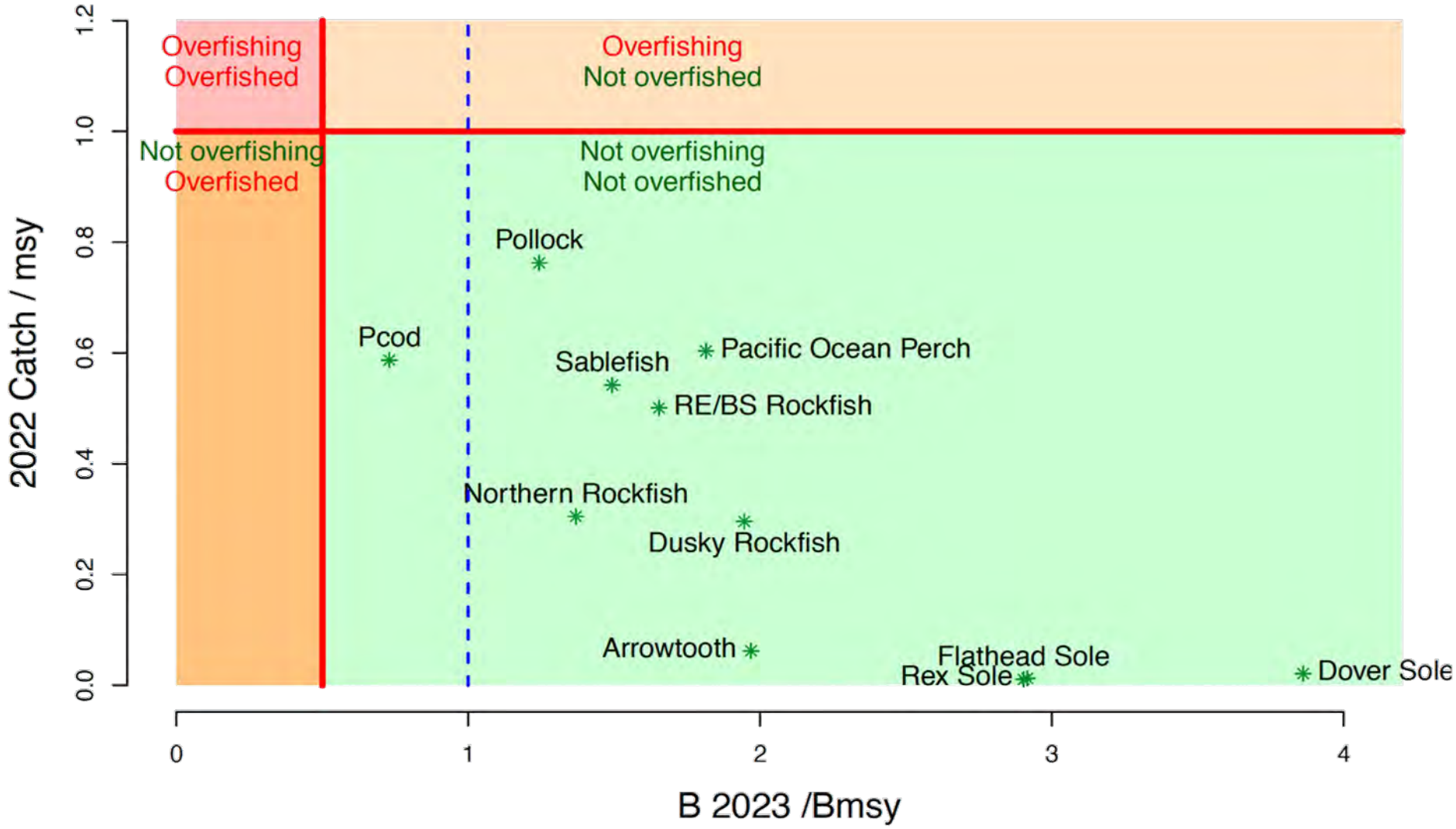
GOA 2023 ABC's: 539,072 t



GOA 2024 ABC's: 641,587 t



Stock status summary **last** year



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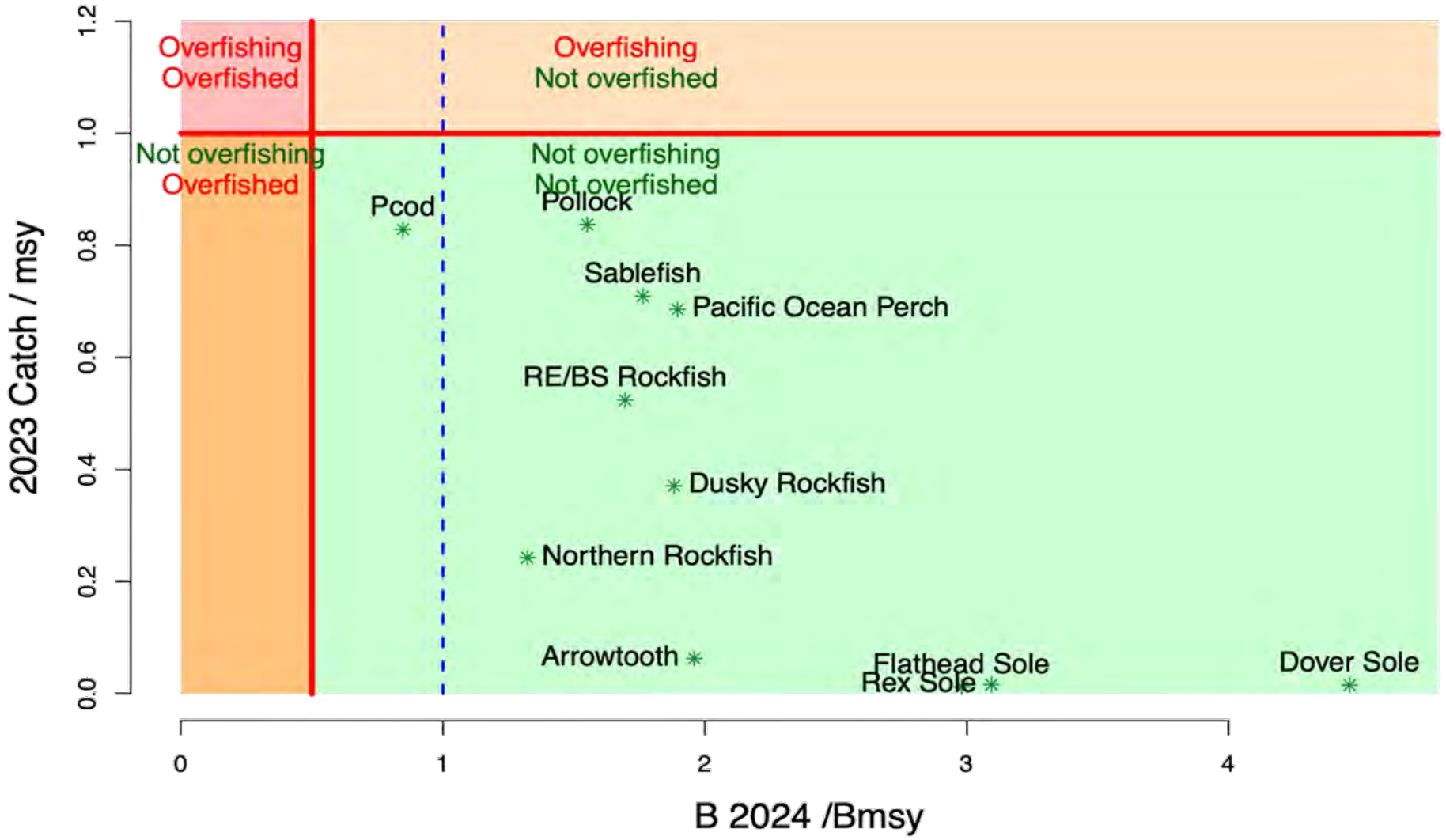


Species overviews

1. 2023 ABC/Catch and recommended changes
2. Highlights
   - New data
   - Analytic approach (changes)
3. Stock status and trend
4. ABC/OFL
   - Tier history and recommendations
   - 2024, 2025 maxABC; recommended ABC

GOA stock assessments 2023

Assessment Type	GOA Stocks for 2023	Description
Operational **Full** (full)	Pollock Pacific cod Other rockfish Rougheye/Blackspotted rockfish Shortraker rockfish	• Considers all data, new model configurations, new modeling platform • More in-depth review

Operational **Update** (full)	Sablefish
	Deepwater flatfish
	Pacific ocean perch
	Skates
		• Maintains model structure of previous full assessment
		  • New data
		  • Minimal changes
		  • Reduced review
		• Meant to improve efficiency and streamline process

Harvest Projection (partial)	Arrowtooth flounder Dusky rockfish Flathead sole Northern/Southern rock sole Northern rockfish Rex sole Shallow water flatfish	• Executive summary • Runs projection model, reports new catches, catch/biomass or REMA model
Catch Report (n/a)	Atka mackerel Demersal shelf rockfish Octopus Thornyheads Sharks	• Off-year assessment. Still monitored via recent catch, ABC, OFL

GOA Pollock

Species	2023 catch	ABC 2023	ABC 2024	Change
Pollock	131,892	160,301	242,292	up 81,991 (51%)
Pacific Cod	14,883	24,634	32,272	up 7,638 (31%)
Sablefish	22,746	40,502	47,146	up 6,644 (16%)
Flatfish	2,017	119,497	124,494	up 4,997 (4%)
Arrowtooth flounder	9,248	119,485	119,249	down 236 (0%)
Rockfish	36,943	57,519	59,527	up 2,008 (3%)
Atka mackerel	462	4,700	4,700	same (0%)
Skates	2,741	6,563	6,036	down 527 (8%)
Sharks	1,777	4,891	4,891	same (0%)
Octopus	154	980	980	same (0%)
Total	222,863	539,072	641,587	up 102,515 (19%)

GOA Pollock—ESP appendix

- Kalei Shotwell provided a presentation on the pollock ESP report card for 2023.
- The Team discussed
  - Predation aspects and future potential mortality patterns derived from the GOA CEATTLE model
  - Noted the challenge to get ESPs to authors prior to finalizing stock assessments.
  - Team was encouraged that workshops prior to the next assessment cycle are likely. We noted this should enhance future collaborations and integration/application within the assessment

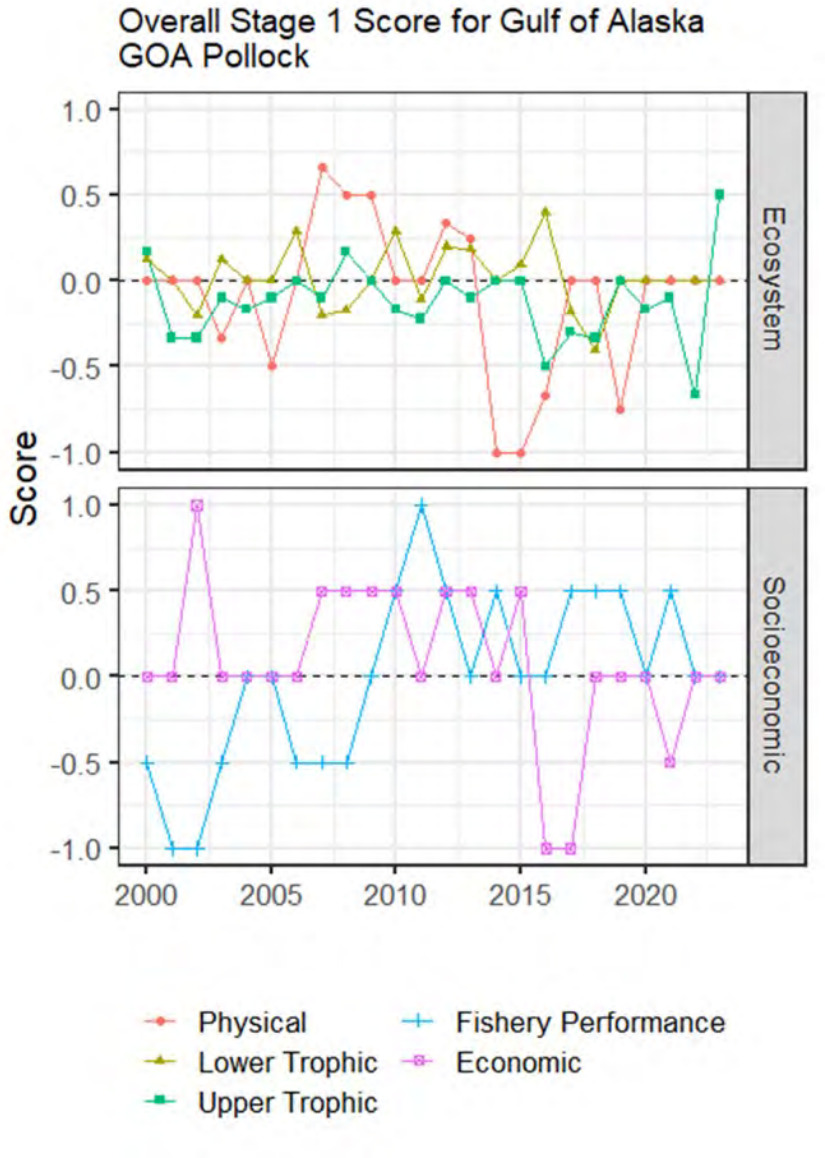
Ecosystem & Socioeconomic Profile (ESP) - GOA pollock

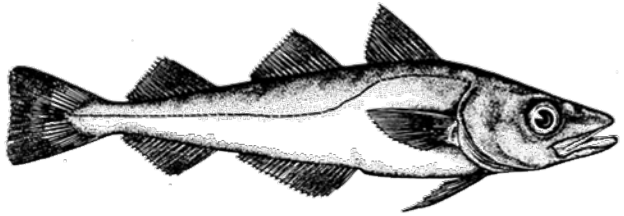
Management Summary:

- Cooler and below average surface temps, bottom temps, marine heatwave events, SW wind suggesting favorable egg and larval habitat conditions but sustained April gap winds may have altered advective patterns
- Mixed lower trophic with lowest chlorophyll a, late spring bloom, lower small copepod, higher large copepod, average planktivore success, adequate prey
- Low spring larvae and low summer YOY in Shelikof, low nearshore CPUE in Kodiak, suggests weak 2023 year-class
- Condition of fall and winter adult pollock increased but still below average, population moved southwest and spread out, possibly to more suitable habitat
- POP and sablefish biomass large, low arrowtooth as competitors/predators
- Fishery CPUE increased from last year and remain above average, roe per unit effort increased to just below average, ex-vessel price above average in 2022

Modeling Summary:

- Two potential covariates for recruitment, spring surface temperature from satellite, fall condition in the fishery, 1991-2019 year-class (missing some years)
- CEATTLE model update: age-1 M steady remains below mean, total biomass consumed below average, ration decreased and still below average





GOA Pollock

Author's <u>2023 ABC = 232,543 t</u>

- Increase of 56% from 2023
- 2025 ABC decreases to 157,687 t
- No reduction from max ABC

Changes to model:

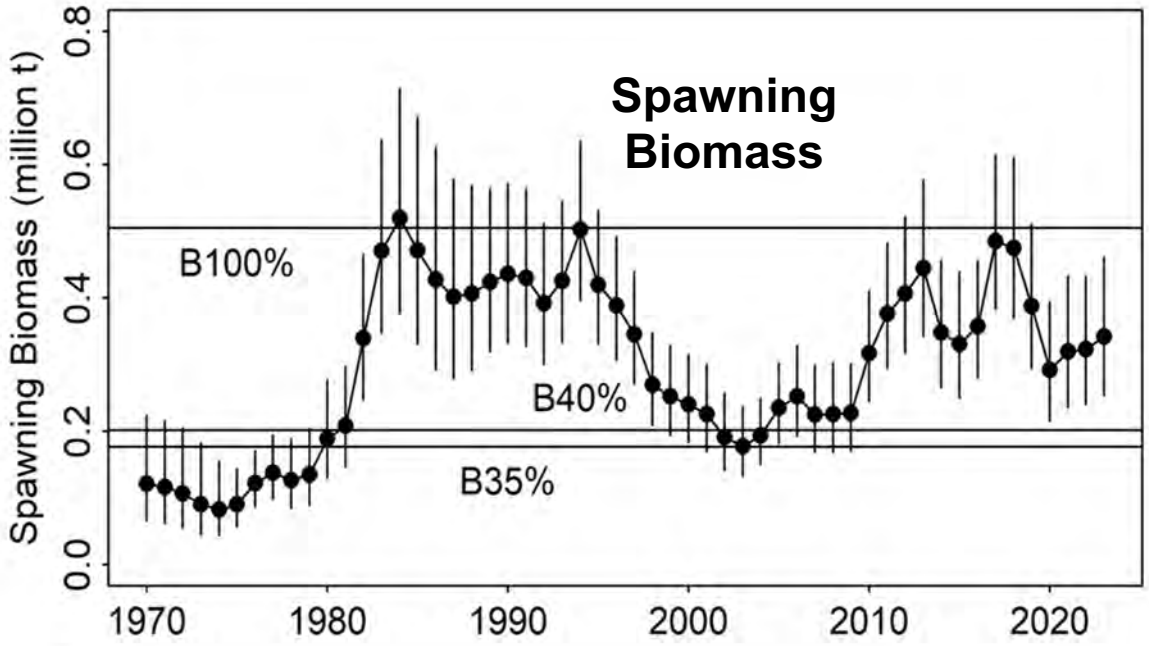
- No structural changes
- Converted to TB (23.0)

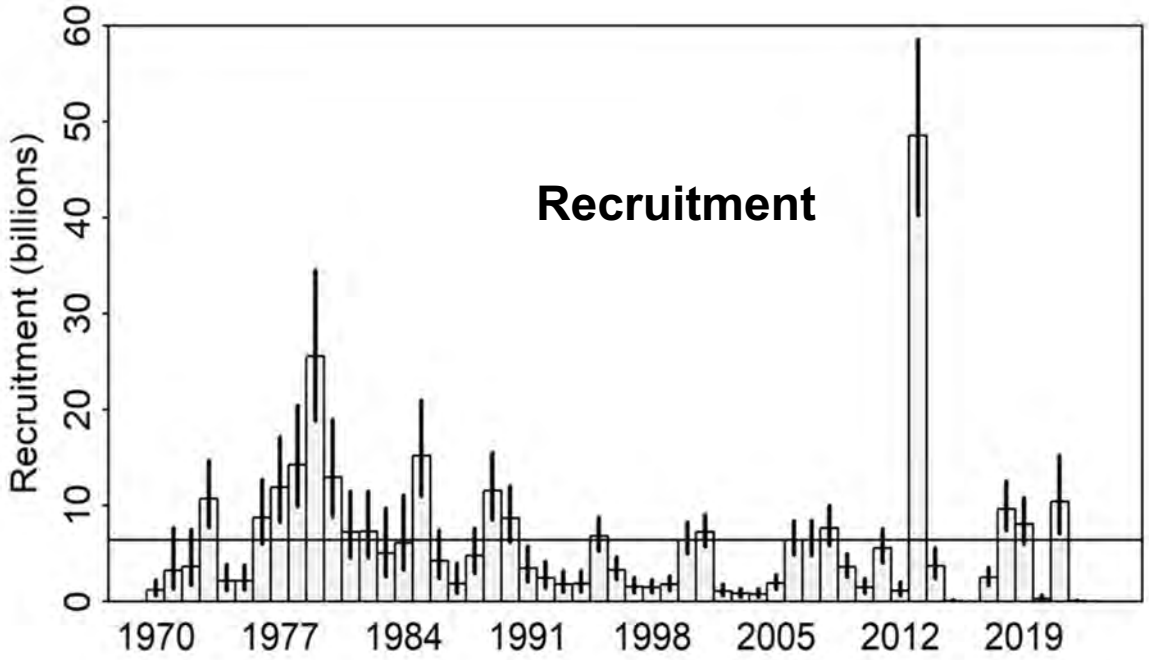
Concerns:

- Extremely small recent cohorts
- Poor fit to NMFS bottom trawl index

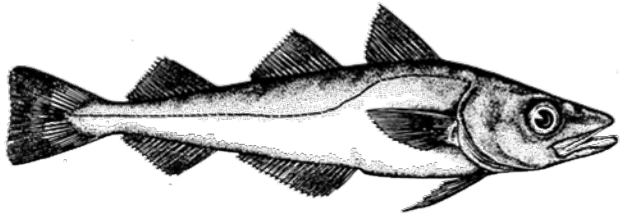
Positives:

- 2017, 2018, 2020 cohorts above average
- 2012 estimate up to ~50 billion
- Good environmental conditions

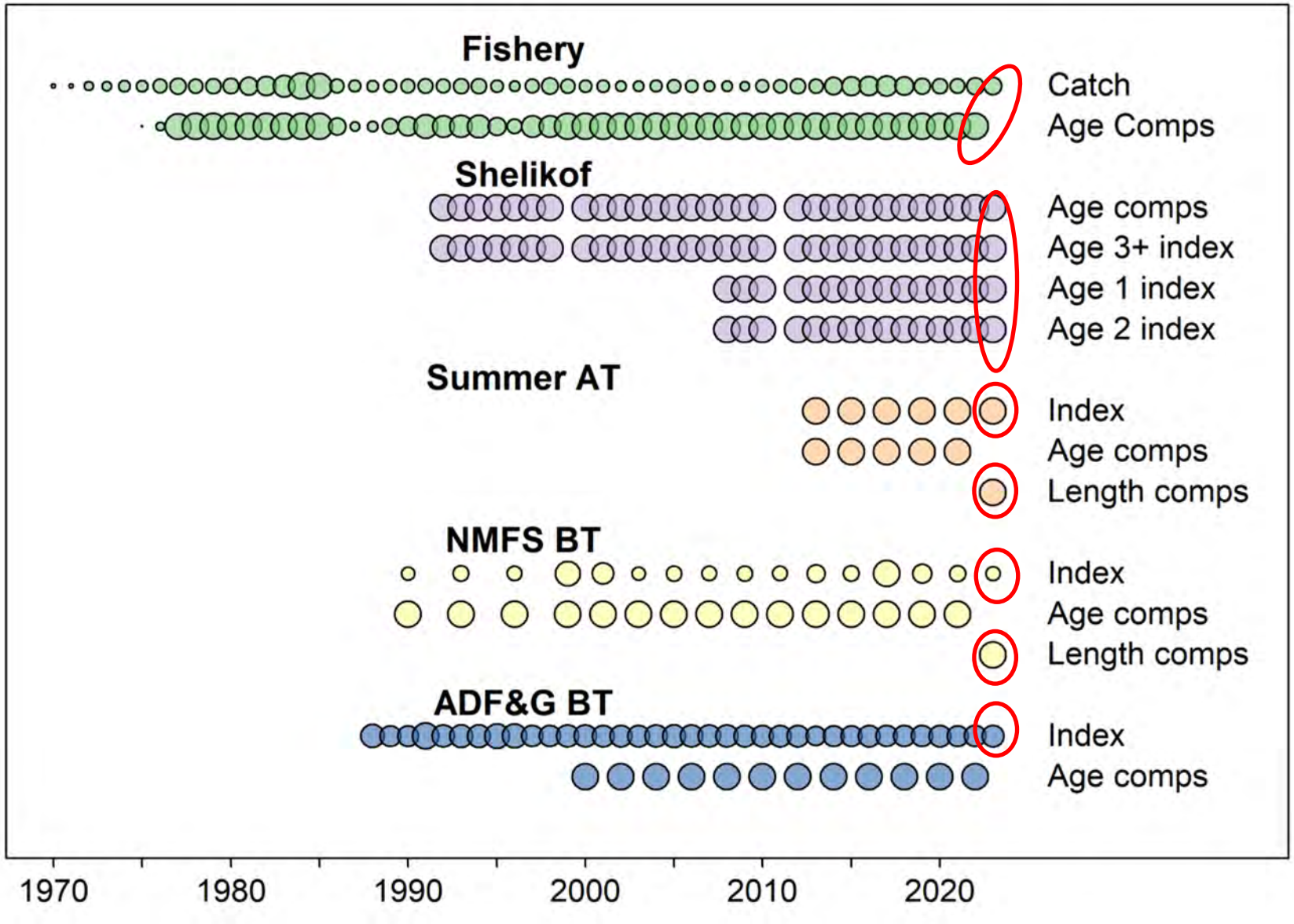




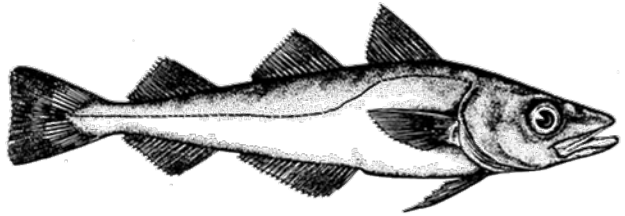
Thanks to Cole Monnahan



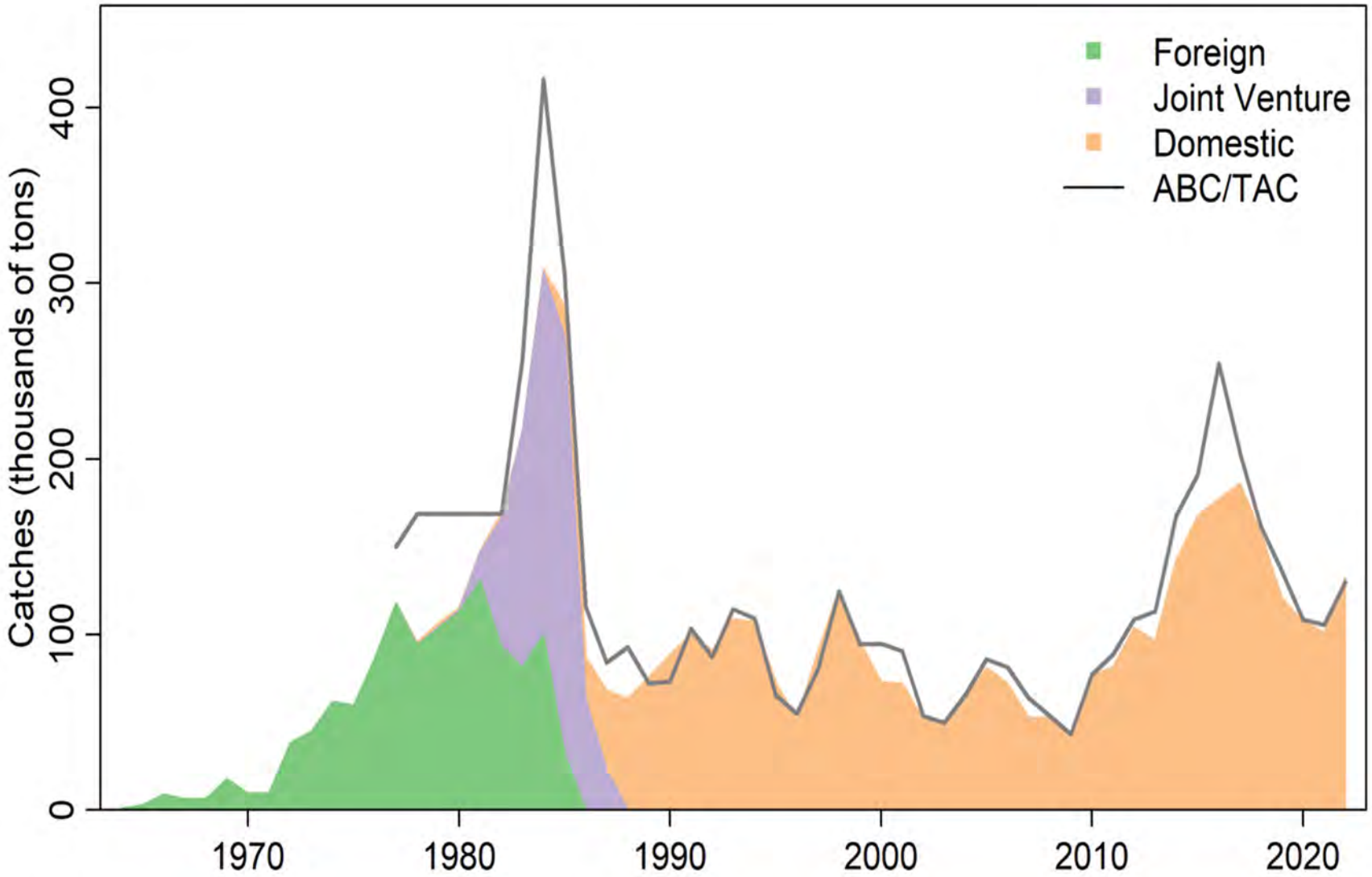
GOA Pollock: data



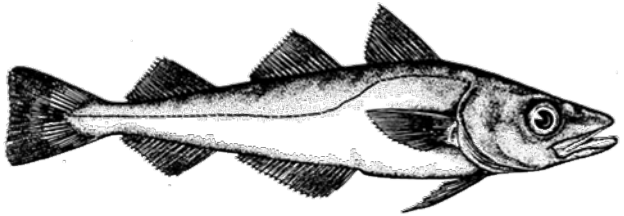
GOA Pollock: Catch

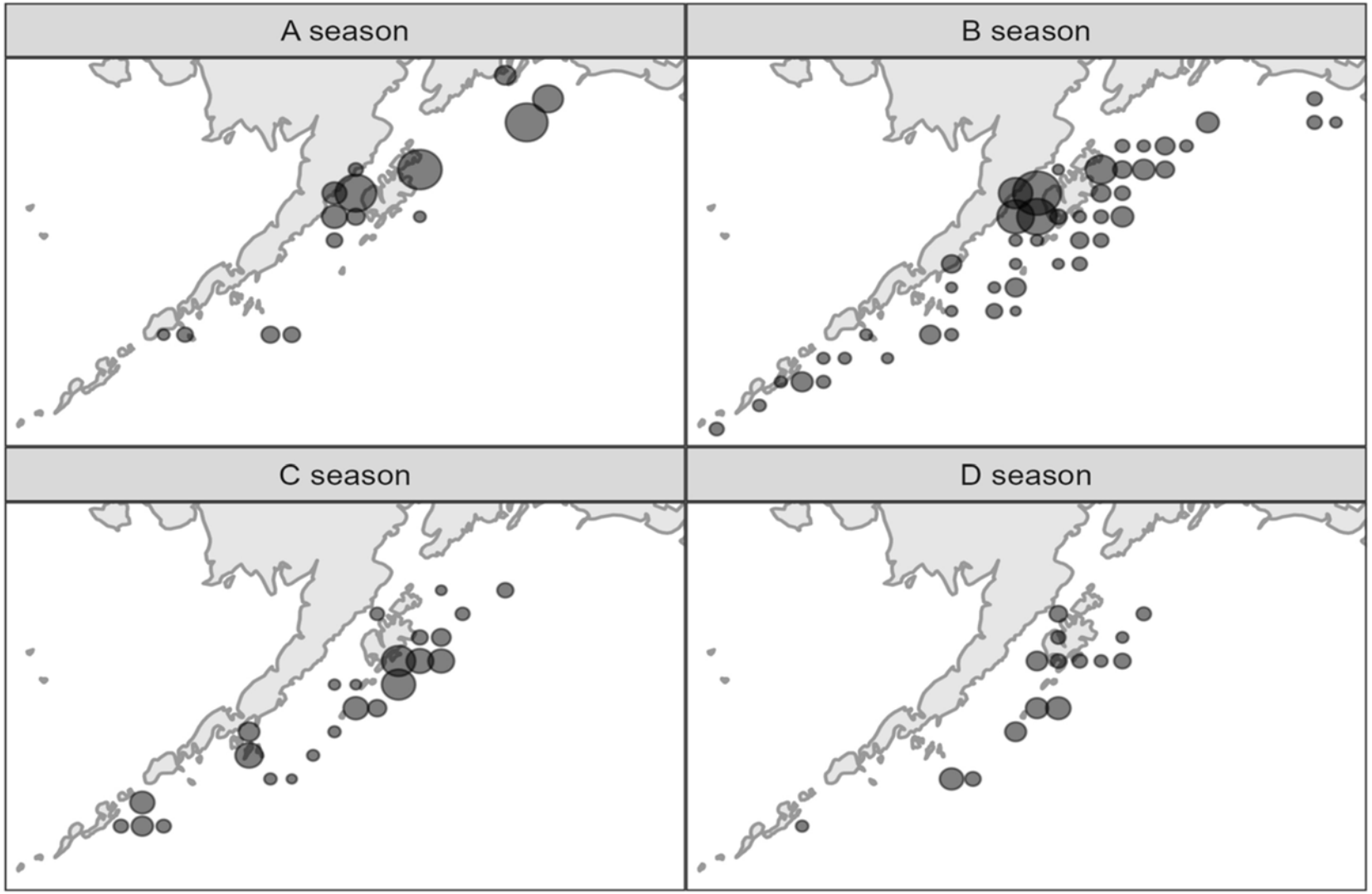


- 2022 projected catch = 129,754 t
- 2022 realized catch = 132,698 t
- 2023 projected catch = 145,215 t

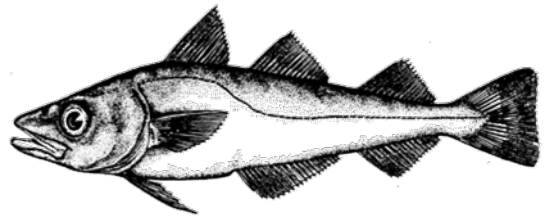


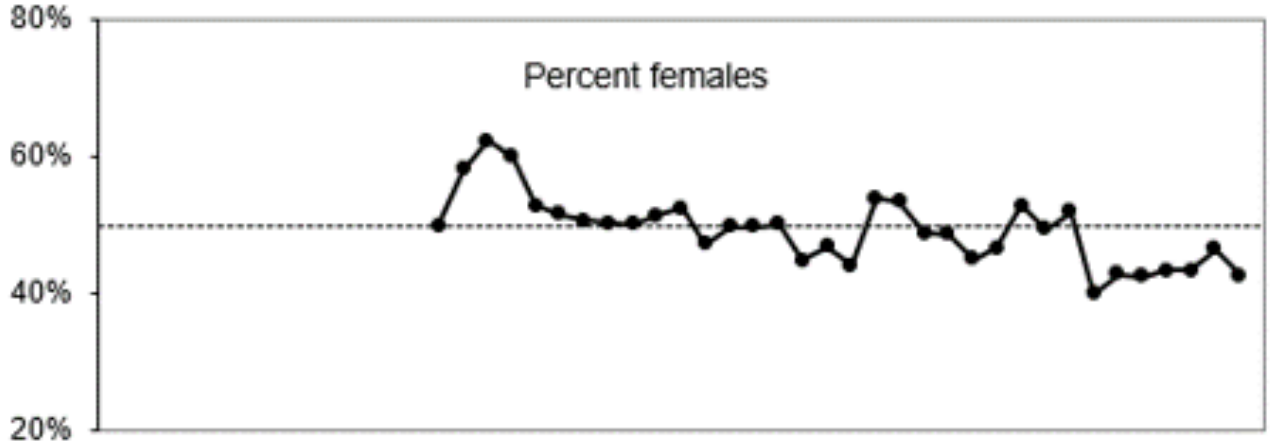
GOA Pollock: 2022 fishery catch distribution

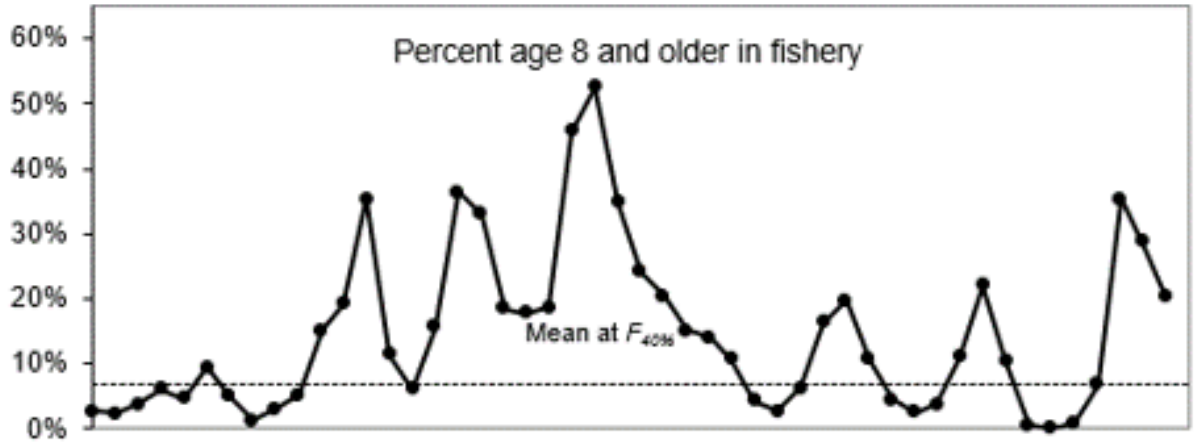


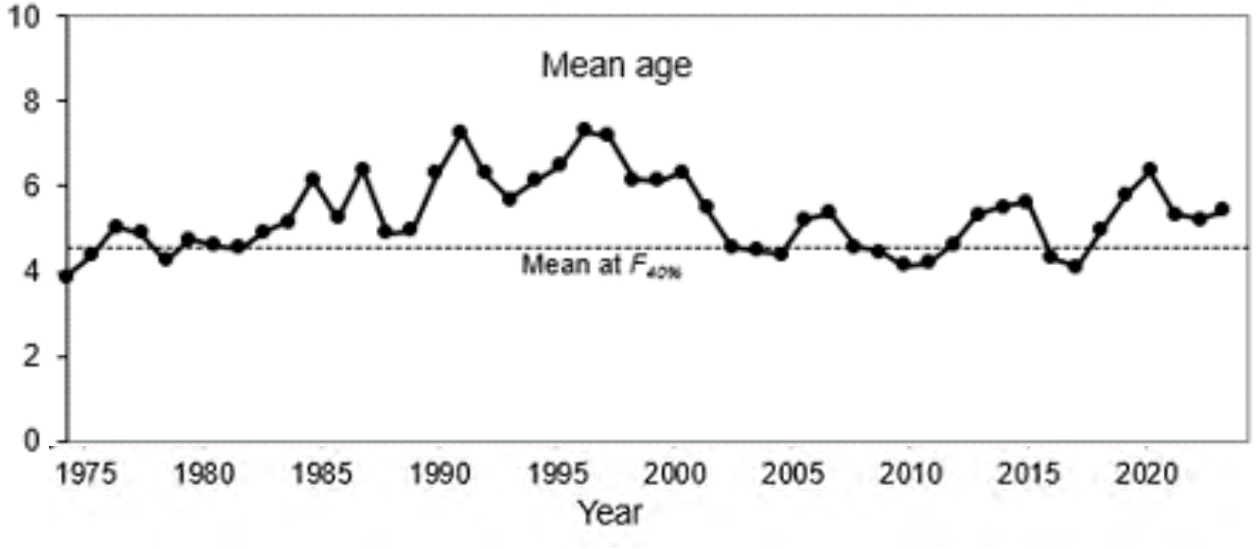


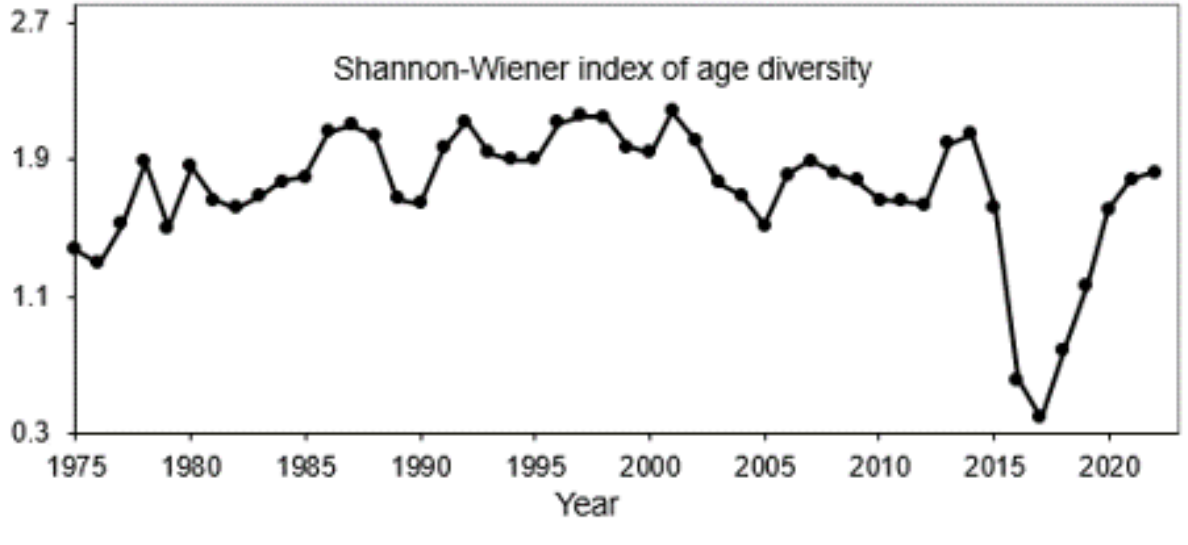
GOA Pollock: Indicators



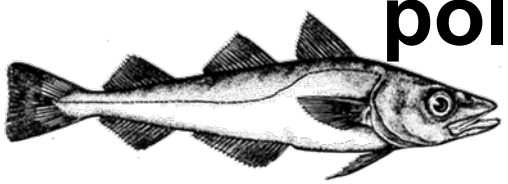






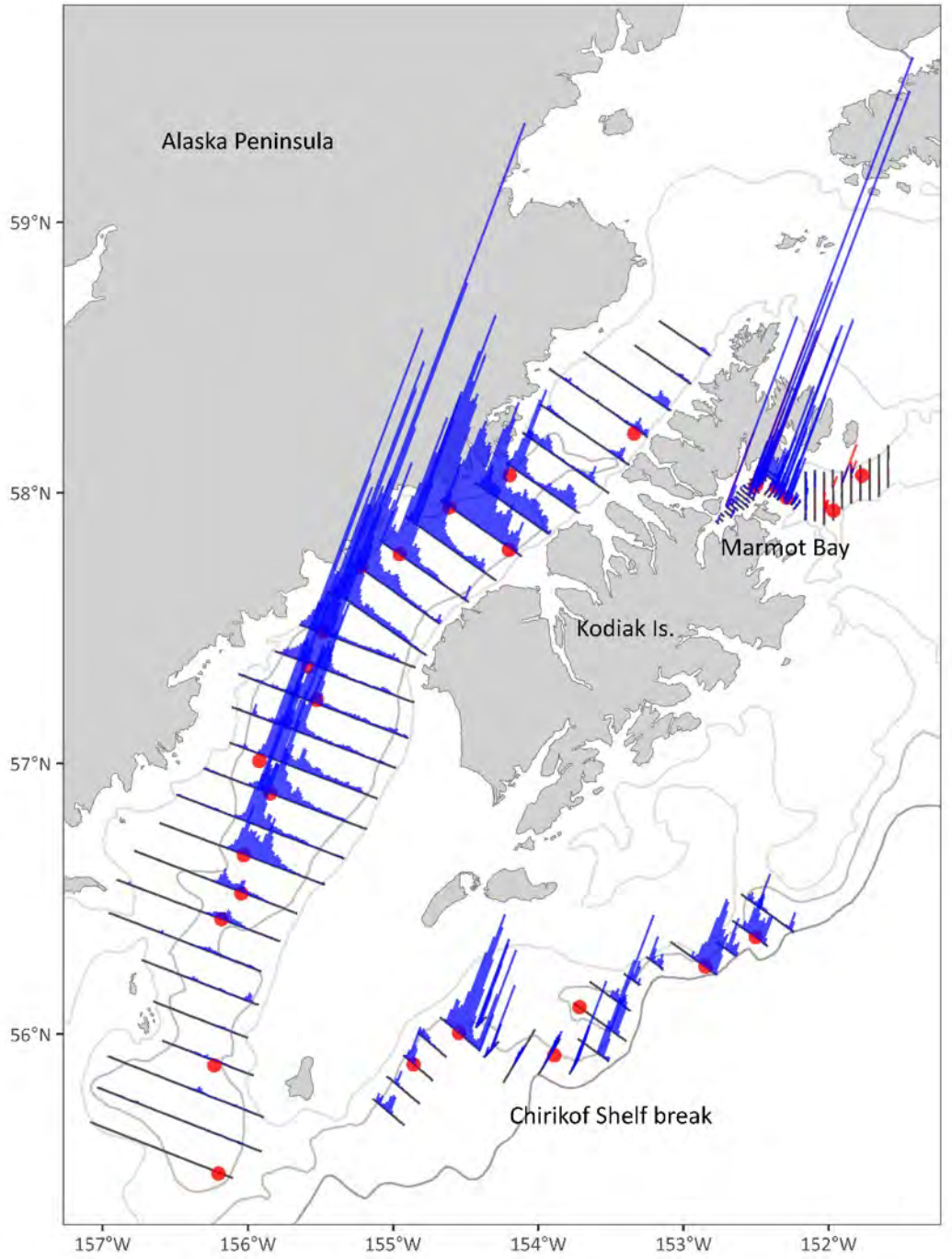


GOA Pollock: 2023 Shelikof Strait pollock AT survey

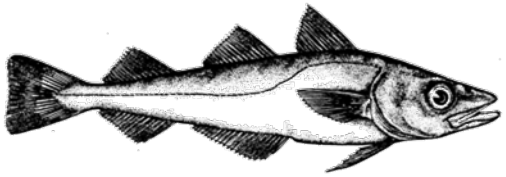


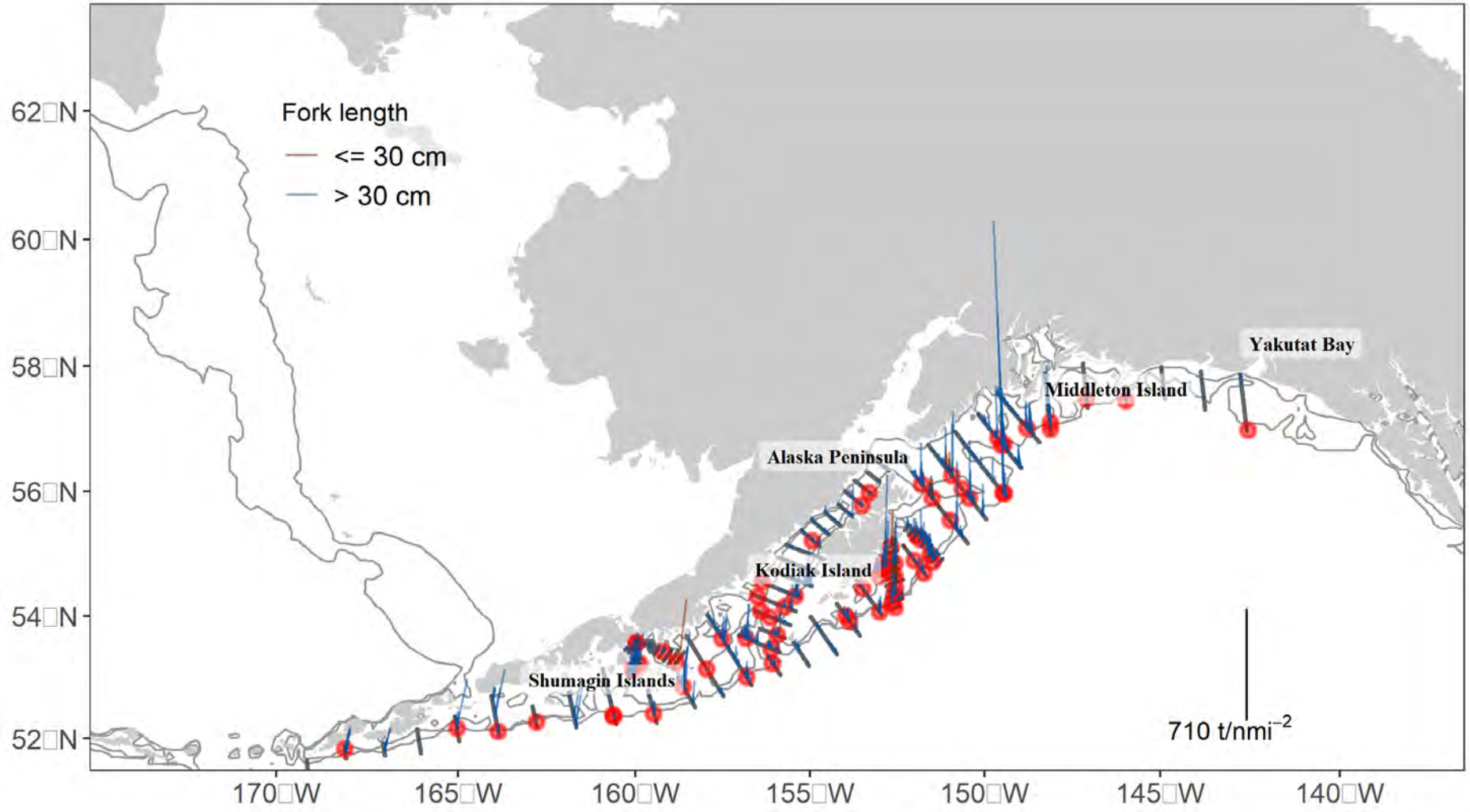
Shelikof down and few small fish

Chirikof and Marmot Bay are both up, but within historical norm



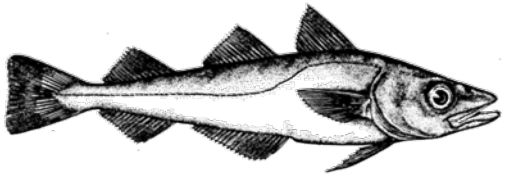
GOA Pollock: 2023 Summer pollock AT survey

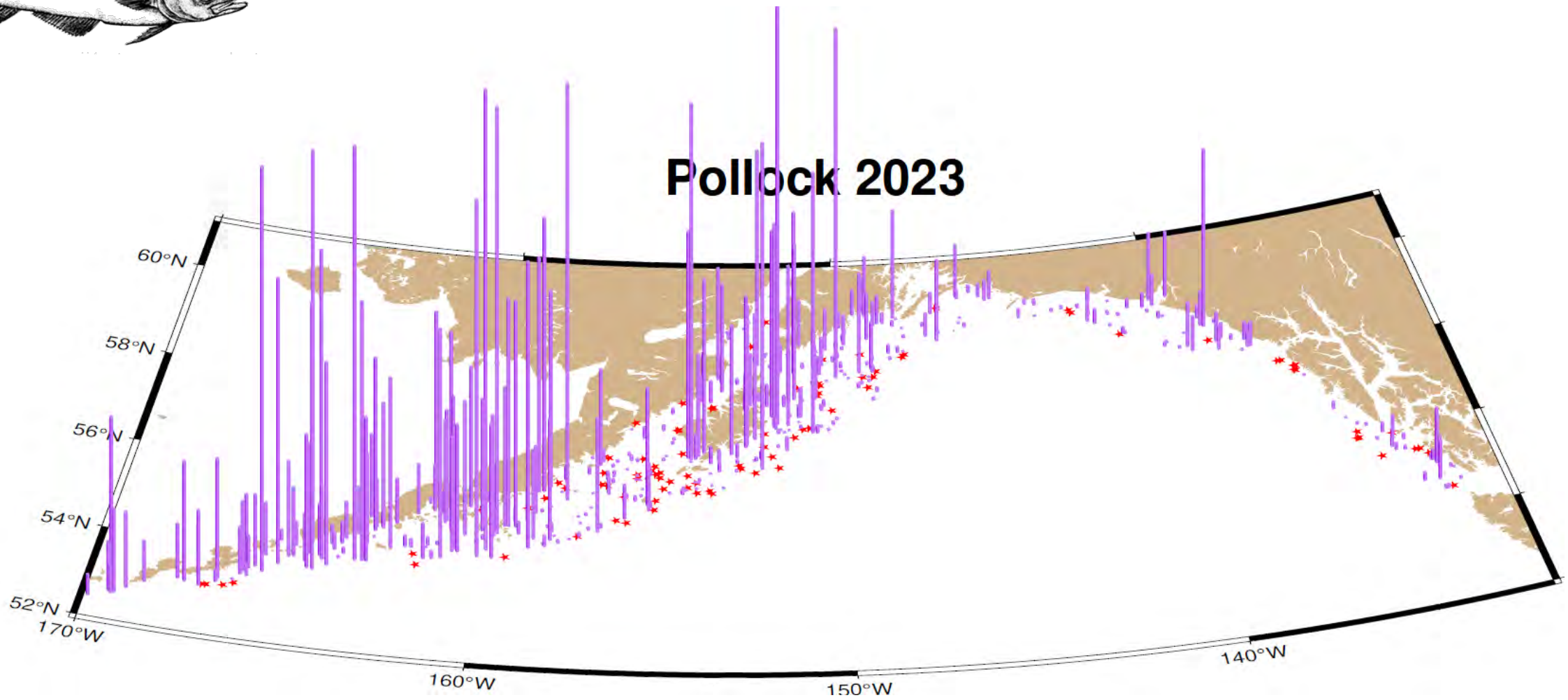




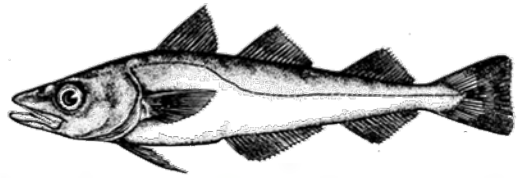
Thanks to D. McGowan

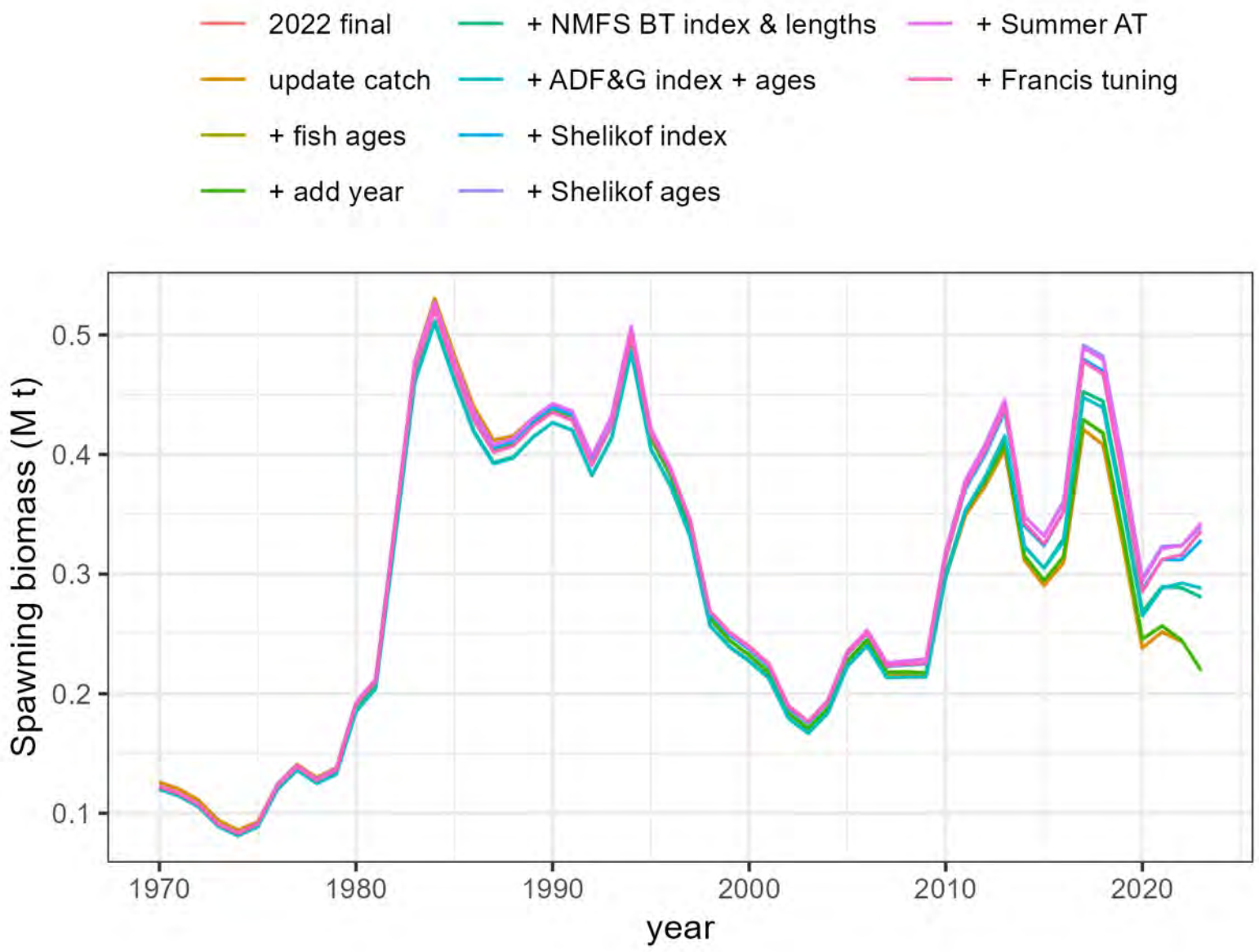
GOA Pollock: 2023 Summer NMFS bottom trawl results





GOA Pollock: Sequential addition of data





- Big increases with addition of NMFS BT and Shelikof data
- Moderate w/ summer AT
- Recent trend but also scale

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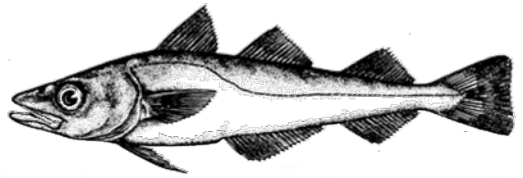

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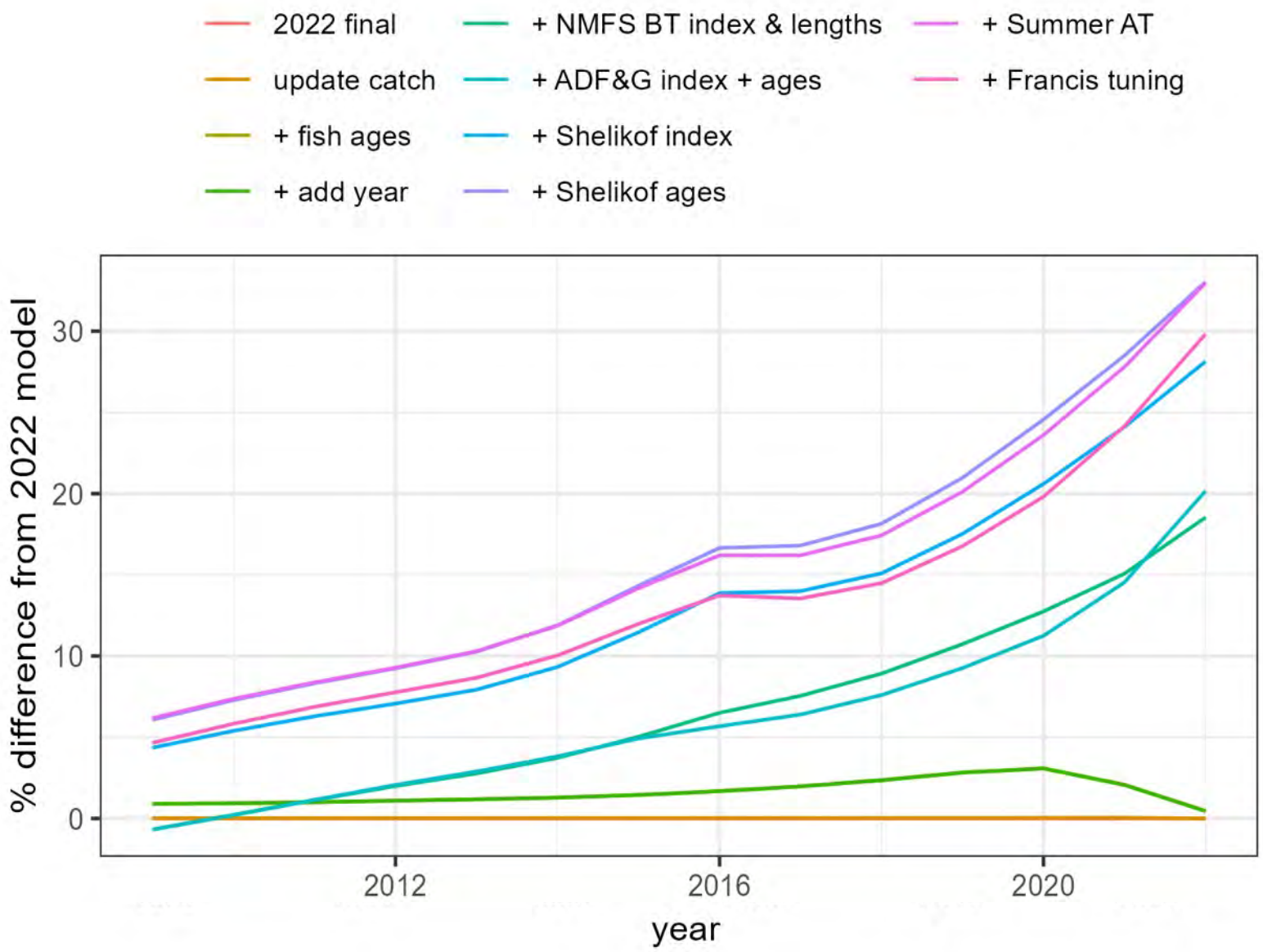
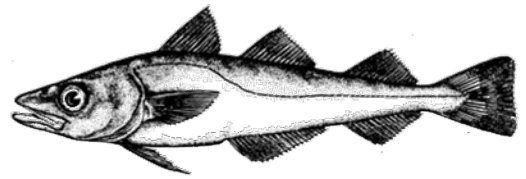
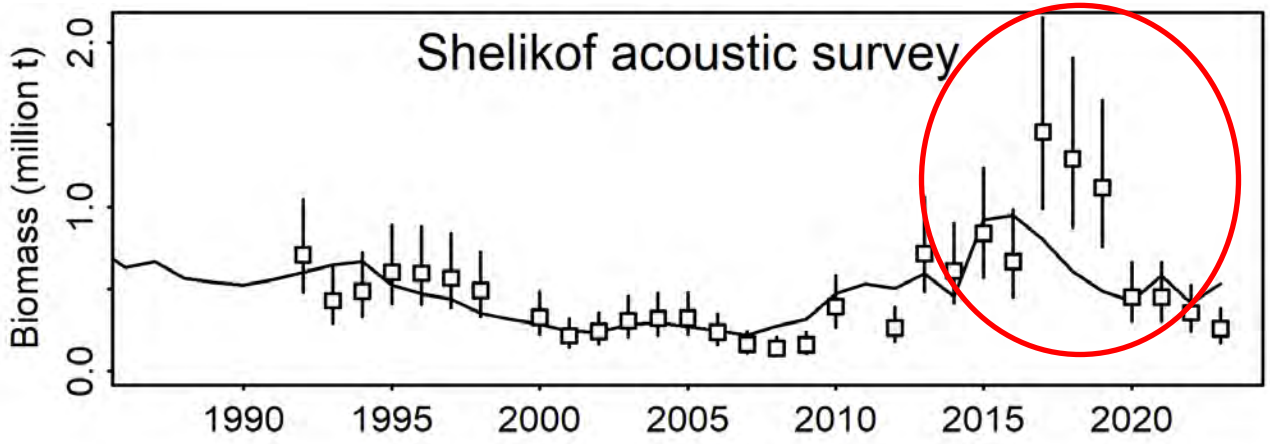
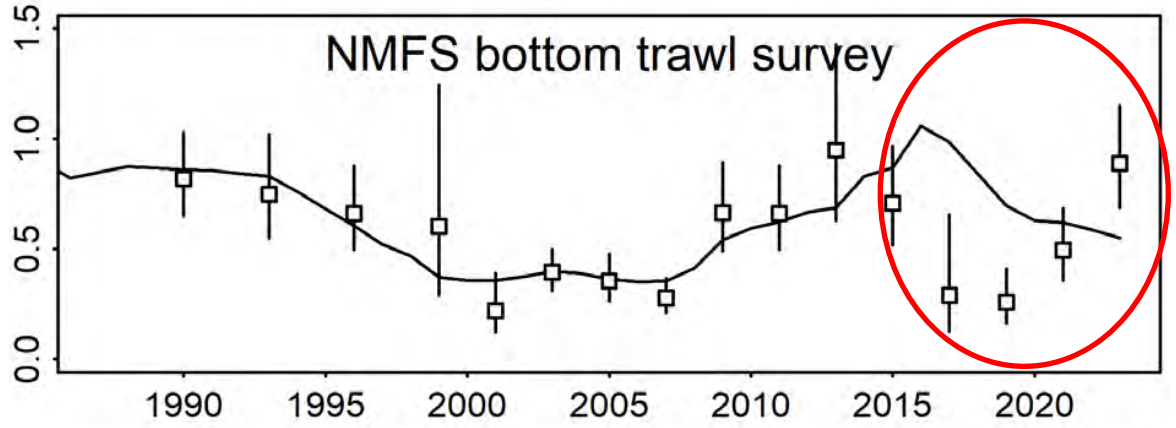


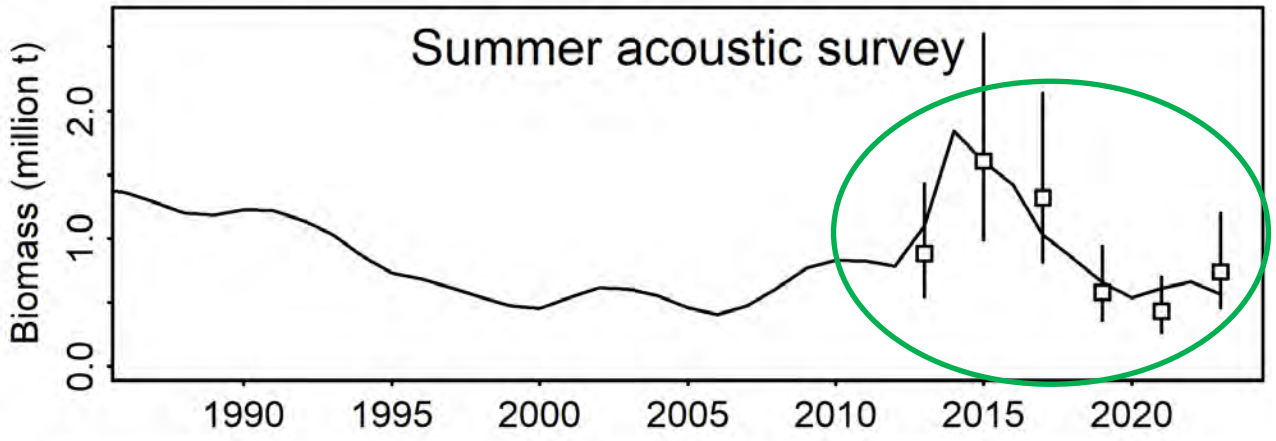


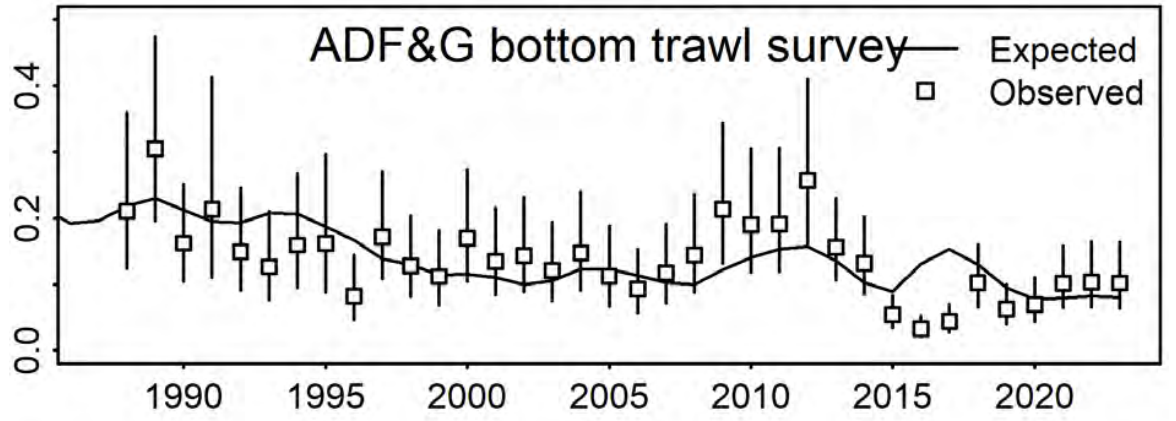
GOA Pollock: fit to indices

- Poor fits, wrong trends for key surveys



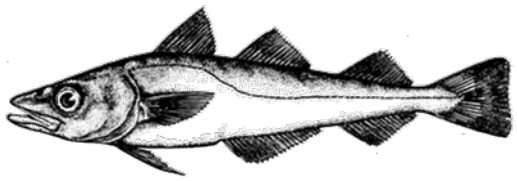


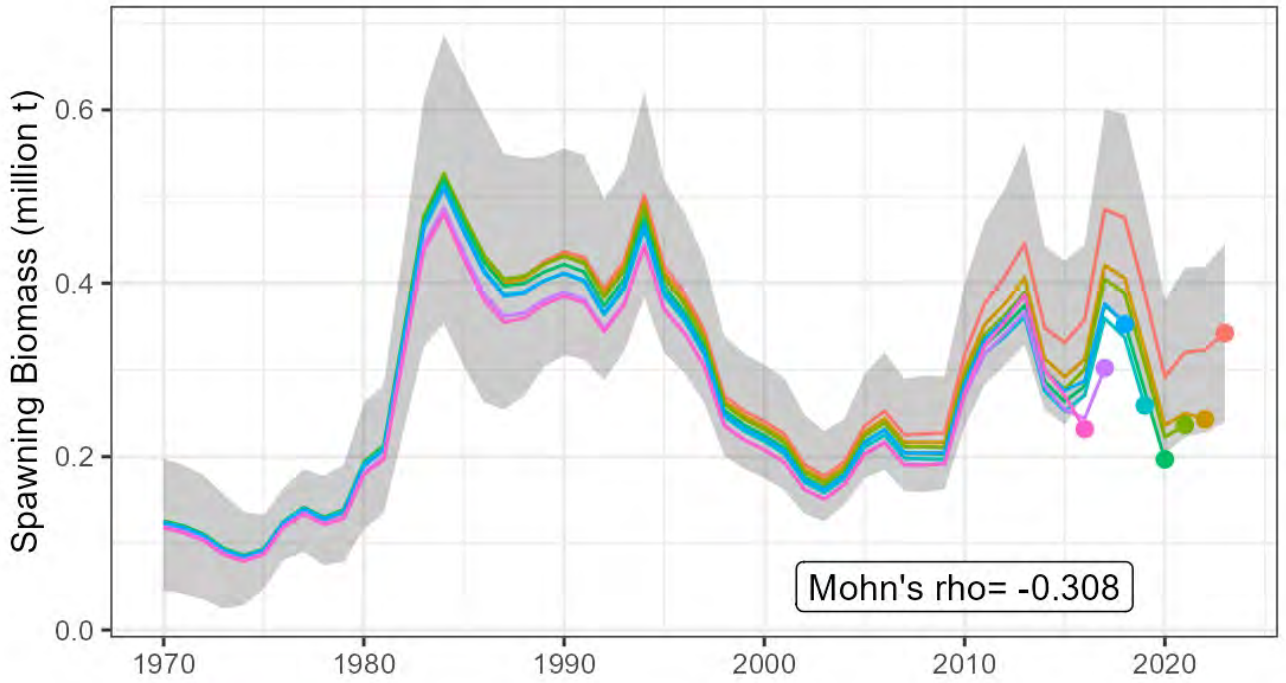


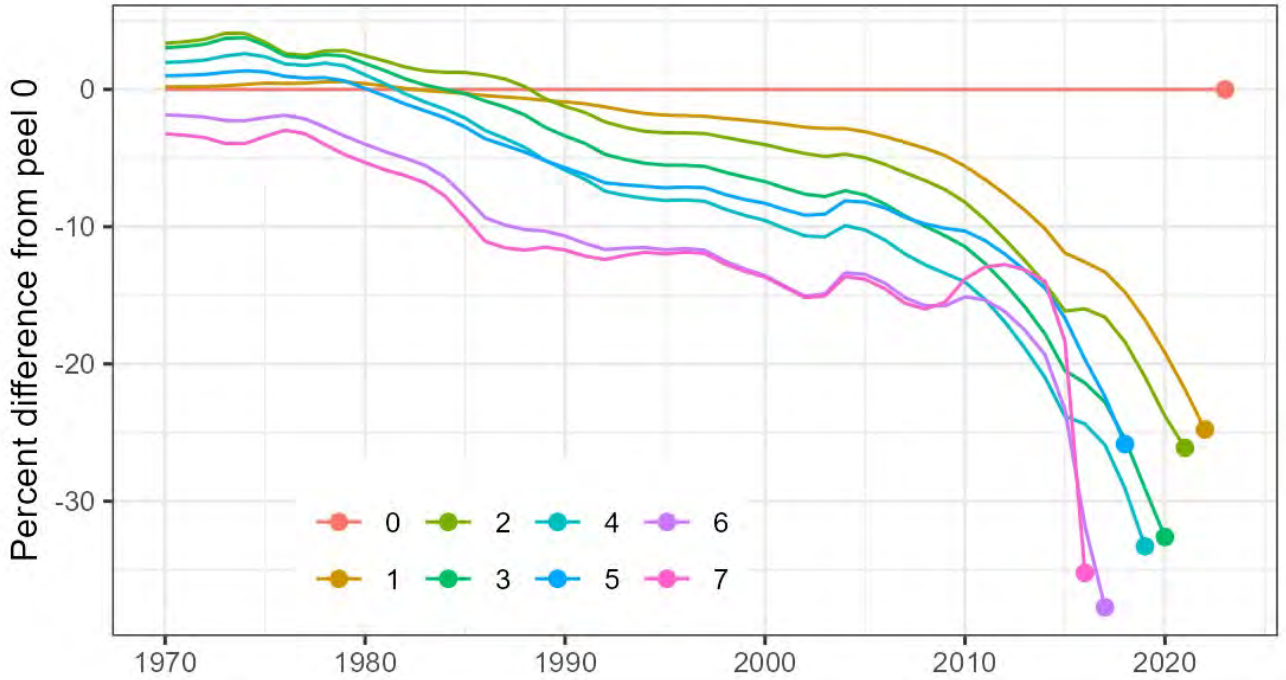


GOA Pollock: Retrospectives

- Rho is expected to range from -0.2 to 0.3 by chance (based on bootstrapping)
- Thus rho=-0.3 this year is significant
- Uses 7 peels, previously used 10



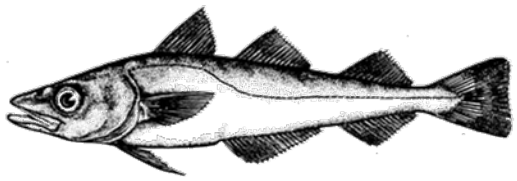


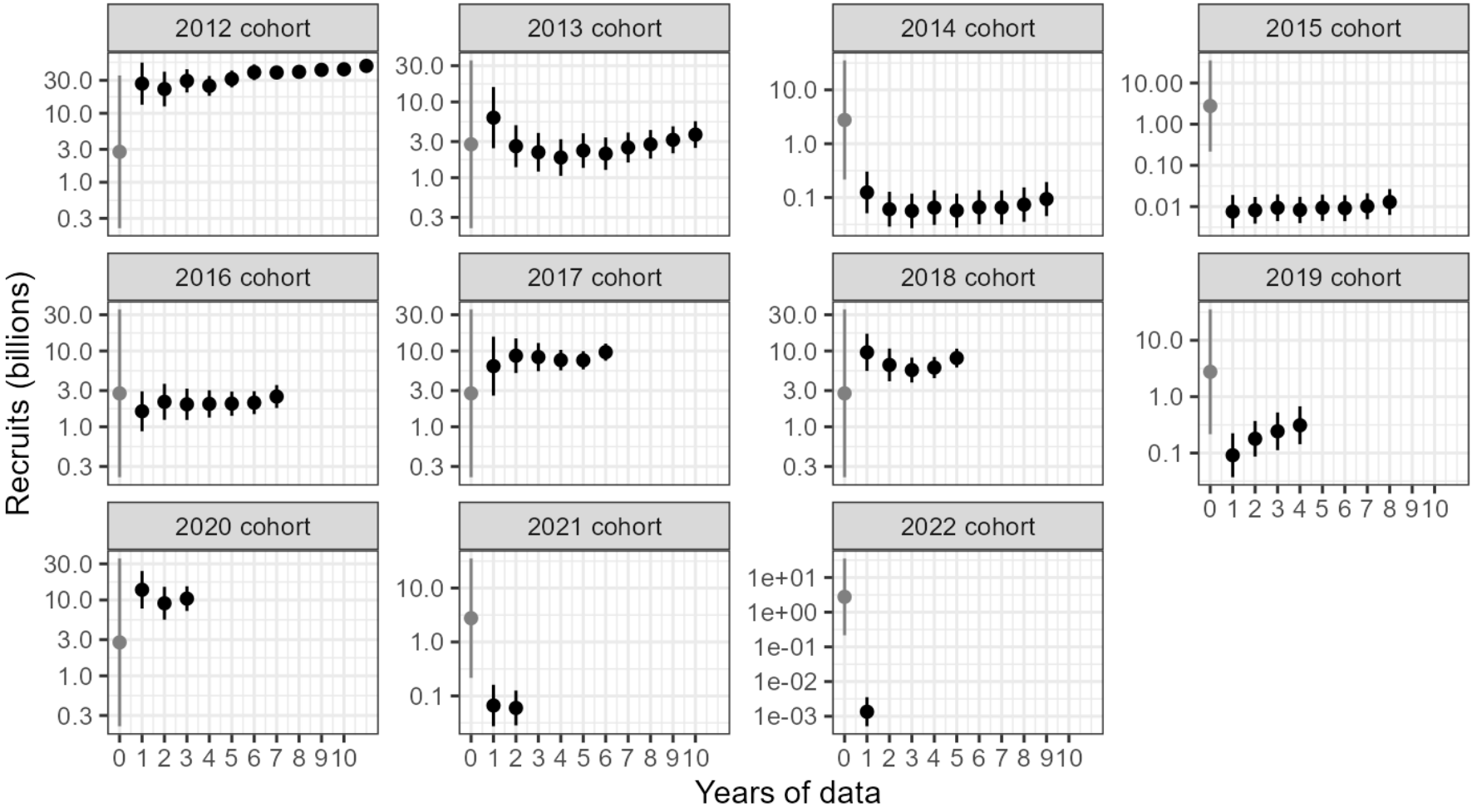


GOA Pollock: Retrospectives

A few vanishingly small recruits in recent years

- Are they real?
- Is that a regime shift?
- What does that mean for recruitment variability?





GOA Pollock: Retrospectives

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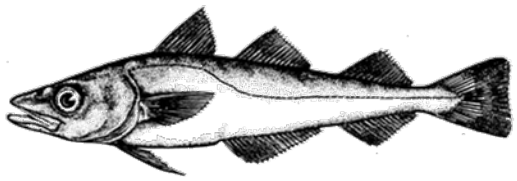
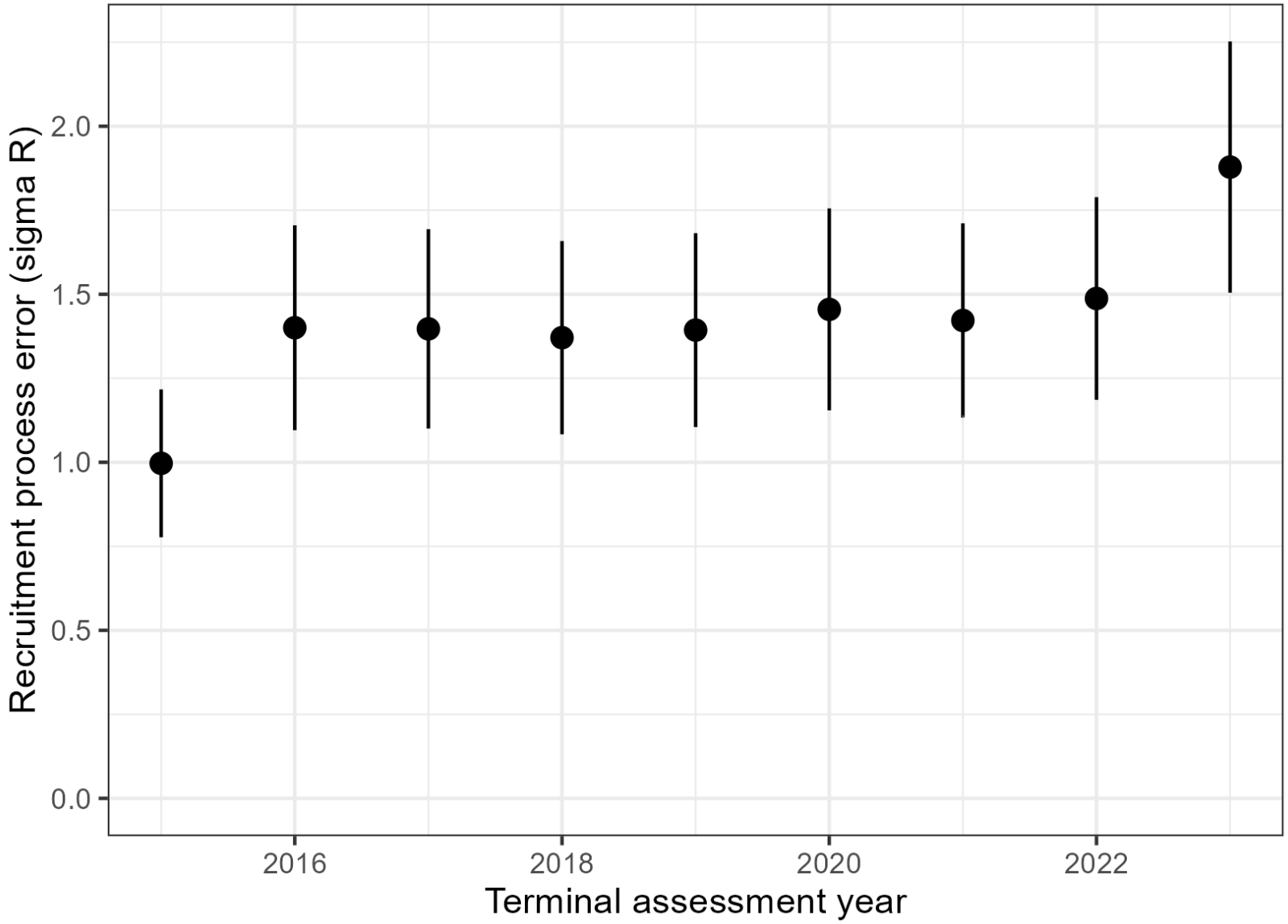


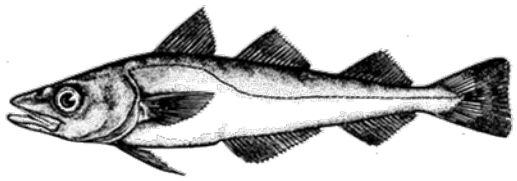


GOA Pollock: Risk table

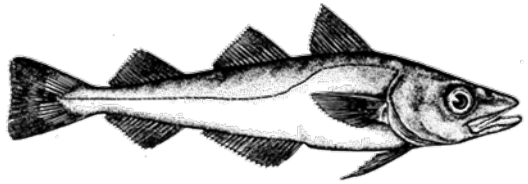
Summary and ABC recommendation

Assessment-related considerations	*Population dynamics considerations*	*Environmental/ecosystem considerations*	*Fishery Performance*
Level 2: Major concern	Level 1: No concern	Level 1: No concern	Level 1: No concern

- Assessment concerns: poor fit to NMFS BT index, retrospective
- Population concerns: extreme low cohorts



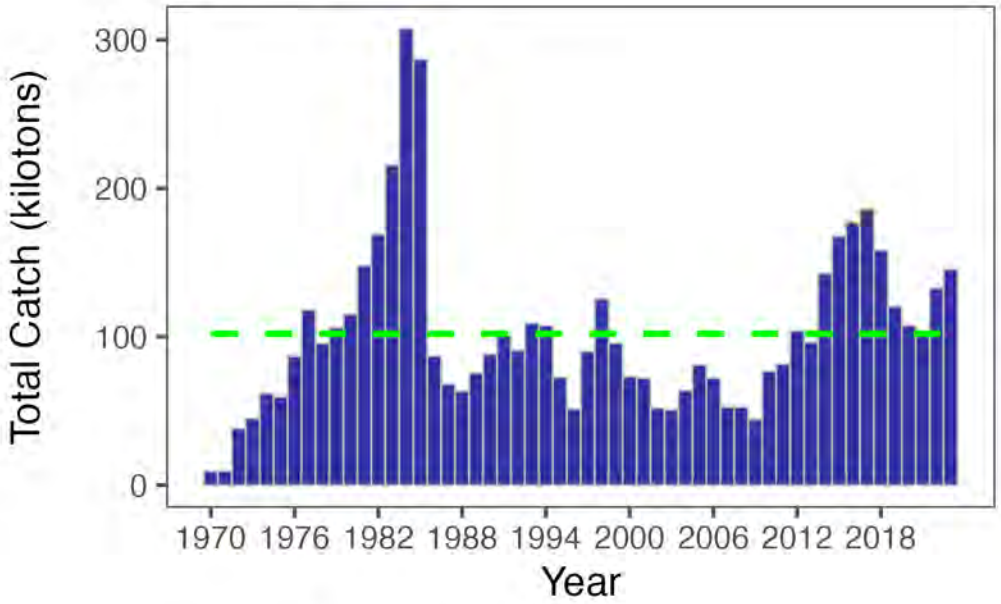
GOA Pollock



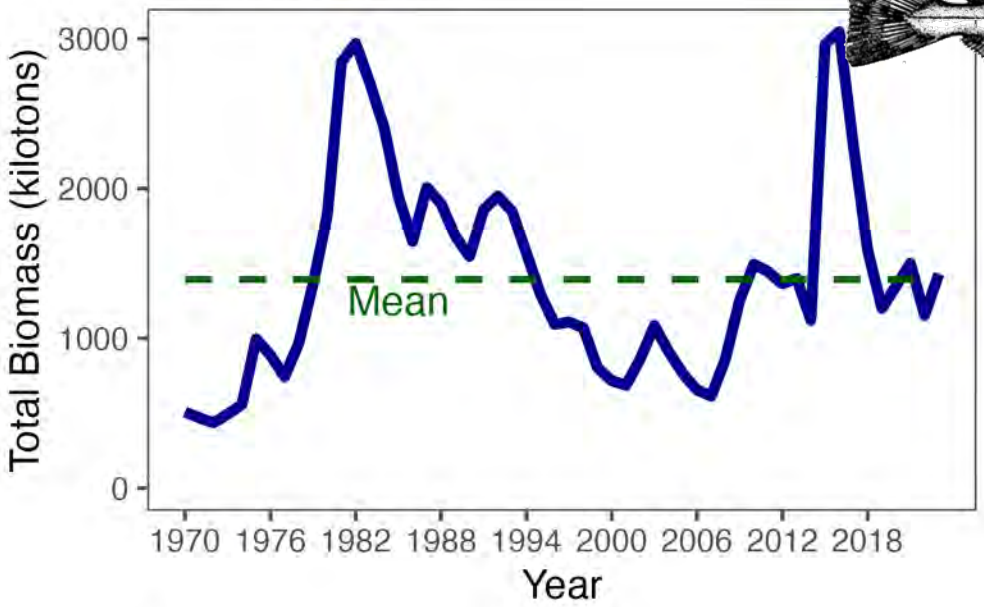
2024 apportionment

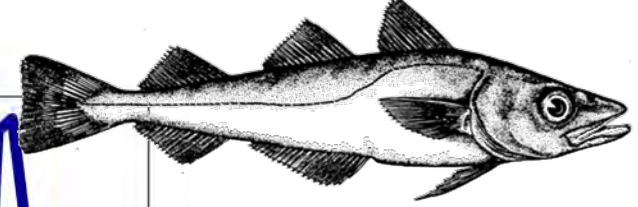
Year	Area	Season A ABC (t)	Season B ABC (t)
2024	610	6,611	40,793
	620	86,461	24,405
	630	16,901	44,773
	640	6,785	

Total Catch

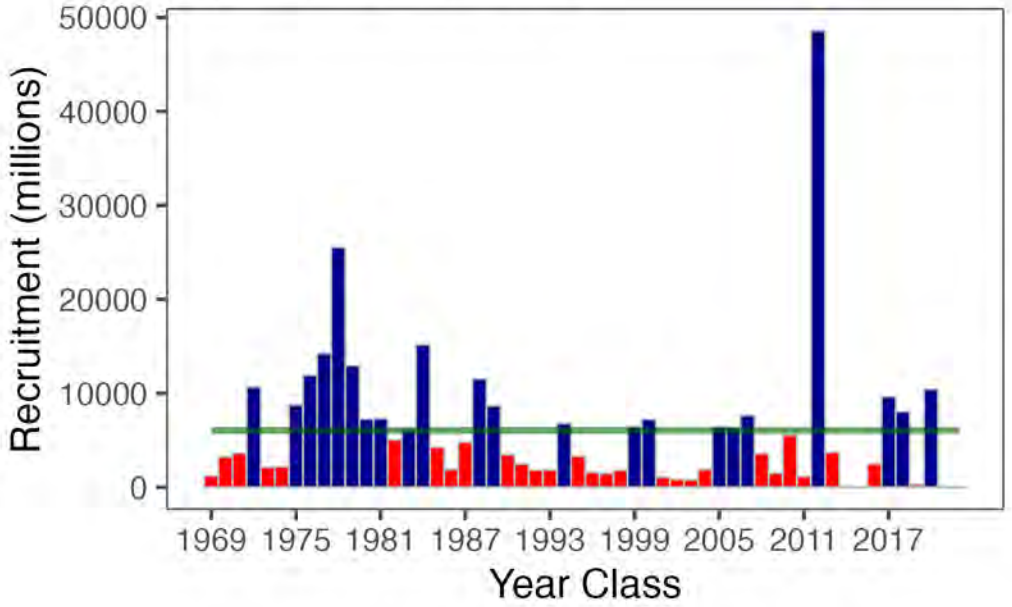


Total Biomass

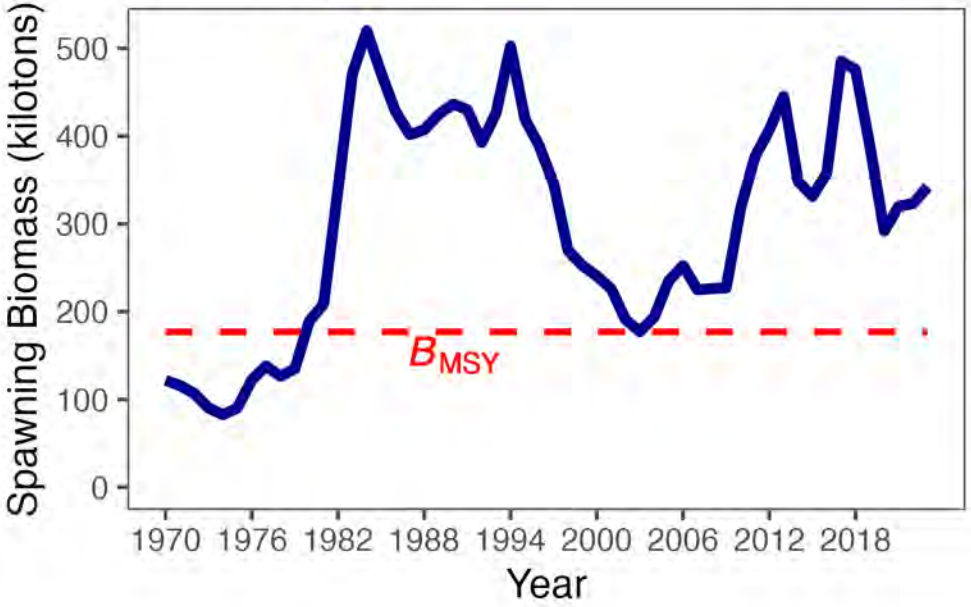




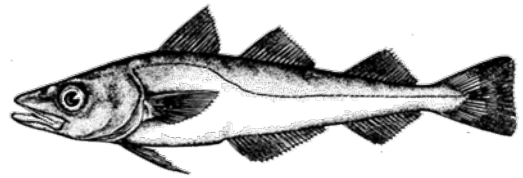
Age 1 Recruitment



Spawning Biomass

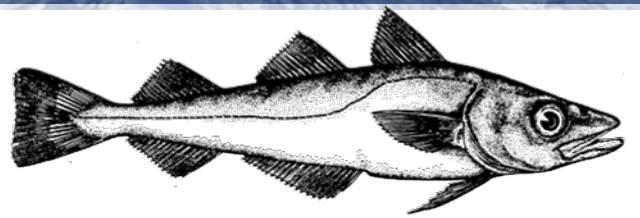


GOA Pollock SE Tier 5



	As estimated or *specified last* year for:		As estimated or *recommended this* year for:	
Quantity/Status	2023	2024	2024	2025
Biomass (t)	50,505	50,505	43,328	43,328
F_{OFL}	0.30	0.30	0.30	0.30
maxF_{ABC}	0.23	0.23	0.23	0.23
F_{ABC}	0.23	0.23	0.23	0.23
OFL (t)	15,150	15,150	12,998	12,998
*max*ABC (t)	11,363	11,363	9,749	9,749
ABC (t)	11,363	11,363	9,749	9,749
	As determined *last* year for:		As determined *this* year for:	
Status	2022	2023	2023	2024
Overfishing	No	n/a	No	n/a

GOA Pollock: Team Discussion



- Appreciated the detailed work by Dr Monnahan and his coauthors
- Noted that GOA pollock is scheduled for a CIE review in spring 2024
  - A focus of review on data weighting and compositional input sample sizes
- Market conditions for GOA pollock poor
- ABC accepted as determined by model 23.0.
- **The Team agreed with the author's recommended model, ABC, OFL, and apportionment**

GOA Pacific cod

Species	2023 catch	ABC 2023	ABC 2024	Change
Pollock	131,892	160,301	242,292	up 81,991 (51%)
Pacific Cod	14,883	24,634	32,272	up 7,638 (31%)
Sablefish	22,746	40,502	47,146	up 6,644 (16%)
Flatfish	2,017	119,497	124,494	up 4,997 (4%)
Arrowtooth flounder	9,248	119,485	119,249	down 236 (0%)
Rockfish	36,943	57,519	59,527	up 2,008 (3%)
Atka mackerel	462	4,700	4,700	same (0%)
Skates	2,741	6,563	6,036	down 527 (8%)
Sharks	1,777	4,891	4,891	same (0%)
Octopus	154	980	980	same (0%)
Total	222,863	539,072	641,587	up 102,515 (19%)

GOA Pacific cod ESP report card

- Kalei Shotwell presented the GOA Pacific cod ESP report card for 2023
- A full ESP is scheduled for 2025.
- As with pollock, the Team discussed CEATTLE model and indicator analyses
- Noted that the CEATTLE model will include more stocks and more predators in the future and may be more generally applicable

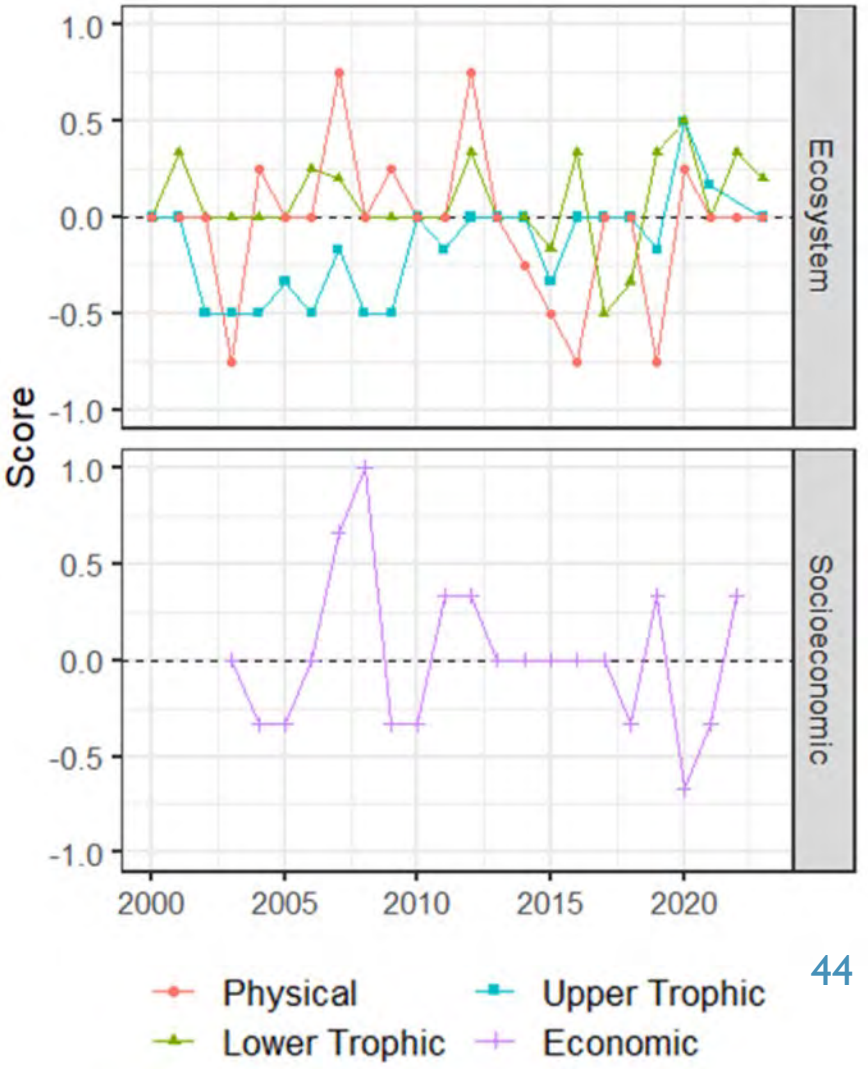
Ecosystem & Socioeconomic Profile (ESP) - GOA P. cod

Management Summary:

- Heat wave events low, bottom temperatures below average, habitat suitability slightly below average, suggesting temperatures unlikely limiting survival, eddy kinetic energy remains low suggesting lower retention, reduced transport
- Spring bloom very delayed, but may be tempered by cooler environment, zooplankton resources average, suggests sufficient prey resources but larvae CPUE was low, and YOY below average suggesting poor year class
- Juvenile condition below average, adult average, population moved slightly to northeast with slightly contracted spatial distribution
- Ex-vessel value increased but still below average, price above average and revenue per unit effort highest in time series in 2022

Modeling Summary:

- Two potential covariates for recruitment, summer bottom temp from CFSR model, annual eddy kinetic energy in Kodiak area, 1994-2019 year class
- Ecosystem research models of time-varying growth, new 2-year project
- CEATTLE model update: age-1 M increased remains below mean, total biomass consumed below average, ration increased but still below average

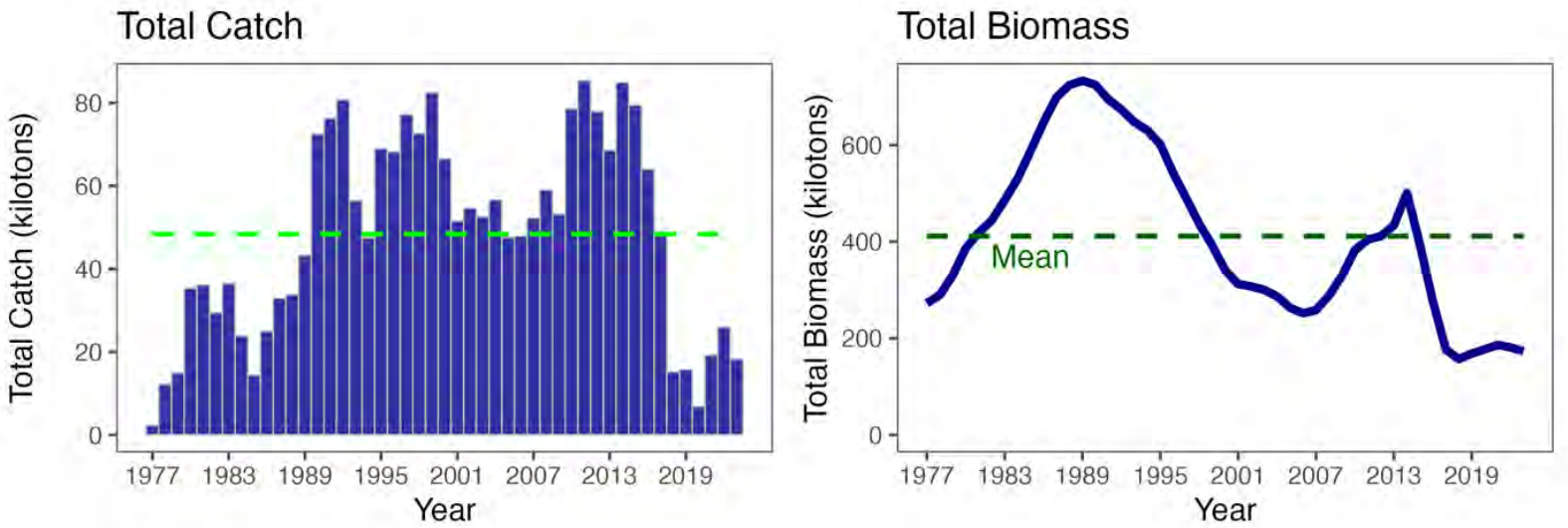


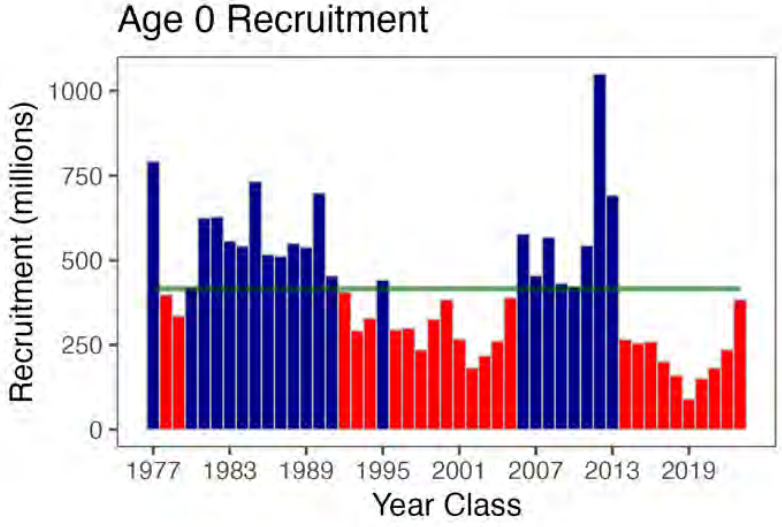
GOA Pacific cod: Team Discussion

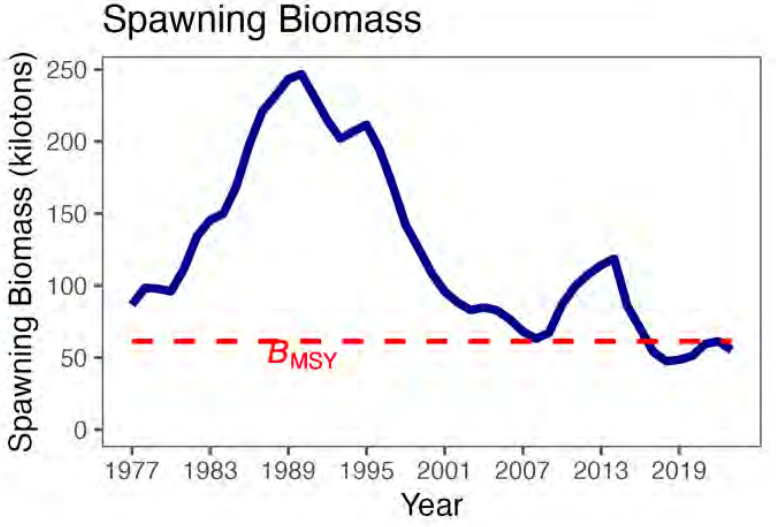
- The Team recommended that sufficient samples be processed and analyzed so that the resulting data can be used in the assessment.
  - Maturity samples remain unprocessed
- The Team noted the work devoted to developing posterior distribution

- The Team agreed with the authors' recommended model, 19.1b, and the authors' recommended OFL and ABCs, with no reduction from the maximum permissible ABC.

GOA Pacific cod







GOA Sablefish

Species	2023 catch	ABC 2023	ABC 2024	Change
Pollock	131,892	160,301	242,292	up 81,991 (51%)
Pacific Cod	14,883	24,634	32,272	up 7,638 (31%)
Sablefish	22,746	40,502	47,146	up 6,644 (16%)
Flatfish	2,017	119,497	124,494	up 4,997 (4%)
Arrowtooth flounder	9,248	119,485	119,249	down 236 (0%)
Rockfish	36,943	57,519	59,527	up 2,008 (3%)
Atka mackerel	462	4,700	4,700	same (0%)
Skates	2,741	6,563	6,036	down 527 (8%)
Sharks	1,777	4,891	4,891	same (0%)
Octopus	154	980	980	same (0%)
Total	222,863	539,072	641,587	up 102,515 (19%)

GOA flatfish

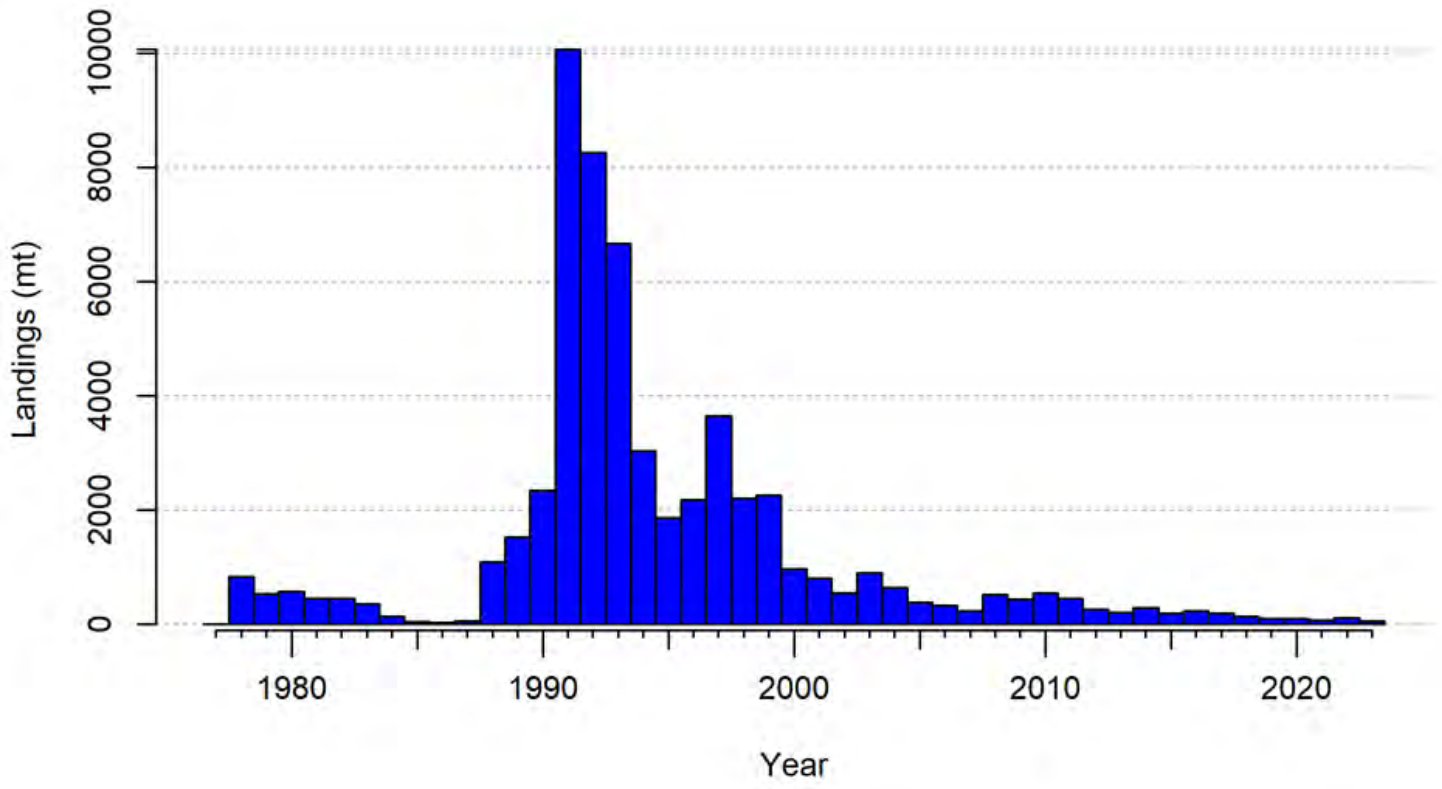
Species	2023 catch	ABC 2023	ABC 2024	Change
Pollock	131,892	160,301	242,292	up 81,991 (51%)
Pacific Cod	14,883	24,634	32,272	up 7,638 (31%)
Sablefish	22,746	40,502	47,146	up 6,644 (16%)
Flatfish	2,017	119,497	124,494	up 4,997 (4%)
Arrowtooth flounder	9,248	119,485	119,249	down 236 (0%)
Rockfish	36,943	57,519	59,527	up 2,008 (3%)
Atka mackerel	462	4,700	4,700	same (0%)
Skates	2,741	6,563	6,036	down 527 (8%)
Sharks	1,777	4,891	4,891	same (0%)
Octopus	154	980	980	same (0%)
Total	222,863	539,072	641,587	up 102,515 (19%)

GOA flatfish

Species	2023 ABC	2024 ABC	Change
Shallow water flatfish	53,537	55,565	up 2,028 (4%)
Rex sole	20,664	21,364	up 700 (3%)
Deep water flatfish*	5,816	7,062	up 1,246 (21%)
Flathead sole	39,480	40,503	up 1,023 (3%)
Arrowtooth flounder	119,485	119,249	down 236 (0%)
Subtotal	238,982	243,743	up 4,761 (2%)
Subtotal (without ATF)	119,497	124,494	up 4,997 (4%)

GOA Deepwater flats: Dover sole catch trends

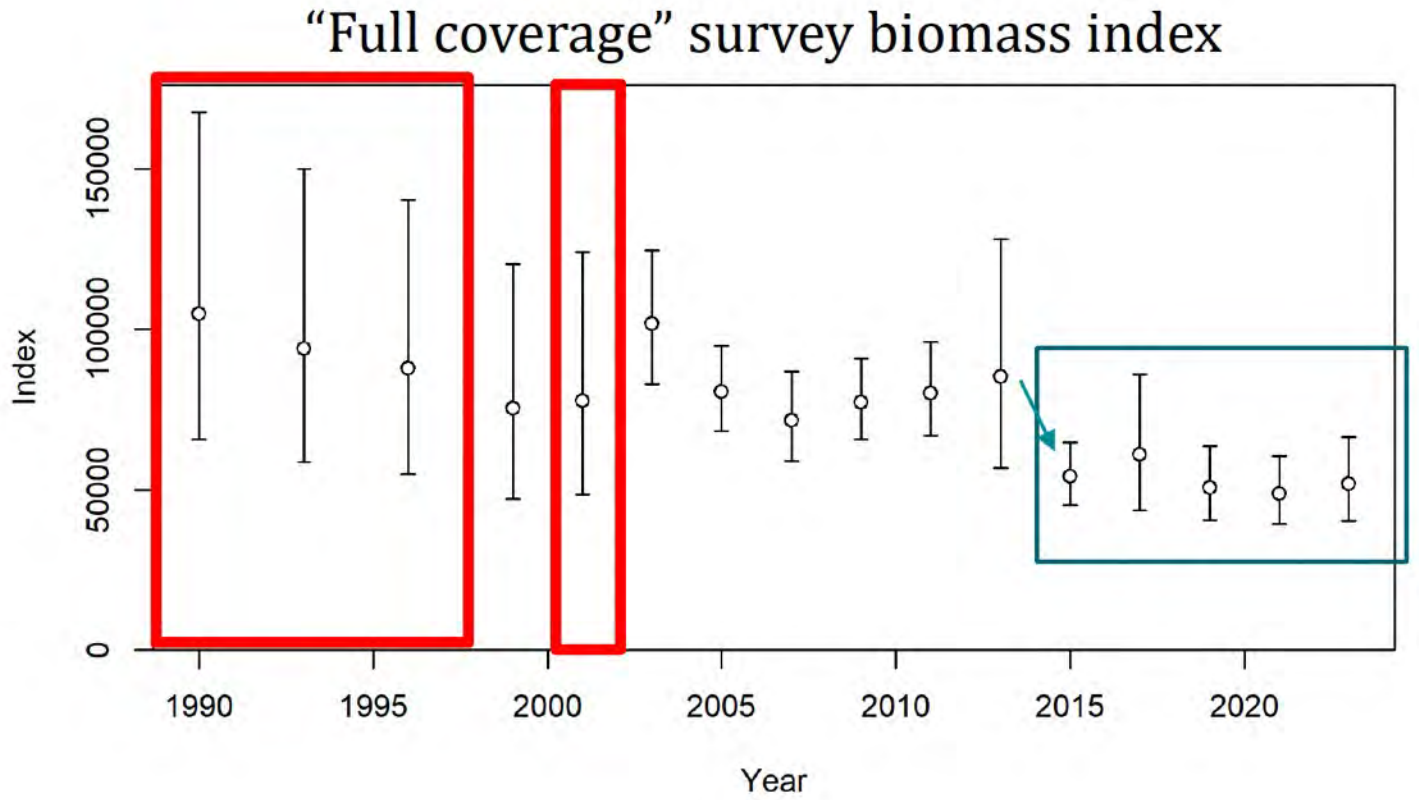
- Dover sole catches low (1-3% of ABC in recent years)
- Big catch in 1991 (10,196 t)
- Catches below 1,000 t since 2000
- Catches primarily in Central GOA
- Increasing proportion in discards:
  - 10% in 1998
  - ~90% in past 3 years

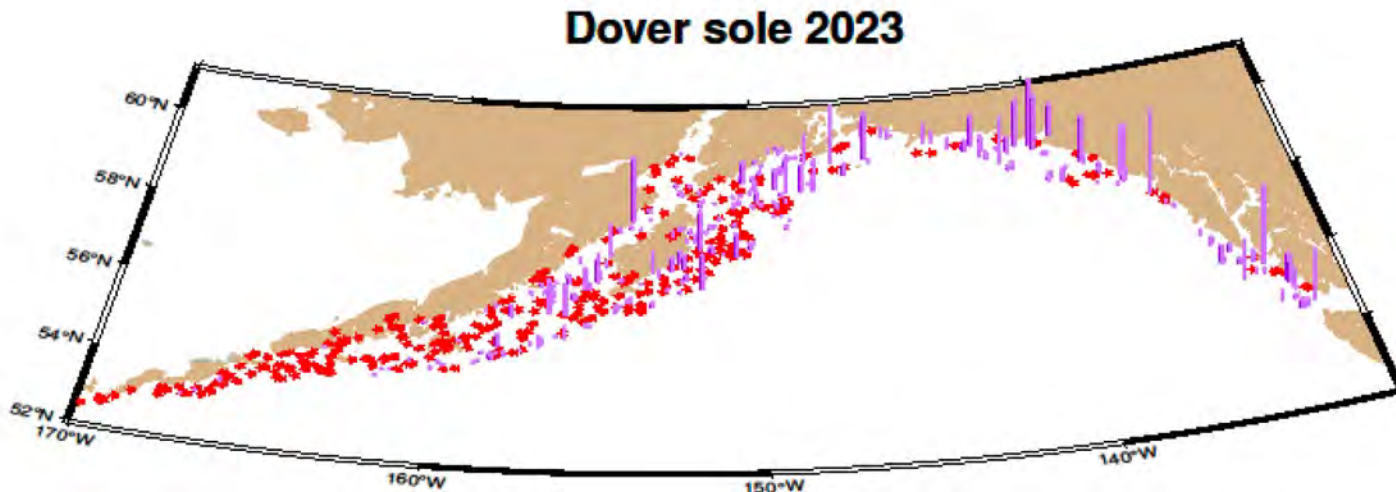


Thanks to Carey McGilliard

GOA Deepwater flats: Dover sole survey trends

- A shift to lower survey biomass 2015-2023
- REMA used to fill in gaps in missing survey depth/area strata
- Highest CPUE in Central GOA (similar to other years)

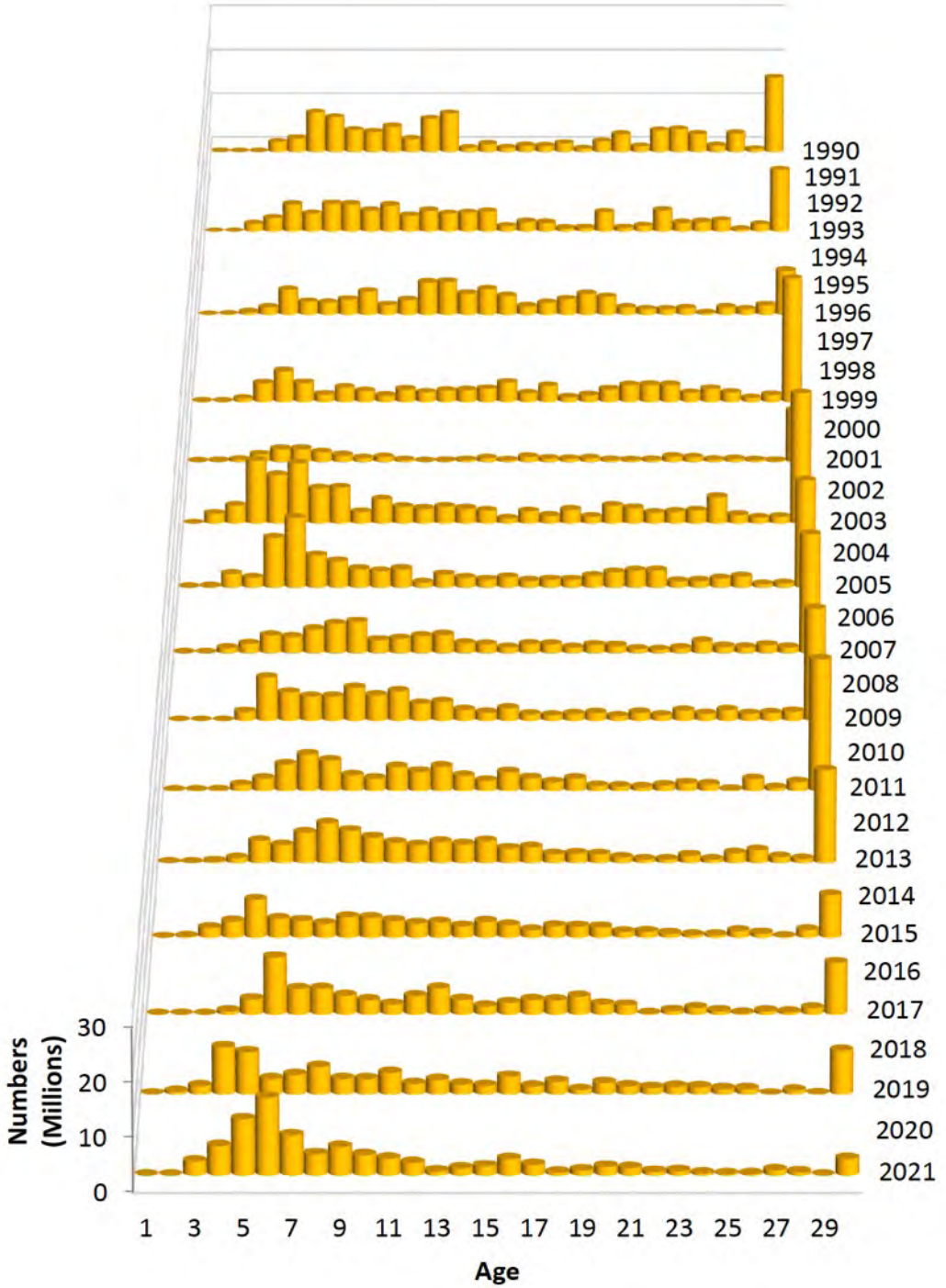




Thanks to Carey McGilliard

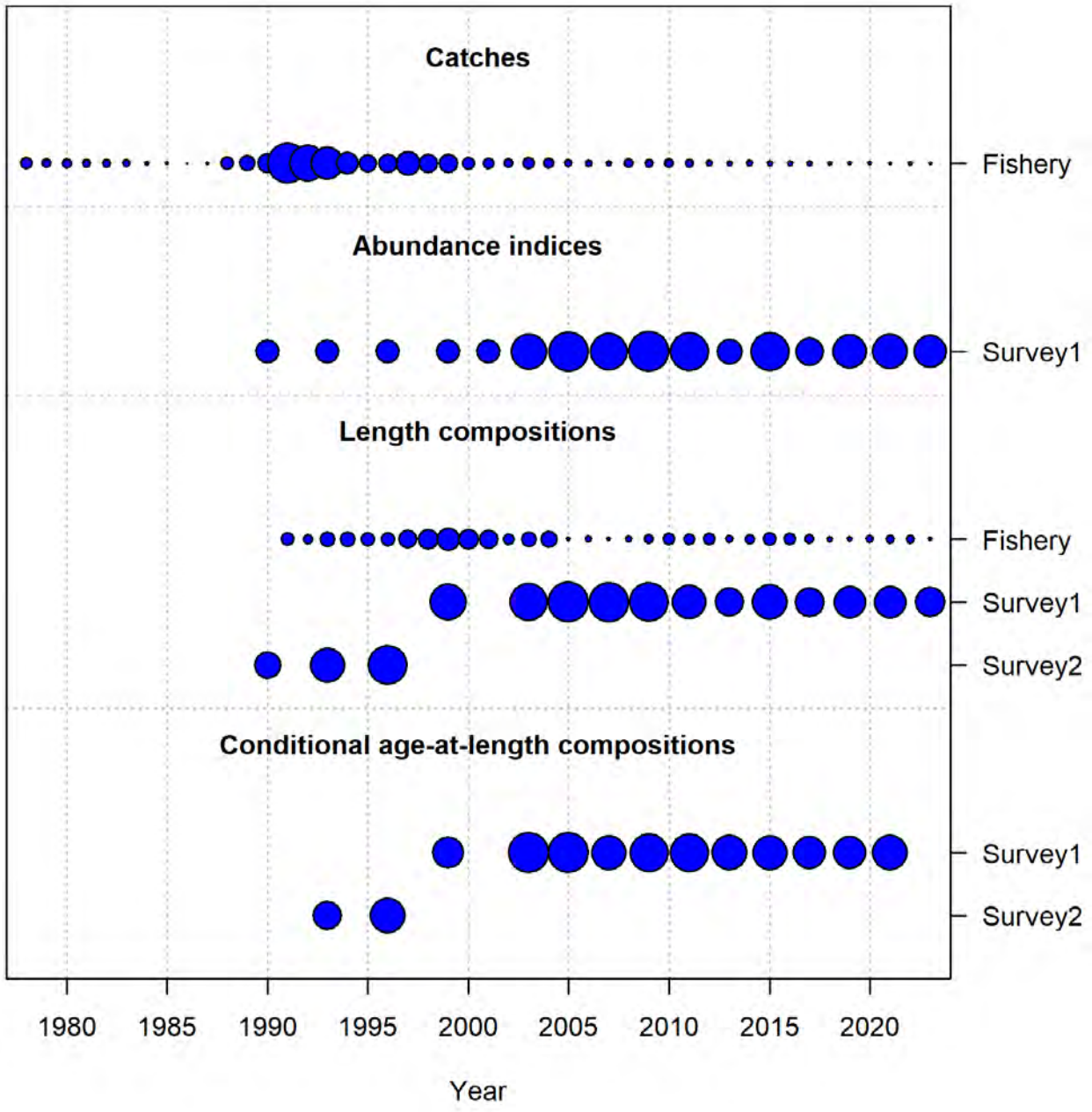
GOA Deepwater flats: Dover sole survey trends

- Decline in fish age 30+ from 2015-2023
- Large new year classes, especially 2015

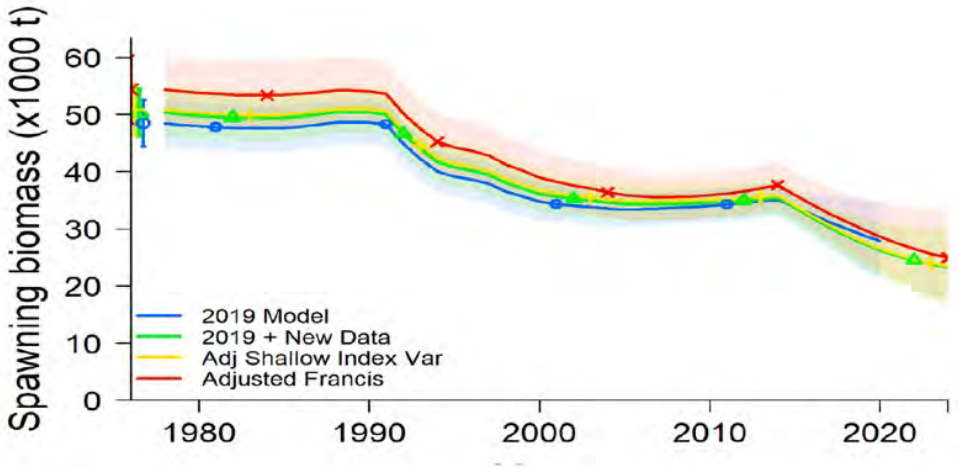


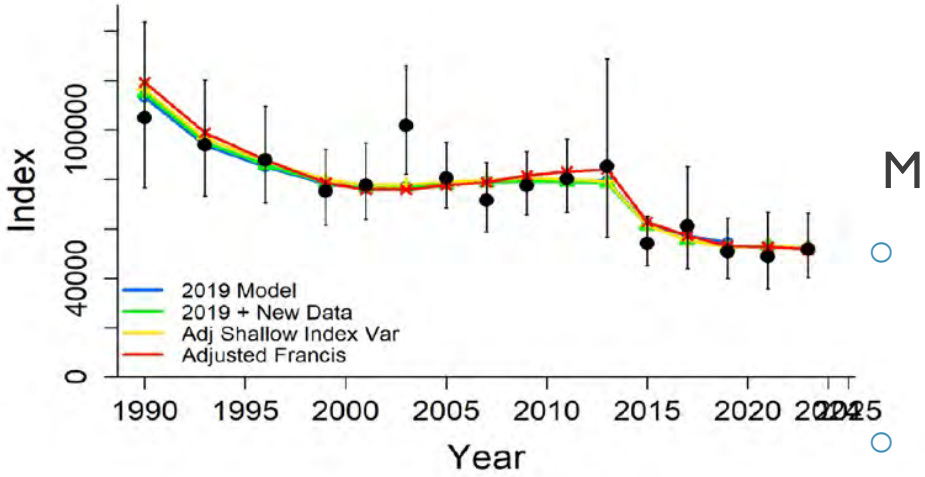
GOA Deepwater flats: Dover sole data

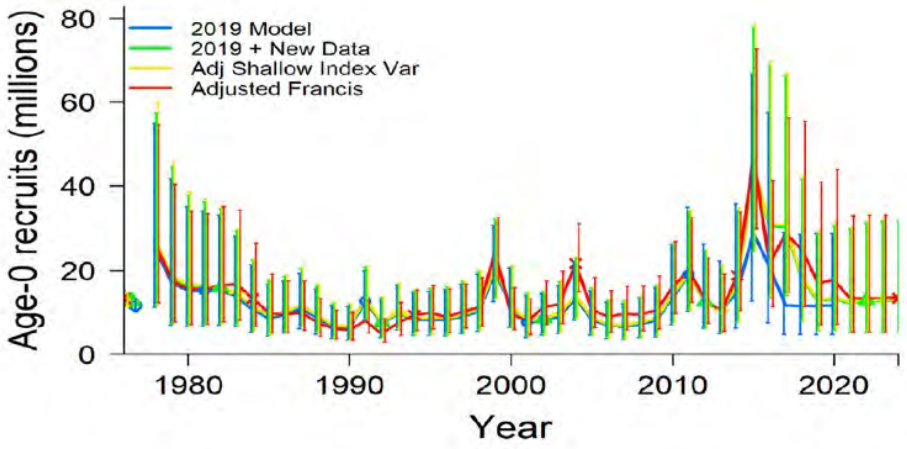
- Size of dot shows:
  - Relative size of catches
  - Relative precision for indices
  - Relative to sample size for comps

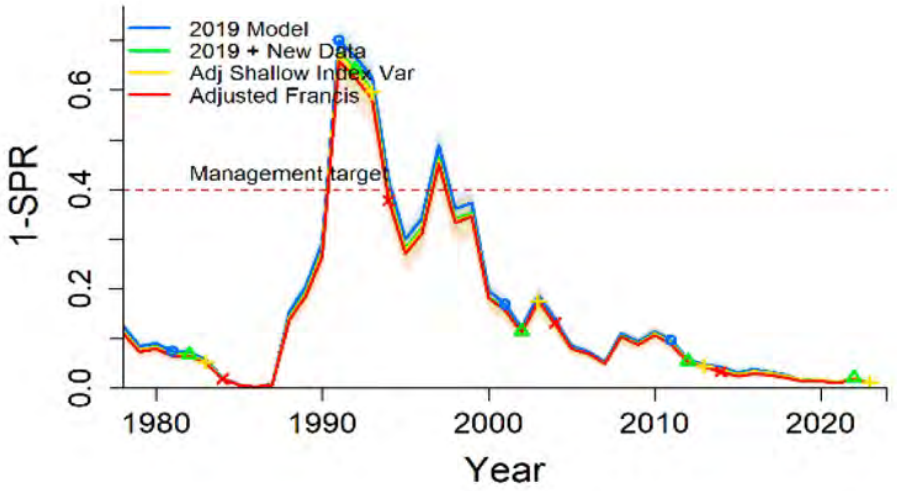


GOA Deepwater flats: Dover sole model bridging









Model 19.3.1:

- Uses new survey biomass variance estimates
- Francis re-weighting, adjusted so that shallow-coverage comp weights = full-coverage comp weights

GOA Deepwater flats

- Greenland turbot historical catches updated due to Catch Accounting System changes
- Kamchatka flounder:
  OFL = max(catches 2011-present)
- Projection model for Dover sole using output from age-structured model using age 3 recruits
- 5-yr average catch of 103 t used in place of ABC for 2023-2025

Species	Quantity	As estimated or *specified last* year for:		As estimated or *recommended this* year for:	
		2023	2024	2024*	2025
Dover sole	*M* (natural mortality rate)	0.119(f), 0.113(m)	0.119(f), 0.113(m)	0.129(f), 0.128(m)	0.129(f), 0.128(m)
	Tier	3a	3a	3a	3a
	Projected total (3+) biomass (t)	81,328	79,578	86,182	84,080
	Projected Female spawning biomass (t)	25,717	25,215	24,938	24,375
	$B_{100\%}$	19,032	19,032	15,968	15,968
	$B_{40\%}$	7,613	7,613	6,387	6,387
	$B_{35\%}$	6,661	6,661	5,589	5,589
	F_{OFL}	0.11	0.11	0.15	0.15
	$maxF_{ABC}$	0.09	0.09	0.12	0.12
	F_{ABC}	0.09	0.09	0.12	0.12
	OFL (t)	6,605	6,489	8,263	8,133
	maxABC (t)	5,581	5,484	6,969	6,860
	ABC (t)	5,581	5,484	6,969	6,860
Greenland turbot	Tier	6	6	6	6
	OFL (t)	238	238	49*	49*
	maxABC (t)	179	179	37	37
	ABC (t)	179	179	37	37
Kamchatka flounder	Tier	6	6	6	6
	OFL (t)	69	69	69	69
	maxABC (t)	51.75	51.75	52	52
	ABC (t)	51.75	51.75	52	52
Deepsea sole	Tier	6	6	6	6
	OFL (t)	6	6	6	6
	maxABC (t)	4	4	4	4
	ABC (t)	4	4	4	4
Deepwater Flatfish Complex	OFL (t)	6,918	6,802	8,387	8,257
	maxABC (t)	5,816	5,719	7,062	6,953
	ABC (t)	5,816	5,719	7,062	6,953
	Status	As determined *last* year for:		As determined *this* year for:	
		2021	2022	2022	2023

GOA Deepwater flats

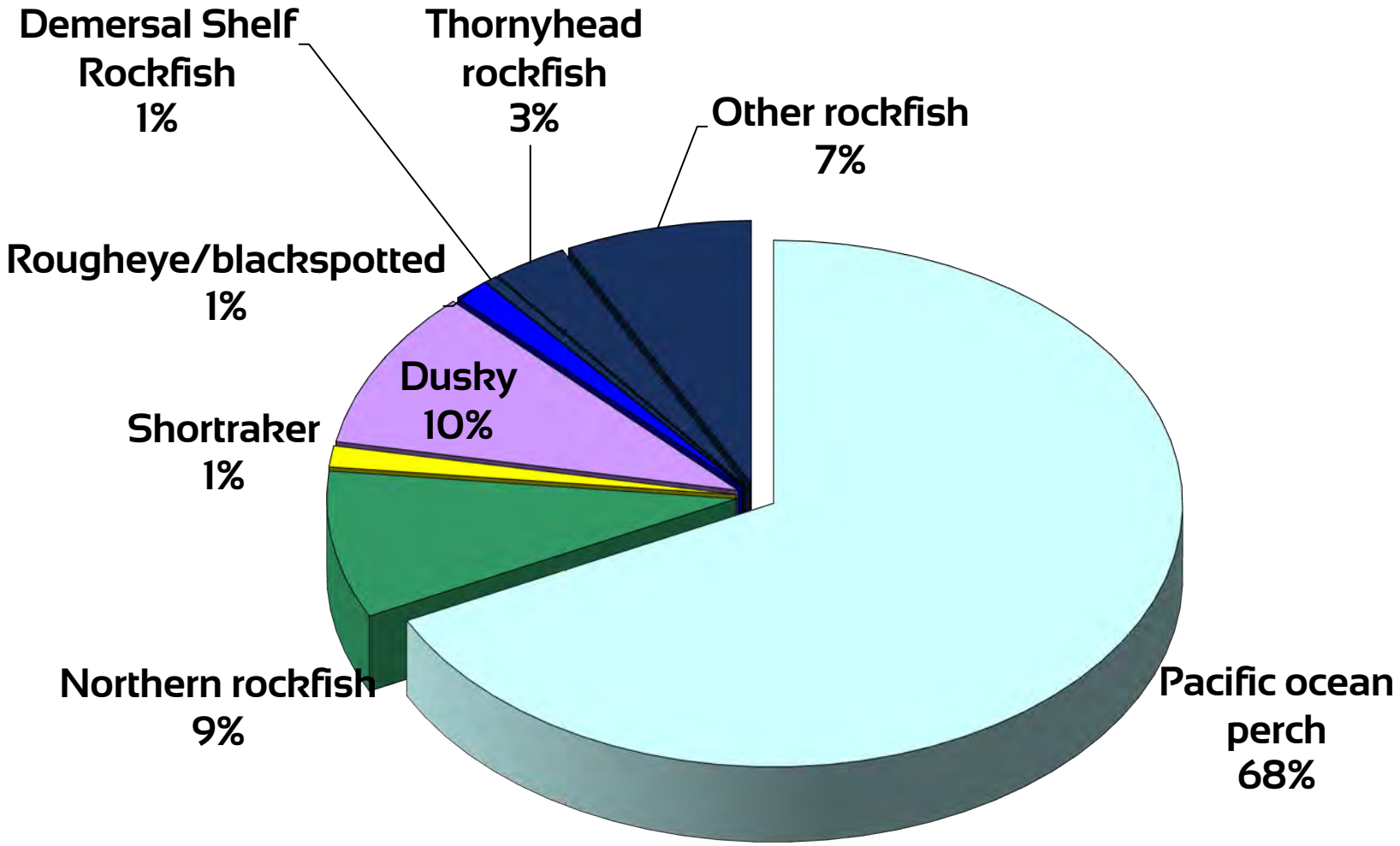
- Apportionment

Species	Year	Western	Central	West Yakutat	Southeast	Total
		2.6%	37.5%	26.6%	33.2%	100.0%
Dover Sole	2024	183	2,617	1,856	2,313	6,969
	2025	180	2,576	1,827	2,277	6,860
		100.0%	0.0%	0.0%	0.0%	100.0%
Greenland Turbot	2024	37	0	0	0	37
	2025	37	0	0	0	37
		32.1%	67.9%			100.0%
Kamchatka Flounder	2024	17	35	0	0	52
	2025	17	35	0	0	52
		0.0%	74.9%	11.2%	13.9%	100.0%
Deepsea Sole	2024	0	3	0	1	4
	2025	0	3	0	1	4
Deepwater Flatfish	**2024**	**237**	**2,655**	**1,856**	**2,314**	**7,062**
	2025	**234**	**2,614**	**1,827**	**2,278**	**6,953**

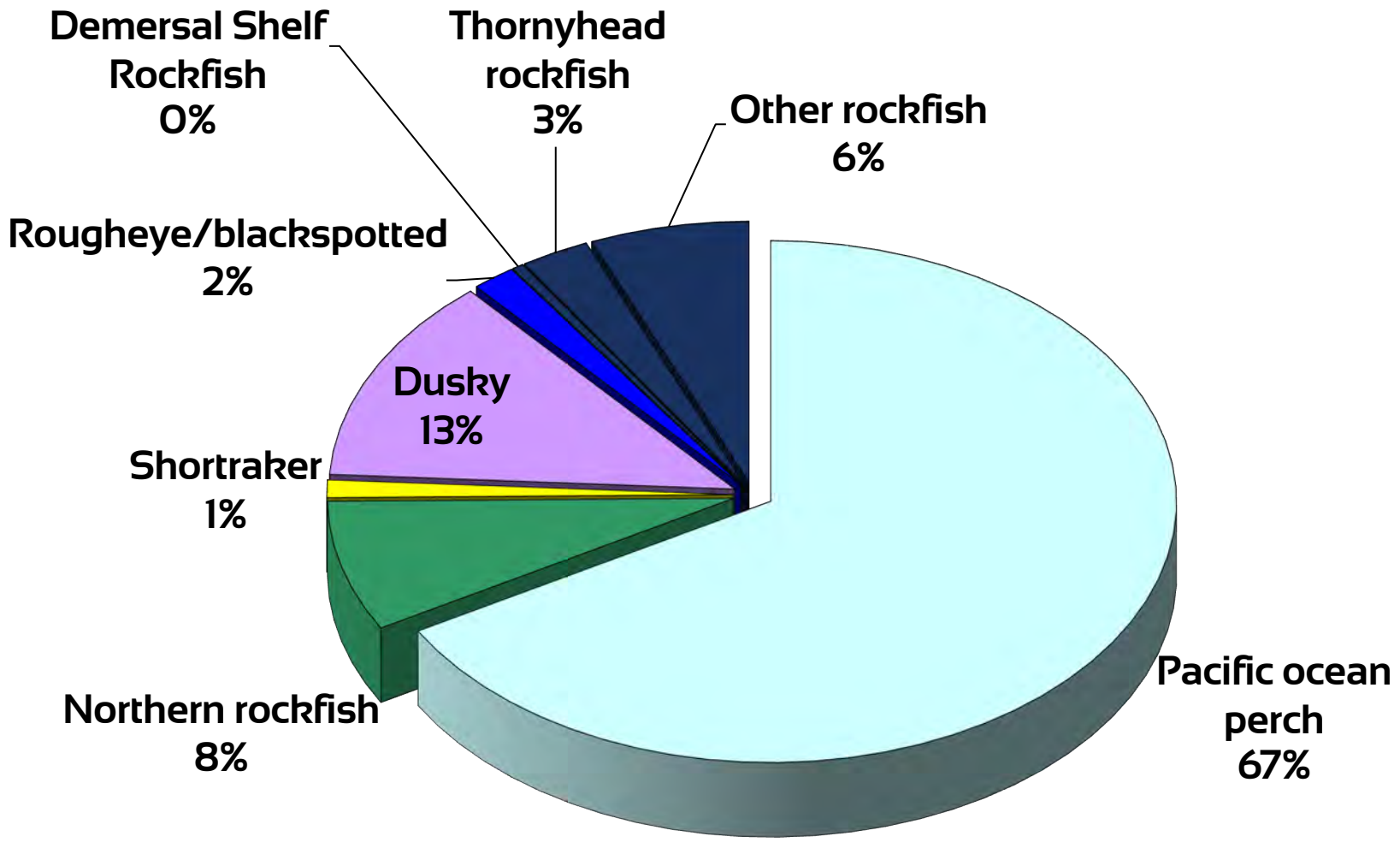
GOA rockfish

Species	2023 catch	ABC 2023	ABC 2024	Change
Pollock	131,892	160,301	242,292	up 81,991 (51%)
Pacific Cod	14,883	24,634	32,272	up 7,638 (31%)
Sablefish	22,746	40,502	47,146	up 6,644 (16%)
Flatfish	2,017	119,497	124,494	up 4,997 (4%)
Arrowtooth flounder	9,248	119,485	119,249	down 236 (0%)
Rockfish	36,943	57,519	59,527	up 2,008 (3%)
Atka mackerel	462	4,700	4,700	same (0%)
Skates	2,741	6,563	6,036	down 527 (8%)
Sharks	1,777	4,891	4,891	same (0%)
Octopus	154	980	980	same (0%)
Total	222,863	539,072	641,587	up 102,515 (19%)

Rockfish 2023 ABC's
57,519 t total



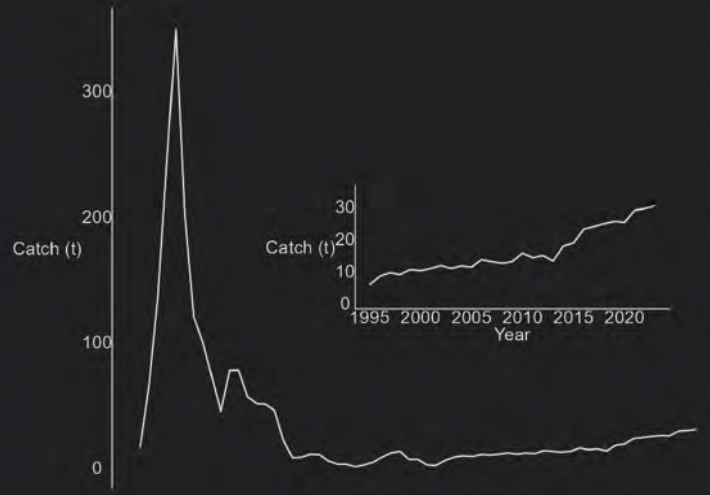
Rockfish 2024 ABC's
59,527 t total



Pacific ocean perch

Species	ABC 2023	ABC 2024	Change
POP*	37,193	39,719	up 2,526 (7%)
northern rockfish	4,964	4,815	down 149 (3%)
Shortraker Rockfish*	705	647	down 58 (8%)
Dusky	7,917	7,624	down 293 (4%)
Rougheye and Blackspotted Rockfish*	775	1,037	up 262 (34%)
Demersal shelf rockfish	283	283	same (0%)
Thornyhead	1,628	1,628	same (0%)
Other rock*	4,054	3,774	down 280 (7%)
Sub Total	57,519	59,527	up 2,008 (3%)

GOA Pacific Ocean Perch: Data



Catches Rising

Far below historical max.

Survey up & uncertain

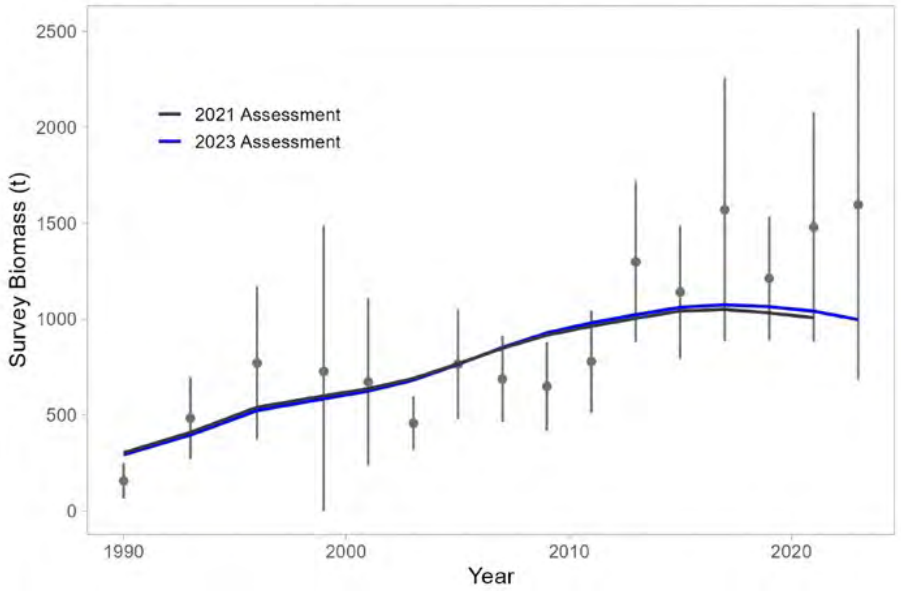
Patchy hauls in EGOA

Ecosystem Moderate

Increasing with warmth
2023 average conditions for adults

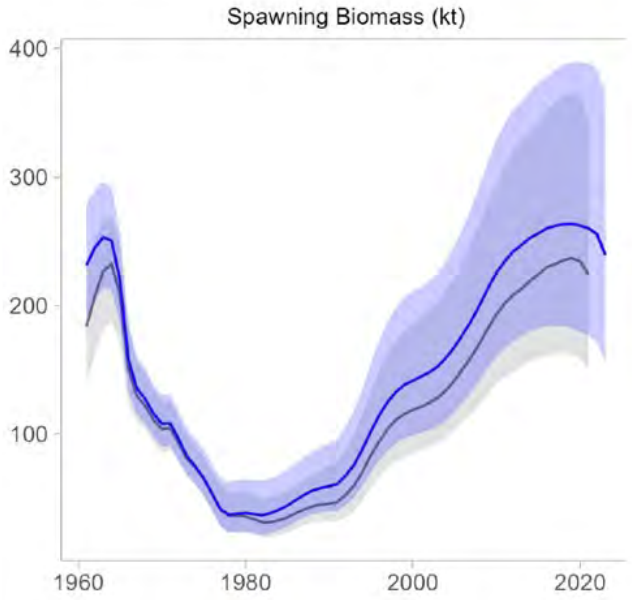
Thanks to Maia Kapur

GOA Pacific Ocean Perch: Model



No Changes to Model

Still underfitting to survey but improving
New model in 2025



Spawning Biomass

Up & increasing

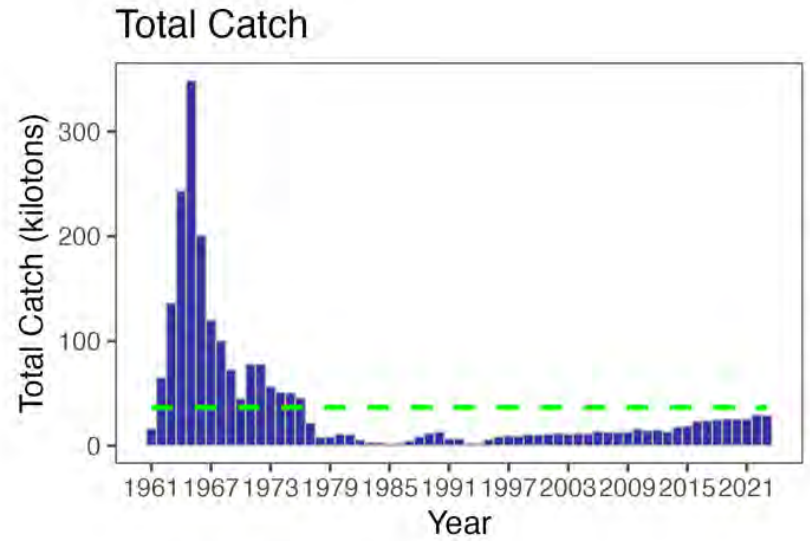
ABC

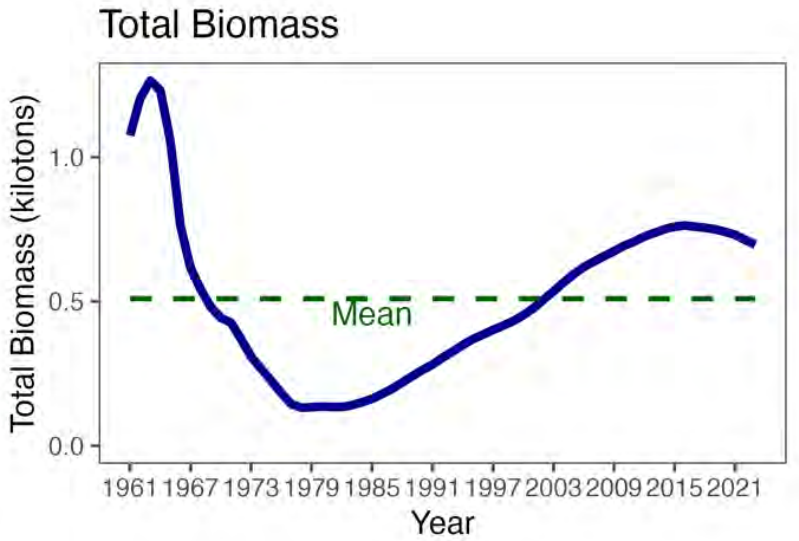
in 2024 is 39,719 t, ~1% difference from last year
Model is structurally stable and robust to new data

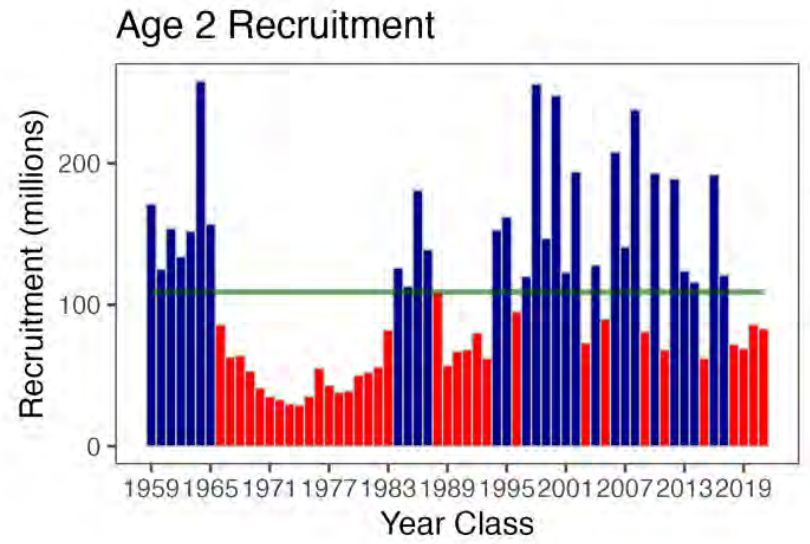
GOA POP Plan Team discussions

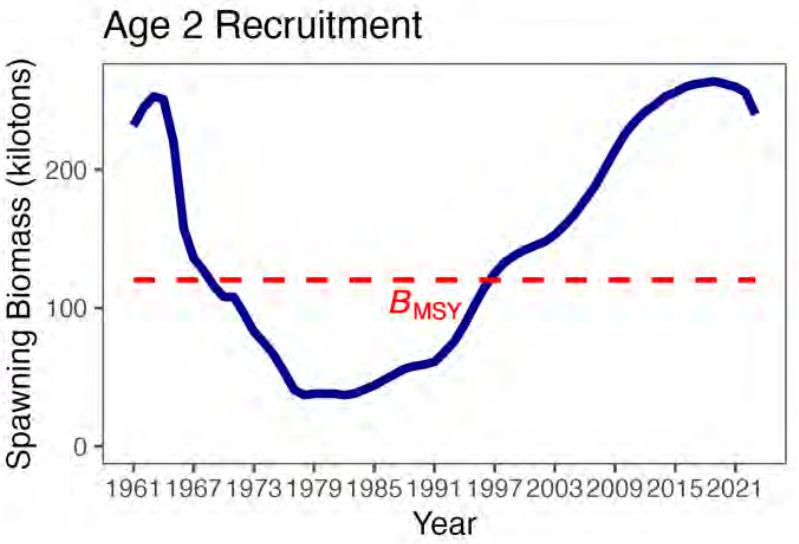
- The Team agreed with all author-recommended assessment updates
- **The Team recommended specifying OFL at the Gulf-wide level**
  - To be consistent with stock status determination criteria
  - Rationale included lack of a biological basis for partitioning OFL

GOA POP summary









Shortraker rockfish

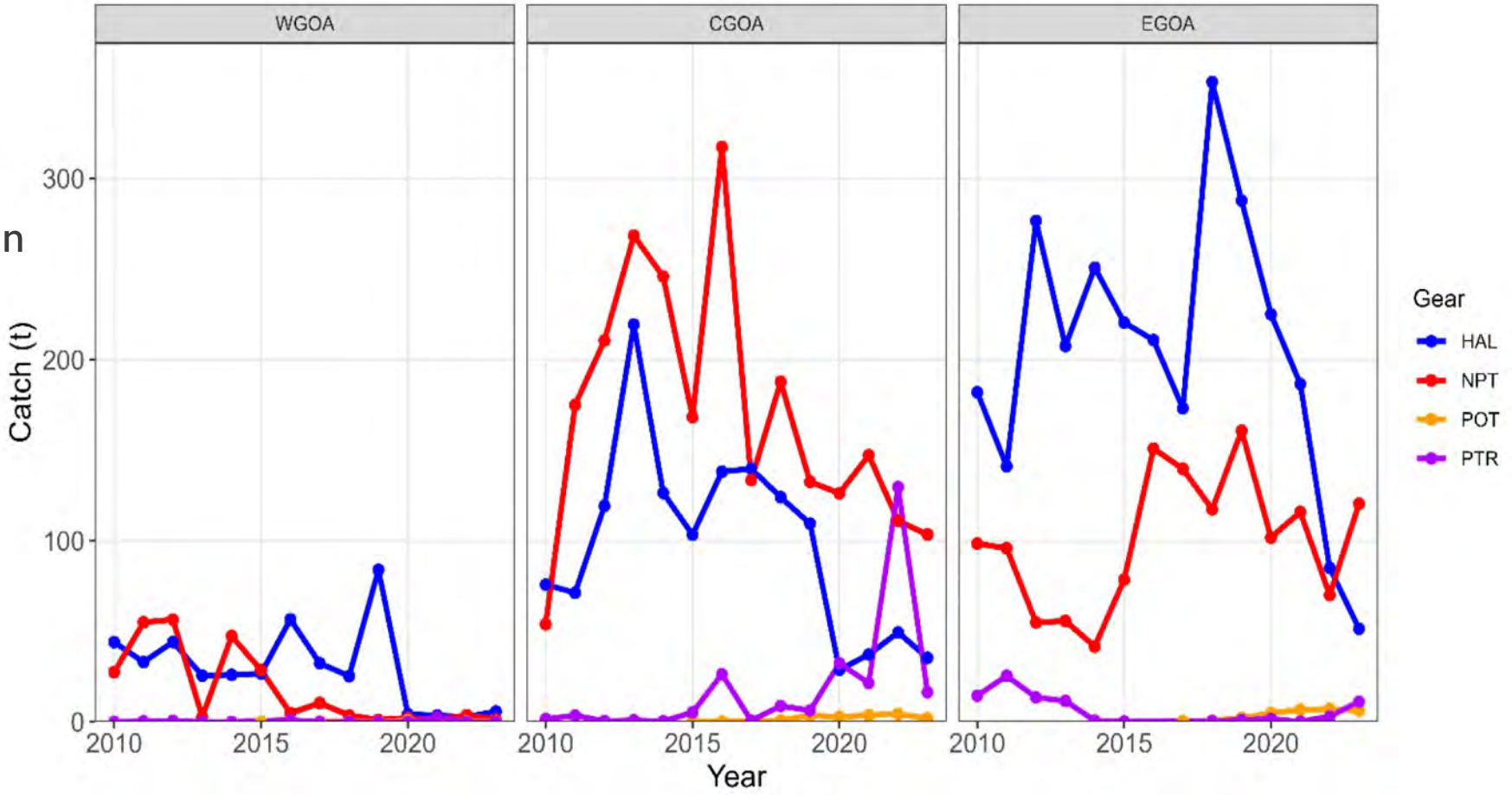
Species	ABC 2023	ABC 2024	Change
POP*	37,193	39,719	up 2,526 (7%)
northern rockfish	4,964	4,815	down 149 (3%)
Shortraker Rockfish*	705	647	down 58 (8%)
Dusky	7,917	7,624	down 293 (4%)
Rougheye and Blackspotted Rockfish*	775	1,037	up 262 (34%)
Demersal shelf rockfish	283	283	same (0%)
Thornyhead	1,628	1,628	same (0%)
Other rock*	4,054	3,774	down 280 (7%)
Sub Total	57,519	59,527	up 2,008 (3%)

GOA Shortraker rockfish

- Tier 5 species –2 index multi area random effects model (REMA)
- Changes in the input data
  - Catch updated through 2 October 2023
  - Length compositions updated: longline and trawl fisheries, GOA bottom trawl and longline surveys
  - Longline survey RPWs (2022/2023) and trawl survey biomass values (2023)
  - 1984 and 1987 GOA trawl surveys removed
- Changes in assessment methodology
  - REMA model implemented (Sullivan et al. 2022)
  - Model 23.3 equal weights of 1.0 for each survey
    - Also an additional observation error term for the AFSC longline survey (Siwicke al. 2023)
- Changes in apportionment methodology
  - Recommend apportionment based on Model 23.3 (Siwicke al. 2023)

GOA Shortraker rockfish: **Catch**

- Overall catch decreasing
  - Increased use of pot gear in the sablefish fishery
- Most catch now from trawl gear (primarily in rockfish fisheries)
- Discards 25-50%



GOA Shortraker rockfish

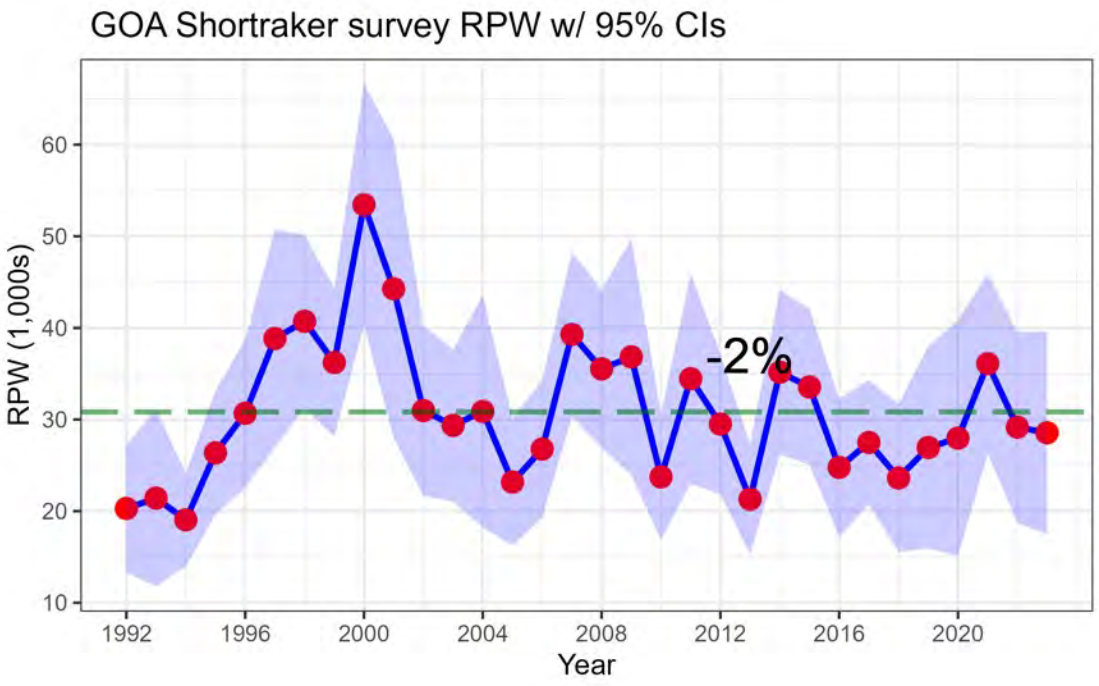
Area	2023 ABC	2023 TAC	2023 OFL	2023 Catch
Western	51	51		7
Central	280	280		157
Eastern	374	374		189
TOTAL	705	705	940	354*

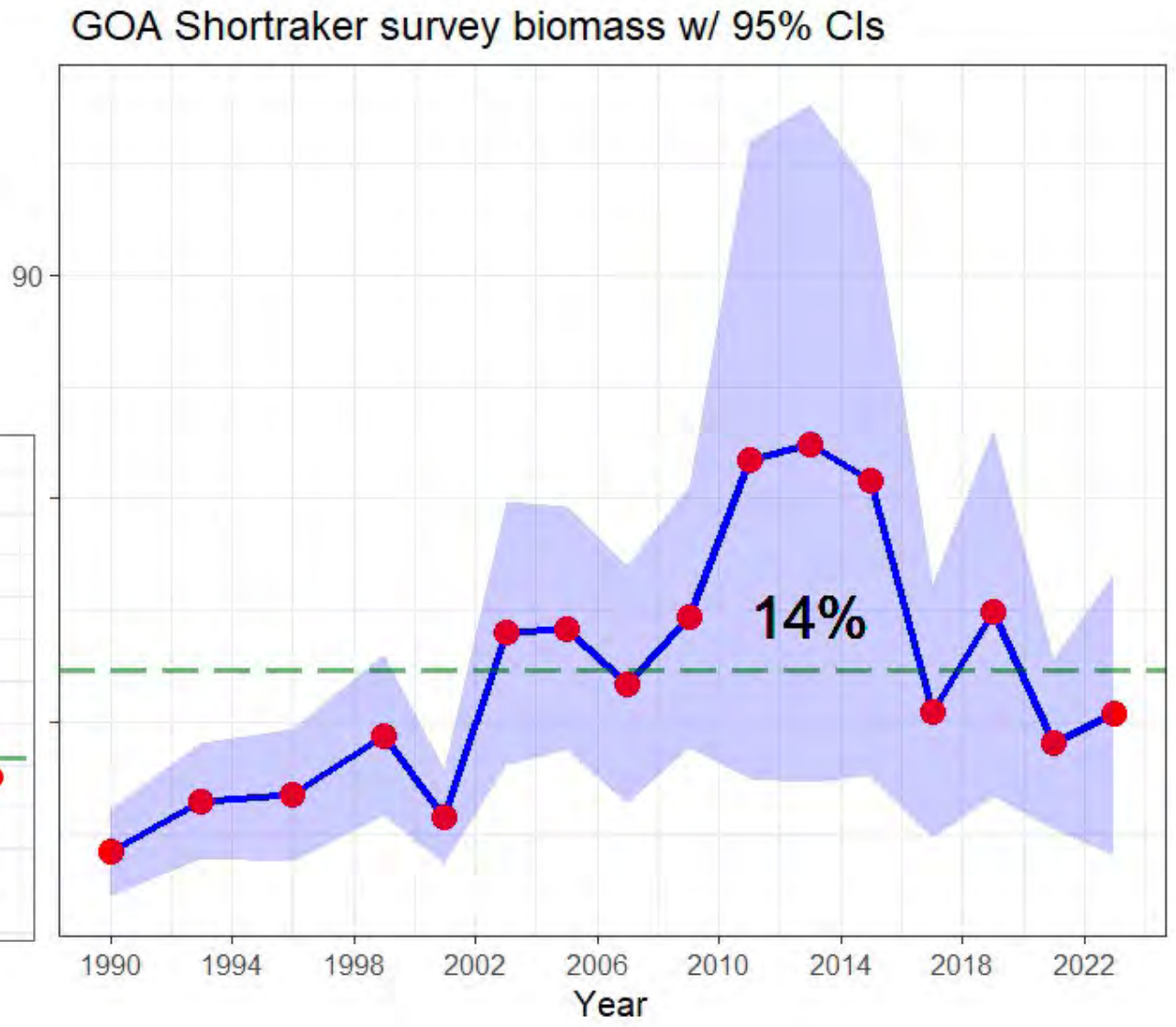
*Catch as of Oct 3, 2023

- 2023 catch is down ~24% from 2022
- This is ~50% of gulfwide ABC

GOA Shortraker rockfish: **REMA**

- Biomass increased in 2023, still below time series mean
  - 1984 and 1987 data removed





GOA Shortraker rockfish: **REMA**

"The SSC looks forward to continued exploration of alternative apportionment methods and believes this should remain a high priority." (SSC, December 2019)

- Two apportionment methods examined:
  - "Biomass" = standard method based on proportion of predicted biomass by area
  - "Biomass + RPW" = our proposed method based on the mean proportions of predicted biomass and predicted RPW by area

REMA model names	Apportionment Method	WGOA	CGOA	EGOA
M19*	Biomass	5.3%	29.5%	65.2%
M19*	Biomass + RPW	8.4%	20.7%	70.9%
M23.3	Biomass	5.2%	29.3%	65.5%
M23.3	**Biomass + RPW**	**8.3%**	**20.7%**	**71%**

GOA Shortraker rockfish Plan Team discussion

- The Team encouraged the author to evaluate area-specific exploitation rates and update the stock structure template.
    - The Team also noted that the genetic stock structure results cited in SAFE presentations this week pertain to evolutionary time scales and should be interpreted with caution with respect to their application to stock structure assumptions within assessments and risk tables.

- The Team agreed with the authors' recommendations for the new model "23.3" and with the authors' recommended ABC being set to the maximum permissible ABC under the FMP

GOA Shortraker rockfish Plan Team discussion (cntd)

- For apportionment, the Team deviated from the assessment and recommended averaging between the two apportionment methods (Biomass and Biomass + RPW)
  - An incremental approach for changing to a new method
  - Caused a large decrease in the ABC apportioned to the central Gulf
  - There is a lack of concern regarding local depletion and stock structure

- The Team noted that there are considerations outside of the purview of the Team that should be taken into account when considering the shortraker apportionment framework:
  - Interaction with Central GOA Rockfish Program
  - Fishing distribution in some areas straddles the Central area and that of West Yakutat.

- The Team encourages the Council to engage in the Spatial Management Policy for this stock to fully consider the economic and management-related impacts of alternative spatial allocations of ABC, as well the risks of localized depletion.

Rougheye & blackspotted rockfish

Species	ABC 2023	ABC 2024	Change
POP*	37,193	39,719	up 2,526 (7%)
northern rockfish	4,964	4,815	down 149 (3%)
Shortraker Rockfish*	705	647	down 58 (8%)
Dusky	7,917	7,624	down 293 (4%)
Rougheye and Blackspotted Rockfish*	775	1,037	up 262 (34%)
Demersal shelf rockfish	283	283	same (0%)
Thornyhead	1,628	1,628	same (0%)
Other rock*	4,054	3,774	down 280 (7%)
Sub Total	57,519	59,527	up 2,008 (3%)

GOA Rougheye-blackspotted rockfish : **Data**

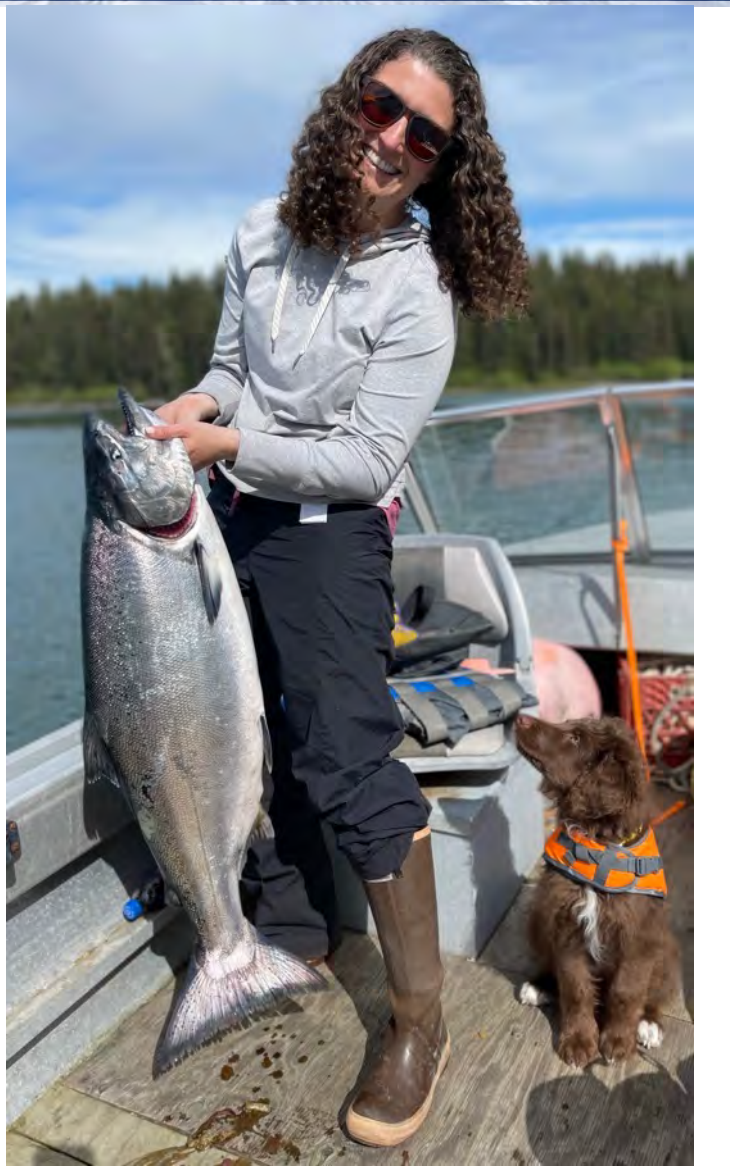
Source	Data	Years
Fisheries	Catch	1977-2021, **2022, 2023**
	Age	1990, 2004, 2006, 2008, 2009, 2010, 2012, 2014, 2018, 2020, **2022**
	Length	1991-1992, 2002-2003, 2005, 2007, 2011, 2013, 2017, 2019, **2021**
AFSC bottom trawl survey	Biomass index	~~1984, 1987,~~ 1990, 1993, 1996, 1999, 2003, 2005, 2009, 2011, 2013, 2015, 2017, 2019, 2021, **2023**
	Age	~~1984, 1987,~~ 1990, 1993, 1996, 1999, 2003, 2005, 2009, 2011, 2013, 2015, 2017, **2019, 2021**
AFSC longline survey	Relative Population Number (RPN)	1993-2019, 2020, 2021, **2022, 2023**
	Length	1993-2019, 2020, 2021, **2022, 2023**

New data in bold

GOA Rougheye-blackspotted rockfish : **Data**

Source	Data	Years
Fisheries	Catch	1977-2021, **2022, 2023**
	Age	1990, 2004, 2006, 2008, 2009, 2010, 2012, 2014, 2018, 2020, **2022**
	Length	1991-1992, 2002-2003, 2005, 2007, 2011, 2013, 2017, 2019, **2021**
AFSC bottom trawl survey	Biomass index	~~1984, 1987,~~ 1990, 1993, 1996, 1999, 2003, 2005, 2009, 2011, 2013, 2015, 2017, 2019, 2021, **2023**
	Age	~~1984, 1987,~~ 1990, 1993, 1996, 1999, 2003, 2005, 2009, 2011, 2013, 2015, 2017, **2019, 2021**
AFSC longline survey	Relative Population Number (RPN)	1993-2019, 2020, 2021, **2022, 2023**
	Length	1993-2019, 2020, 2021, **2022, 2023**

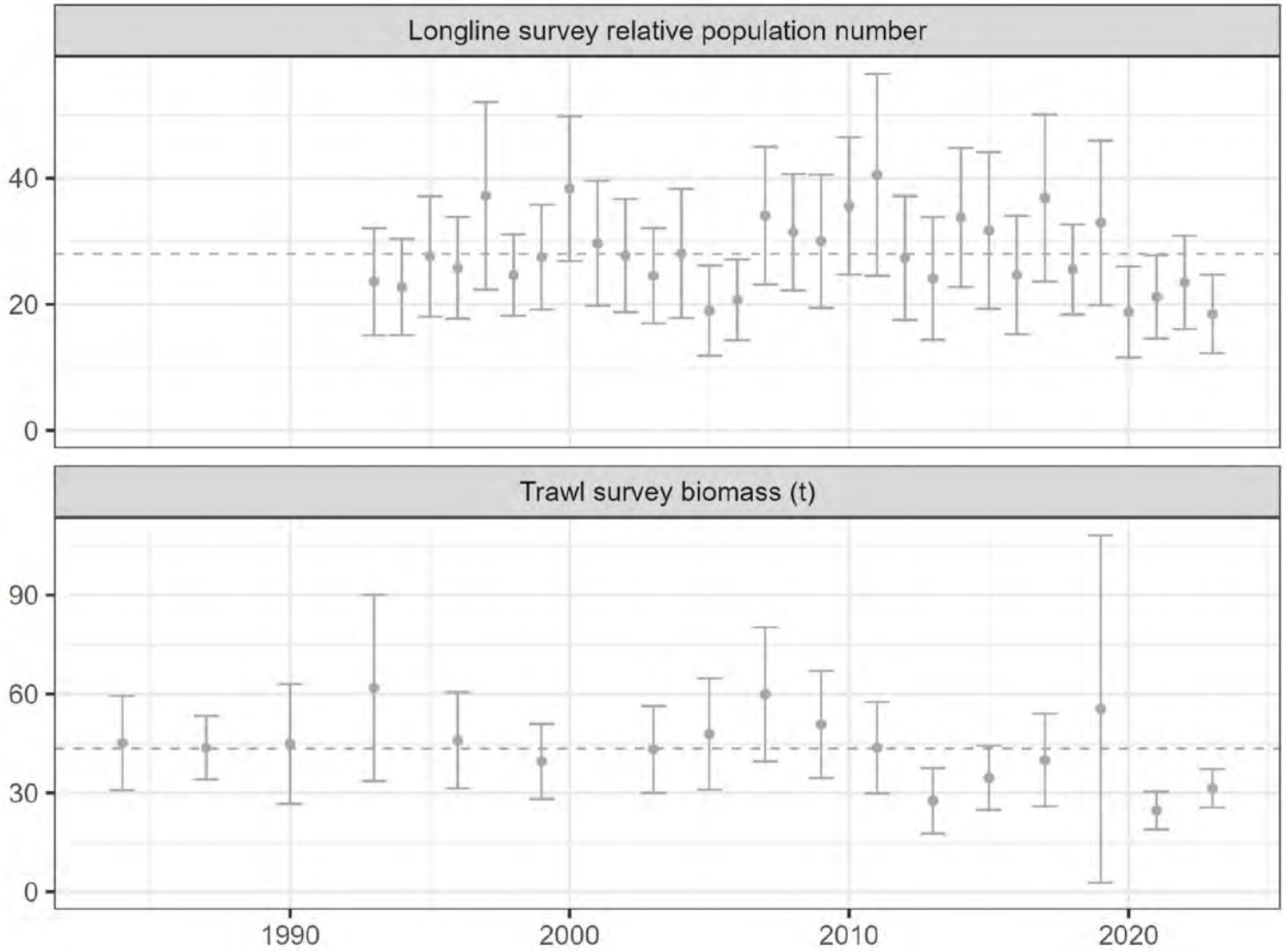
New data in bold



GOA Rougheye-blackspotted rockfish : **Indices**

LLS: 2023 lowest on record, 34% below mean

BTS: increase from 2021, which was the lowest on record, and 28% below mean



GOA Rougheye-blackspotted rockfish : **Models evaluated**

Model	Natural Mortality	Bottom Trawl (BTS) & Longline Survey (LLS) q	Recruitment Variability	Maturity, Growth, Ageing Error
Model 15.4	*Estimated* with lognormal prior Mean=0.03, CV=0.1 McDermott 1994 (GSI estimator)	*Estimated* with lognormal priors BTS Mean=1.0, CV=5.0 LLS Mean=1.0, CV=1.0	*Estimated* with lognormal prior Mean=1.1, CV=0.06	2015 assessment McDermott 1994 length-based maturity converted to age
Model 15.4a				
Model 23.1	*Estimated* with lognormal prior Mean=0.042, CV=0.058 Based on updated prior using longevity estimator			Reviewed in Sep 2023 Conrath 2017 age-based maturity Status quo growth methods with new data Punt et al. 2008 age error
Model 23.1a		*Estimated* with lognormal priors BTS Mean=1.0, CV=0.05 LLS Mean=1.0, CV=0.05	*Fixed* at 1.1	
Model 23.1b (recommended)	*Fixed* at the updated prior mean=0.042			

GOA Rougheye-blackspotted rockfish

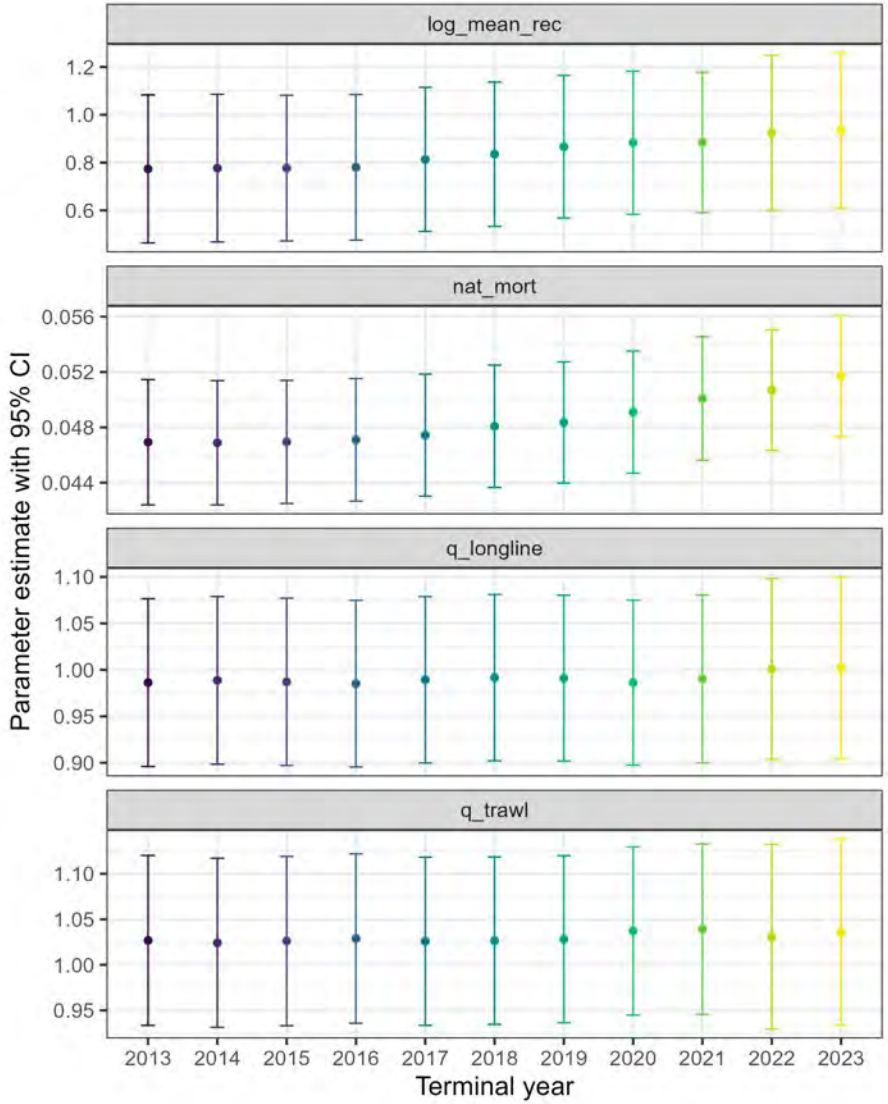
Model	Mohn's rho	Key Results	2024 Age-3+ Biomass*	2024 SSB*	2024 ABC*
Model 15.4	1.05	- Severe positive retrospective bias in SSB - Strong retro patterns and high parameter correlation among both *q*'s, *M*, mean recruitment - Unreasonably high estimates of trawl survey *q* (>2) - High reliance on length composition data	29,081	9,642	794
Model 15.4a	1.16	- Same as Model 15.4 but with even worse retro behavior	27,574	9,245	751
Model 23.1	0.42	- Bad retrospective bias in spawning biomass and strong retrospective trends in global scaling parameters - Unreasonably high estimates of both *q*'s (>2) - Biomass scales that significantly lower than any model result to date - Slight improvements in the fits to the index data	16,154	3,890	432
Model 23.1a	0.13	- Greatly improved retro behavior, except for continued retro trends in *M* - Biomass scales that are consistent with Model 15.4 results *before* it started exhibiting retrospective patterns - Degraded fits to index data in recent years - Recent biomass trajectories are inconsistent with survey trends	45,252	11,876	1,460
Model 23.1b	**0.14**	**- Same as Model 23.1a but with no retrospective pattern in *M***	**46,129**	**13,022**	**1,305**

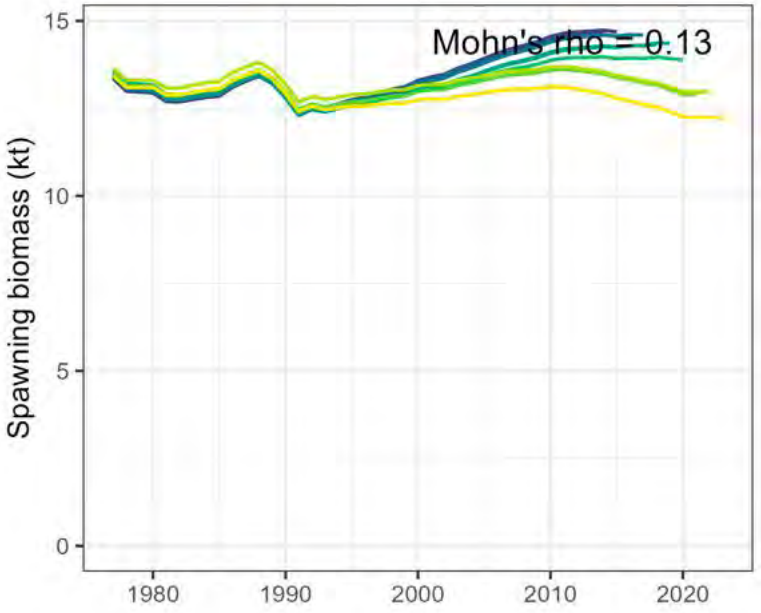
GOA Rougheye-blackspotted rockfish

Model 23.1a

- Improved model stability,
- Biomass estimates similar scale to past

- Retrospective shift (increase)
  Figure 13-9, Table 13-15





GOA Rougheye-blackspotted rockfish

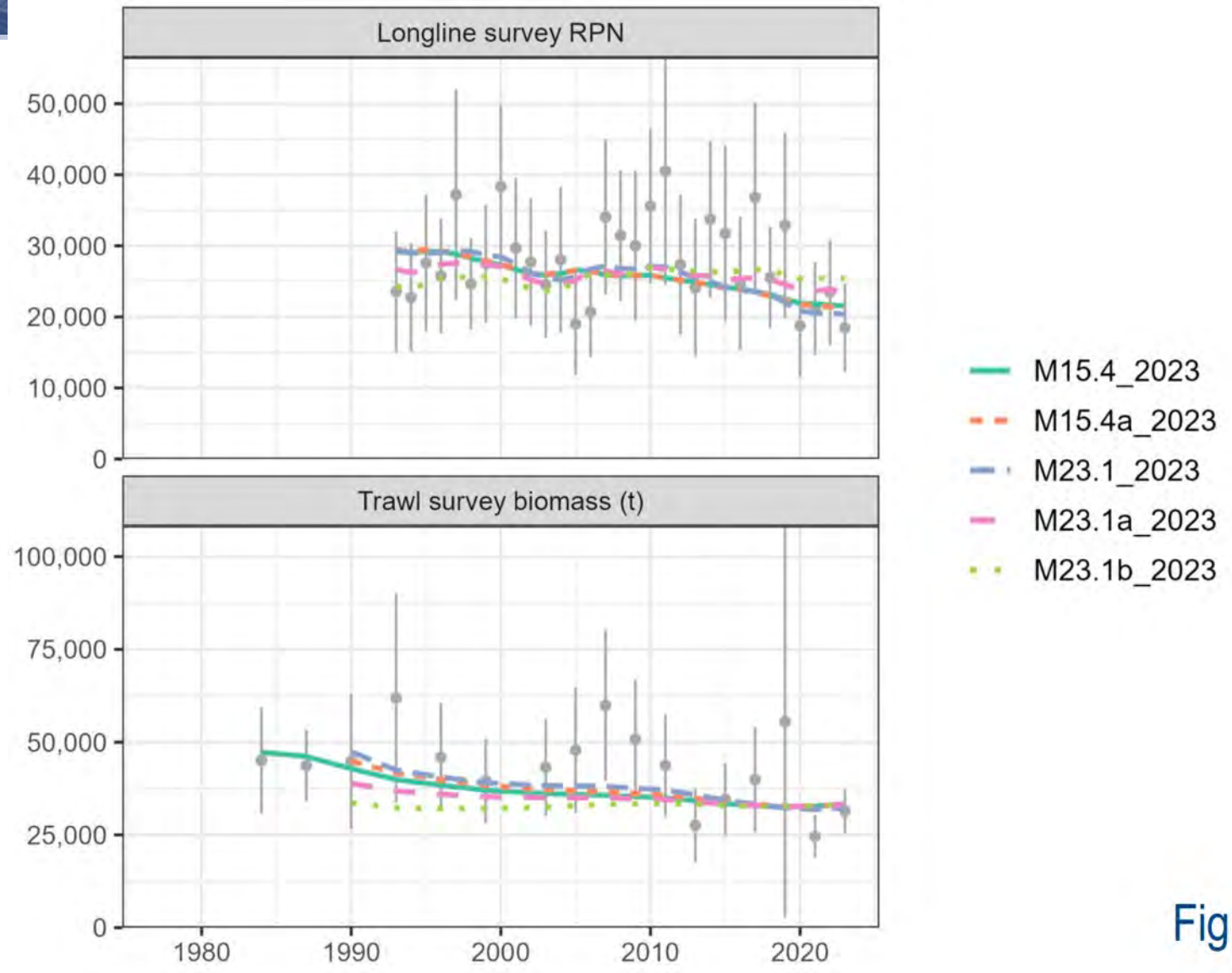


Figure 13-1

GOA Rougheye-blackspotted rockfish summary

Base model M15.4 first accepted in 2015

- In Sep 2023, new *M*, maturity, ageing error, and growth
- Updating data degraded retrospective bias (Mohn's rho=1.05)
- Confounding *M*, *q*, and recruitment params…hence
- By constraining scale Model 23.1a
  - Stabilized the model (Mohn's rho=0.14);
  - Degraded fits to the survey data and
  - Biomass trajectories that are inconsistent with recent trends in survey abundance
- More work needed to address model misspecification

Year	OFL	ABC (=TAC)	Catch
2010	1,568	1,302	426
2011	1,579	1,312	557
2012	1,472	1,223	599
2013	1,482	1,232	580
2014	1,497	1,244	760
2015	1,345	1,122	564
2016	1,596	1,328	697
2017	1,594	1,327	553
2018	1,735	1,444	795
2019	1,715	1,428	790
2020	1,452	1,209	398
2021	1,456	1,212	407
2022	947	788	469
2023	930	775	487*
2024	1,555	1,037	

GOA Rougheye-blackspotted rockfish

- Split difference

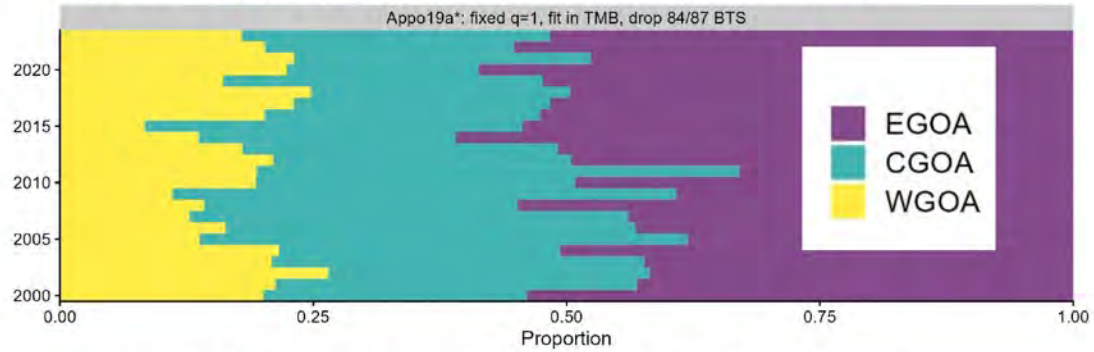
Quantity	As estimated or *specified last* year for:		As estimated or *recommended this* year for:	
	2023	2024	2024	2025
M (natural mortality rate)	0.034	0.034	0.042	0.042
Tier	3a	3a	3a	3a
Projected total (ages 3+) biomass (t)	25,837	25,755	46,029	46,109
Projected female spawning biomass (t)	8,554	8,514	12,986	13,005
$B_{100\%}$	14,776	14,776	21,878	21,878
$B_{40\%}$	5,911	5,911	8,751	8,751
$B_{35\%}$	5,172	5,172	7,657	7,657
F_{OFL}	0.046	0.046	0.045	0.045
$maxF_{ABC}$	0.038	0.038	0.038	0.038
F_{ABC}	0.038	0.038	0.030	0.030
OFL (t)	930	927	**1,555**	**1,566**
maxABC (t)	775	772	1,302	1,310
ABC (t)	775	772	**1,037**	**1,041**
Status	As determined *last* year for:		As determined *this* year for:	
	2021	2022	2022	2023
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

GOA Rougheye-blackspotted rockfish apportionment

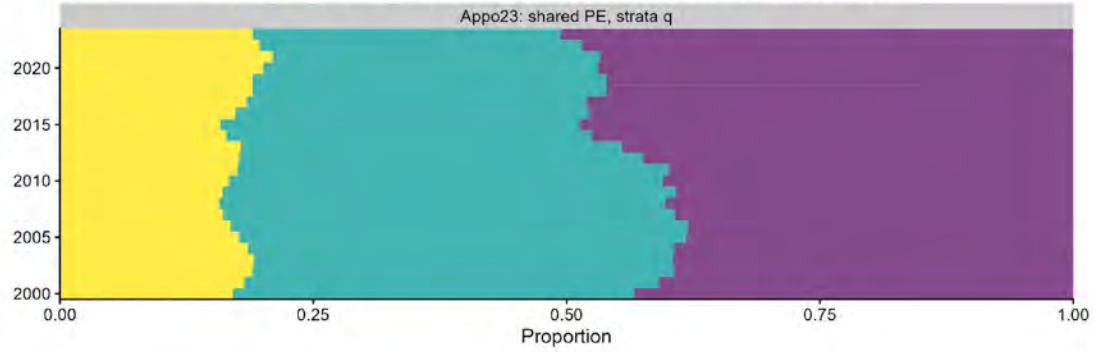
- Two-survey random effects (REMA) model first accepted in 2019
- LLS scaling parameters fixed at 1.0 to balance LLS/BTS data conflict
- Recommend estimating area-specific scaling parameters, greatly improves model performance
- Recommend using the average area-specific proportions of REMA-predicted biomass and REMA-predicted relative population weights from the LLS in order to more appropriately balance BTS/LLS data

Stock/ Assemblage	Area	2023 OFL	ABC	TAC	Catch[2]	2024 OFL	ABC
RE/BS complex	W		180	180	101		197
	C		232	232	135		315
	E		363	363	149		525
	Total	930	775	775	385	1,555	1,037

Apportionment based on fixed q and predicted biomass by area (CURRENT)



Apportionment based on predicted biomass and RPWs by area (PROPOSED)



GOA Rougheye-blackspotted rockfish **risk table**

Recommend reduction from max ABC
Author-recommended model was not reviewed in September

Assessment	Population Dynamics	Ecosystem	Fishery
2 - Major Concern	**2 - Major Concern**	1 - None	1 - None
(Base model) • Severe one-way positive retrospective bias • High uncertainty in stock scale **(Recommended model)** • Improved stability, but poor fit and unable to account for recent declines in survey indices	• Declines in LLS and BTS indices in recent years • 2023 LLS abundance lowest on record • 2021 BTS lowest on record	• Average environmental conditions • Some evidence of long-term declines in structural epifauna	• Incidental catch only • Catch << ABC • Not currently constraining target fisheries

LLS = longline survey
BTS = bottom trawl survey

GOA Rougheye-blackspotted rockfish **Plan Team discussions**

- The Team discussed a number of issues…

- The Team agreed with the authors' recommended model (23.1b), resulting OFLs, and the author's recommended reduction from maxABC.

Other Rockfish

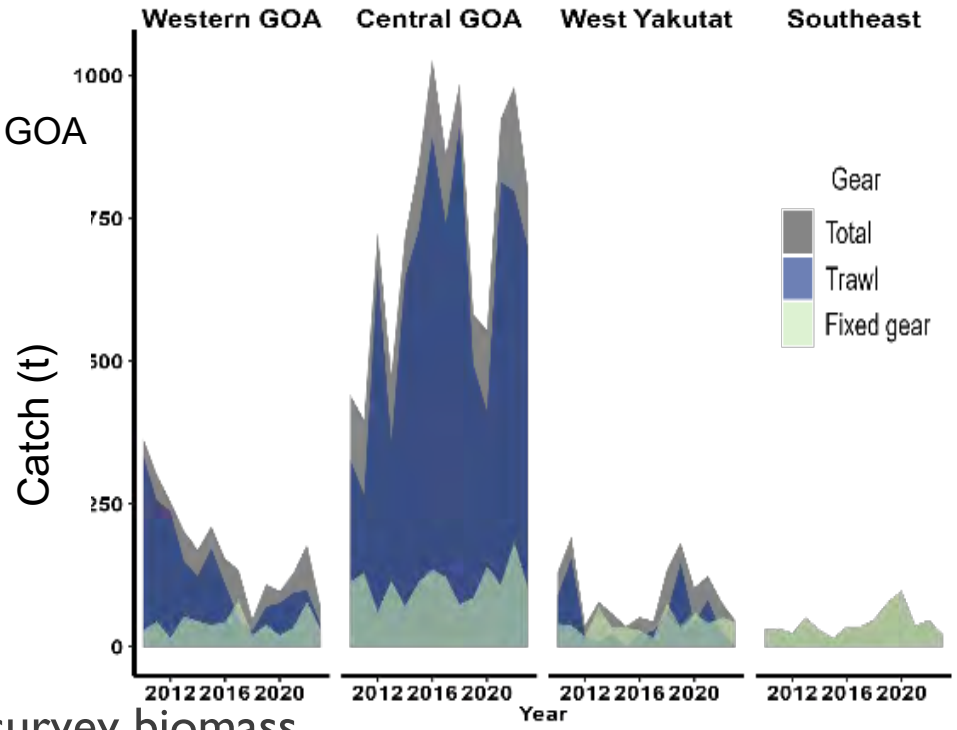
Species	ABC 2023	ABC 2024	Change
POP*	37,193	39,719	up 2,526 (7%)
northern rockfish	4,964	4,815	down 149 (3%)
Shortraker Rockfish*	705	647	down 58 (8%)
Dusky	7,917	7,624	down 293 (4%)
Rougheye and Blackspotted Rockfish*	775	1,037	up 262 (34%)
Demersal shelf rockfish	283	283	same (0%)
Thornyhead	1,628	1,628	same (0%)
Other rock*	4,054	3,774	down 280 (7%)
Sub Total	57,519	59,527	up 2,008 (3%)

GOA Other Rockfish stock complex

2023 recommendations

ABC	OFL
3,773 t	4,977 t
-7% from 2023	-6% from 2023

Current Status
Total GOA catch is ~ 25% of OFL
Catch is passing TAC/ ABC in Western/Central GOA
2023 catch is down ~ 25% from 2022 (1,287 t)



Changes (approved by PT and SSC Sept./Oct. 2021)

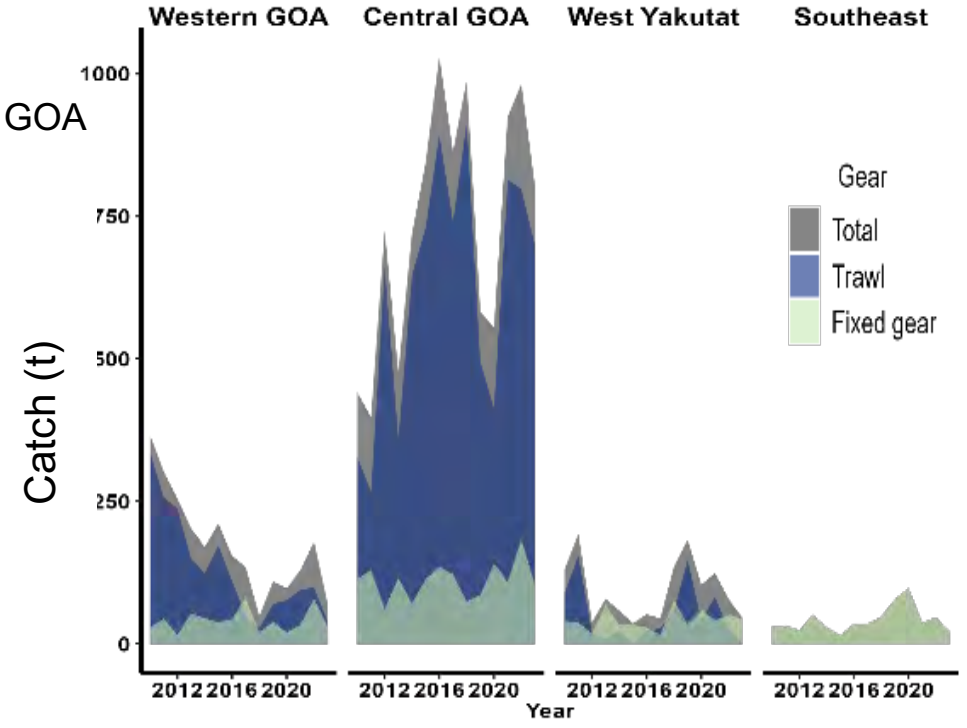
- Tier 4 Model 15.2 change to REMA model framework
- Tier 5 Model 23.1 includes:
  - Change to REMA model framework
  - Alternative average weighted M ($\overline{(Wt\ M)}$) as a proxy for FOFL.
  - Four Tier 5 species (reduced from 17 species) due to unreliable survey biomass.
  - Tier 6 Model 23.1 includes:
    - Extension of maximum catch time series to 2013-2022
    - Twenty-one Tier 6 species (addition of 12 species) due to unreliable survey biomass.

GOA Other Rockfish stock complex

2023 recommendations

ABC	OFL
3,773 t	4,977 t
-7% from 2023	-6% from 2023

Current Status
Total GOA catch is ~ 25% of OFL
Catch is passing TAC/ ABC in Western/Central GOA
2023 catch is down ~ 25% from 2022 (1,287 t)

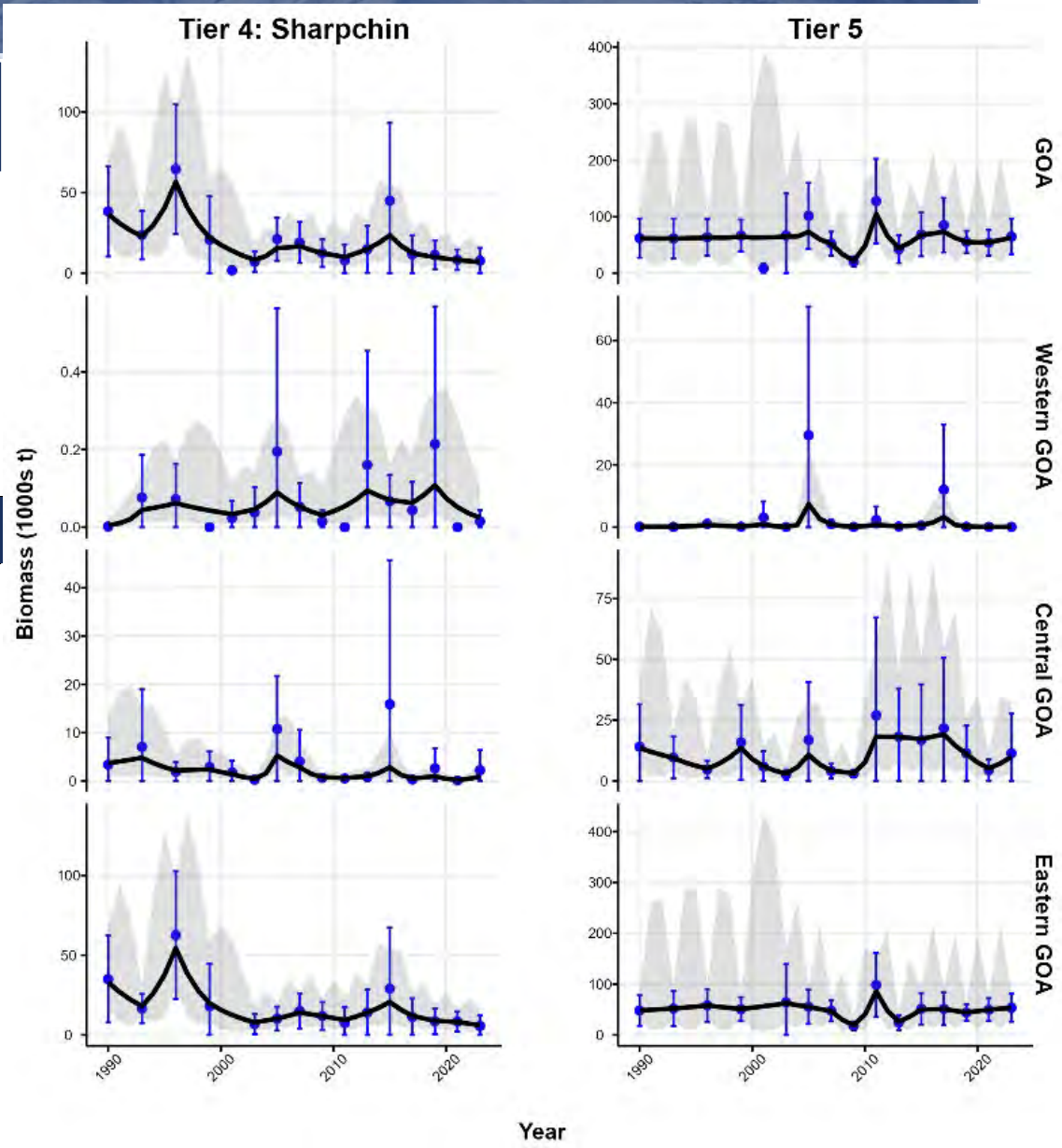


Changes to model: (**changes in red**; *status quo in "()"*)

Tier	# spp. (*status quo*)	Assessment method (*status quo*)	OFL calculations (*status quo*)
Tier 4	1	**REMA** (RE ADMB)	Biomass x $F_{35\%}$
Tier 5	**4** (16)	**REMA** (RE ADMB)	Biomass x $\overline{Wt\ M}$ (Biomass x *Wt M*)
Tier 6	**21** (9)	Catch history	**Max catch (2013-2022)** (Max catch (2013-2016))

GOA Other Rockfish stock complex

Tier (# spp.)	Biomass (2023)	F_{OFL}	OFL	F_{ABC}	ABC
Tier 4 (1 spp.)	7,008 t	$F_{35\%} = 0.079$	554	$F_{40\%} = 0.065$	456
Tier 5 (4 species)	63,291 t	$\overline{Wt\_M} = 0.062$	3,924	$0.75*F_{OFL}$	2,943
Tier 6 (21 species)			499		374
All Tiers			**4,977**		**3,773**



Results overview

- High CVs
- 2023 Tier4 (Sharpchin): -7%
- 2023 Tier5 (4 species): slight increase

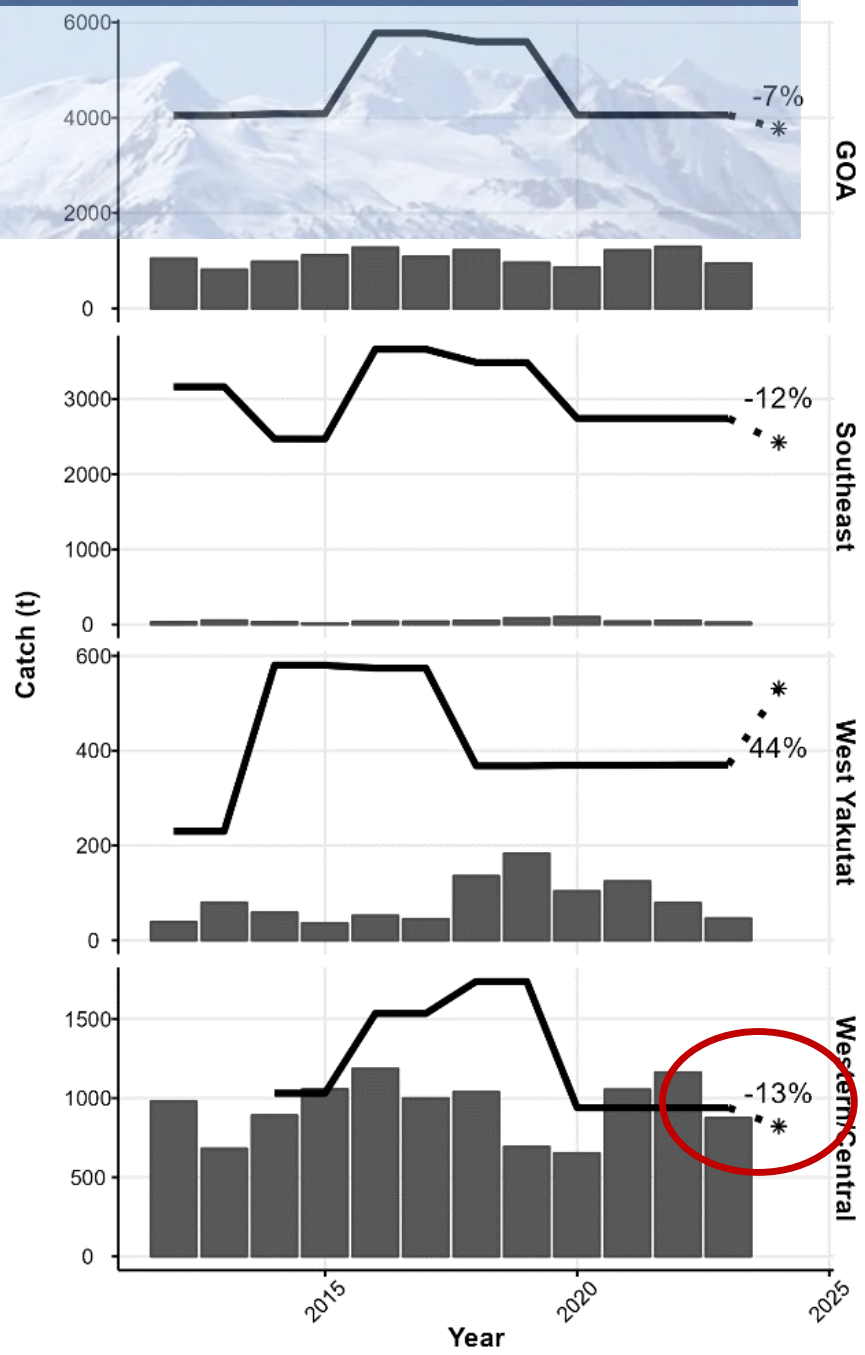
GOA Other Rockfish stock complex

Area Apportionment

Area		2023 ABC	2024 ABC	2023 Catch*
Western/ Central		940	820	873
Eastern	West Yakutat	370	532	46
	East Yakutat/ Southeast	2,744	2,421	22
Total		4,054**	3,773	941

**Includes added Northern ABC for EGOA

*Catch as of Oct. 10, 2023



Issues:

- Regional ABC overages continue to occur.
- Mismatch between survey catch & fishery catch ("trawlable" & "untrawlable habitat") → underestimating biomass based on survey (e.g., harlequin)
- Patchy distributions → variable survey catches → subarea ABC fluctuations

No apparent conservation concerns

- Non-target species that are poorly sampled by trawl survey
- No major changes in fishing behavior, but good species-specific catch data
- Majority of biomass in SE, but no trawling allowed in SE
- No to little genetic structure (general prelim results) & no local depletion observed

GOA Other Rockfish stock complex Plan Team discussions

- For 2024, the Team agreed with the author and recommended that the sub-area ABCs remain.
  - However, the Team recommended that in 2025, the W/C/WYAK sub-area ABCs be combined, which would be consistent with the recent changes to DSR.
  - The Team recommended that the Council engage in the Spatial Management Policy for this stock. The Team noted the next assessment is scheduled for 2025.

GOA skate complex: update assessment

- Random Effects (RE) model
- M = 0.1
- Updated Data
  - Catch (2022-2023 as of October 16th)
    Survey Biomass Estimate from AFSC bottom trawl survey.

Big Skate

Longnose Skate

Other Skates

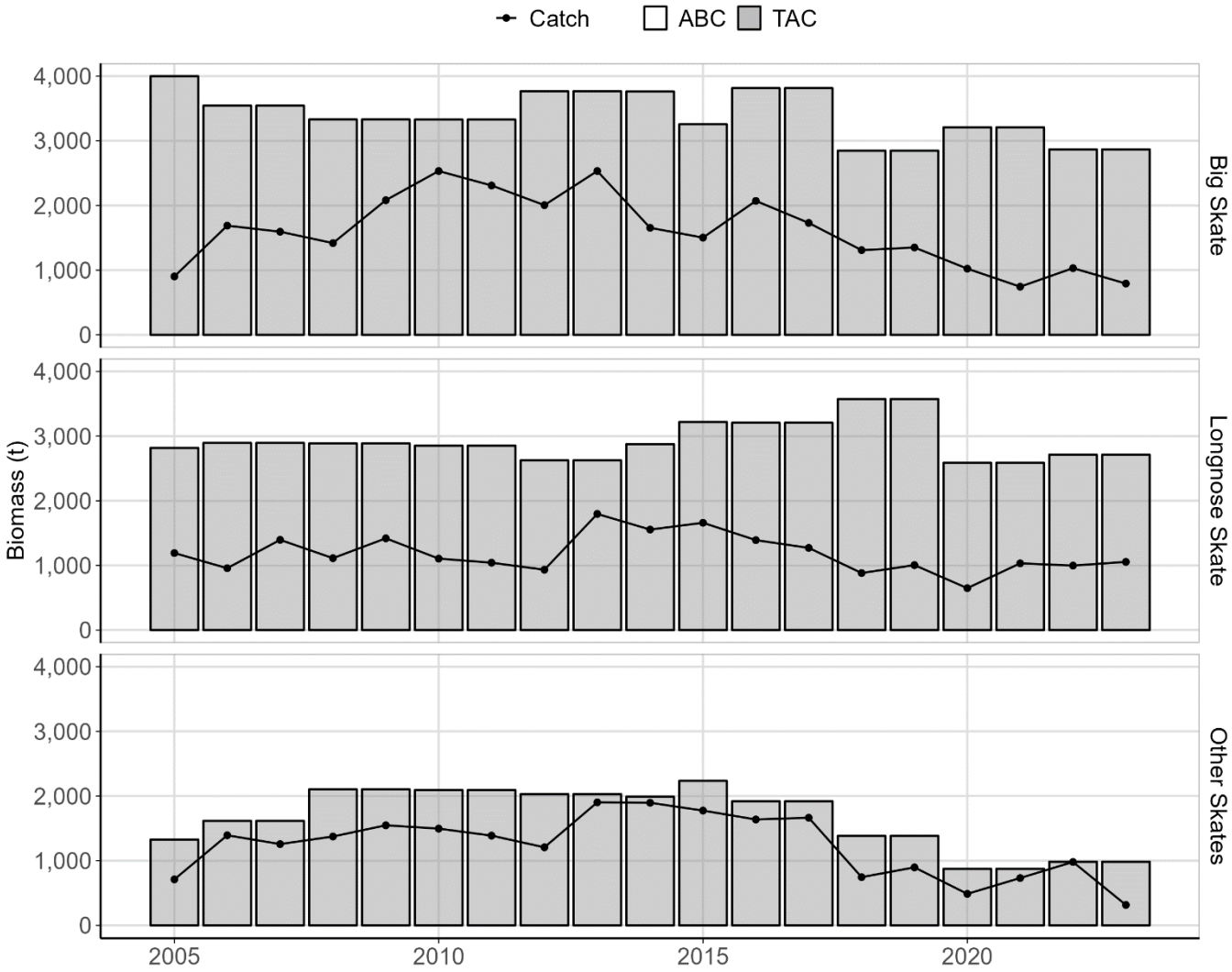
Thanks to Lee Cronin-Fine!

Stock Complex Overview

- Tier 5

Group	OFL (t)	ABC (t)	Catch (t)*
Big	3,822	2,867	792
Longnose	3,616	2,712	1,055
Other	1,311	984	316

*As of October 16th, 2023

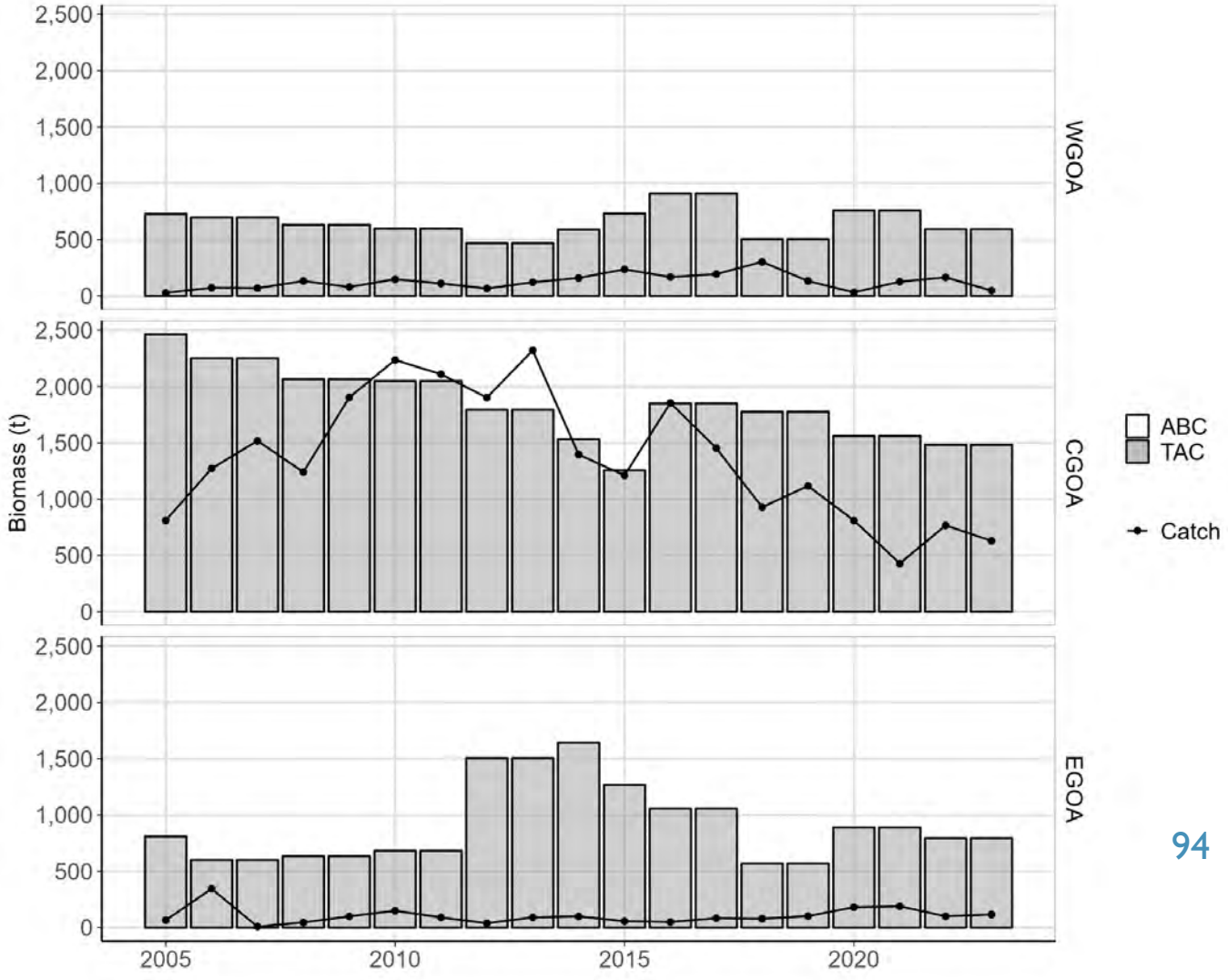


Big Skate Area Overview

- Tier 5

Area	ABC (t)	TAC (t)	Catch (t)*
WGOA	591	591	47
CGOA	1,482	1,482	629
EGOA	794	794	116

*As of October 16th, 2023

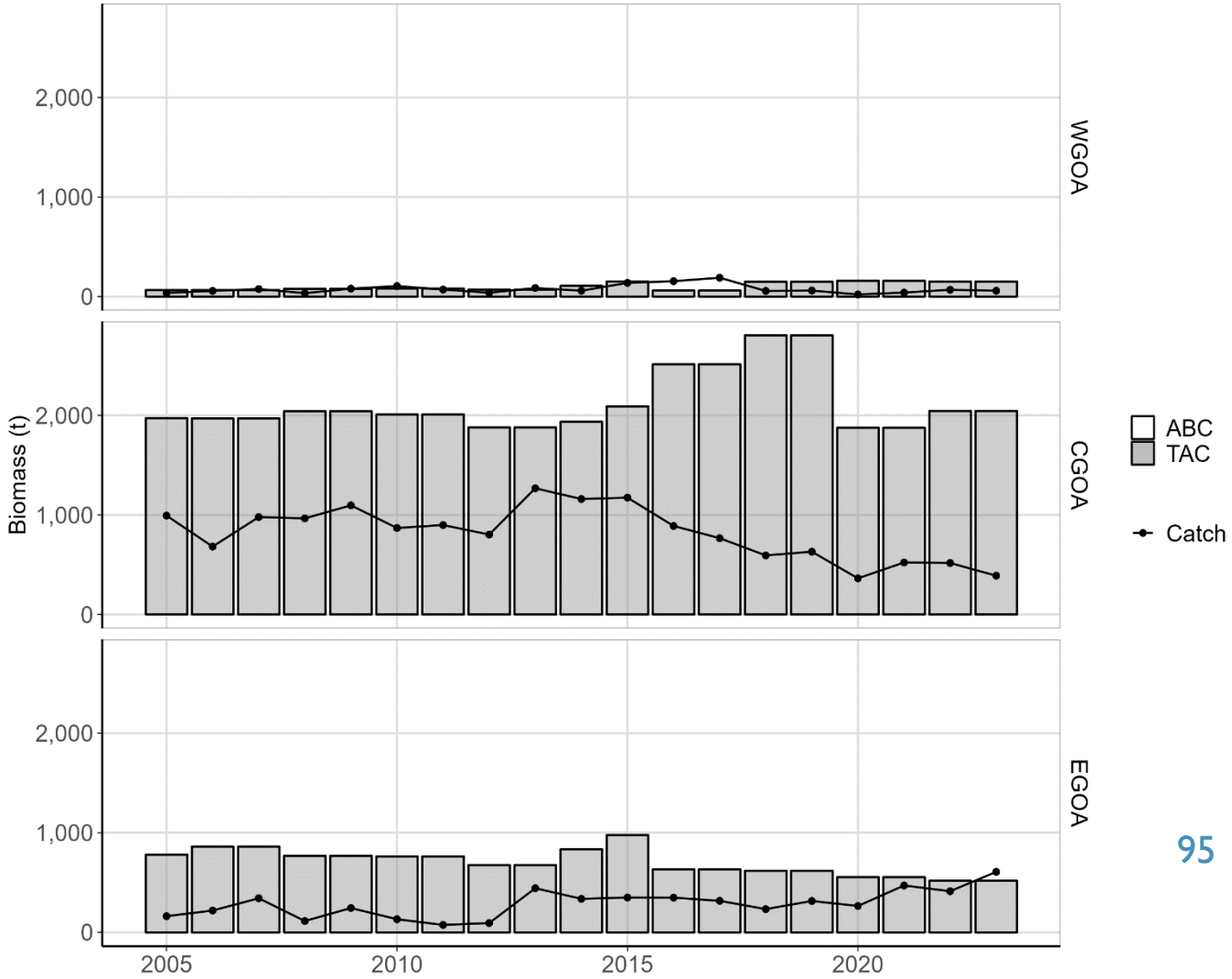


Longnose Skate Area Overview

- Tier 5

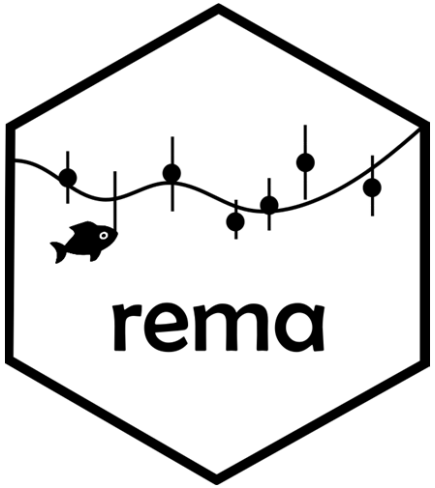
Area	ABC (t)	TAC (t)	Catch (t)*
WGOA	151	151	59
CGOA	2,044	2,044	389
EGOA	517	517	607

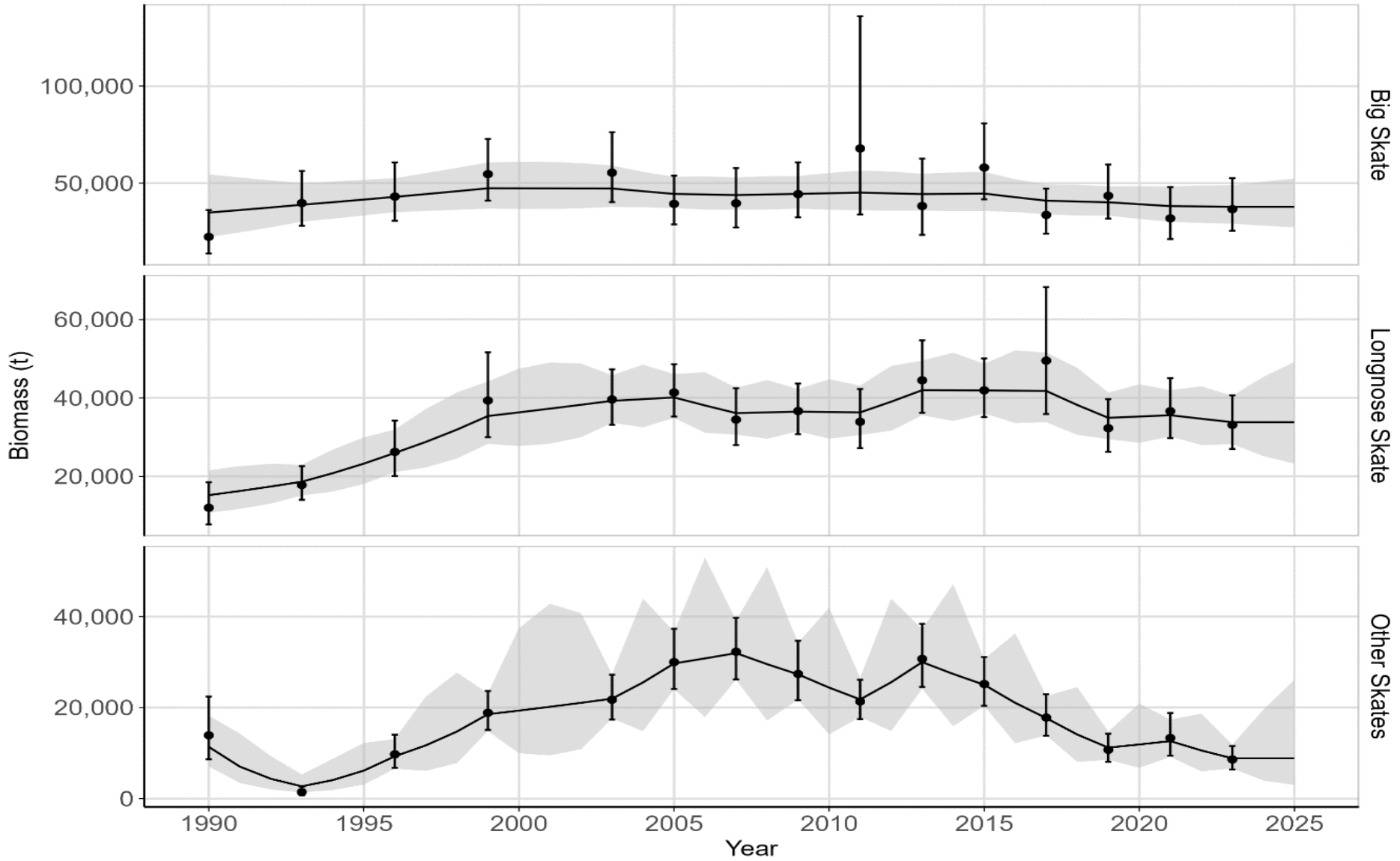
*As of October 16th, 2023



GOA Skates survey trends

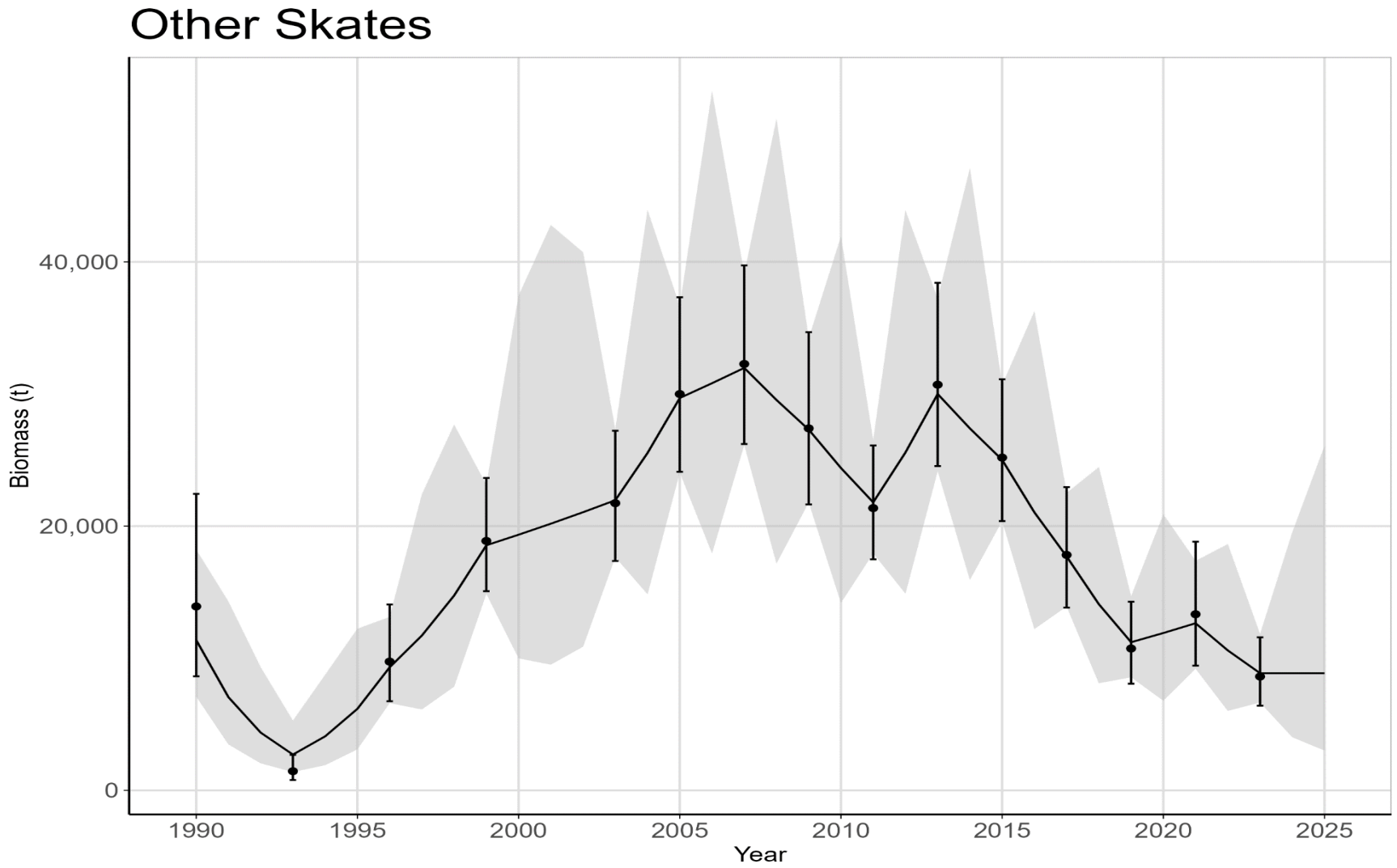
- By species species/groups





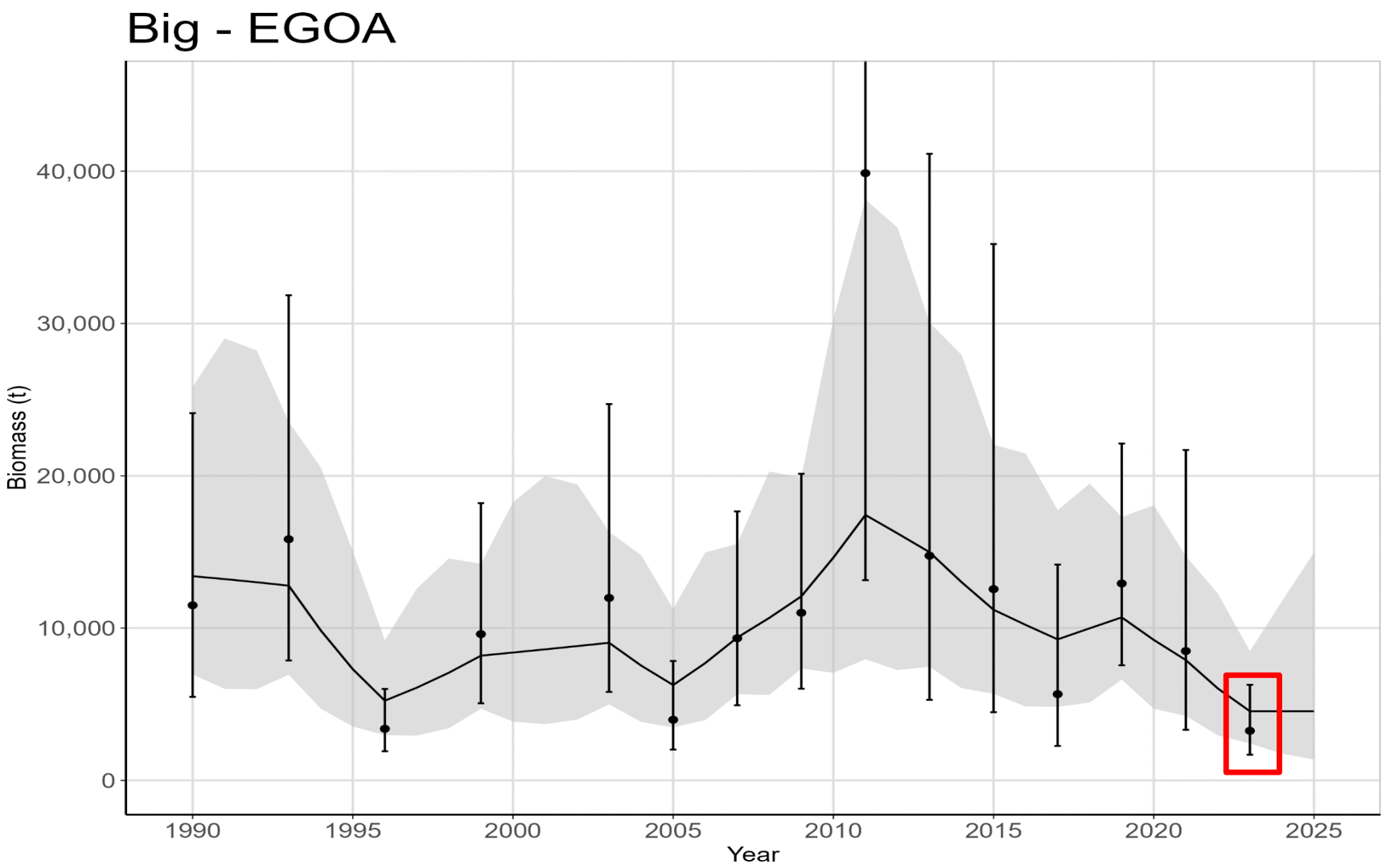
GOA Skates—Other skate complex

2023 is the Lowest Estimated Biomass (8,869 t) since 1996



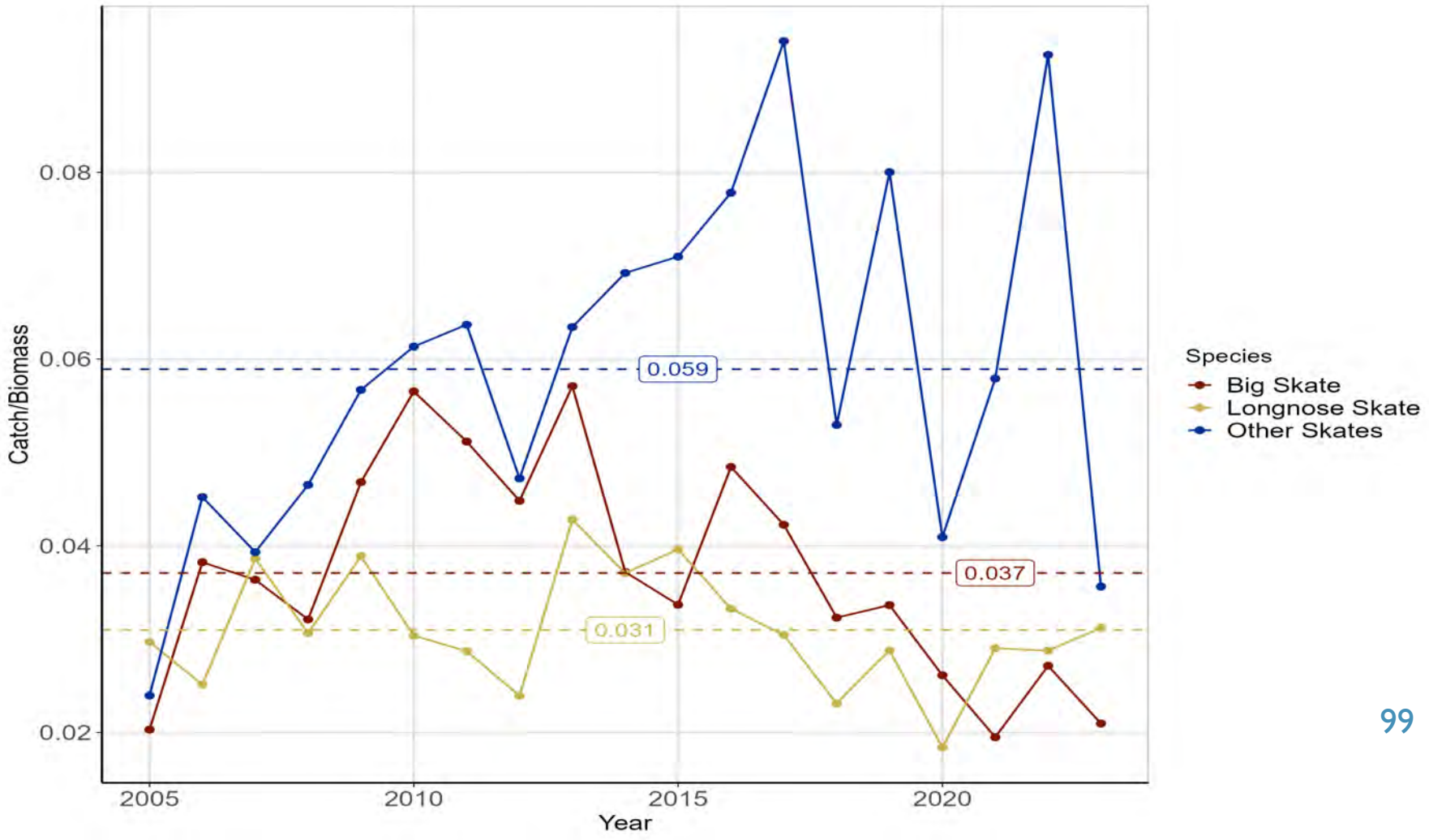
GOA Skates—Big skate in Eastern GOA

2023 is the Lowest Estimated Biomass (4,545 t)



GOA Skates—Big skate in Eastern GOA

2023 is the Lowest Estimated Biomass (4,545 t)



GOA Skates risk table

Assessment-related considerations	*Population dynamics considerations*	*Environmental/ecosystem considerations*	*Fishery Performance*
Level 1: No Concern	Level 1: No Concern	Level 1: No Concern	Level 1: No Concern

Big skate ABC/OFLs

- Tier 5
- M = 0.1
- F_{OFL} = M = 0.1
- $maxF_{ABC}$ = 0.75*M = 0.075
- F_{ABC} = 0.75*M = 0.075

Big skate (*Beringraja binoculata*)					
Quantity		As estimated or *specified last* year for: 2023	2024	As estimated or *recommended this* year for: **2024**	2025
Biomass (t)	W	7,882	7,882	9,934	9,934
	C	19,756	19,756	23,326	23,326
	E	10,581	10,581	4,545	4,545
	GOA Wide	38,220	38,220	37,804	37,804
OFL (t)	GOA Wide	3,822	3,822	**3,780**	3,780
*max*ABC (t)	W	591	591	745	745
	C	1,482	1,482	1,749	1,749
	E	794	794	341	341
ABC (t)	W	591	591	**745**	745
	C	1,482	1,482	**1,749**	1,749
	E	794	794	**341**	341
Status		As determined *last* year for: 2021	2022	As determined *this* year for: 2022	2023
Overfishing?		No	n/a	No	n/a

Longnose skate ABC/OFLs

- Tier 5
- M = 0.1
- F_{OFL} = M = 0.1
- $maxF_{ABC}$ = 0.75*M = 0.075
- F_{ABC} = 0.75*M = 0.075

Longnose skate (*Raja rhina*)					
Quantity		As estimated or *specified last* year for: 2023	2024	As estimated or *recommended this* year for: **2024**	2025
Biomass (t)	W	2,013	2,013	1,384	1,384
	C	27,258	27,258	25,249	25,249
	E	6,890	6,890	7,172	7,172
	GOA Wide	36,162	36,162	33,804	33,804
OFL (t)	GOA Wide	3,616	3,616	**3,380**	3,380
*max*ABC (t)	W	151	151	104	104
	C	2,044	2,044	1,894	1,894
	E	517	517	538	538
ABC (t)	W	151	151	**104**	104
	C	2,044	2,044	**1,894**	1,894
	E	517	517	**538**	538
Status		As determined *last* year for: 2021	2022	As determined *this* year for: 2022	2023
Overfishing?		No	n/a	No	n/a

Bathyraja skate ABC/OFLs

- Tier 5
- M = 0.1
- F_{OFL} = M = 0.1
- $maxF_{ABC}$ = 0.75*M = 0.075
- F_{ABC} = 0.75*M = 0.075

Other skates (*Bathyraja*)				
	As estimated or *specified last* year for:		As estimated or *recommended this* year for:	
Quantity	2023	2024	**2024**	2025
Biomass (t)	13,114	13,114	8,869	8,869
OFL (t)	1,311	1,311	**887**	887
*max*ABC (t)	984	984	665	665
ABC (t)	984	984	**665**	665
	As determined *last* year for:		As determined *this* year for:	
Status	2021	2022	2022	2023
Overfishing?	No	n/a	No	n/a

GOA skate complex Plan Team discussions

- The Team supported the authors' recommendations for OFLs and ABCs.
  - The Team recommended that the author look at the bycatch rates of skates in the fisheries in which they are caught (e.g., what is the ton of skates caught per ton of target species across different fisheries) and present this data in the next assessment.

Partial assessments in 2023 (renamed “Harvest projections”)

Stocks

- GOA arrowtooth flounder
- GOA rex sole
- GOA shallow water flatfish (+N & S rock sole)
- GOA flathead sole
- GOA Dusky rockfish
- GOA Northern rockfish

Slide(s) on

Fishery trends

Survey trends

Updated catch

Notes

GOA Arrowtooth Flounder (Tier 3a)

Not overfishing, overfished nor approaching overfished

Fishery trends Catch remains low (as in 2022) majority in ATF fishery, ~8-9% in rockfish and pollock fishery

Survey trends 5% increase in 2023 bottom trawl survey,
VAST estimates similar

Updated catch 2023: 9,029 t
2024: 17,576 t

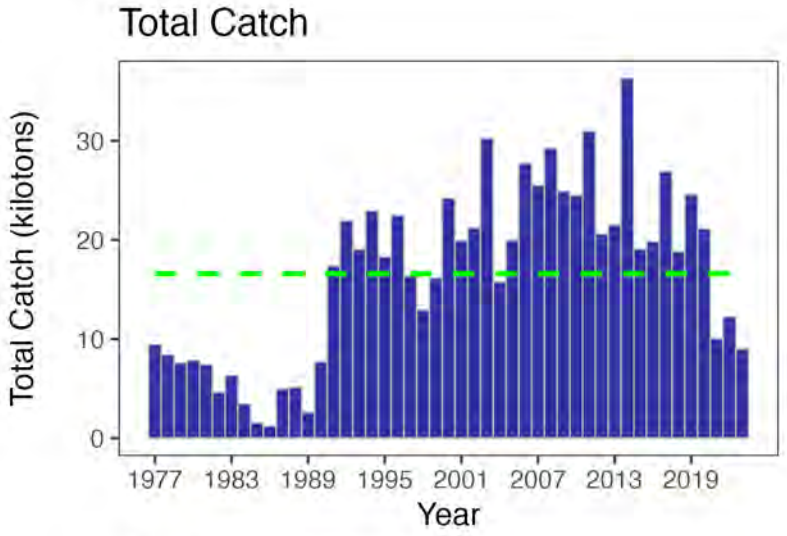
Notes Catch/Biomass decreasing since 2021, now lowest in time series

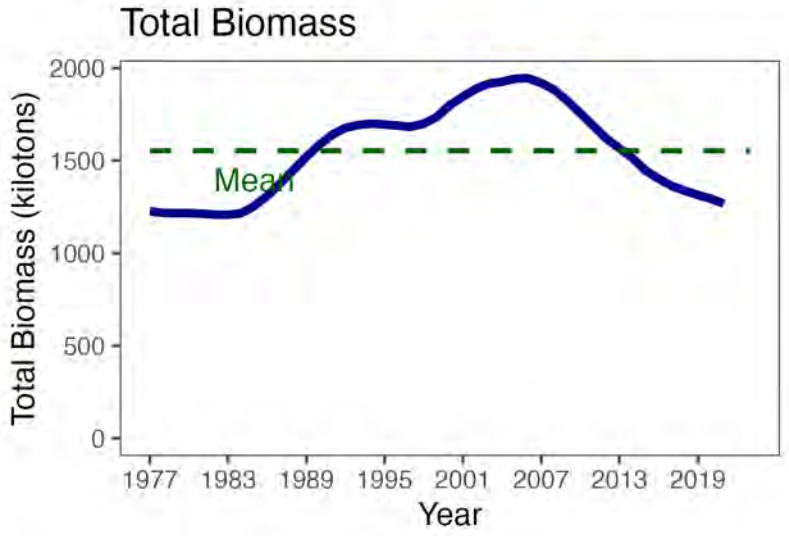
	As estimated or *specified*		As estimated or	
Quantity/Status	2023	2024	2024*	2025*
M (natural mortality)	0.2	0.2	0.2	0.2
Tier	3a	3a	3a	3a
Projected total (age 1+) biomass (t)	1,265,950	1,269,510	1,295,410	1,311,810
Projected female spawning biomass	702,074	690,799	698,842	695,299
$B_{100\%}$	1,018,700	1,018,700	1,018,700	1,018,700
$B_{40\%}$	407,478	407,478	407,478	407,478
$B_{35\%}$	356,544	356,544	356,544	356,544
F_{OFL}	0.225	0.225	0.225	0.225
maxF_{ABC}	0.185	0.185	0.185	0.185
F_{ABC}	0.185	0.185	0.185	0.185
OFL (t)	142,749	141,008	**142,485**	142,074
*max*ABC (t)	119,485	118,014	119,249	118,912
ABC (t)	119,485	118,014	**119,249**	118,912
	As determined *last* year for:		As determined *this* year for:	
Status	2022	2023	2023	2024
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

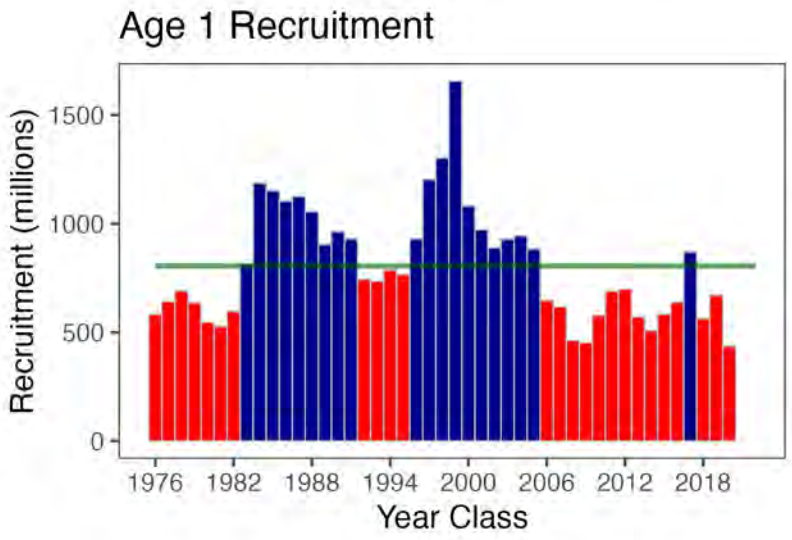
Thanks to Kalei Shotwell

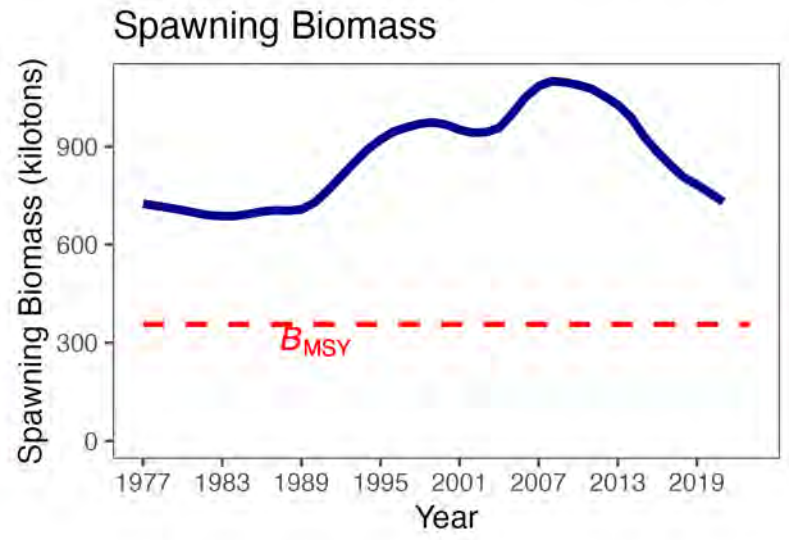
GOA Arrowtooth Flounder (Tier 3a)

Not overfishing, overfished nor approaching overfished









GOA Rex sole (Tier 3a) Not overfishing, overfished, nor approaching overfished

Fishery trends Lower than average catches for 2021-2023

Survey trends 2023 biomass lower than 2021

Update Most recent: 2021
Next: 2025

Notes Catch/ABC low

Quantity	As estimated or *specified this* year for:		As estimated or *recommended this* year for:	
	2023	2024	2024	2025
M (natural mortality rate)	0.17	0.17	0.17	0.17
Tier	3a	3a	3a	3a
Projected total (3+) biomass (t)	127,297	128,207	129,611	129,296
Female spawning biomass (t)	56,965	59,734	60,486	61,413
$B_{100\%}$				
$B_{40\%}$				
$B_{35\%}$				
F_{OFL}	See area-specific tables below		See area-specific tables below	
$maxF_{ABC}$				
F_{ABC}				
OFL (t)	25,135	25,652	25,978	25,900
maxABC (t)	20,664	21,097	21,364	21,303
ABC (t)	20,664	21,097	21,364	21,303
Status	As determined *last* year for:		As determined *this* year for:	
	2021	2022	2022	2023
Overfishing	no	n/a	no	n/a
Overfished	n/a	no	n/a	no
Approaching overfished	n/a	no	n/a	no

Thanks to Carey McGilliard

GOA Rex sole, Tier 3a (west-central)

Quantity: (Western-Central GOA)	As estimated or *specified this* year for:		As estimated or *recommended this* year for:	
	2023	2024	2024	2025
M (natural mortality rate)	0.17	0.17	0.17	0.17
Tier	3a	3a	3a	3a
Projected total (3+) biomass (t)	101,963	102,913	104,316	104,219
Female spawning biomass (t)	46,412	48,834	49,586	50,458
$B_{100\%}$	46,850	46,850	46,850	46,850
$B_{40\%}$	18,740	18,740	18,740	18,740
$B_{35\%}$	16,398	16,398	16,398	16,398
F_{OFL}	0.28	0.28	0.28	0.28
$maxF_{ABC}$	0.23	0.23	0.23	0.23
F_{ABC}	0.23	0.23	0.23	0.23
OFL (t)	19,865	20,335	20,660	20,635
maxABC (t)	16,346	16,739	17,006	16,987
ABC (t)	16,346	16,739	17,006	16,987
Status	As determined *last* year for:		As determined *this* year for:	
	2021	2022	2022	2023
Overfishing	no	n/a	no	n/a
Overfished	n/a	no	n/a	no
Approaching overfished	n/a	no	n/a	no

Note:
Fish are larger at age in the Western-Central GOA than in the Eastern GOA

Thanks to Carey McGilliard

GOA Rex sole, Tier 3a (eastern)

- Almost no rex sole catch in the Eastern GOA

Quantity: (Eastern GOA)	As estimated or *specified this* year for:		As estimated or *recommended this* year for:	
	2023	2024	2024	2025
M (natural mortality rate)	0.17	0.17	0.17	0.17
Tier	3a	3a	3a	3a
Projected total (3+) biomass (t)	25,334	25,294	25,295	25,077
Female spawning biomass (t)	10,553	10,900	10,900	10,955
$B_{100\%}$	8,998	8,998	8,998	8,998
$B_{40\%}$	3,599	3,599	3,599	3,599
$B_{35\%}$	3,149	3,149	3,149	3,149
F_{OFL}	0.31	0.31	0.31	0.31
$maxF_{ABC}$	0.25	0.25	0.25	0.25
F_{ABC}	0.25	0.25	0.25	0.25
OFL (t)	5,270	5,317	5,318	5,265
maxABC (t)	4,318	4,358	4,358	4,316
ABC (t)	4,318	4,358	4,358	4,316
Status	As determined *last* year for:		As determined *this* year for:	
	2021	2022	2022	2023
Overfishing	no	n/a	no	n/a
Overfished	n/a	no	n/a	no
Approaching overfished	n/a	no	n/a	no

Thanks to Carey McGilliard

GOA Shallow water flatfish: Central-Eastern N/S rock sole

Fishery trends

Catch trend has been declining in central-eastern GOA (main catch), stable and low in western GOA

Survey trends

Central-eastern:
NRS declining, SRS sight decline in 2023
Western:
NRS declining, SRS stable

Update

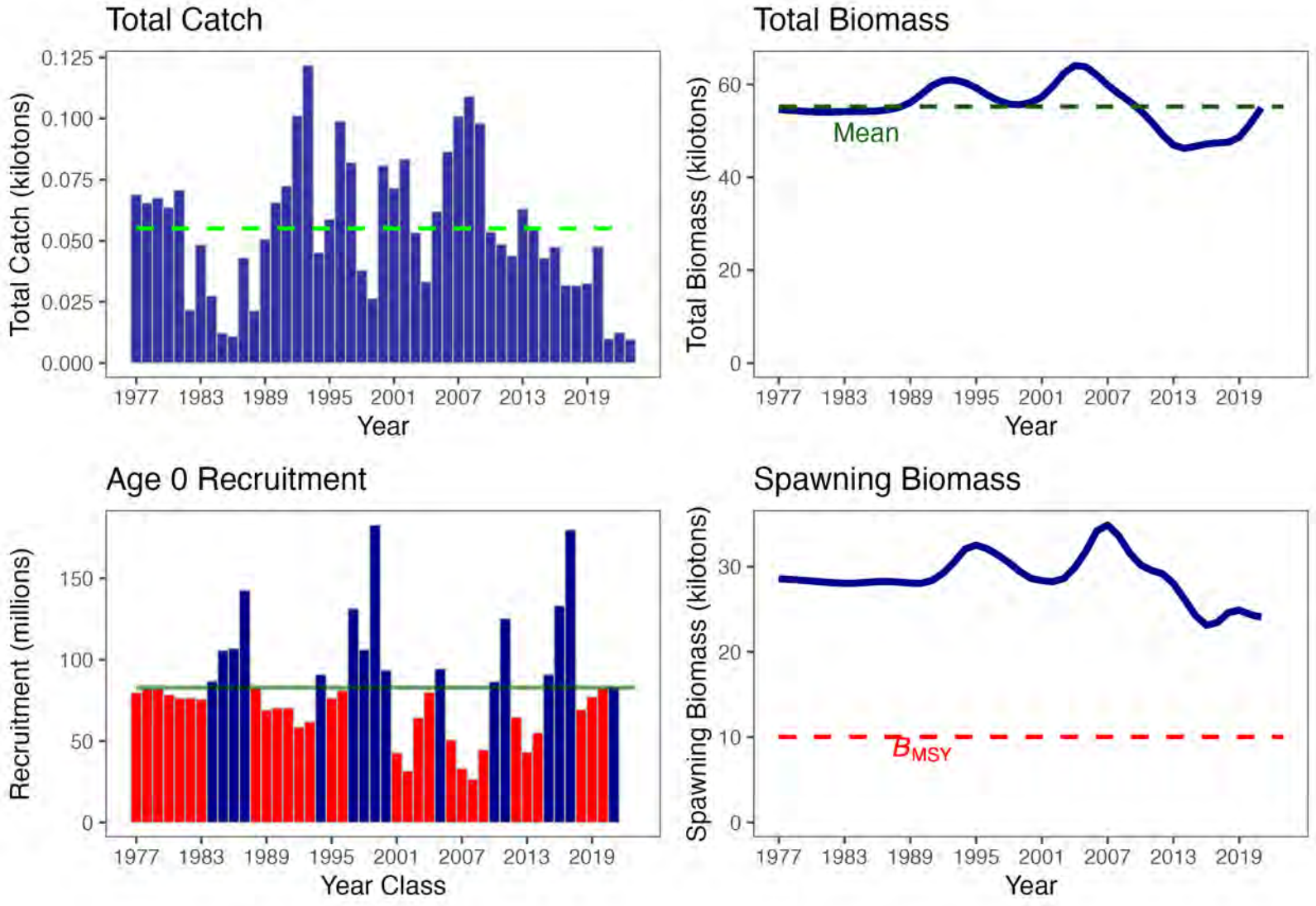
Most recent: 2021
Next: 2025

Notes

Catch/ABC low

Thanks to Meaghan Bryan

Shallow water flatfish: N rock sole



GOA flathead sole

Fishery trends approaching bycatch (<5% of TAC)

Survey trends 2023: 27% lower than the 10-year average

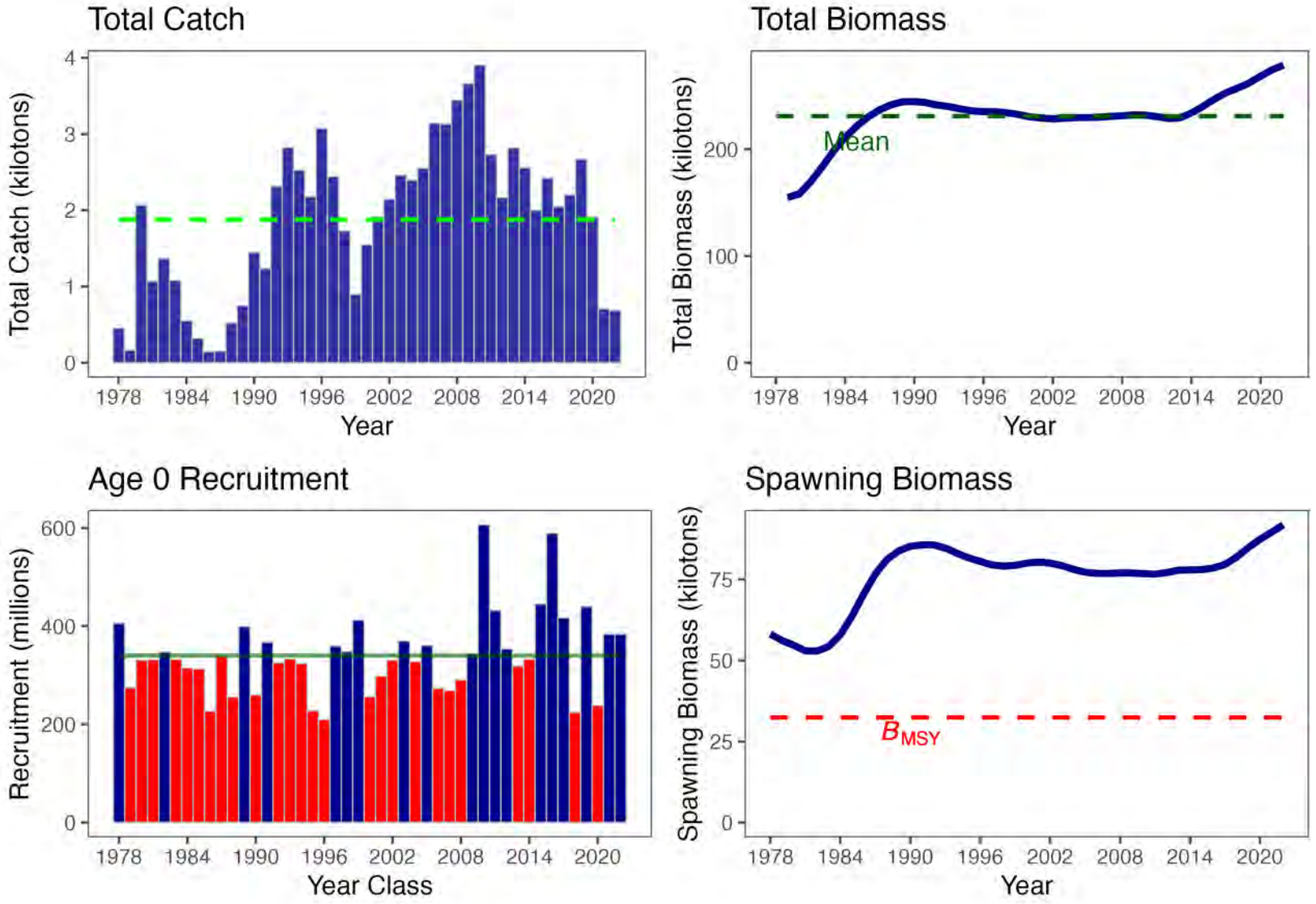
Update Most recent: 2022
Next: Update in 2025

Notes 2024 spawning biomass 96,604, trend stable

Quantity/Status	As estimated or *specified last* year for: 2023	2024	As estimated or *recommended this* year for: 2024*	2025*
Projected total (3+) biomass (t)	294,188	293,277	294,616	292,639
Projected Female spawning biomass (t)	94,059	95,932	96,604	98,468
$B_{100\%}$	92,582	92,582	92,582	92,582
$B_{40\%}$	37,033	37,033	37,033	37,033
$B_{35\%}$	32,404	32,404	32,404	32,404
F_{OFL}	0.36	0.36	0.36	0.36
maxF_{ABC}	0.29	0.29	0.29	0.29
F_{ABC}	0.29	0.29	0.29	0.29
OFL (t)	48,161	49,073	**49,414**	50,322
*max*ABC (t)	39,480	40,222	40,503	41,258
ABC (t)	39,480	40,222	**40,503**	41,258
Status	As determined *last* year for: 2022	2023	As determined *this* year for: 2023	2024
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching Overfished	n/a	No	n/a	No

Thanks to Maia Kapur

GOA flathead sole



Dusky rockfish

Fishery trends Stable
Catch < 50% of TAC

Survey trends overall increase, but minor decline in past few years

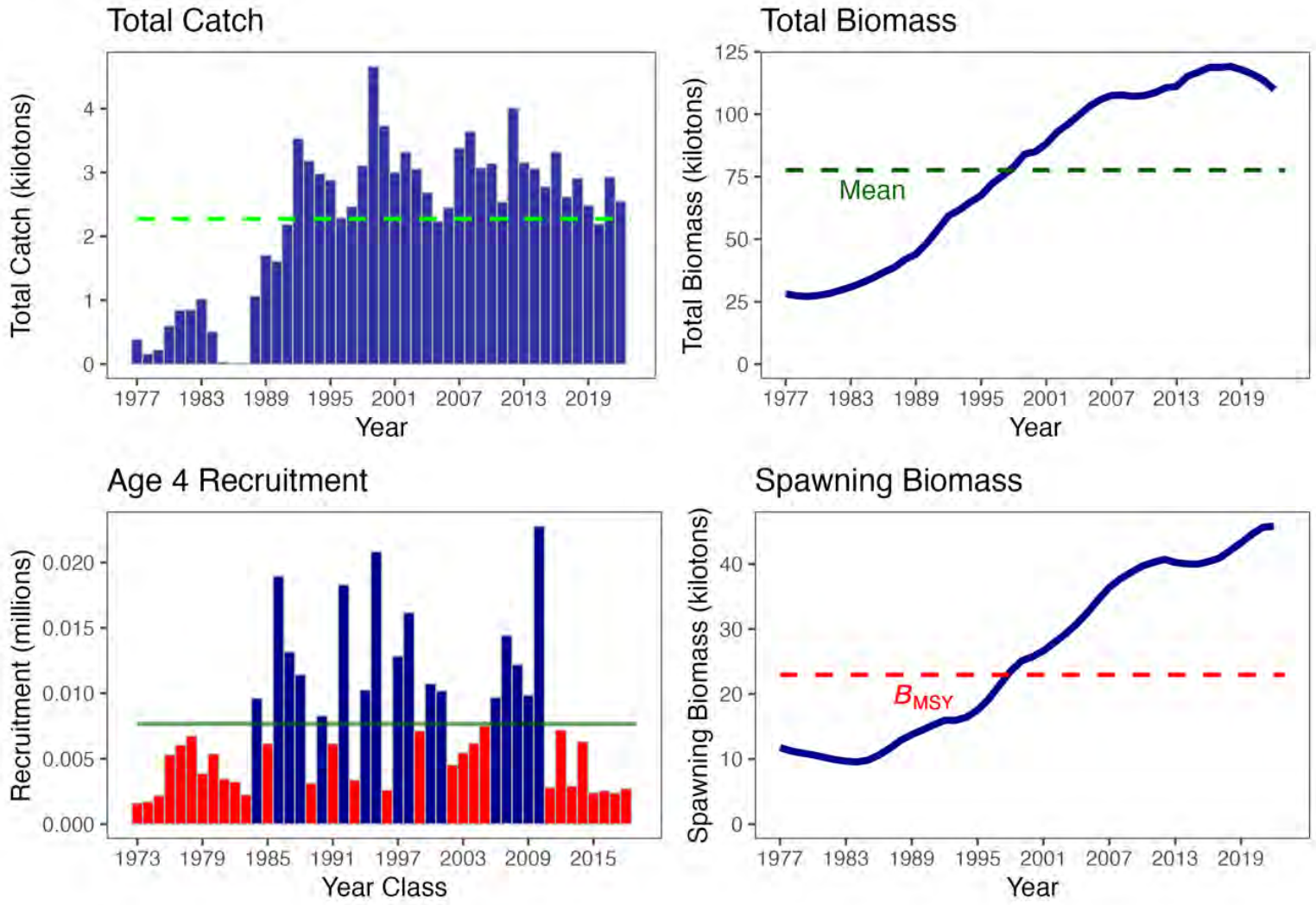
Update Most recent: 2022
Next: 2024

Notes 2024 spawning biomass 43,197
trend decreasing

Quantity	As estimated or **specified** *last* year for:		As estimated or **recommended** *this* year for:	
	2023	2024	2024*	2025*
M (natural mortality)	0.07	0.07	0.07	0.07
Tier	3a	3a	3a	3a
Projected total (age 4+) biomass (t)	107,160	104,627	103,997	100,827
Projected female spawning biomass (t)	44,651	44,651	43,197	41,200
$B_{100\%}$	65,565	65,565	65,565	65,565
$B_{40\%}$	26,226	26,226	26,226	26,226
$B_{35\%}$	22,948	22,948	22,948	22,948
F_{OFL}	0.11	0.11	0.112	0.112
$maxF_{ABC}$	0.09	0.09	0.091	0.091
F_{ABC}	0.09	0.09	0.091	0.091
OFL (t)	9,638	9,154	**9,281**	8,796
*max*ABC (t)	7,917	7,520	7,624	7,225
ABC (t)	7,917	7,520	**7,624**	7,225
Status	As determined *last* year for:		As determined *this* year for:	
	2022	2023	2023	2024
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

Thanks to Kristen Omori

Dusky rockfish



Northern rockfish

Fishery trends Stable
Catch < 50% of TAC

Survey trends Decrease in past few years

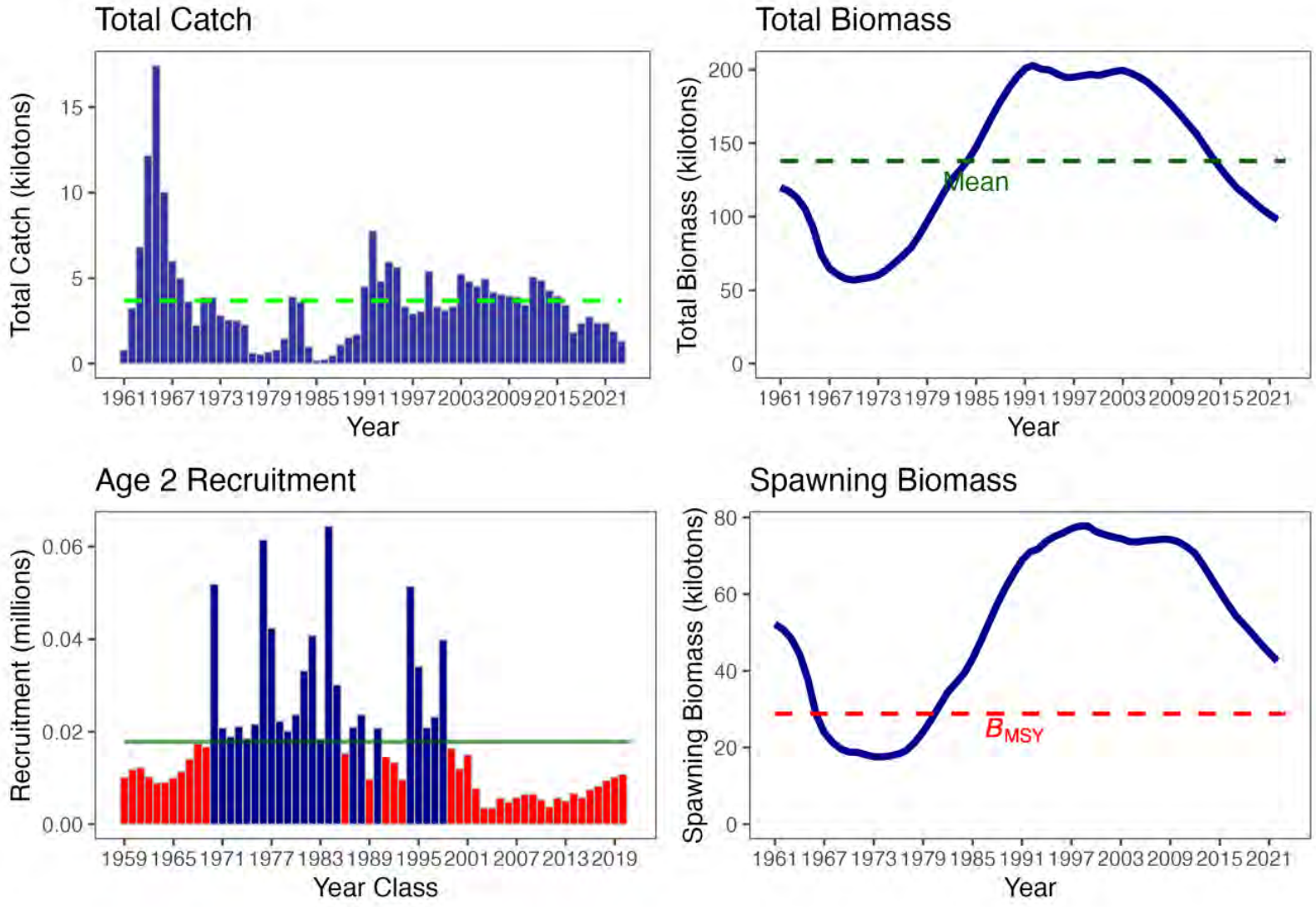
Update Most recent: 2022
Next: 2024

Notes 2024 spawning biomass 38,118; trend decreasing

Thanks to Ben Williams

Quantity/Status	As estimated or *specified last* year for: 2023	2024	As estimated or *recommended this* year for: 2024*	2025*
M (natural mortality)	0.059	0.059	0.059	0.059
Tier	3a	3a	3a	3a
Projected total (age 2+) biomass (t)	95,452	93,022	94,319	93,088
Projected female spawning biomass (t)	39,445	37,470	38,118	36,510
$B_{100\%}$	82,350	82,350	82,350	82,350
$B_{40\%}$	32,940	32,940	32,940	32,940
$B_{35\%}$	28,822	28,822	28,822	28,822
F_{OFL}	0.074	0.074	0.074	0.074
$maxF_{ABC}$	0.061	0.061	0.061	0.061
F_{ABC}	0.061	0.061	0.061	0.061
OFL (t)	5,927	5,661	**5,750**	5,548
maxABC (t)	4,965	4,742	4,816	4,647
ABC (t)	4,965	4,742	**4,816**	4,647
Status	As determined *last* year for: 2022	2023	As determined *this* year for: 2023	2024
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

Northern rockfish



Catch reports

- Atka mackerel
- SEO DSR
- Sharks
- Octopus
- Thornyheads

Catch reports

	Year	OFL	ABC	TAC	Catch
Atka mackerel	2022	6,200	4,700	3,000	880
	2023	6,200	4,700	3,000	462
SEO DSR	2022	579	365	365	163
	2023	376	283	283	188
Sharks	2022	5,006	3,755	3,755	2,160
	2023	6,521	4,891	4,891	1,777
Octopus	2022	1,307	980	980	155
	2023	1,307	980	980	154
Thornyheads	2022	2,604	1,953	1,953	359
	2023	2,170	1,628	1,628	201