GOA Plan "Team"

Jim Ianelli	AFSC REFM (co-chair)
Chris Lunsford	AFSC ABL (co-chair)
Sara Cleaver	NPFMC (coordinator)
Obren Davis	NMFS AKRO
Jennifer Cahalan (substitute for Craig Faunce)	AFSC FMA
Lisa Hillier	WDFW
Pete Hulson	AFSC ABL
Sandra Lowe	AFSC REFM
Nat Nichols	ADF&G
Jan Rumble	ADF&G
Paul Spencer	AFSC REFM
Marysia Szymkowiak	AFSC REFM
Kresimir Williams	AFSC RACE
Andrew Olson	ADF&G

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GOA Plan Team

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Last thing first…GOA Plan Team

The Team approved the proposed harvest specifications for 2022 and 2023 by recommending the 2022 GOA final harvest specifications for OFLs and ABCs as published in the Federal Register in February 2021.

*The Team approved the 2022 and 2023 halibut discard mortality rates with one change to GOA trawl CP.*

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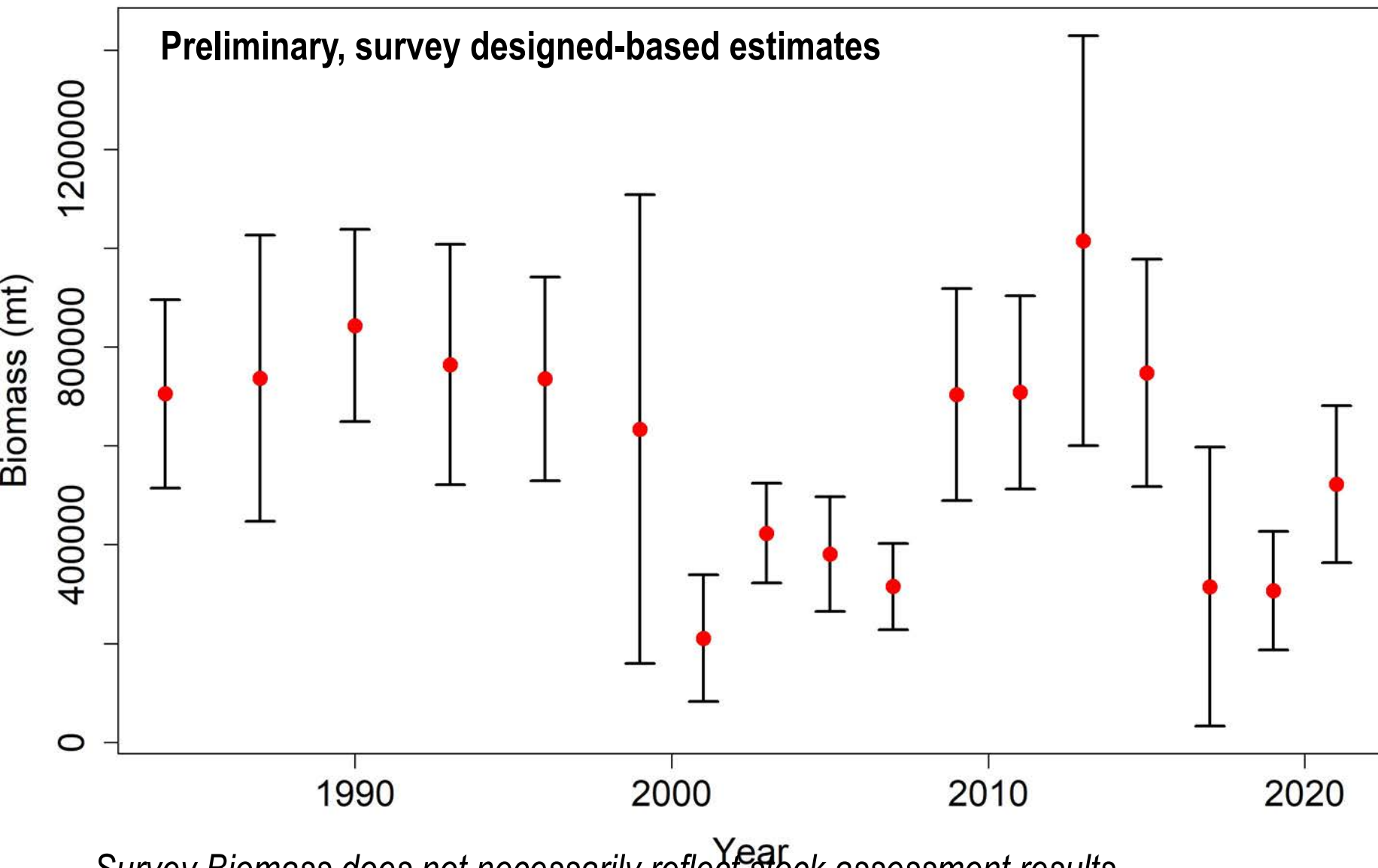
NOAA's GOA bottom-trawl survey 2021

Wayne Palsson, team
- Nate Raring, co-ord.
- Christina Conrath
- Ned Laman
- Susanne McDermott
- Cecilia O'Leary
- Sean Rooney
- Lou Rugolo
- Margaret Siple
- Paul von Szalay
- Mark Zimmermann

Occupied 2021 Station Locations
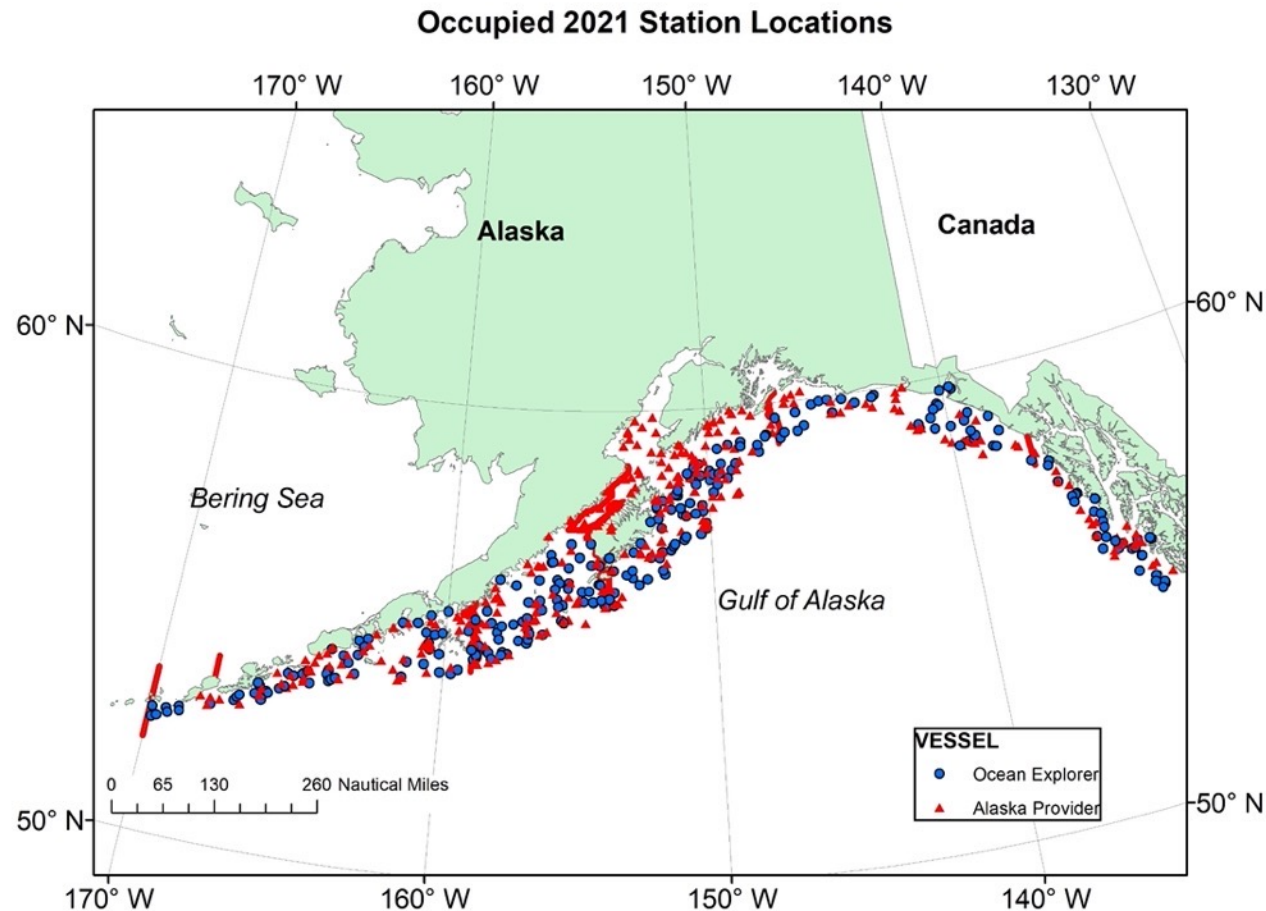
walleye pollock (Gadus chalcogrammus)

Preliminary, survey designed-based estimates

Survey Biomass does not necessarily reflect stock assessment results

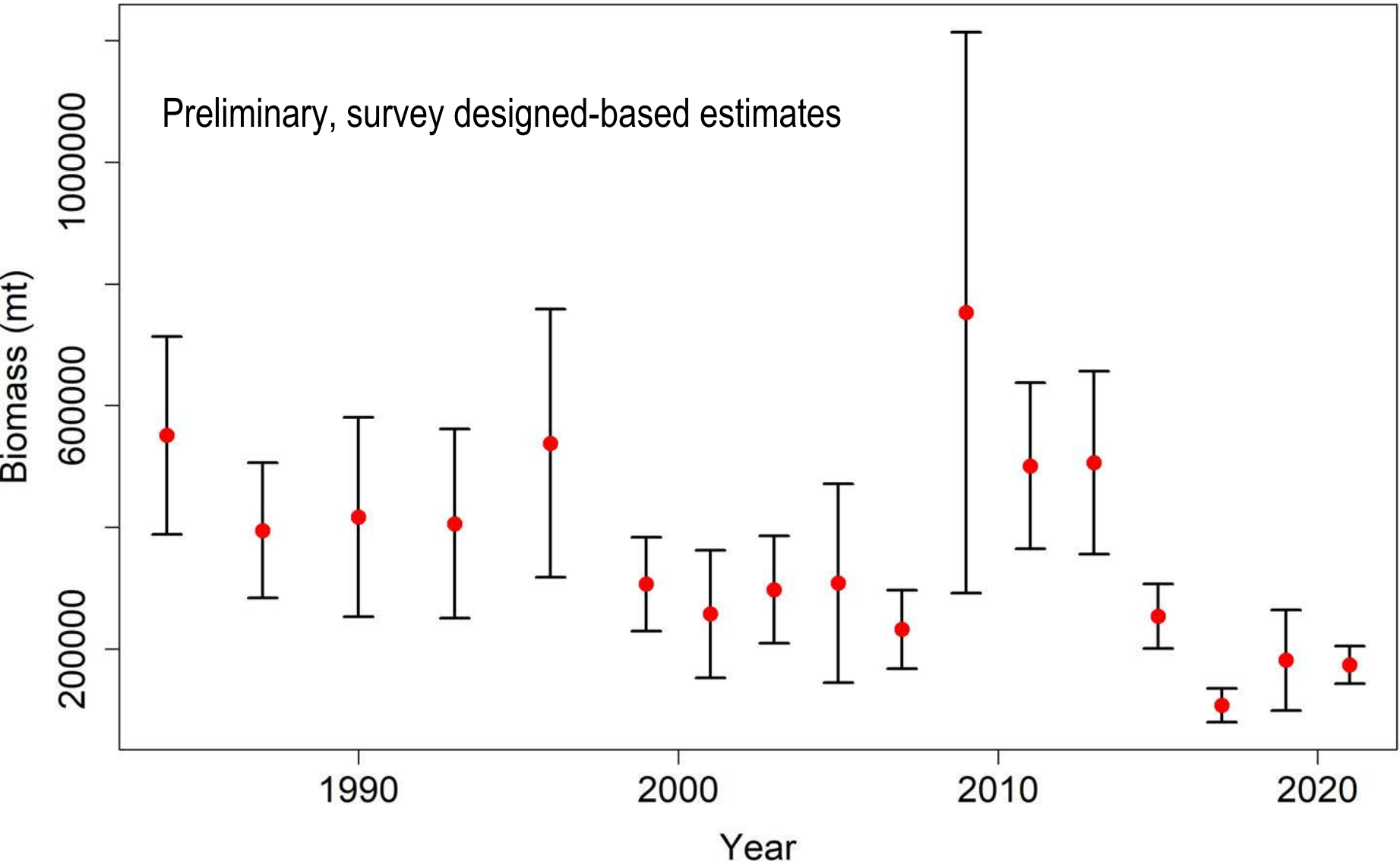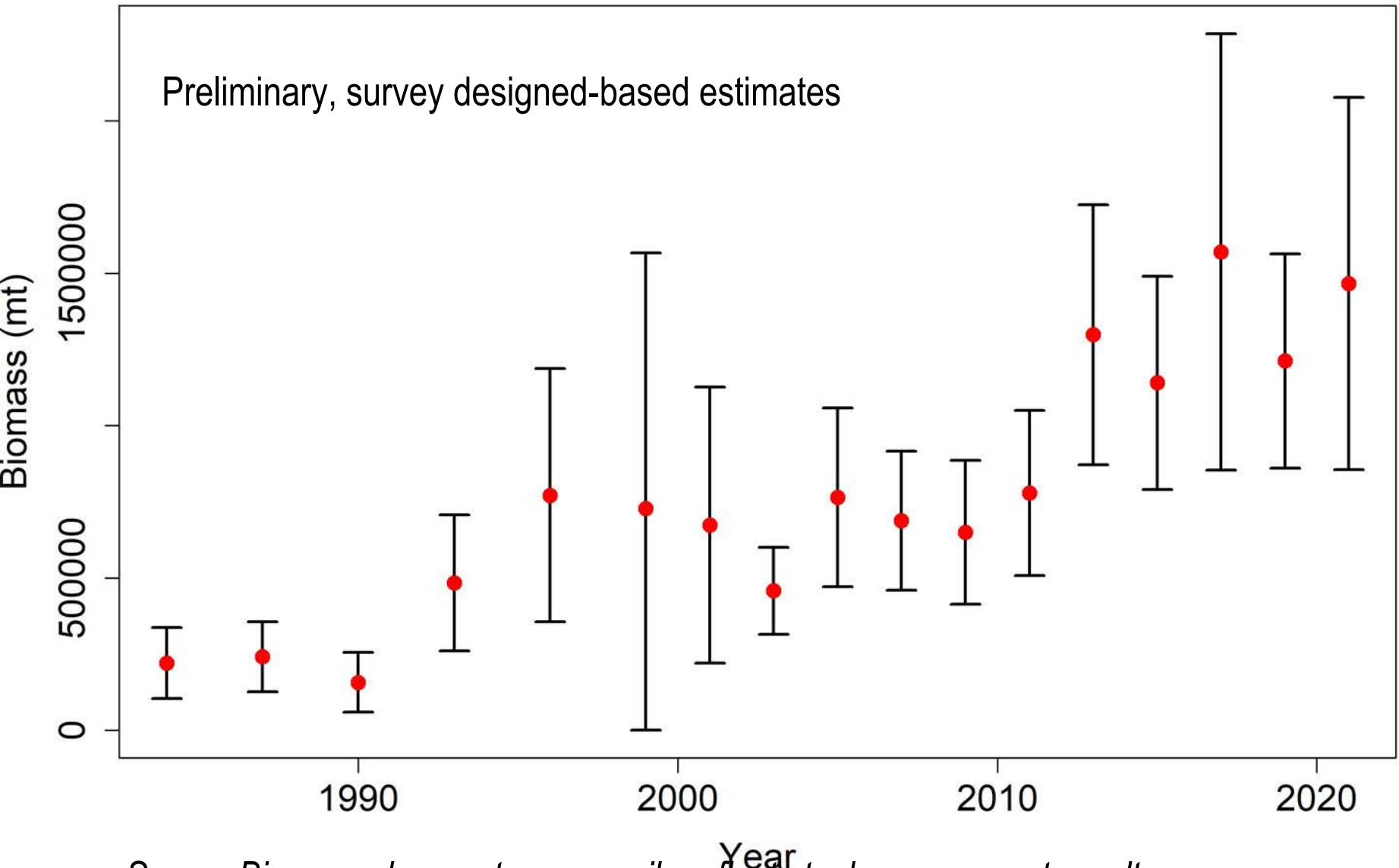Pacific cod (Gadus macrocephalus)

Survey Biomass does not necessarily reflect stock assessment results

GOA Plan Team—NMFS bottom-trawl survey 2021

Pacific ocean perch (Sebastes alutus)

Preliminary, survey designed-based estimates
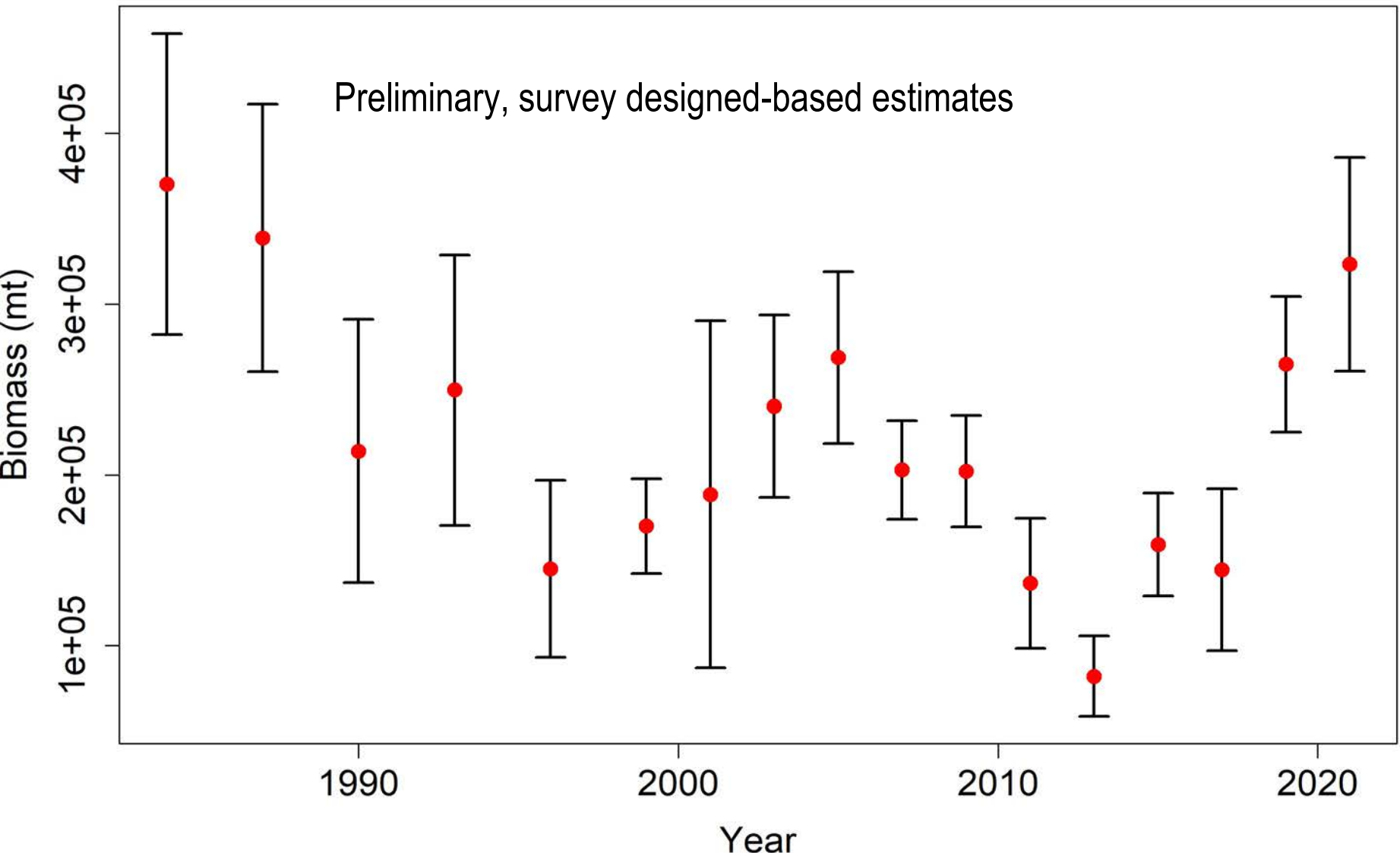
Survey Biomass does not necessarily reflect stock assessment results

GOA Plan Team—NMFS bottom-trawl survey 2021

sablefish (Anoplopoma fimbria)

Preliminary, survey designed-based estimates

Survey Biomass does not necessarily reflect stock assessment results

NMFS GOA Bottom trawl survey design evaluation

The Team noted that the presentation was mainly informational, but the analysts sought feedback. Consequently the Team:

- Agreed that this general approach is acceptable.

- Supported the authors recommendation to focus on area level solutions as they provide unbiased estimates for each management area, whereas the gulf-wide design results in some bias for certain management areas.

- Suggested that the authors explore area-specific species prioritizations.

- Indicated that it would be a potential concern if changes to survey design would affect interpretation and consistency of the survey time series.

- Supports the author's conclusion that the two vessels, 550 stations, and survey design likely provide adequate abundance estimates (outlined in a Technical Memorandum currently in revision).
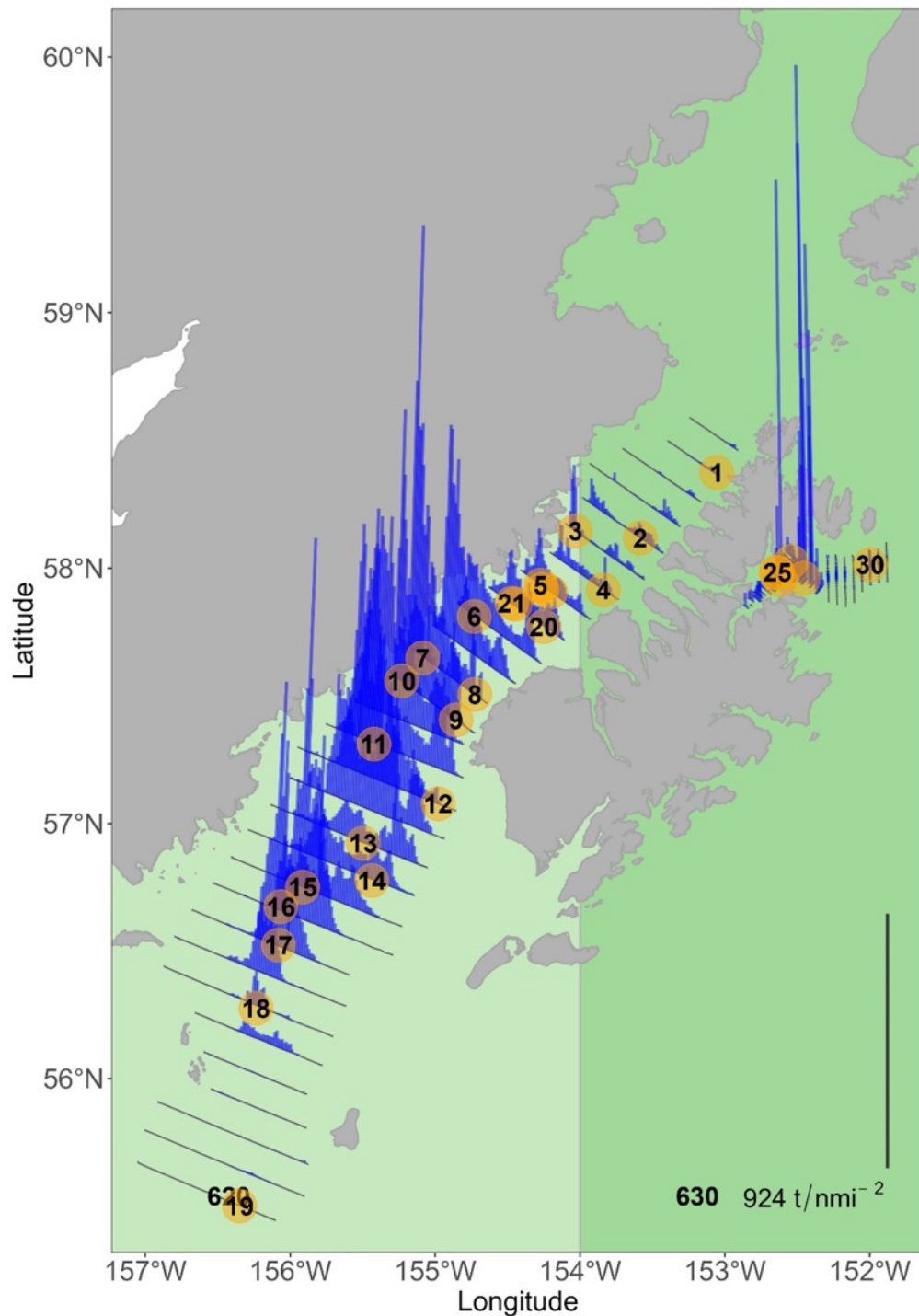
GOA Plan Team

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Shelikof pollock biomass estimate
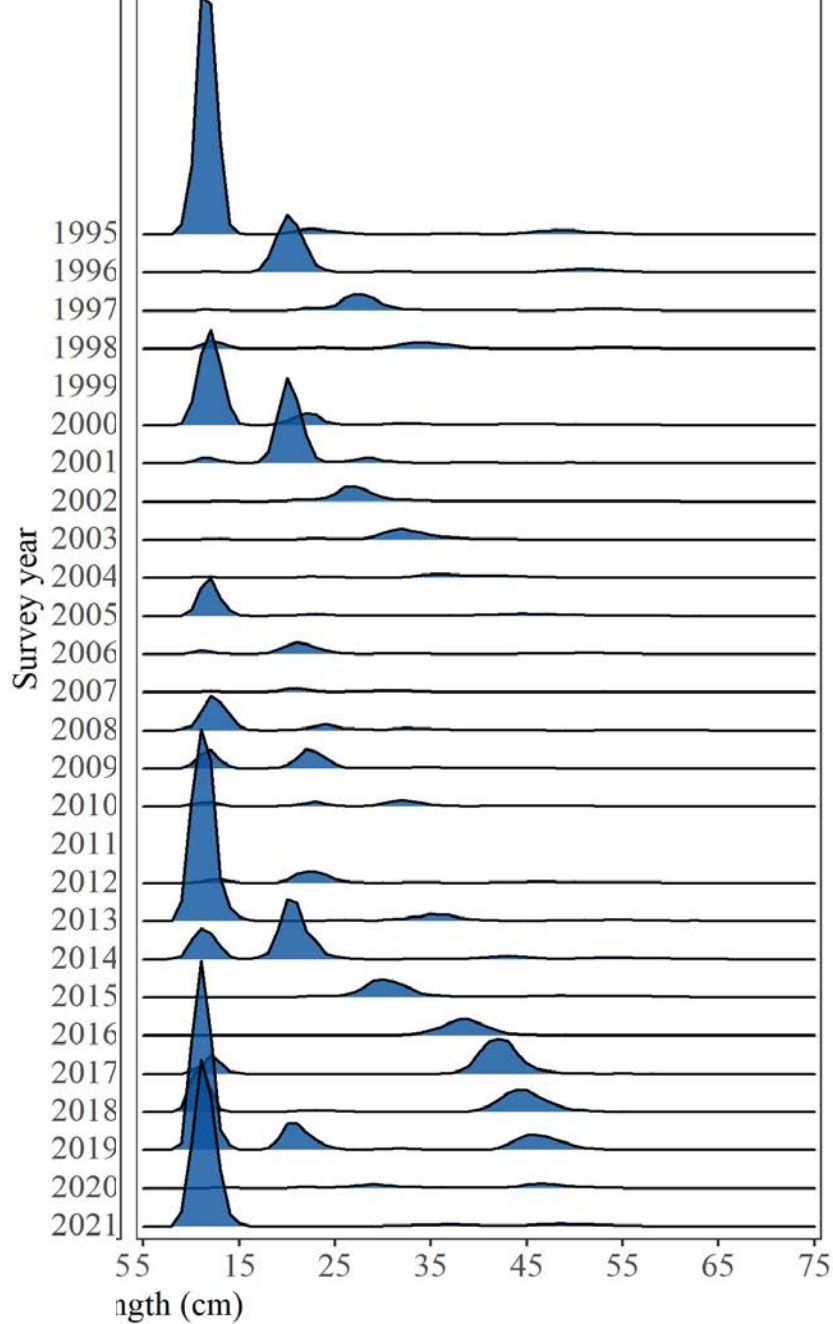
March 3-10

24 LFS tows 1127 nmi trackline

March 13-15

6 LFS tows 157 nmi trackline

Shelikof pollock estimates at length 1995-2021

- 2008-2021 corrected for net selectivity due to juvenile escapement

GOA pollock—related acoustic survey work
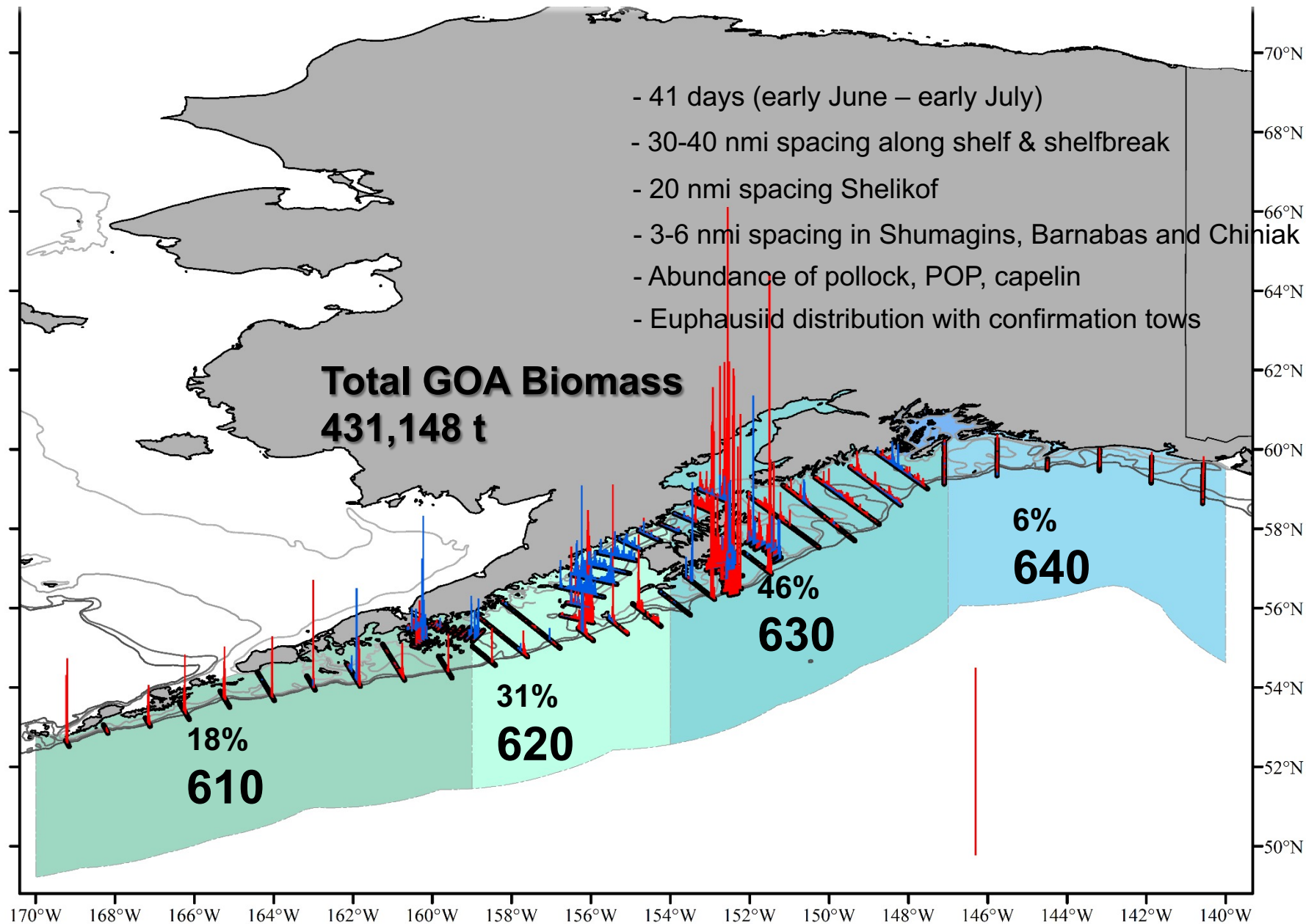
Time series work
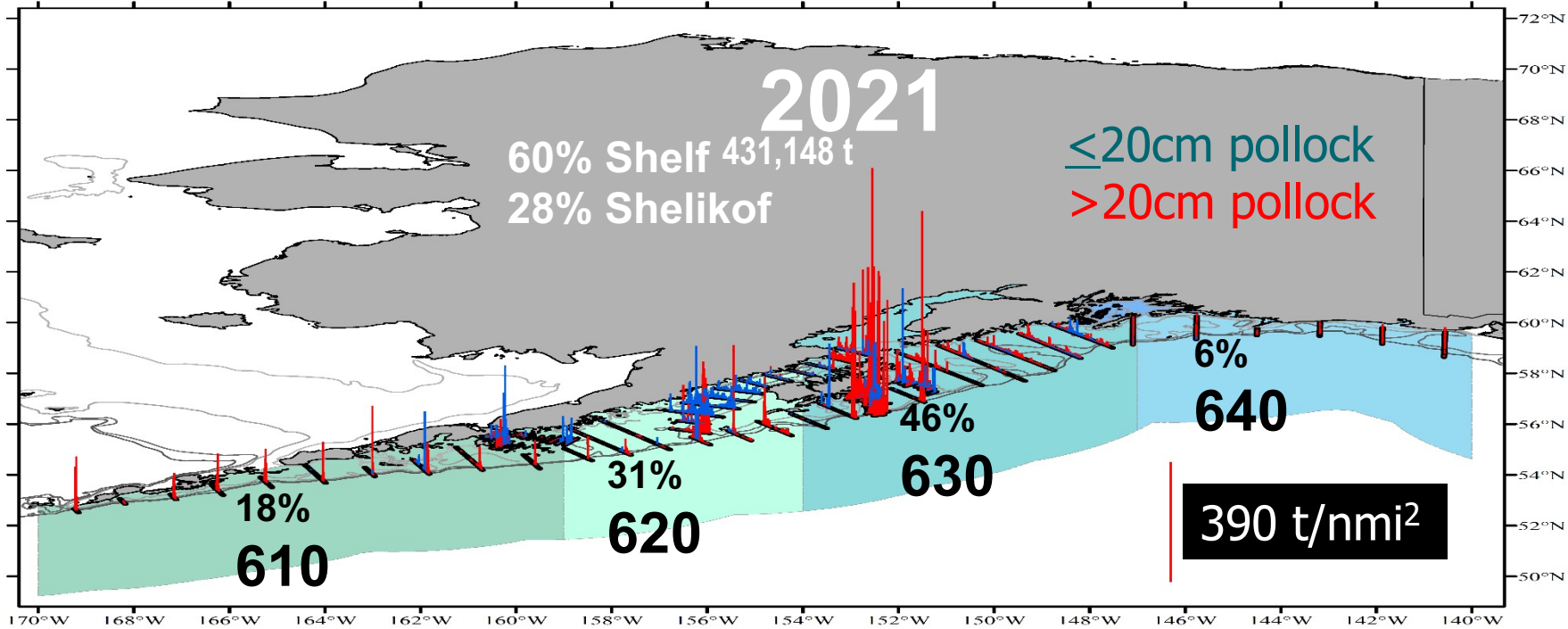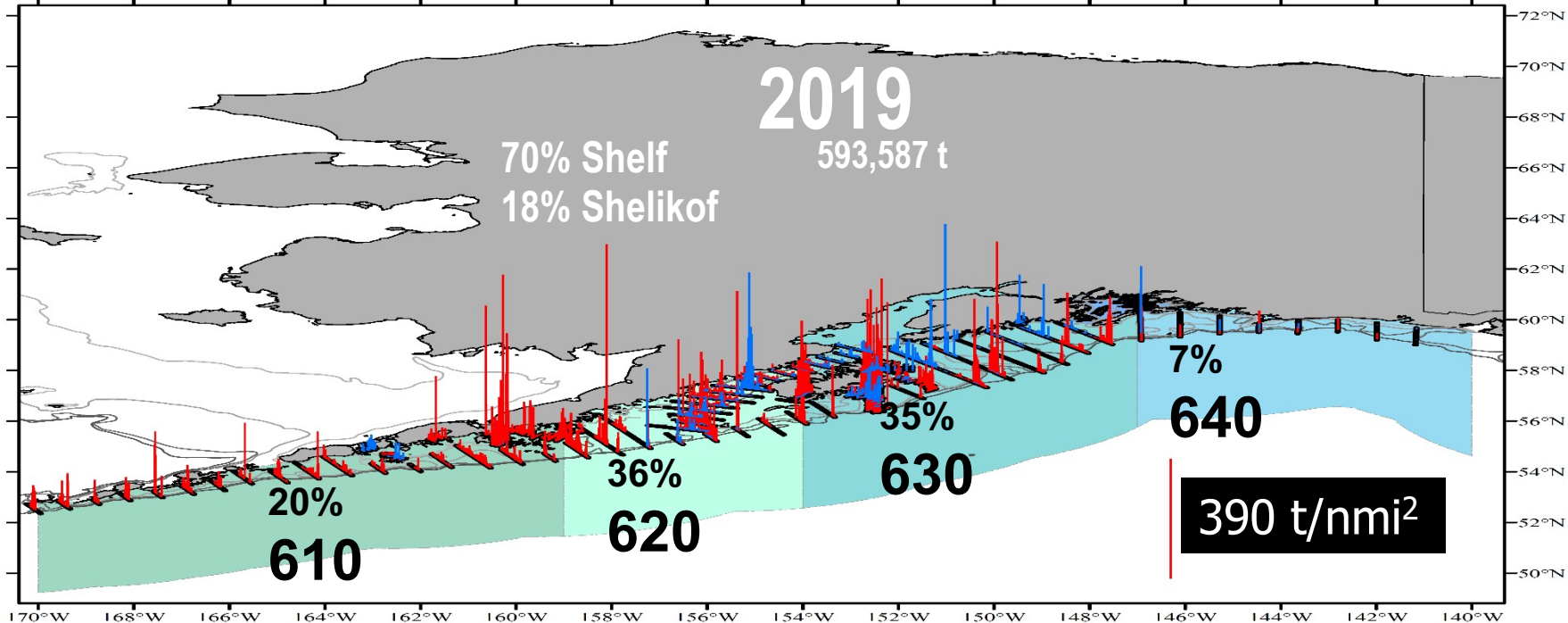
- *SDM developments (GLMM, include age data)*

The Team supported this ongoing and future planned work with some comments about potential covariates to examine (e.g., distance from seafloor)

2022 Survey plans

- Winter: Shumigans / Sanak / Shelikof Strait
- Summer: Bering Sea (last surveyed 2018)

GOA pollock 2021 Summer acoustic-trawl survey

- 41 days (early June – early July)
- 30-40 nmi spacing along shelf & shelfbreak
- 20 nmi spacing Shelikof
- 3-6 nmi spacing in Shumagins, Barnabas and Chiniak
- Abundance of pollock, POP, capelin
- Euphausiid distribution with confirmation tows

Total GOA Biomass 431,148 t

6%
640

46%
630

31%
620

18%
610

2019
70% Shelf
18% Shelikof
593,587 t

7%
640

35%
630

36%
620

20%
610

390 t/nmi²

2021
60% Shelf 431,148 t
28% Shelikof

≤20cm pollock
>20cm pollock

6%
640

46%
630

31%
620

18%
610

390 t/nmi²

GOA Plan Team

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GOA pollock plan for 2021 assessment model

Cole Monnahan lead author this year, Martin Dorn to assist

Data updates:

- 2021 fishery catches + 2020 ages
- 2021 Shelikof indices + 2021 ages
- 2021 NMFS BT index (no new ages)
- 2021 ADF&G index + 2020 ages
- 2021 Summer acoustic index

ESP will be a scorecard update

GOA Pollock Plan Team and SCC comments

1. EM concerns
2. Fishery selectivity
3. Shelikof survey catchability/availability
4. Sensitivities to survey data
   - Impacts on population scale
5. Selectivity impacts w/ survey timing
6. Combine acoustic and bottom trawl survey data
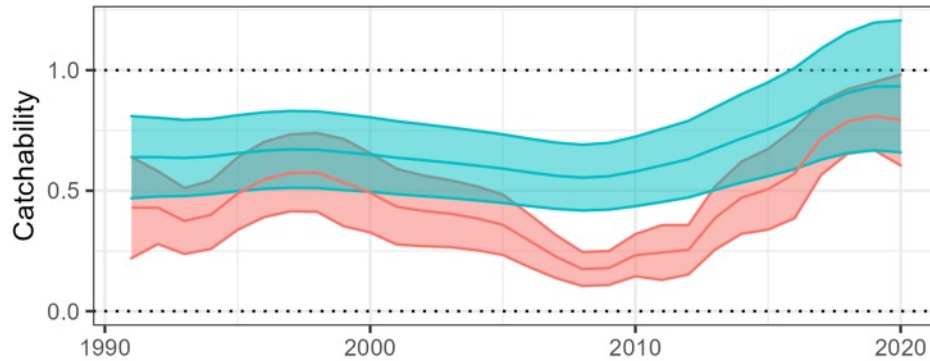7. Maturity estimates

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GOA pollock—improving fishery selectivity

Tested with more RW parametric flexibility in time variability
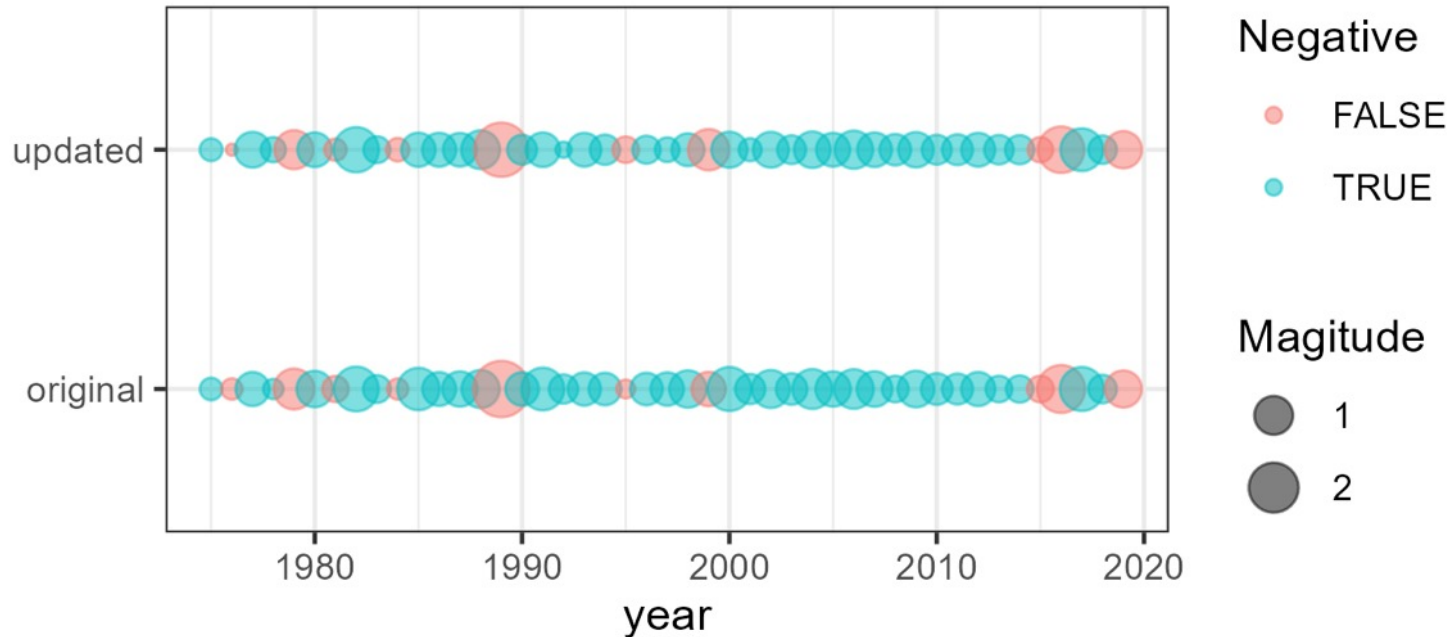
The Team recommended that in future analyses (not necessarily in 2021), alternative smoothers/penalty forms be considered.

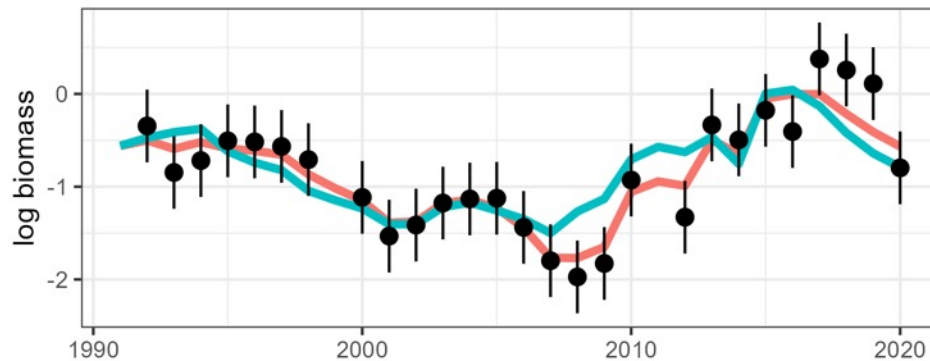NOAA FISHERIES   U.S. Department of Commerce | National Oceanic and Atmospheric Administration | National Marine Fisheries Service

GOA Pollock—constraining Shelikof catchability

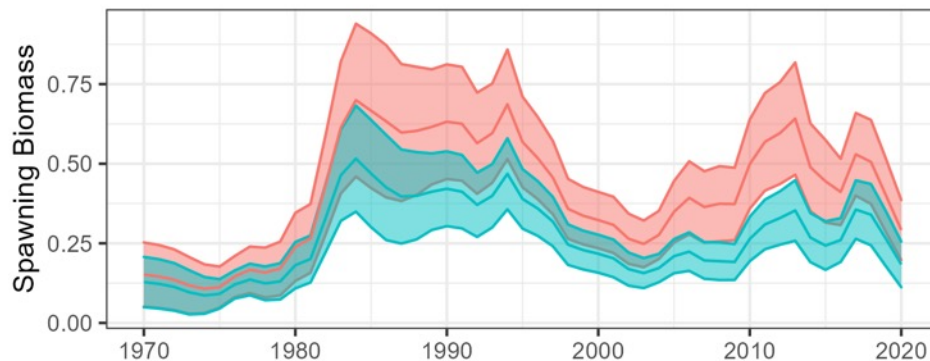
Plan Team Supported **proposal to re-parameterize survey catchability**

$0<q<1$ is expected
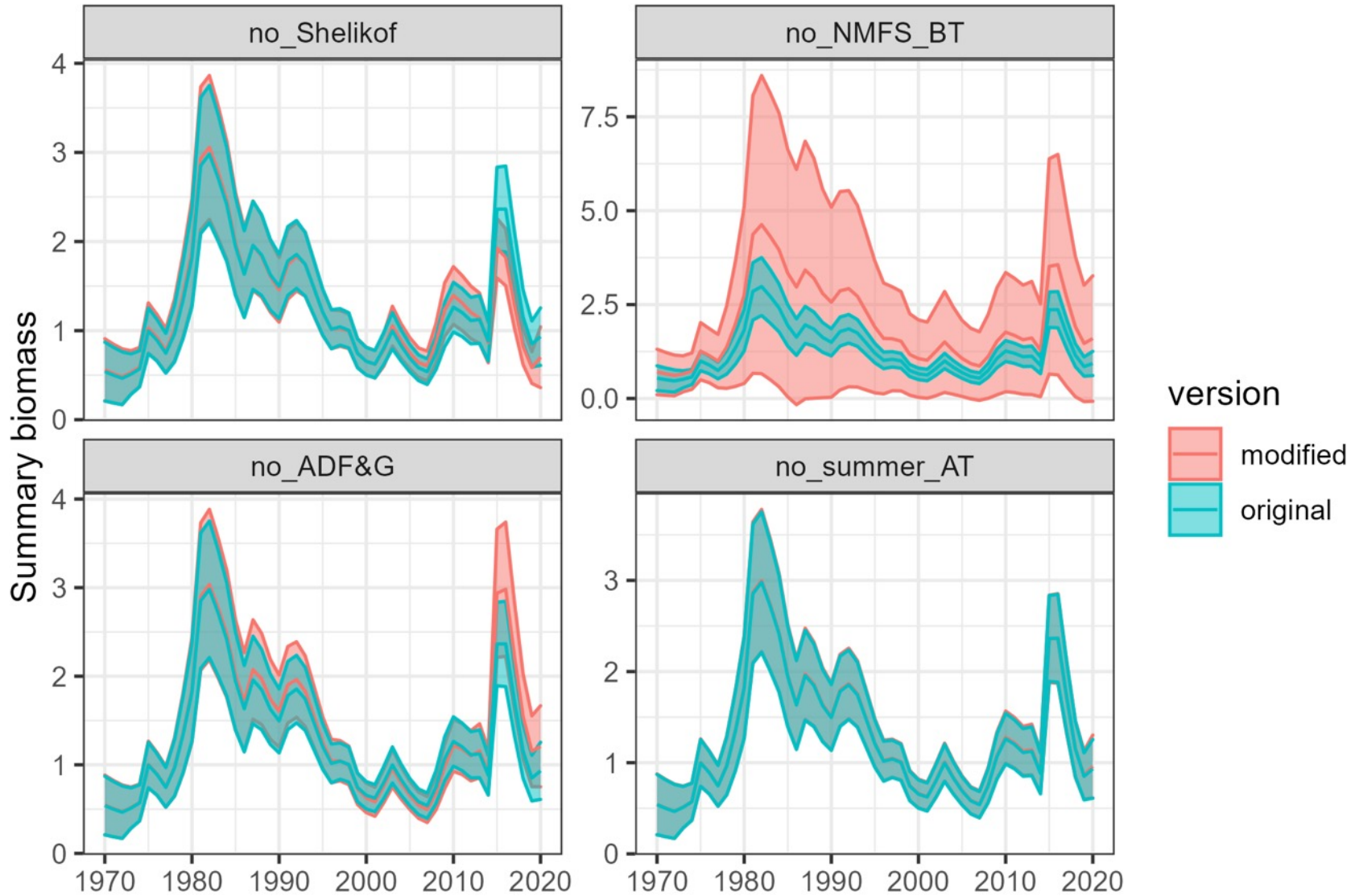
The Team recommended continuing with this form at the author's discretion. We also recommended that future consideration might include state-space models or fully Bayesian forms be considered so that the variance term can be estimated along with the other processes.

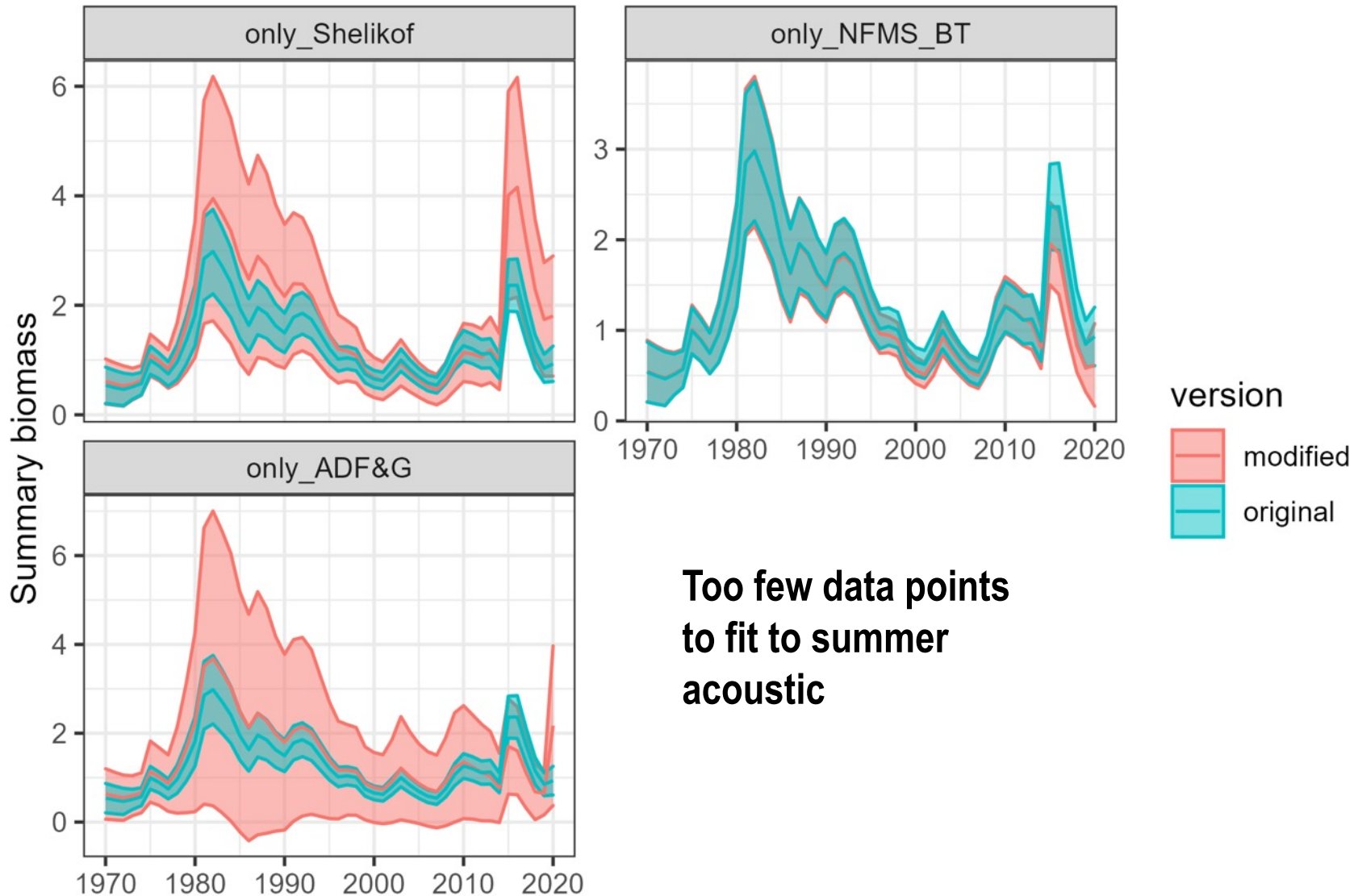# GOA pollock—effect of dropping single surveys

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GOA pollock—effect of dropping all but one survey

Too few data points to fit to summer acoustic

GOA Plan Team

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GOA Pacific cod ESP

The Team recommended that the SSC provide clarity about how the incorporation of socioeconomic information should be used to meet the objectives of the ESPs.

- If the SSC's interest in incorporating community information within ESPs is actually in terms of local ecological knowledge that should be clarified and prioritized in terms of species and regions, given that this will necessitate a new data collection.

The Team recommended ESP authors provide clarity around the terminology for socioeconomic indicators given the lack of familiarity of these terms within the Team.
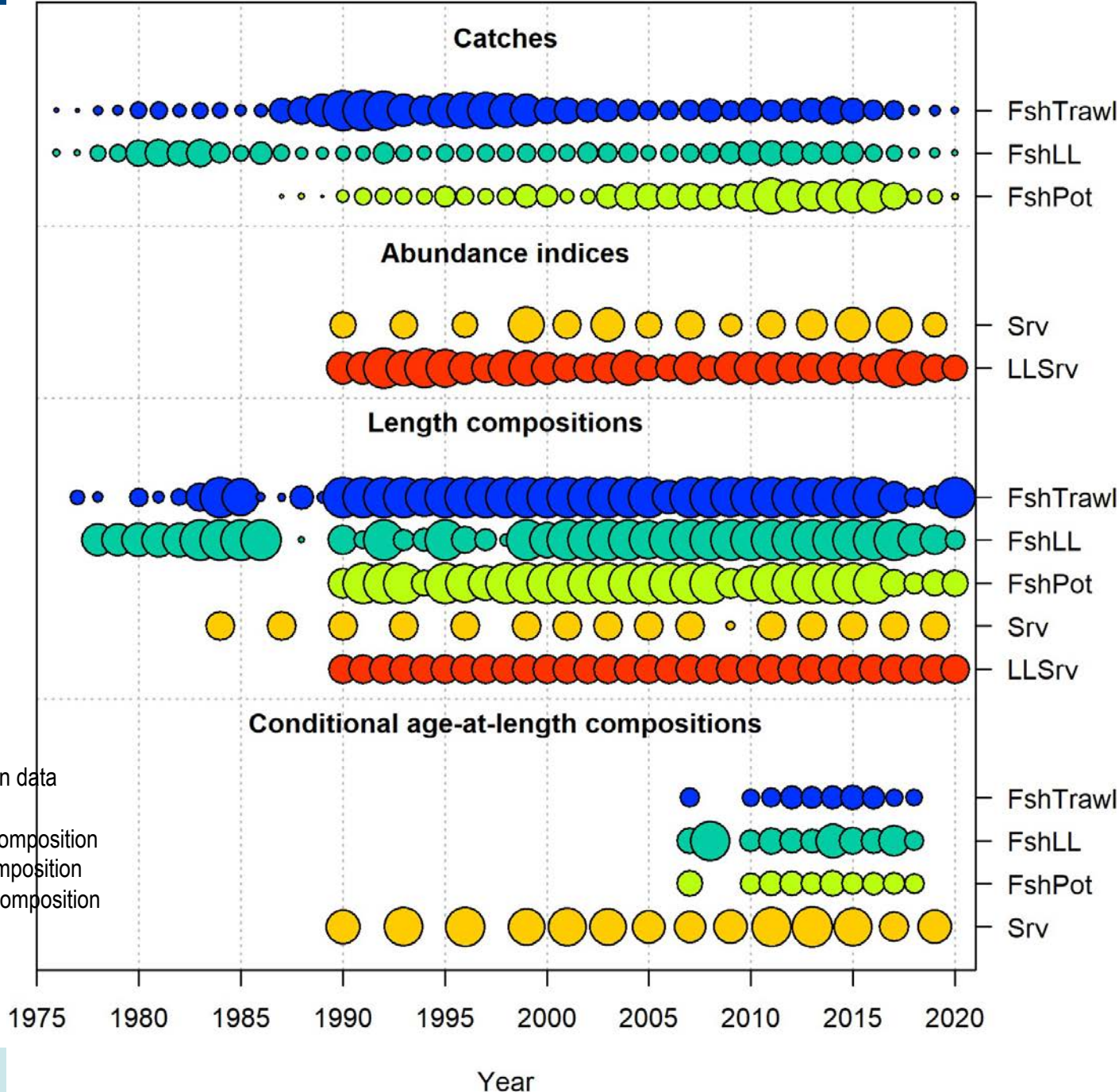
Appendix 2.1. Ecosystem and Socioeconomic Profile of the Pacific cod stock in the Gulf of Alaska

S. Kalei Shotwell, Steven Barbeaux, Bridget Ferriss, Ben Fissel, Ben Laurel, Lauren Rogers
September 2021

With Contributions from:

Kerim Aydin, Curry Cunningham, Kirstin Holsman, Carol Ladd, Beth Matta, Sandi Neidetcher, Patrick Ressler, Heather Renner, Sean Rohan, Elizabeth Siddon, Ingrid Spies, Katie Sweeney, Grant Thompson, Muyin Wang, Jordan Watson, Sarah Wise, Stephani Zador

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GOA Pacific cod assessment data

New data to be included for 2021:
2021 Observer fishery length composition data
2019-2020 observer fishery age data
2021 ADF&G port sampling fish length composition
2021 Bottom trawl survey and length composition
2021 Longline survey index and length composition
2021 Beach seine survey age-0 index

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GOA Pacific cod model configurations

	Larval index	Environmental links			Data re-weighting	M-block to 2020
		Growth	M	Recruits		
Base 19.1						
21.1a	■					
21.1b	■	■				
21.1c	■		■			
21.1d	■			■		
21.1e	■			■	■	
21.1g	■			■	■	
21.5a	■			■		■
21.5c	■			■	■	■

GOA Pacific cod model configurations

Larval index	Environmental links			Data re-weighting	M-block to 2020
	Growth	M	Recruits		

	Larval index	Growth	M	Recruits	Data re-weighting	M-block to 2020
Base 19.1						
21.1a	■					
21.1b	■	■				
21.1c	■		■			
21.1d	■			■		
21.1e	■	■	■	■		
21.1g	■	■	■	■	■	
21.5a	■	■	■	■		■
21.5c	■	■	■	■	■	■

Age-0 Pacific cod beach seine index

Litzow, et al. (In Review) Predicting year class strength for climate-stressed gadid stocks in the Gulf of Alaska. Fisheries Research

2006-2020 Model 19.1
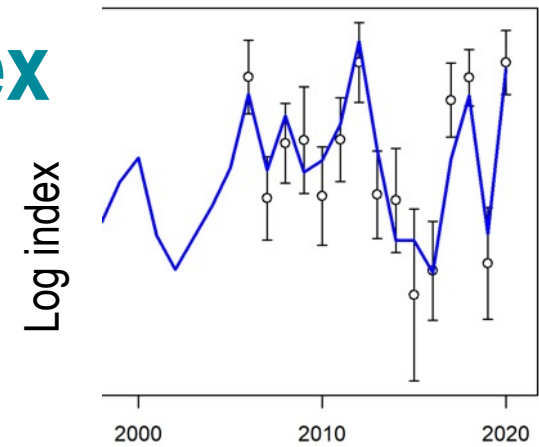Recruitment vs Beach Seine CPUE
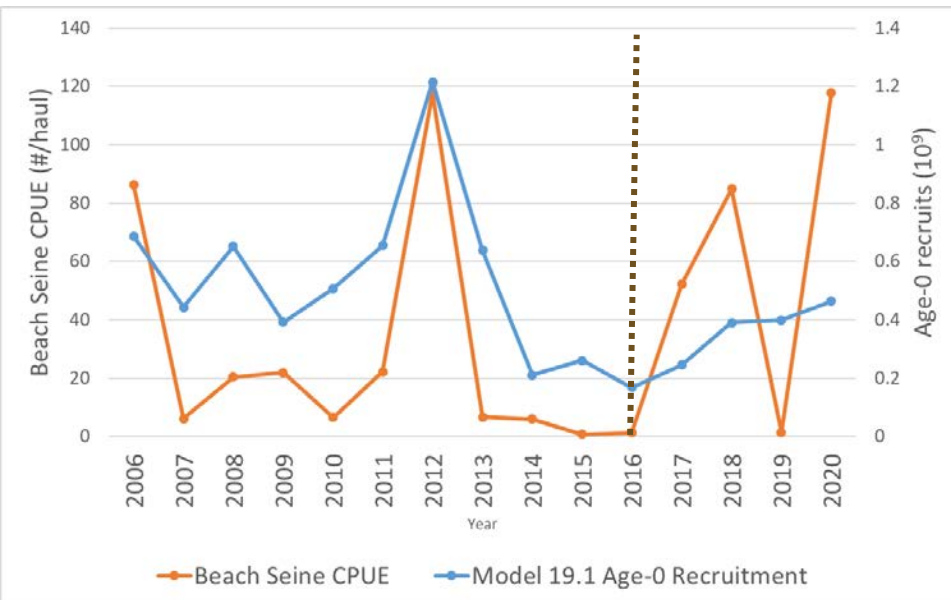
2006-2016 Model 19.1
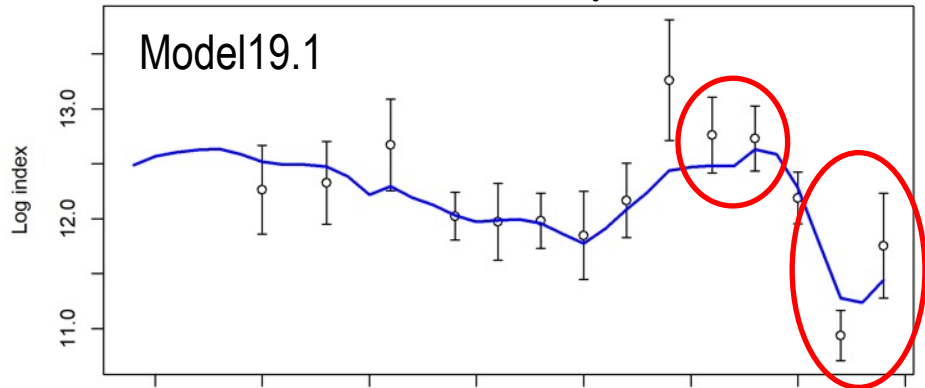Recruitment Devs. vs ln(Beach Seine CPUE)
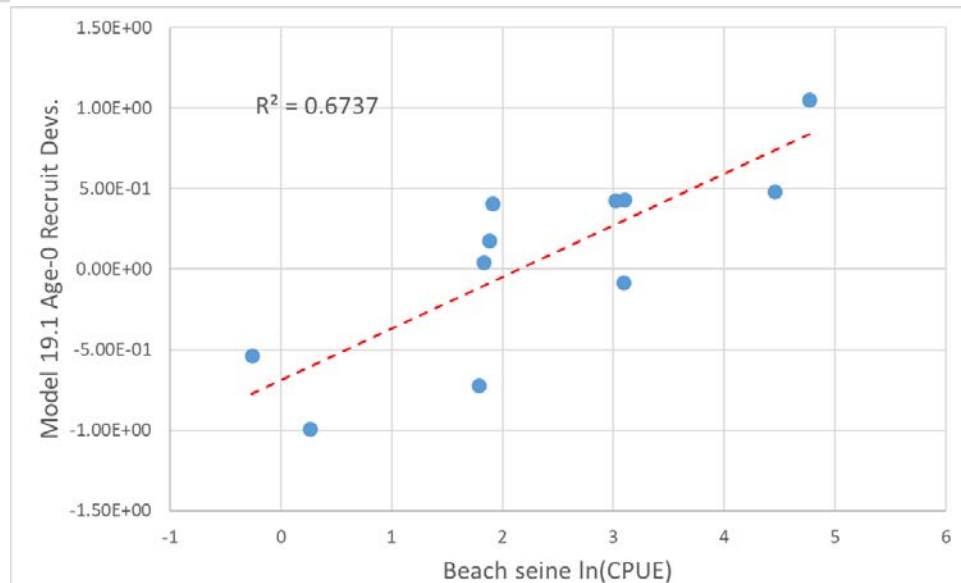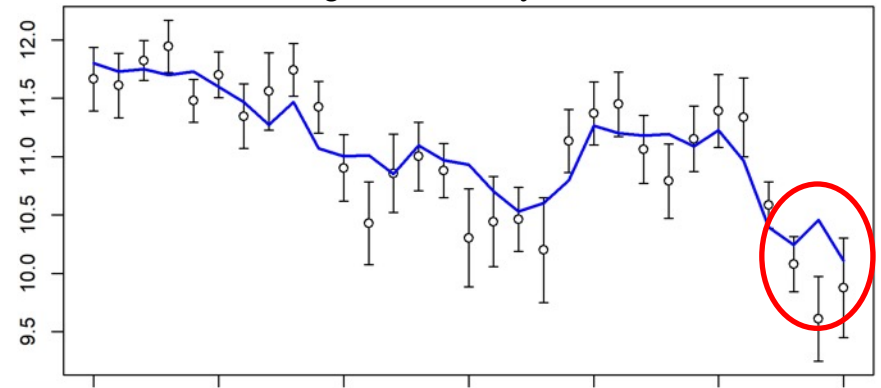
Addition of age-0 beach seine index

- Good fit to beach seine index
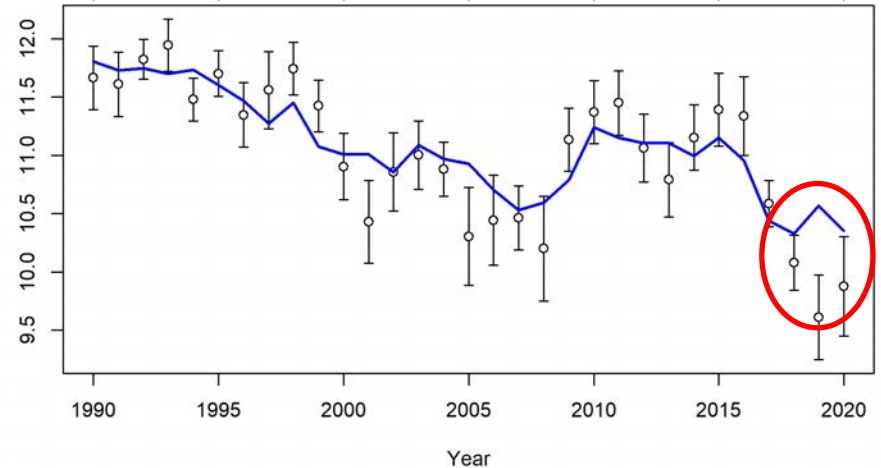- Poorer fit to all other survey indices

Bottom Trawl Survey Index

Model19.1

Model21.1a

Longline Survey Index

GOA Pacific cod model configurations

	Larval index	Environmental links			Data re-weighting	M-block to 2020
		Growth	M	Recruits		
Base 19.1						
21.1a	■					
21.1b	■	■				
21.1c	■		■			
21.1d	■			■		
21.1e	■	■	■	■		
21.1g	■	■	■	■	■	
21.5a	■	■	■	■		■
21.5c	■	■	■	■	■	■

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GOA Pacific cod models

GOA Pacific cod summary

The age-0 beach seine index was consistent with previous estimates

- Pro: Including reduced uncertainty in recent recruitment estimates
- Con: Degraded fit to other indices

Addition of temperature impacts on key parameters was reasonable

- Relative to fitting available data

Data weighting impacted survey catchability estimates

- Further work needed to investigate why high Qs in tuned models

Small changes in environmental linkages or weighting led to large changes reference points

The Team recommended that the rationale for increases in the bottom trawl catchability parameter, particularly when re-weighting, should be noted; specifically, compare values with earlier experimental results.

GOA Plan Team

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OR and DSR Complexes

Composition varies by area

Background

2015

- Proposed GOA-wide DSR

2017

- PT/SSC approved Alternative 3a and moving to *NPFMC Spatial Management Policy Step 2*

2019

- Continued discussion about what to do next
- PT/SSC reiterated support of moving to *Step 2*

2021

Research activity

- Multivariate analysis of life history and vulnerabilities and SDM

Authors' request to Plan Team

Step 2: With input from the agency, the public, and its advisory bodies, **the Council (and NMFS) should identify the economic and management implications and potential options for management response to these findings and identify the suite of tools that could be used to achieve conservation and management goals**.

> NS1 guidelines: "Where practicable, the group of stocks should have a **similar geographic distribution**, **life history characteristics**, and **vulnerabilities to fishing pressure** such that the impact of management actions on the stocks is similar. The vulnerability of individual stocks should be considered when determining if a particular stock complex should be established or reorganized, or if a particular stock should be included in a complex"

The Team recommends, based on the analyses presented, that the DSR complex be split from the ORx complex GOA-wide.

Team continues to recommend Council consideration to split DSR from OROX GOA wide

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GOA Pacific ocean perch

Pete Hulson described the CIE reports and discussed approaches to resolving concerns

The Team recommended the author include the table provided in the November assessment as an appendix and include a column that provides author responses to reviewers.

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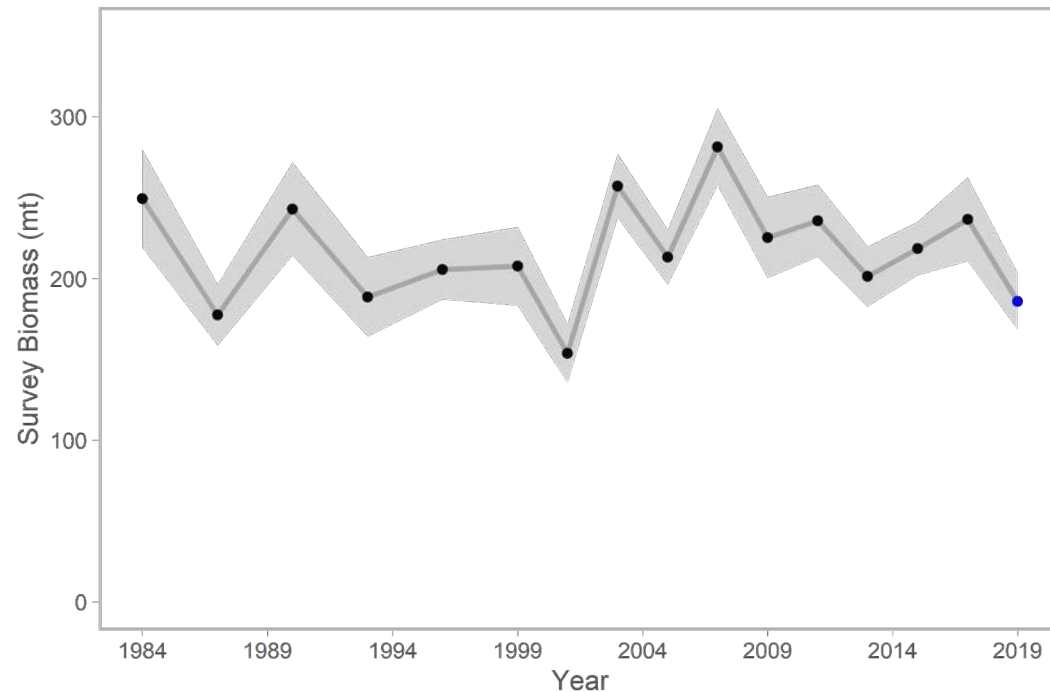
GOA Plan Team

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Flathead sole – partial update
New Author: Maia Kapur

- Last full assessment for GOA was 2017

- Catches consistently ~10% of TACs since 2010

The Team supported the author's recommendation in continuing with a partial update this cycle, …no major conservation concern…
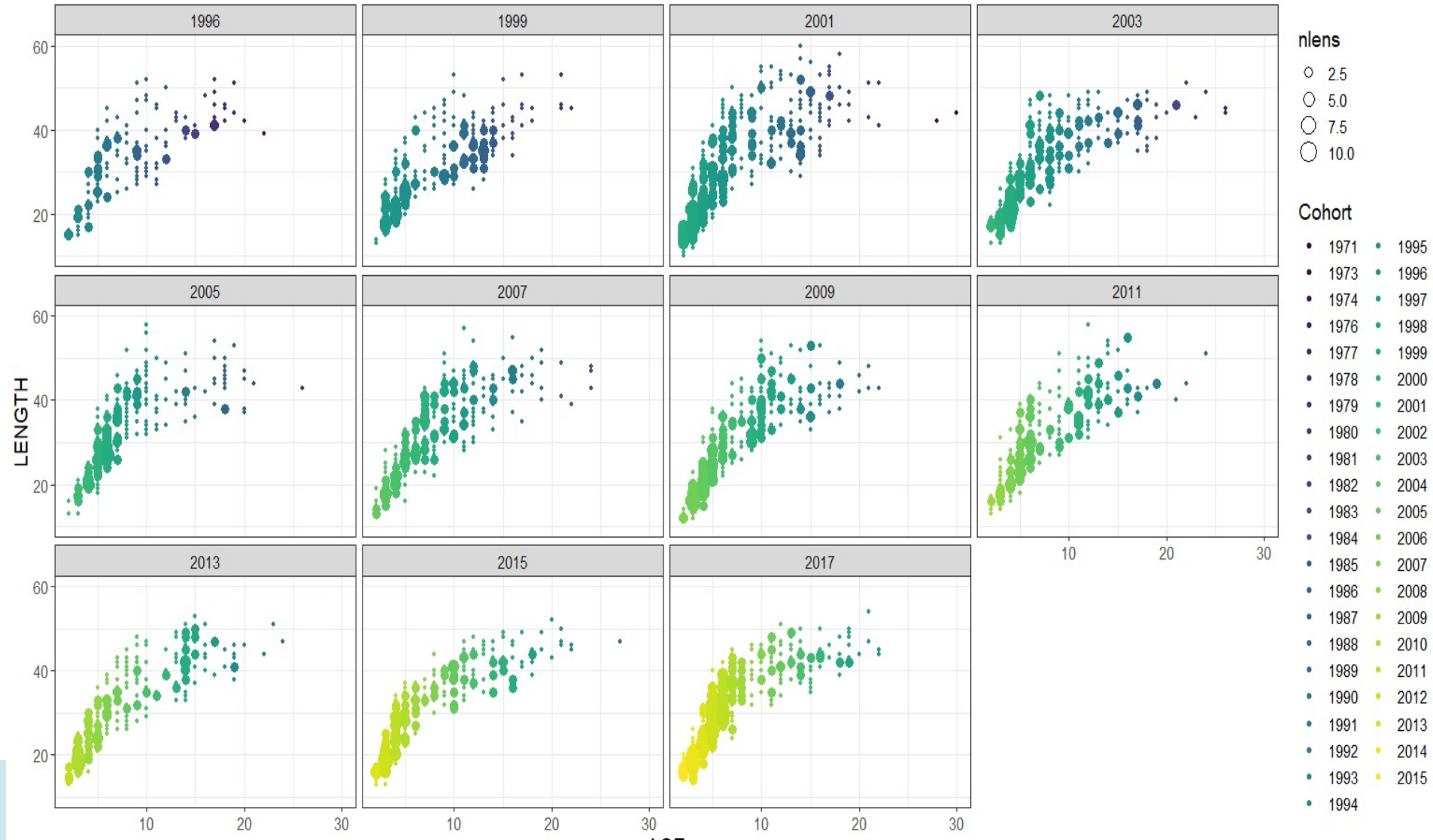
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Preliminary assessment of northern and southern rock sole (*Lepidopsetts polyxtra and bilineata*) in the Gulf of Alaska

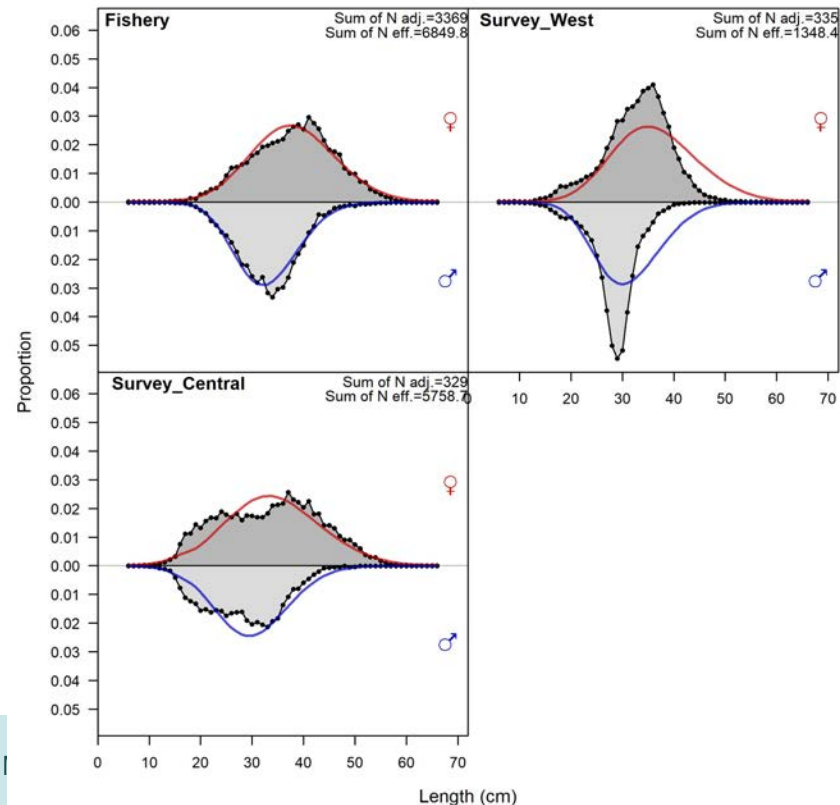Meaghan Bryan, Wayne Palsson, and Cecilia O'Leary

April 2021 CIE Recommendations

- Improved modeling of growth
- Investigate the possibility of estimating catchability to relax assumption that survey biomass is an absolute index
- Develop model-based indices and use as input
  - Partially to address concern about assuming survey biomass is an absolute index
- Encouraged research of untrawlable habitat to better understand the relative abundance of the rock soles in these habitats
- Catch split – justification for 50% lacking
  - Model catch with uncertainty
  - Use annual proportions from FMA observer data

GOA rock soles—area specific growth

Difference in growth is apparent for NRS

- Growth in Chirikof and Kodiak are similar
- Growth in Shumagin seems slower and the asymptotic size is lower than Chirikof and Kodiak

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GOA Plan Team comments on Rock soles assessment

...continue to explore the differences in growth by area...examining survey net selectivity...

...bring forward Models 17.1d (updated age error matrix) and 17.1f (17.1d with estimated catchability and VAST estimate of survey biomass) for November.

GOA Plan Team

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Development of an Atlantis ecosystem model for the Gulf of Alaska

Contributors

Martin Dorn, Andre Punt, Isaac Kaplan
Beth Fulton, Kerim Aydin, Al Hermann
Madison Weise, Jamal Moss, Bridget Ferriss
Szymon Surma, Gemma Carroll, Owen Liu
Alan Haynie, Marysia Szymkowiak, Bob McConnaughey
Sean Anderson, Ned Laman, Jodi Pirtle, Chris Rooper
Stock assessment authors… and others
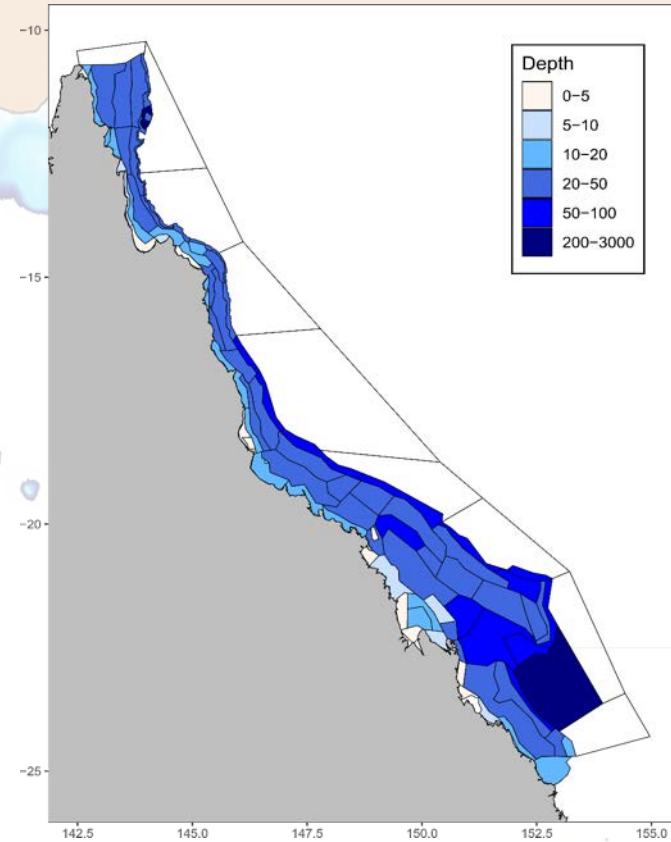
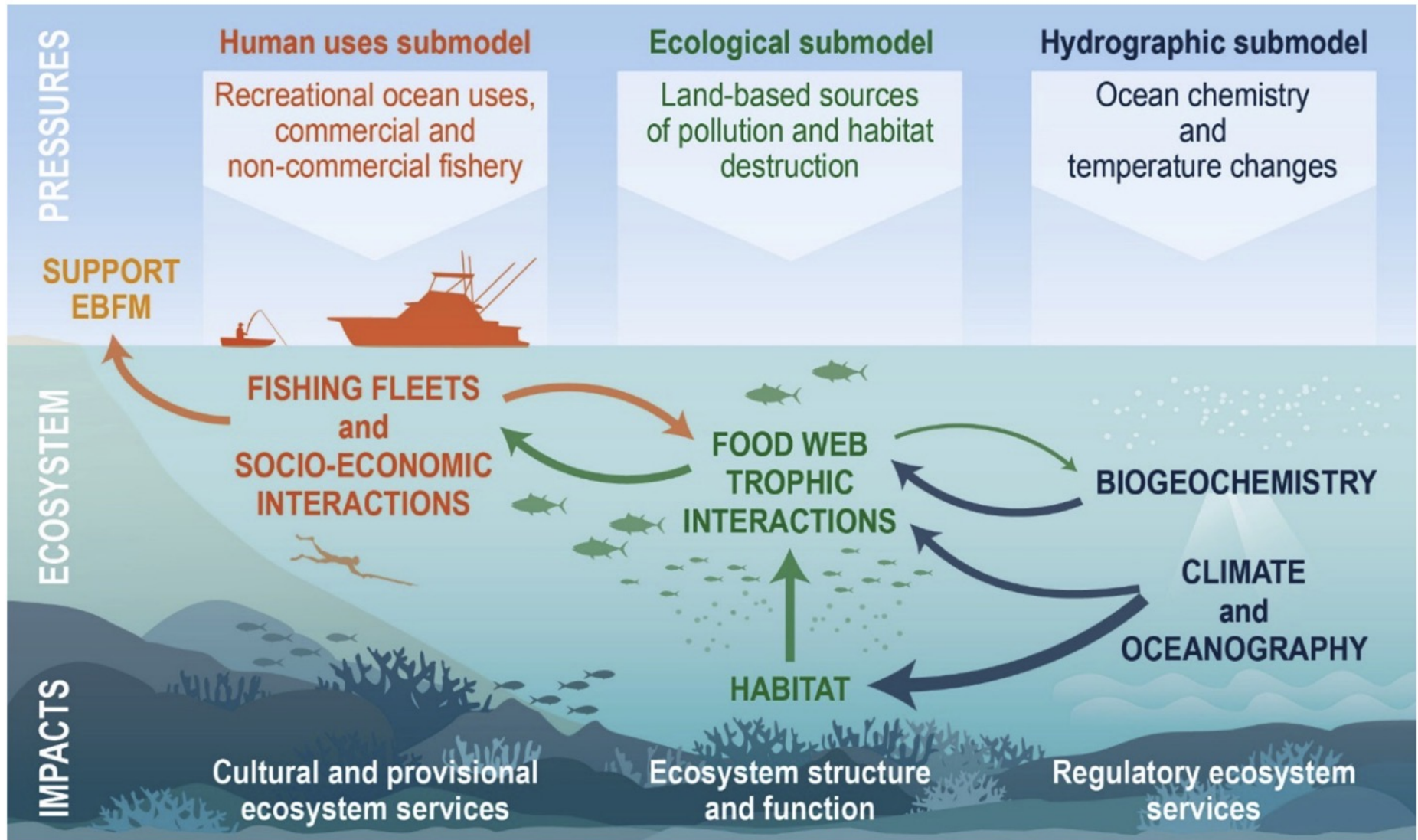Alberto Rovellini – AFSC, University of Washington (Seattle)
Martin Dorn – AFSC

September 22nd, 2021

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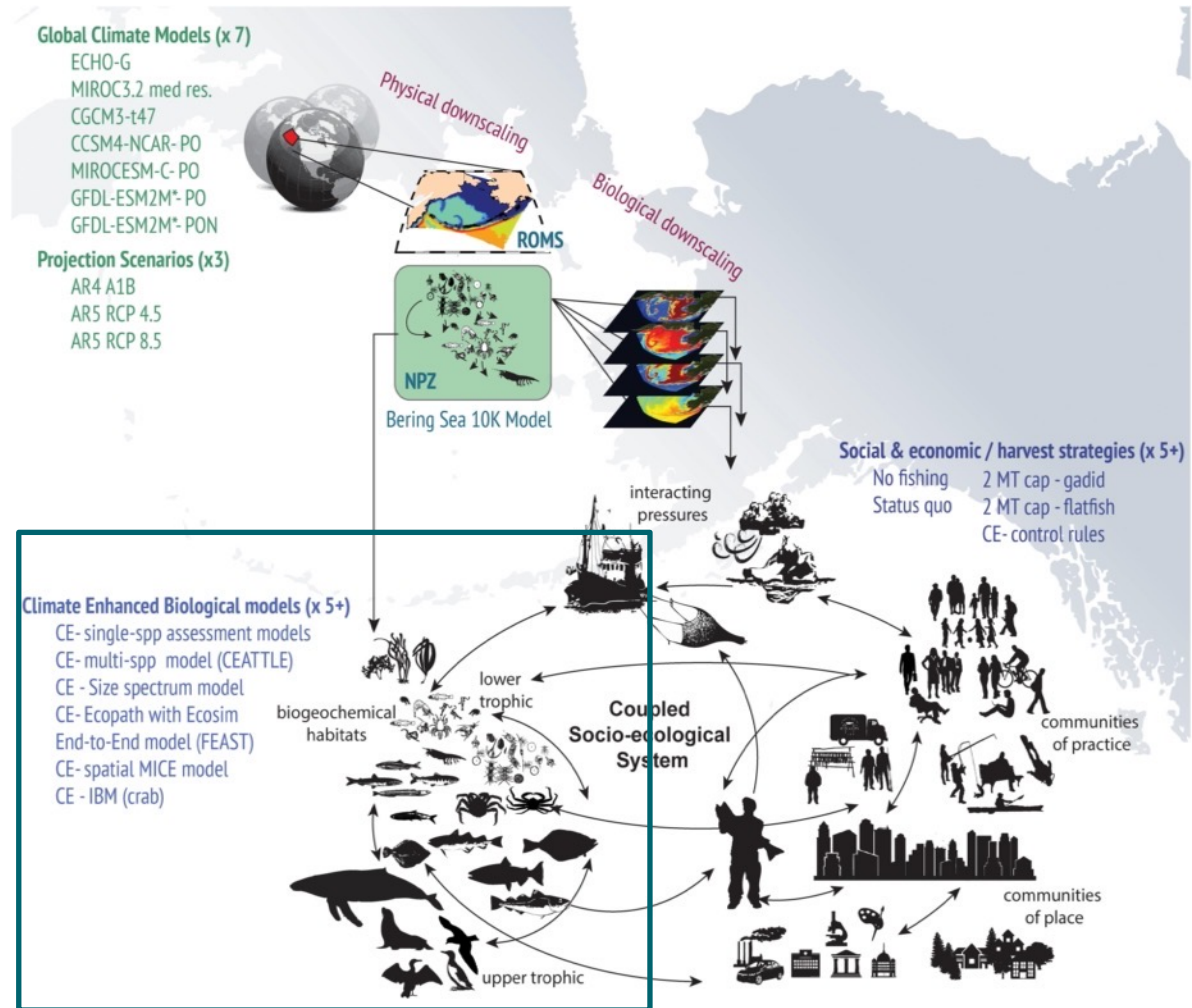# GOA Atlantis model structure

H.R. Pethybridge, et al.

Applications

- Climate change simulation and projection

- Management strategy evaluation
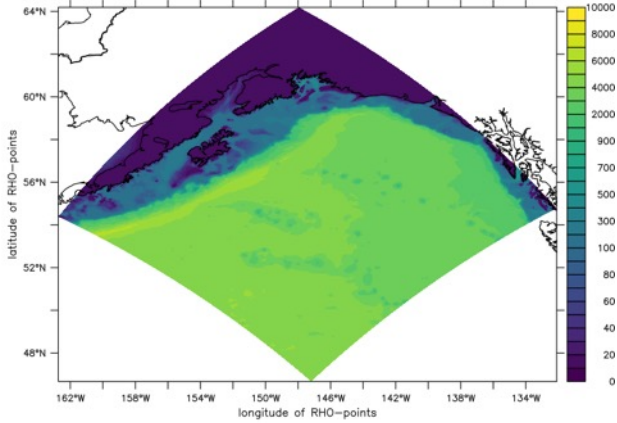
- Hypothesis testing

- Multi-model inference

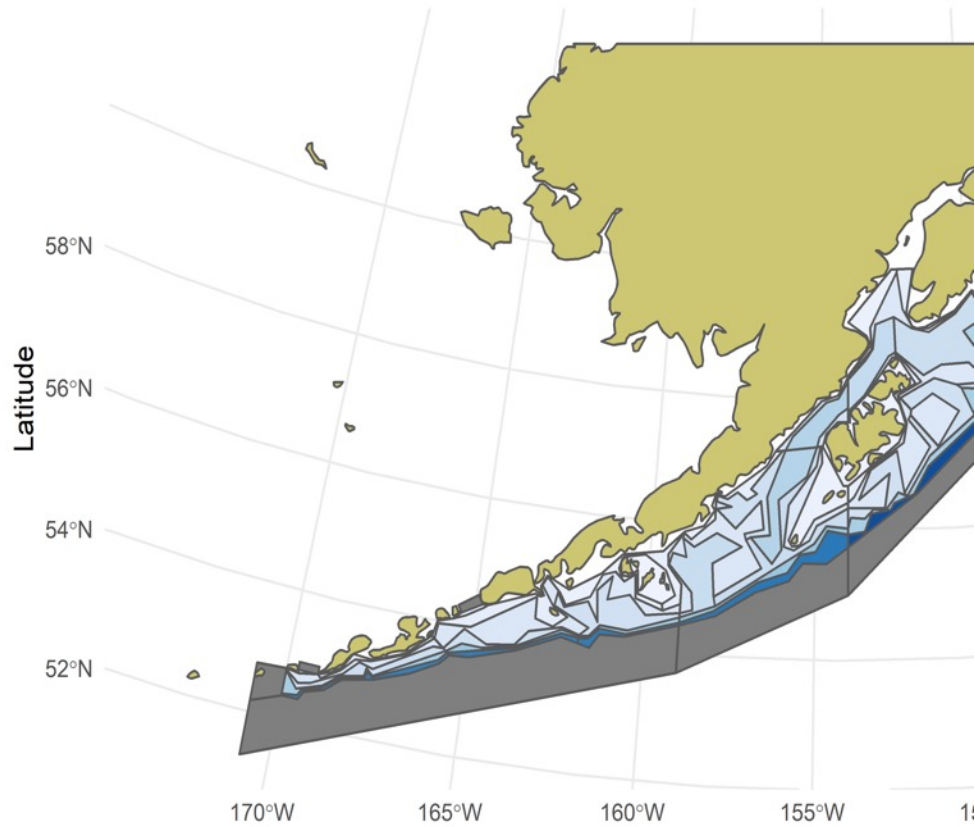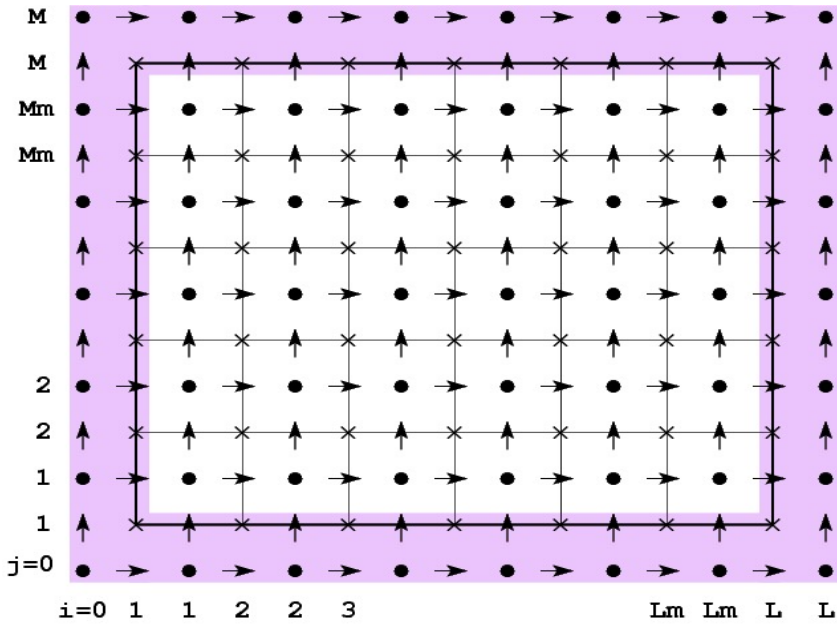**Strategic advice to Ecosystem-Based Fishery Management**

Hollowed et al. 2020

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Physics: Mapping ROMS to Atlantis

Final bathymetry at RHO–points (meter)

ROMS ρ, *u*, and *v* grids to Atlantis polygons

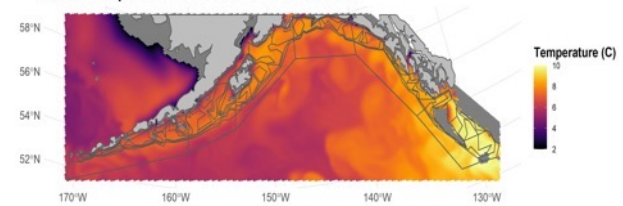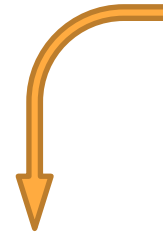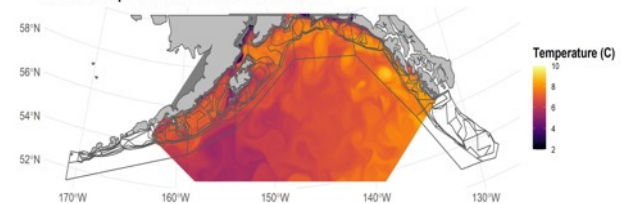(horizontal transformation)

Physics: Mapping ROMS to Atlantis

- Initially only NEP 10K (entire model domain)

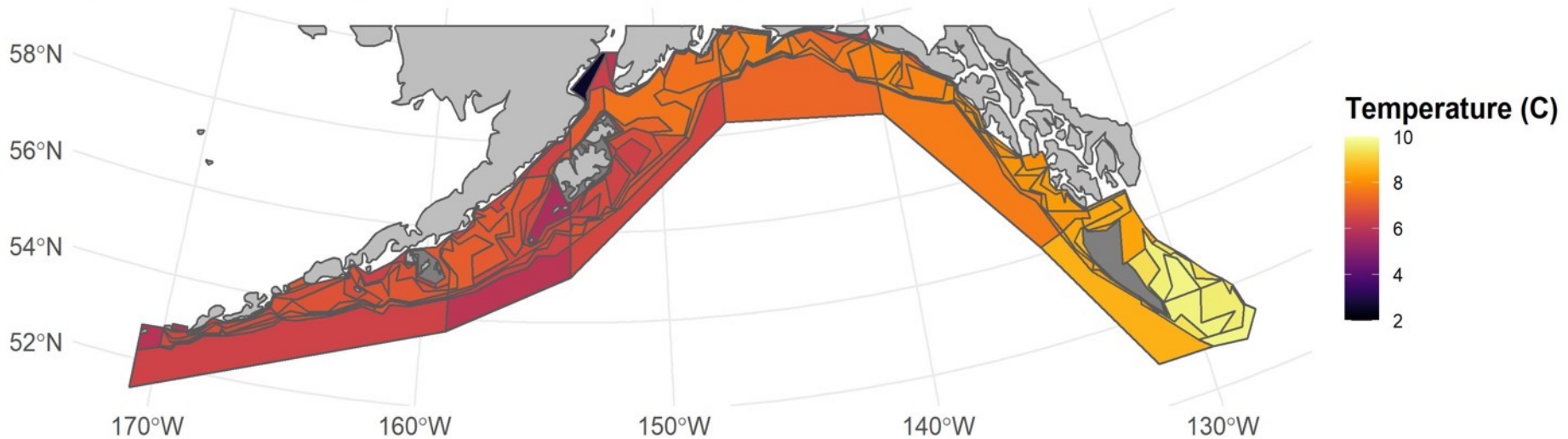- Working on ways of performing bias correction and incorporate both models

Surface temperature from North East Pacific ROMS

Surface temperature from Central GOA ROMS

Mean surface temperature from GOA ROMS

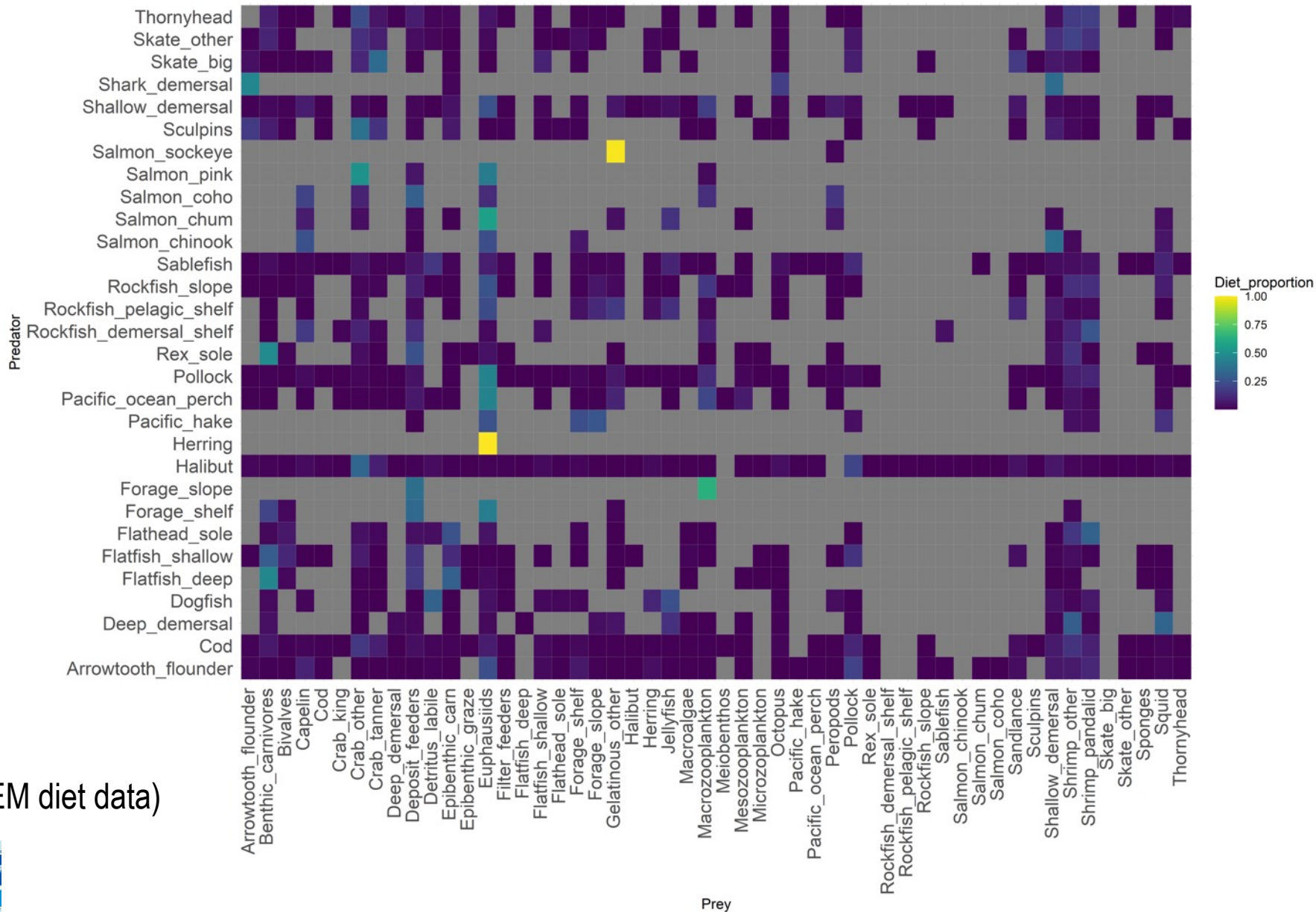# Model biology: Functional groups

- 78 functional groups:

  - **28 bony fish**

  - 3 sharks

  - 3 skates

  - 9 mammals

  - 4 birds

  - 26 invertebrates

  - 2 bacteria

  - 3 detritus

- Pollock

- Pacific cod

- Sablefish

- Halibut

- …

- Chinook salmon

- …

- Shallow water flatfish

- Rockfish demersal shelf

- …

- Forage fish

Biology: Ontogenetic diet preferences
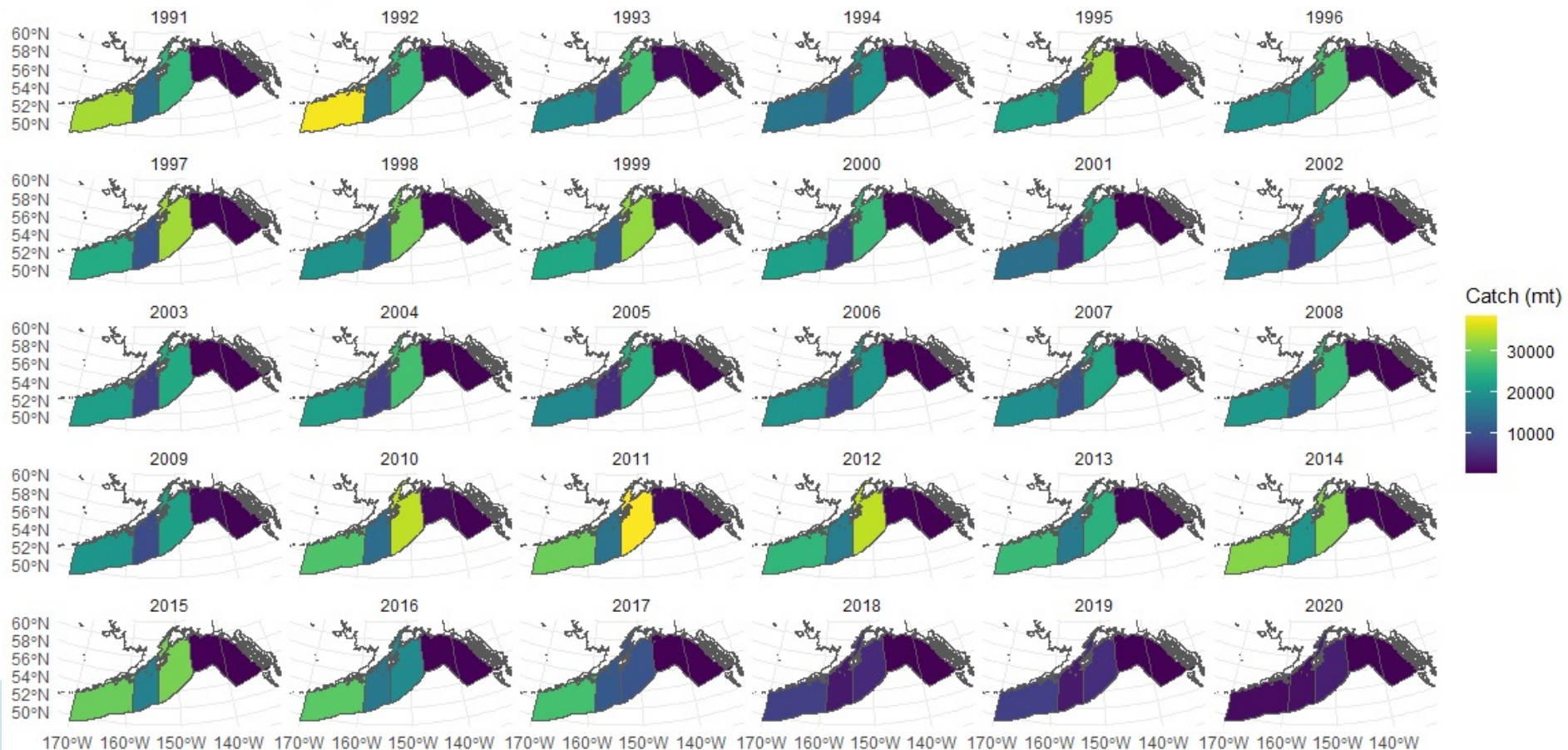

Proportion of predator diet

(REEM diet data)

Fisheries in Atlantis

- Initially modelled as "imposed" catch for hindcast runs
- Can be modelled as F in forecast as first simple approximation
- Eventually the goal will be dynamic fishing – but some ways away

Catch for Pacific Cod by NMFS area

Plan Team feedback

They sought feedback:

- Apparent issues with model geometry?
- Concerns about species grouping?
- Can we reach out to assessment authors to help us validate model dynamics?

Modelling fisheries:

- Conversations with economists and social scientists to capture GOA fishing fleets
- Evaluating management strategies: what would you like to see us address with this model, when we use it for future projections?

The Team recommended that the GOA CLIM project investigators consider increasing their dialogue with assessment authors and other relevant scientists through additional meetings or ad hoc communications in the near future, versus waiting until the 2022 September Plan Team meeting.

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