# GOA DUSKY ROCKFISH

## GROUNDFISH PLAN TEAM, NOV 2020

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SPECIAL THANKS TO ELLEN YASUMIISHI

## DUSKY OVERVIEW

### TIER 3A, SINGLE-SEX, AGE STRUCTURED ASSESSMENT

- Geospatial model estimator (VAST) for trawl survey biomass index
- No model structural changes, but data & VAST model changes
- Recommending model 15.5a (2020)
- For 2021:
  - SSB 38,362 t and
  - ABC 7,101 t (93% increase from 2020)

# SSC/PLAN TEAM COMMENTS

*"The SSC requests that all authors fill out the risk table in 2019…"* (SSC December 2018), + *other similar comments in June, October 2019*

- ✓ Included in this assessment. (Will discuss later)

*"VAST applications: (in summary…) should have standardized documentation, caution against standardized model filling, consider covariates, consider knots…"*

- ✓ GOA dusky rockfish has used geospatial model for biomass index since 2015. Geospatial model and parameterization has changed each year
- ✓ 2020 model used VAST GAP 'standard' parameterization, but examined several alternative (only one bridging alternative presented in SAFE report)

# DATA

New data to model:

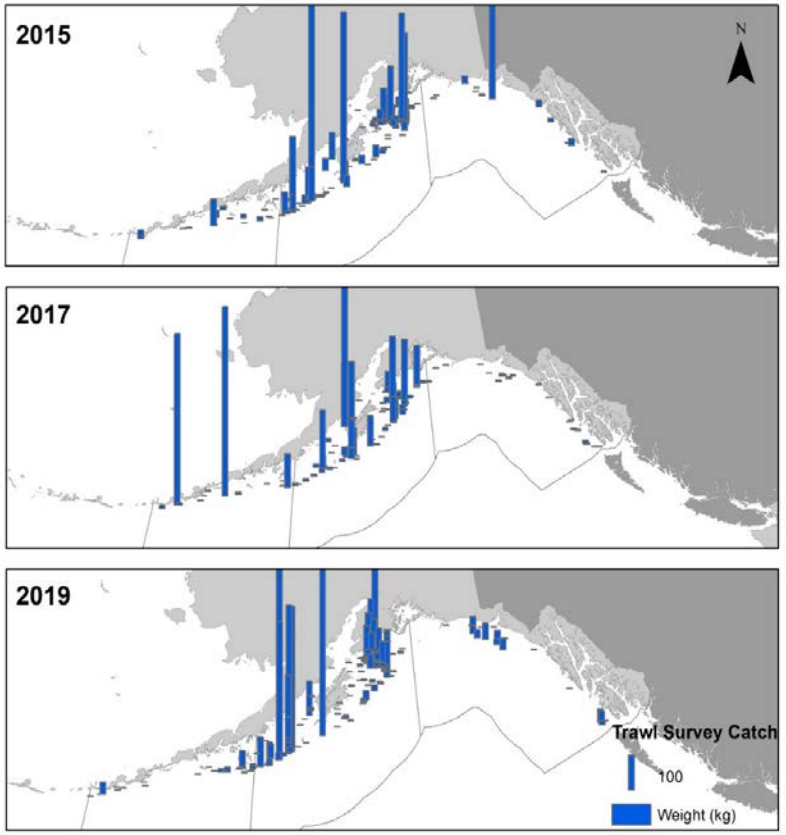
- 2019, 2020* catch  (*projected)
- 2019 trawl survey biomass
- 2019 survey age comps
- 2018 fishery age comps
- 2019 fishery length comps

# DATA: TRAWL SURVEY

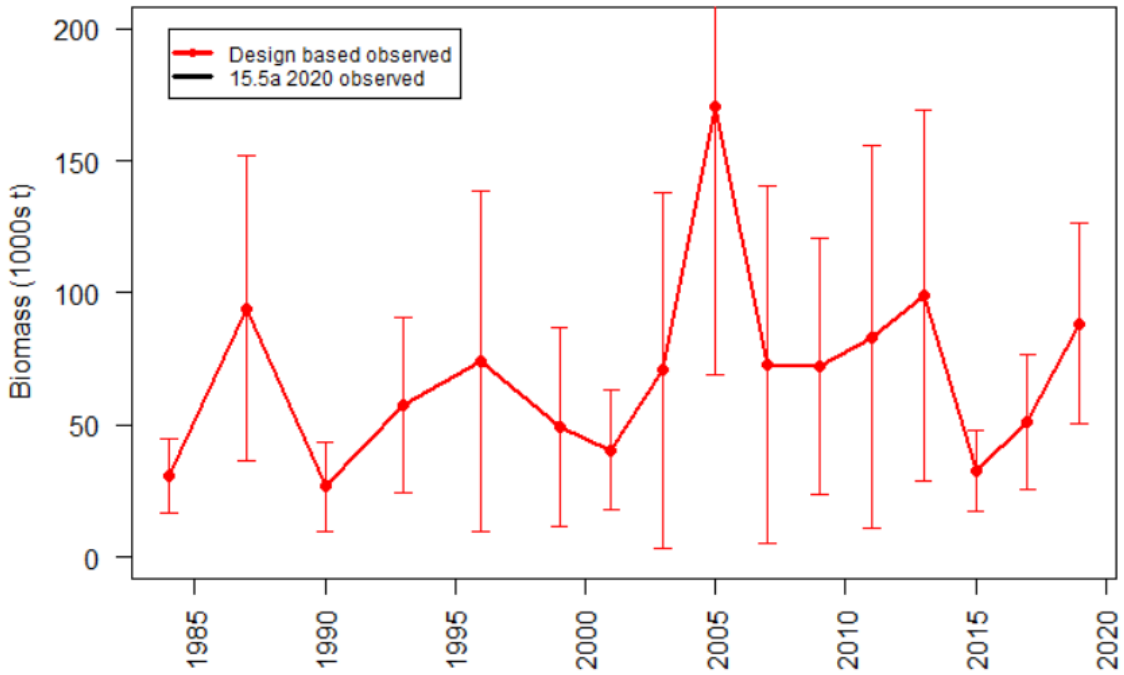
2019 survey

- 2 vessels, 541 hauls

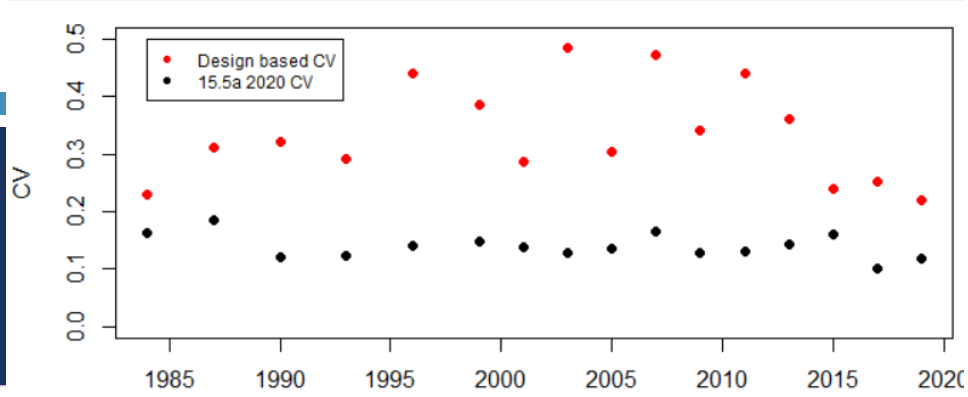
- 2019 trawl survey only sampled to 700 m but this still covers dusky depth range well

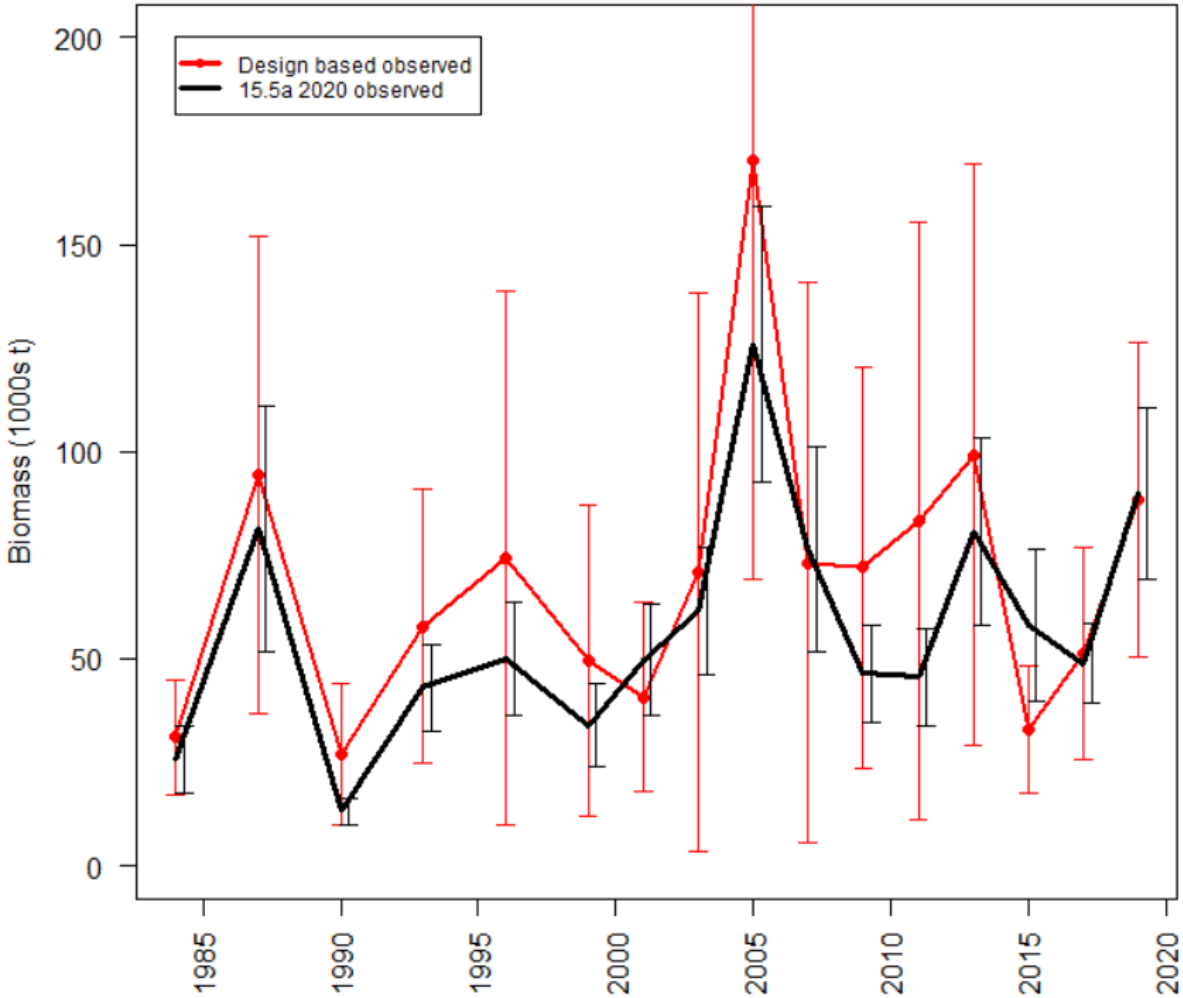



# DATA: TRAWL INDEX




# DATA: TRAWL INDEX



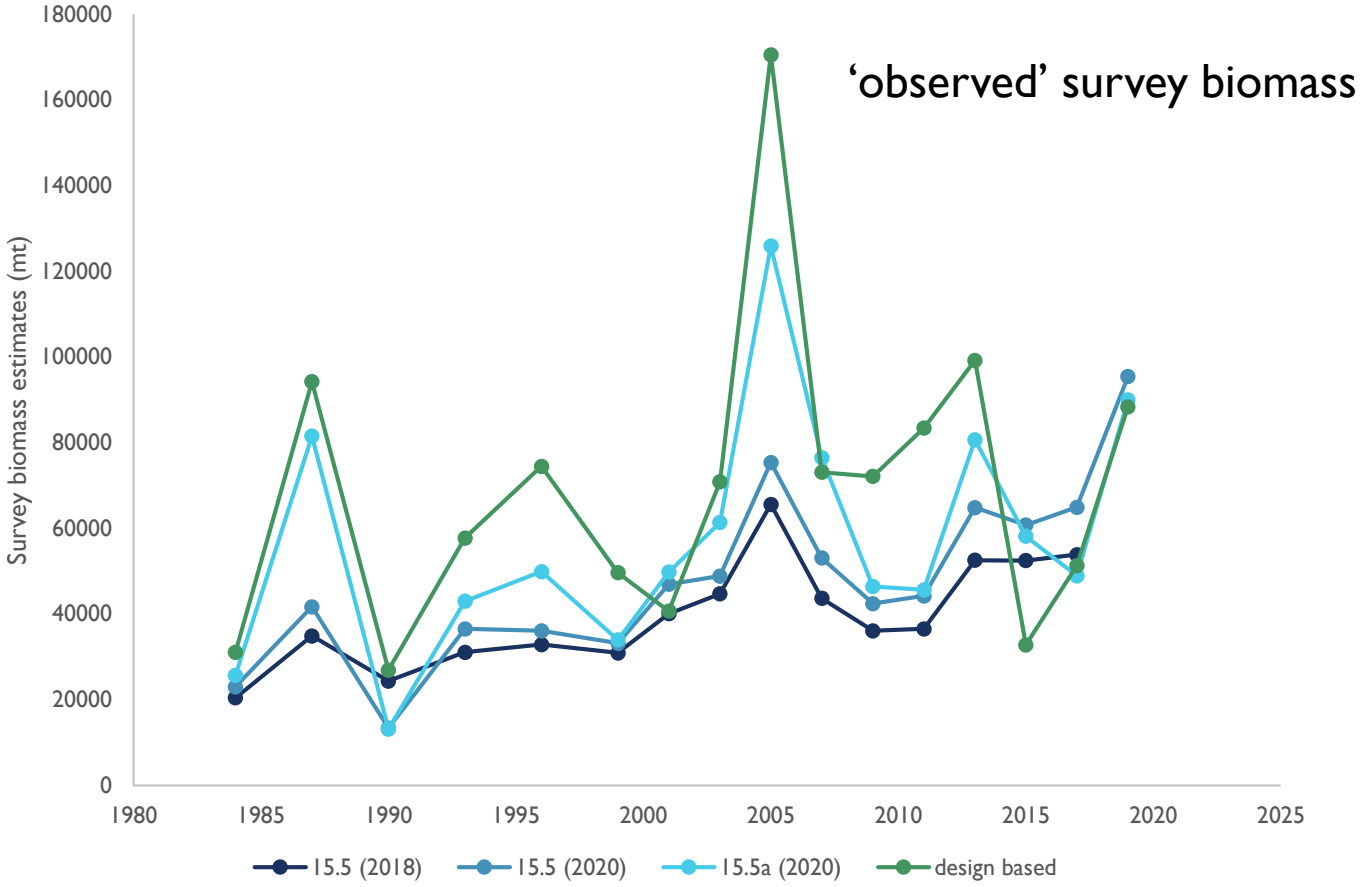

# MODELS

| Model case | Description |
|---|---|
| 15.5 (2018) | 2018 accepted model (Model case M5 in 2015) |
| 15.5 (2020) | 'Bridge' model. Same model as 2018, but with updated data through 2020 using VAST parametrization described for Model 15.5 (2020) above |
| 15.5a (2020) | Same model as 2018, but with updated data through 2020 using new VAST standard parametrization described for Model 15.5a (2020) above (preferred model) |

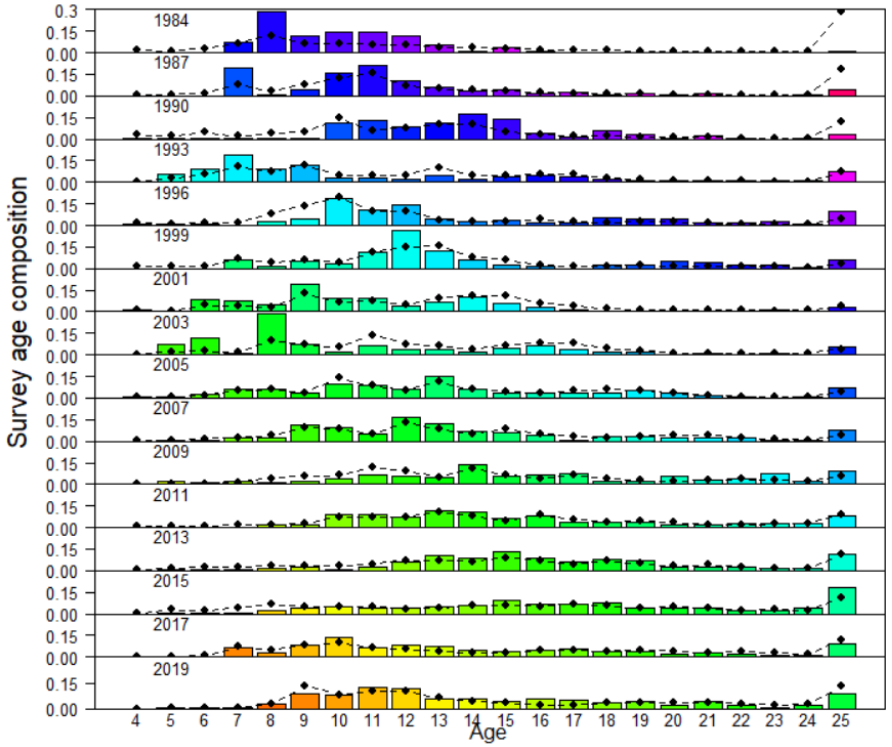
# VAST MODEL PARAMETERIZATION

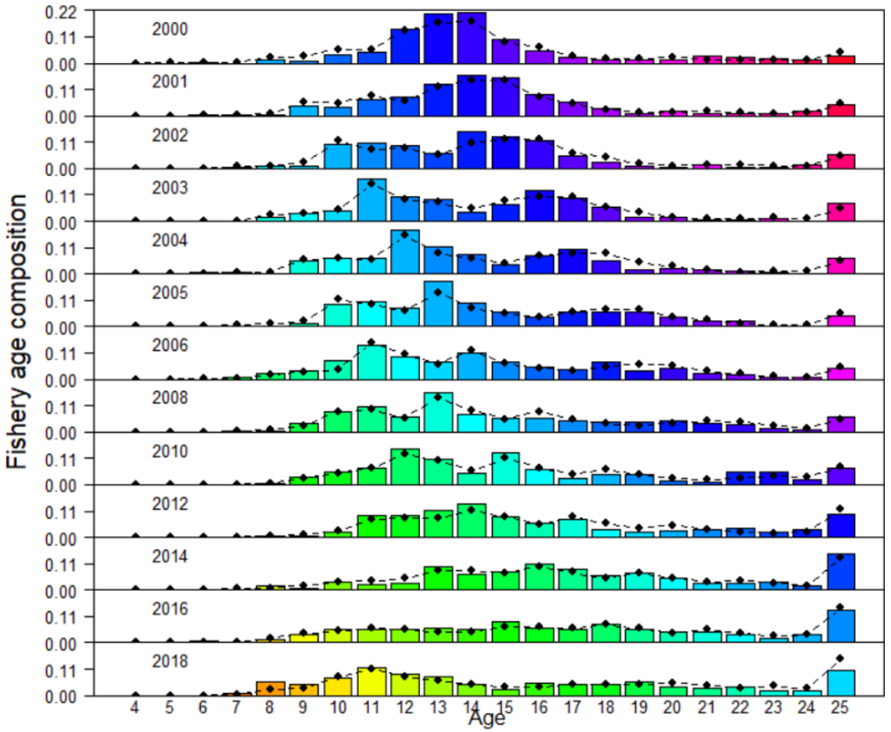
| Model | Computed by | Survey years | Knots | Obs model | PCR |
|---|---|---|---|---|---|
| **15.5 (2018)** | MESA | 1984-2017 | 1000 | delta | lognormal |
| **15.5 (2020)** | GAP | 1984-2019 | 500 | delta | lognormal |
| **15.5a (2020)** | GAP | 1984-2019 | 500 | delta-gamma | gamma |

# TRAWL SURVEY BIOMASS

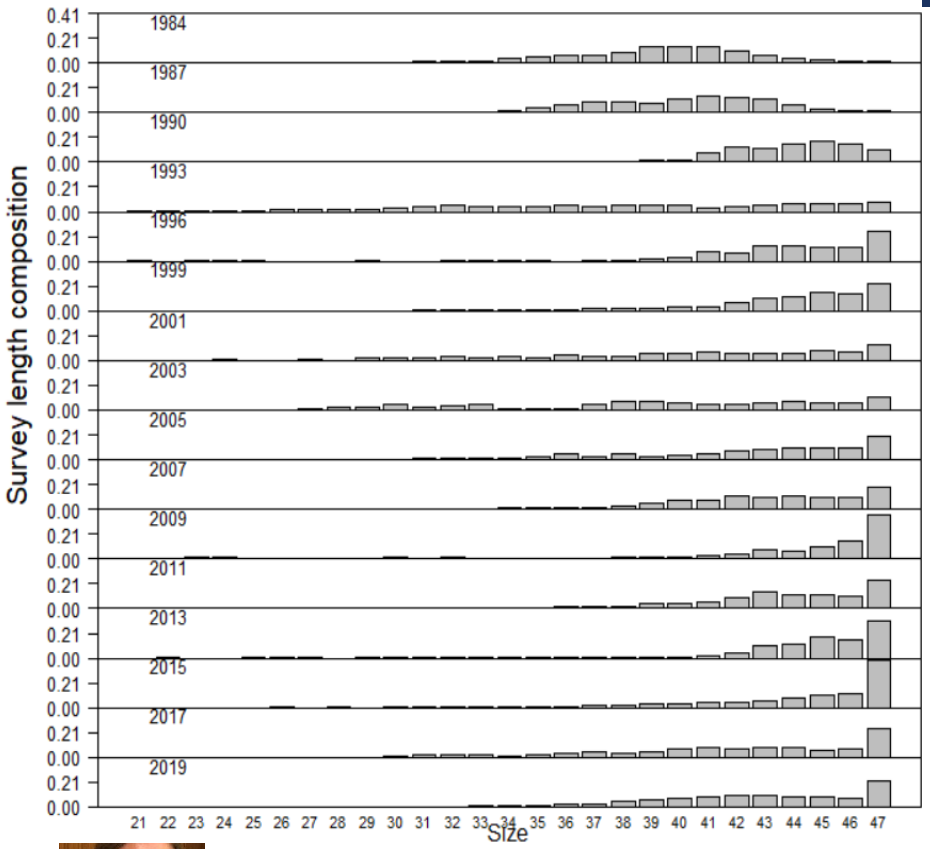


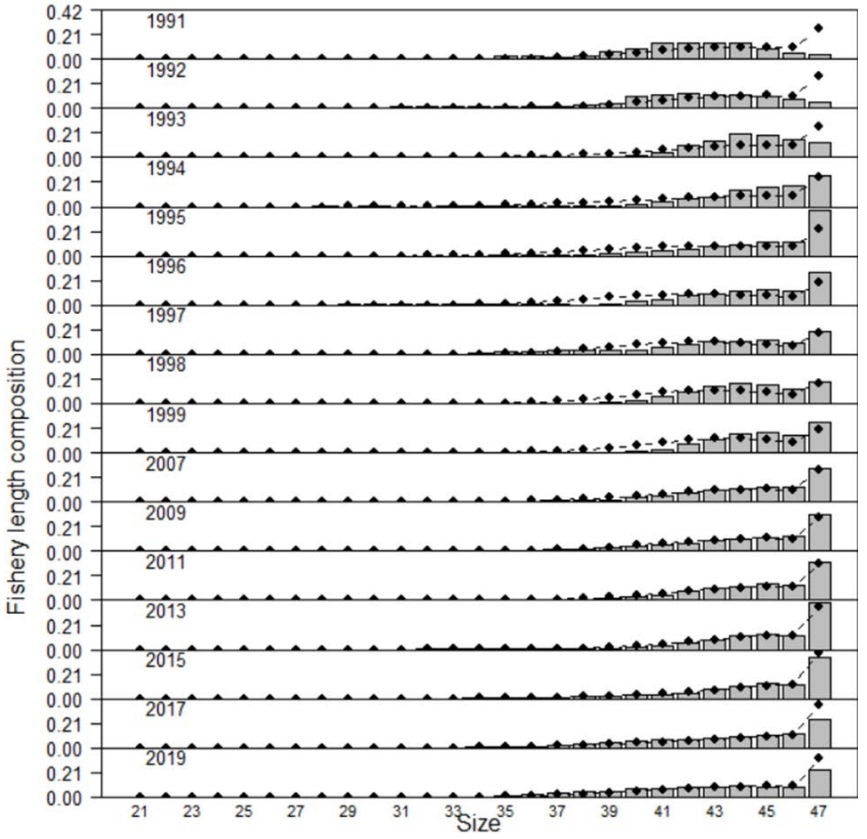

# RESULTS


Survey age composition
1984
1987
1990
1993
1996
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
2019
Age

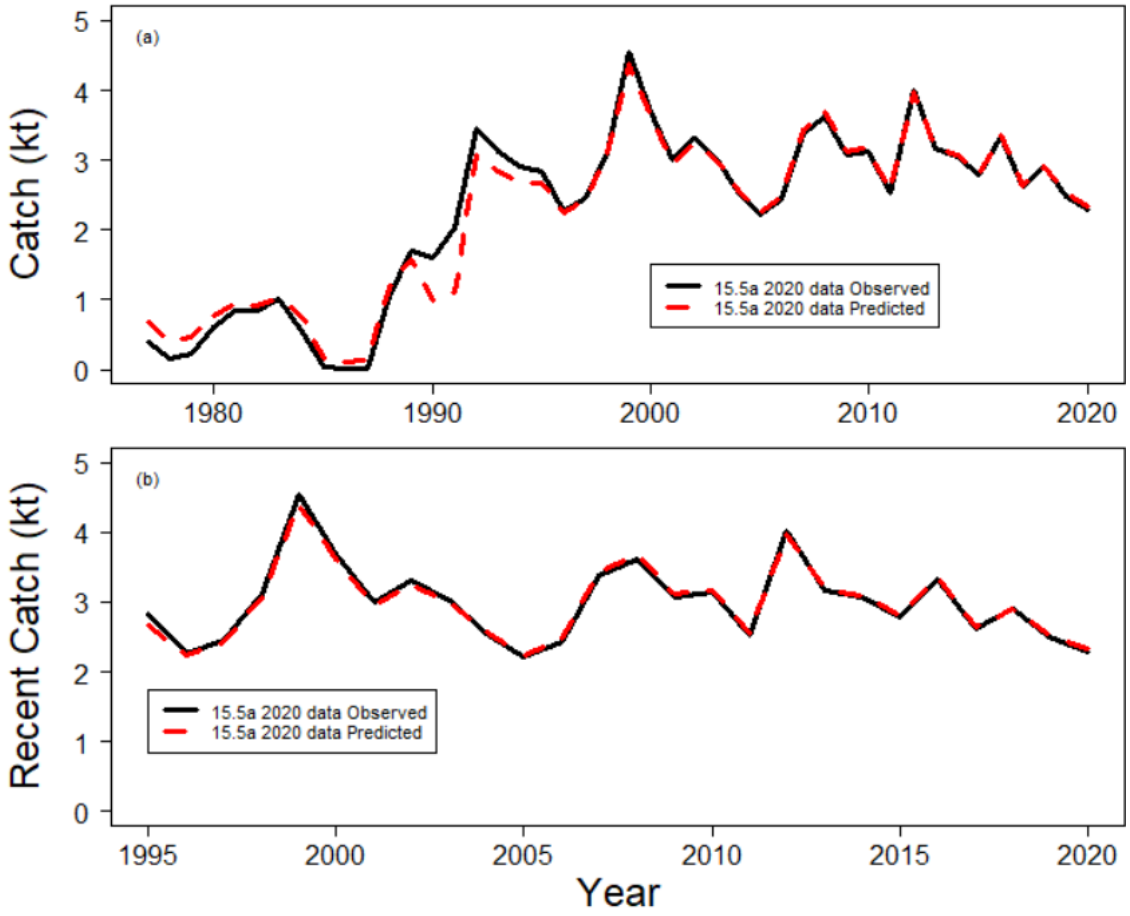

Fishery age composition
2000
2001
2002
2003
2004
2005
2006
2008
2010
2012
2014
2016
2018
Age

# RESULTS

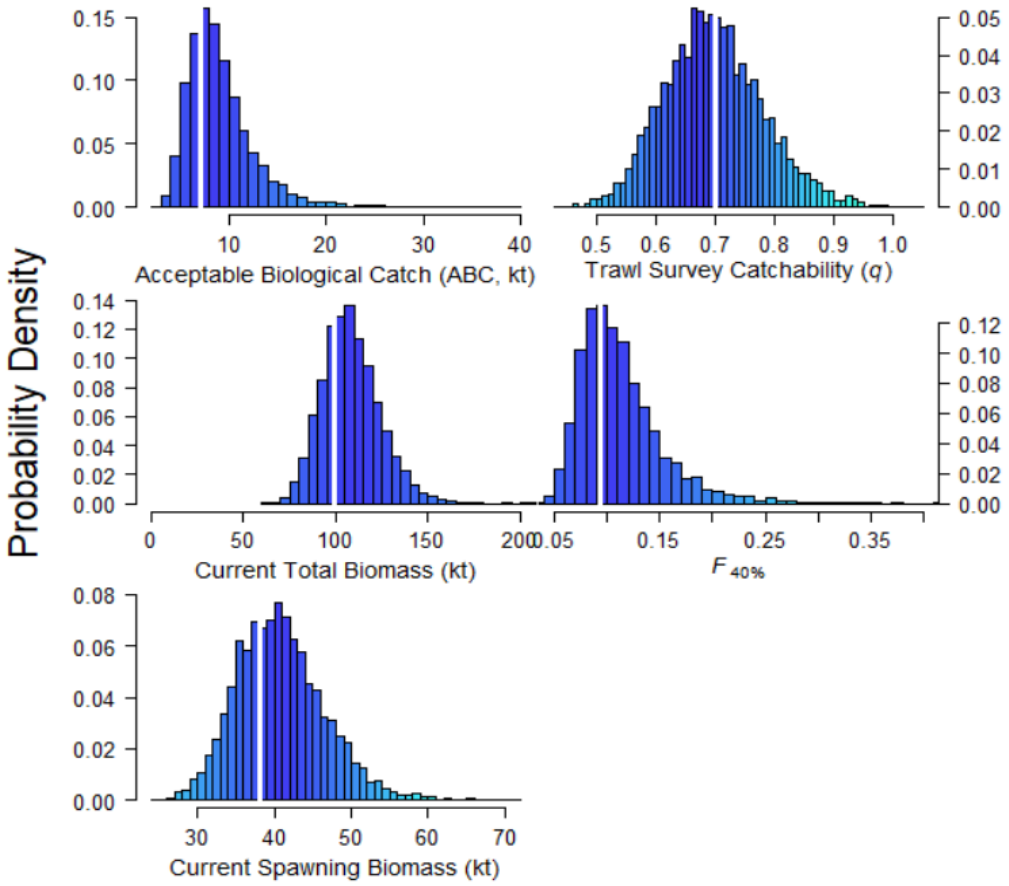

Survey length composition
1984
1987
1990
1993
1996
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
2019
0.41
0.21
0.00
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
Size


Fishery length composition
1991
1992
1993
1994
1995
1996
1997
1998
1999
2007
2009
2011
2013
2015
2017
2019
0.42
0.21
0.00
21 23 25 27 29 31 33 35 37 39 41 43 45 47
Size

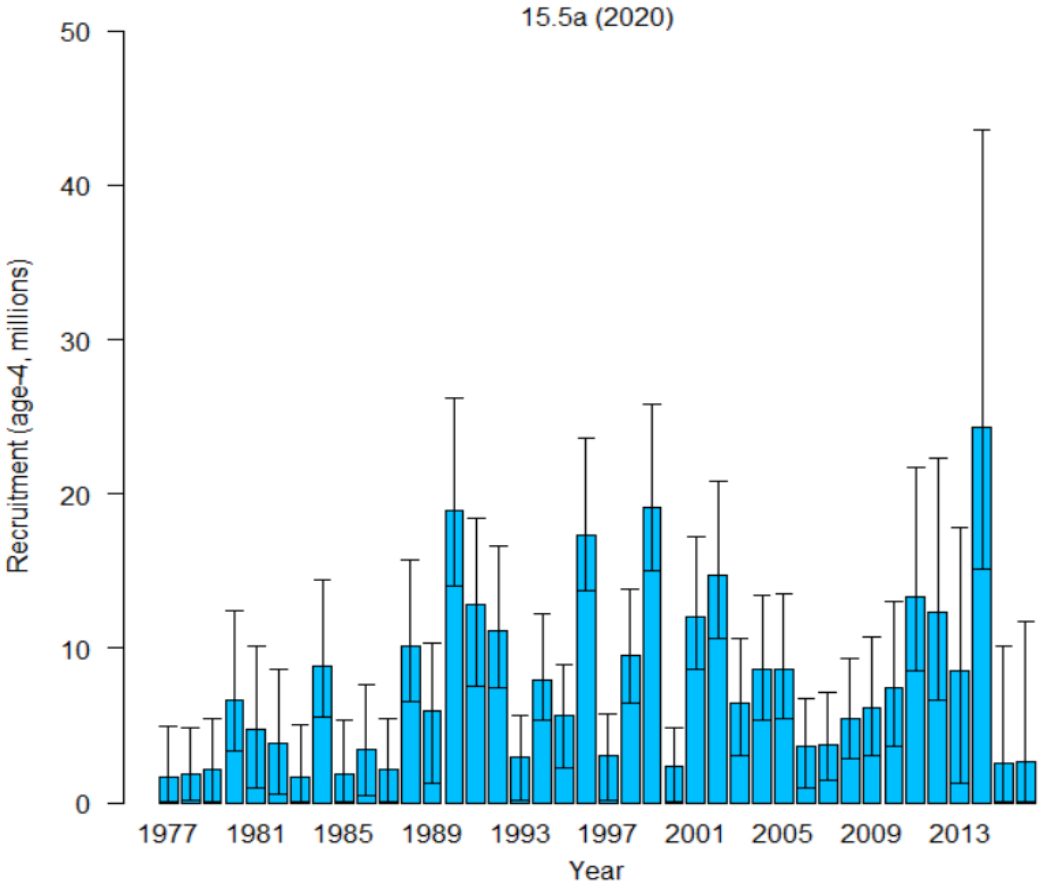
# RESULTS


(a)
Catch (kt)
0
1
2
3
4
5
1980
1990
2000
2010
2020
15.5a 2020 data Observed
15.5a 2020 data Predicted
(b)
Recent Catch (kt)
0
1
2
3
4
5
1995
2000
2005
2010
2015
2020
Year
15.5a 2020 data Observed
15.5a 2020 data Predicted

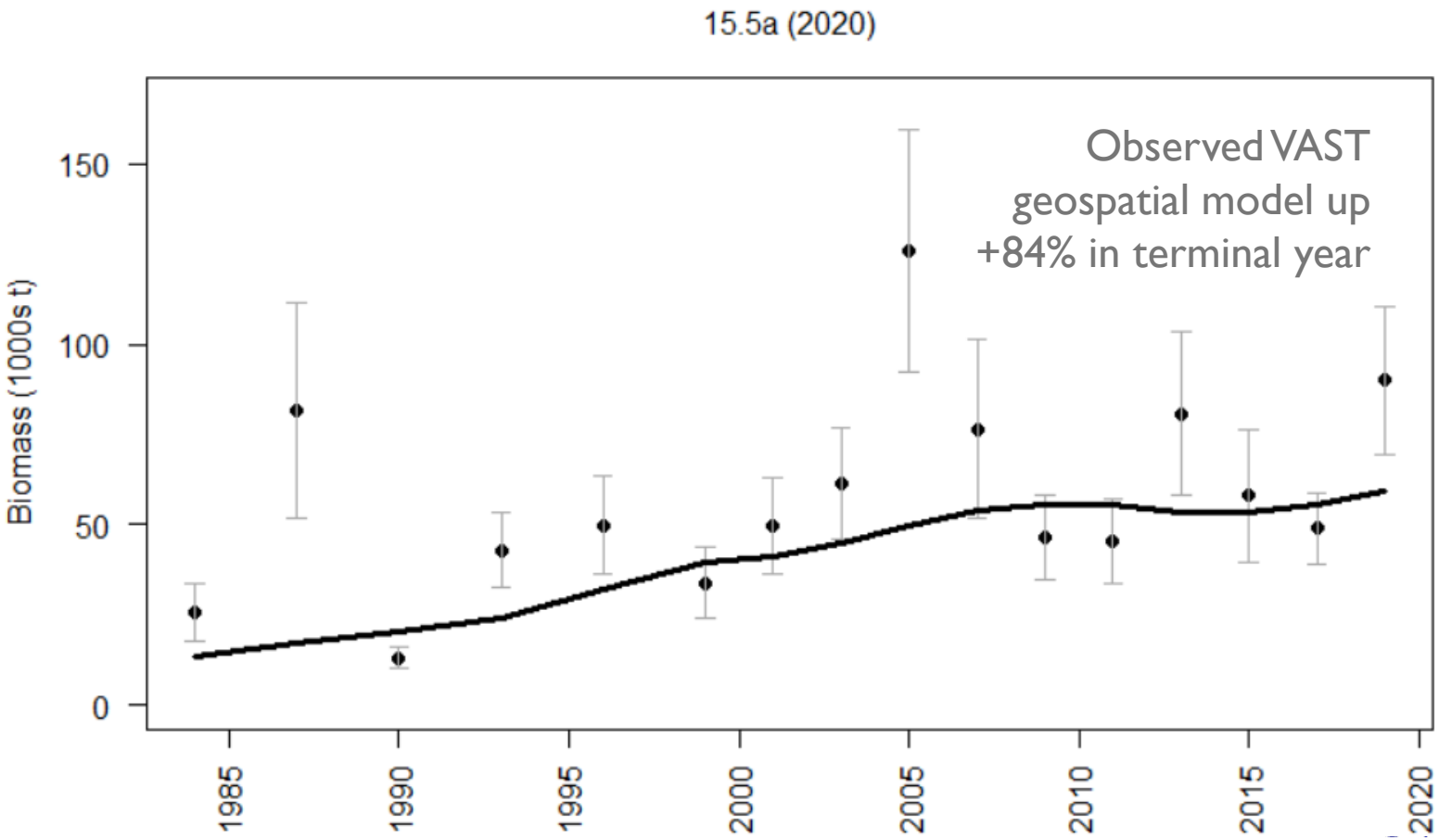
# RESULTS


Probability Density
Acceptable Biological Catch (ABC, kt)
Trawl Survey Catchability (q)
Current Total Biomass (kt)
F 40%
Current Spawning Biomass (kt)

# RESULTS

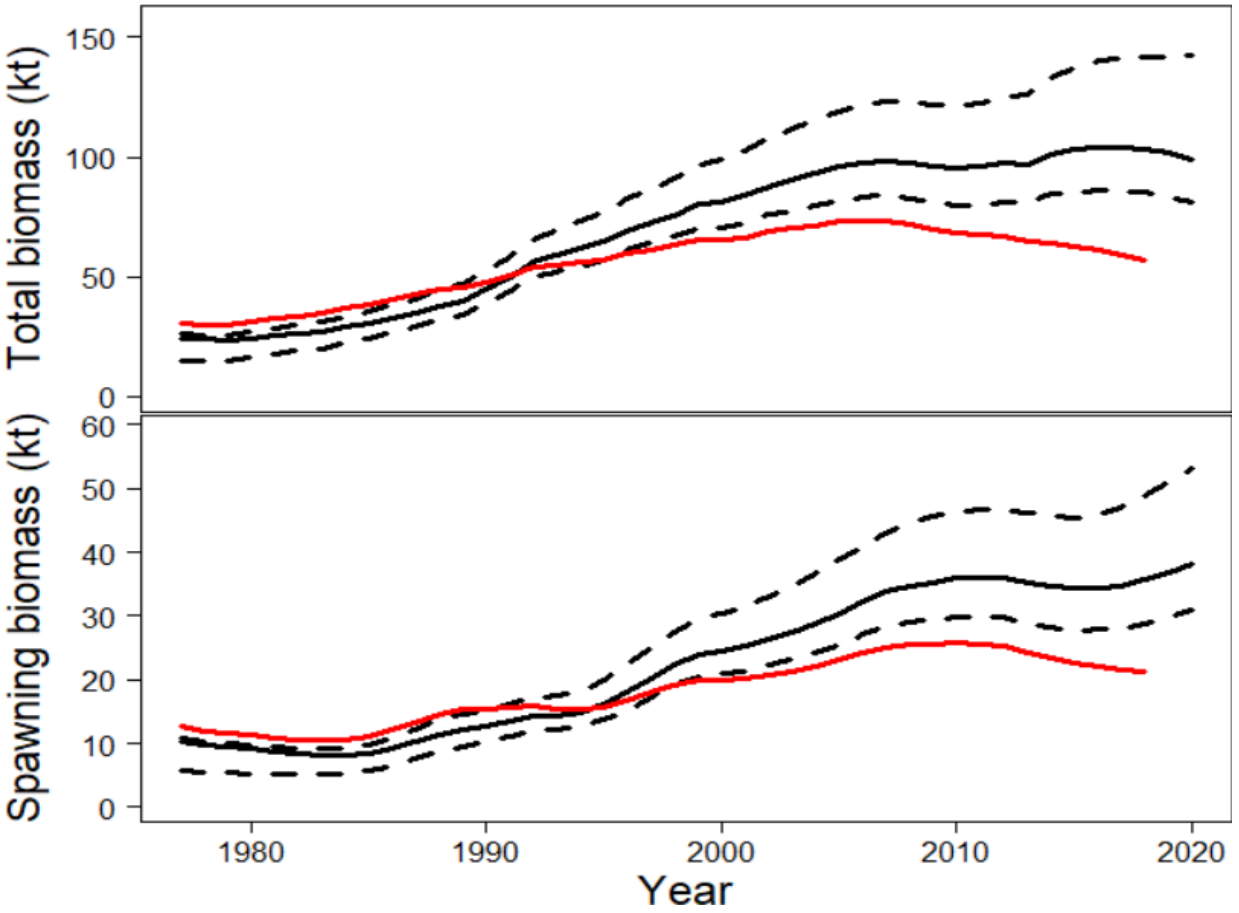

15.5a (2020)
Recruitment (age-4, millions)
0
10
20
30
40
50
1977
1981
1985
1989
1993
1997
2001
2005
2009
2013
Year

# RESULTS

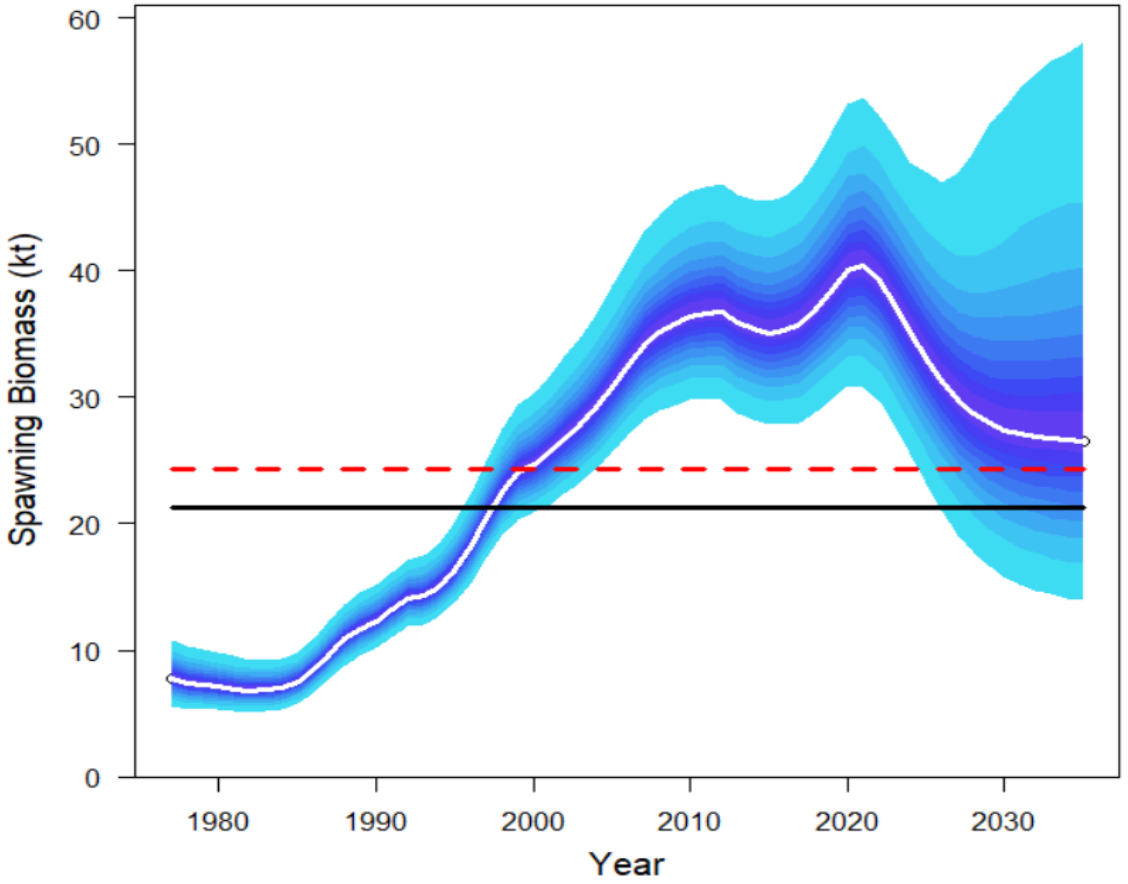

15.5a (2020)
Biomass (1000s t)
150
100
50
0
1985
1990
1995
2000
2005
2010
2015
2020
Observed VAST geospatial model up +84% in terminal year

# RESULTS

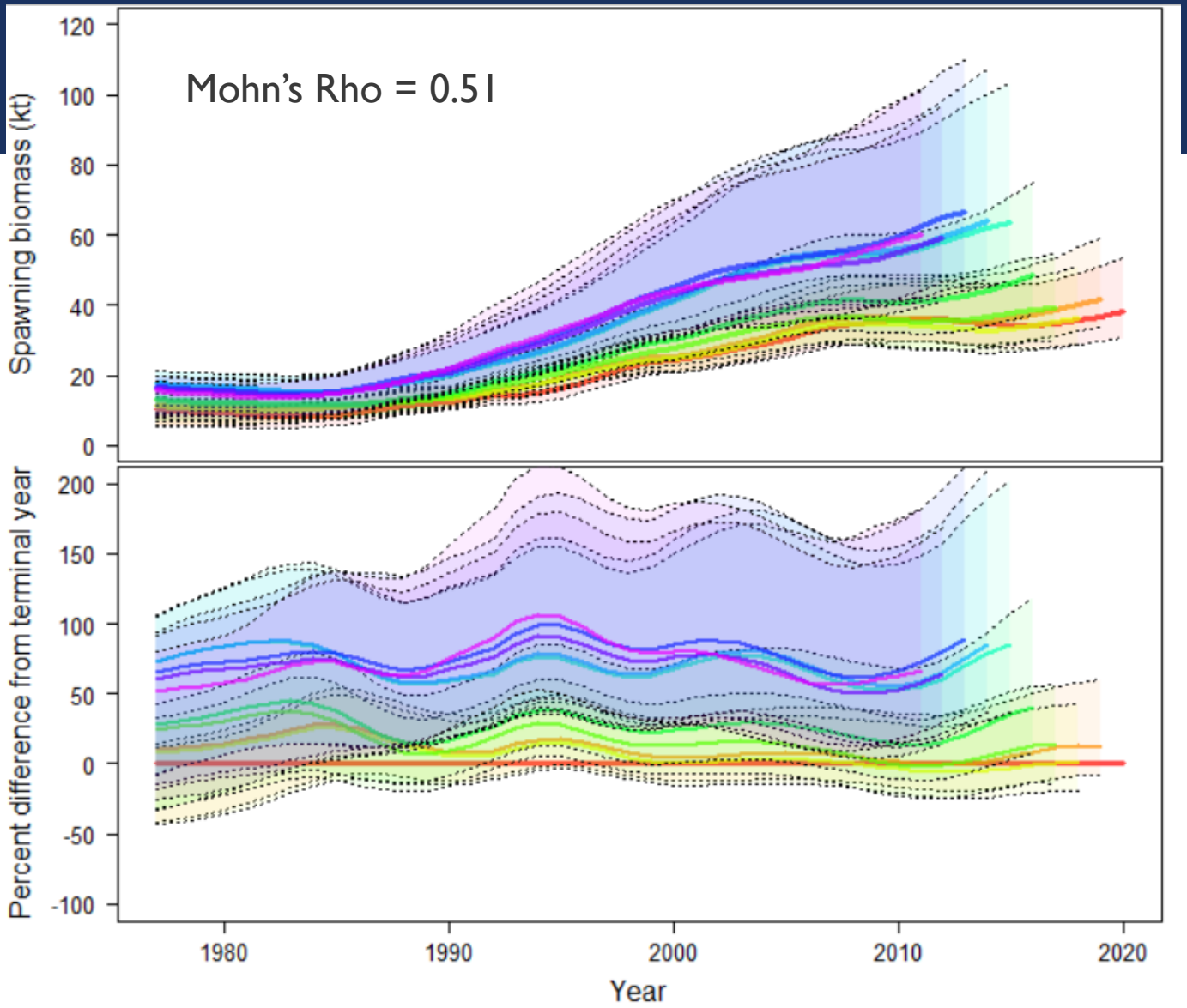
- Model 15.5a (2020)
- Model 15.5 (2018)



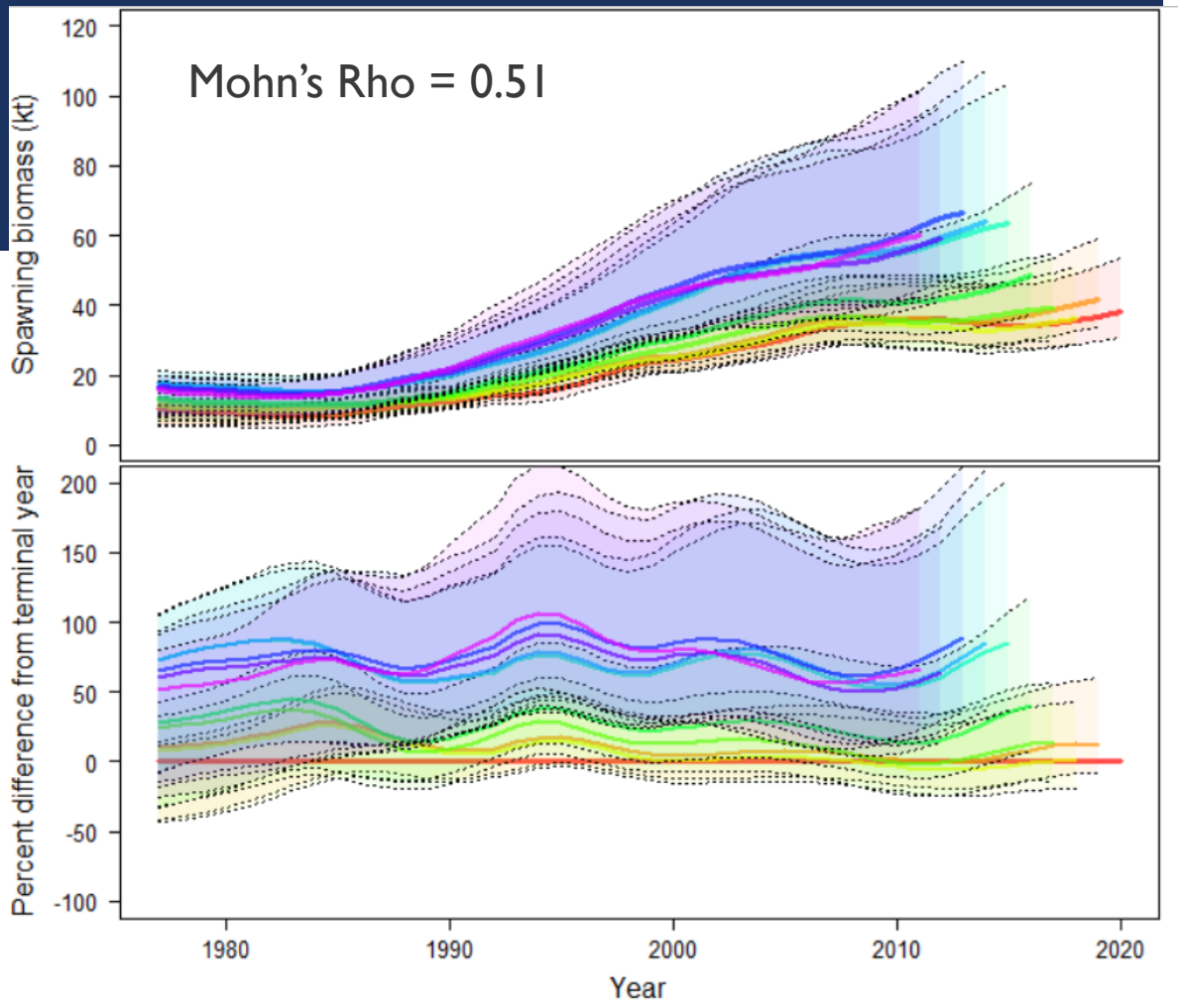

# RESULTS


Spawning Biomass (kt)
0
10
20
30
40
50
60
1980
1990
2000
2010
2020
2030
Year

# RESULTS


Mohn's Rho = 0.51
Spawning biomass (kt)
120
100
80
60
40
20
0
Percent difference from terminal year
200
150
100
50
0
-50
-100
1980
1990
2000
2010
2020
Year

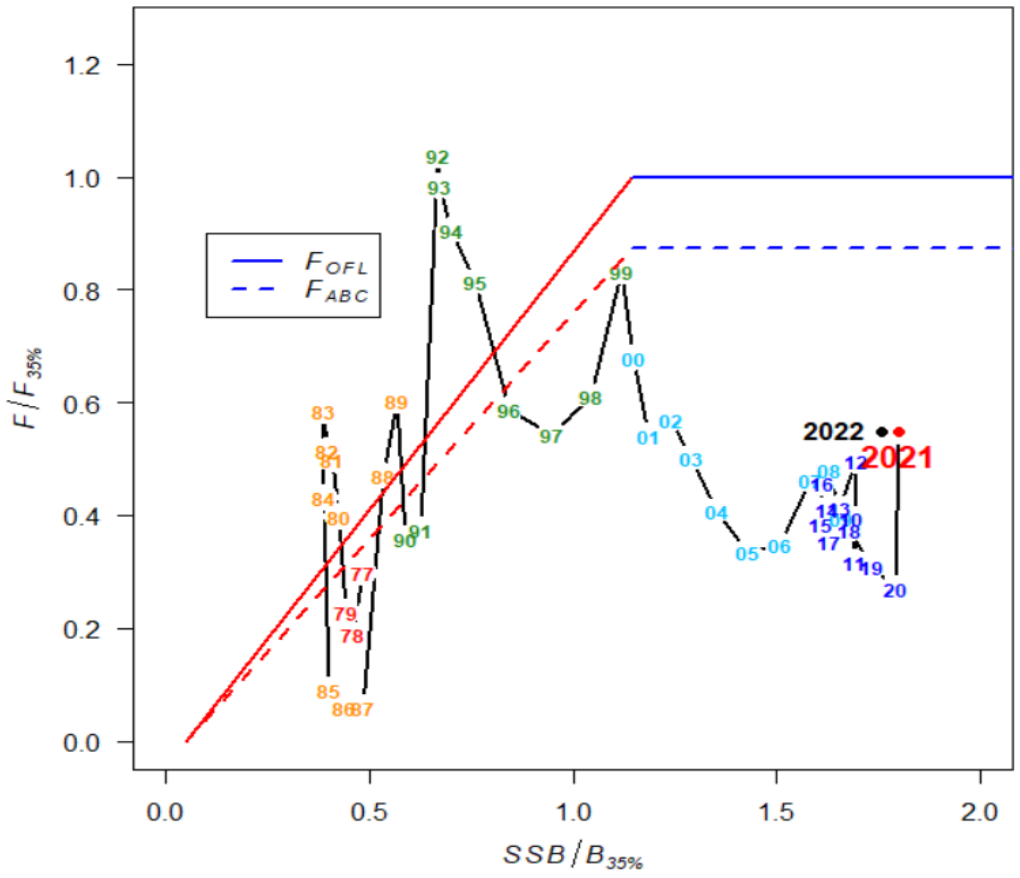
# RESULTS




| 2019 | 2018 | 2017 | 2016 | 2015 | 2014 | 2013 | 2012 | 2011 |
|---|---|---|---|---|---|---|---|---|
| 12% | 1% | 13% | 41% | 85% | 85% | 89% | 63% | 67% |
| Mohn's Rho | 51% | | | | | | | |

# RESULTS

- Not overfished
- Not overfishing
- Tier 3a



# RISK TABLE

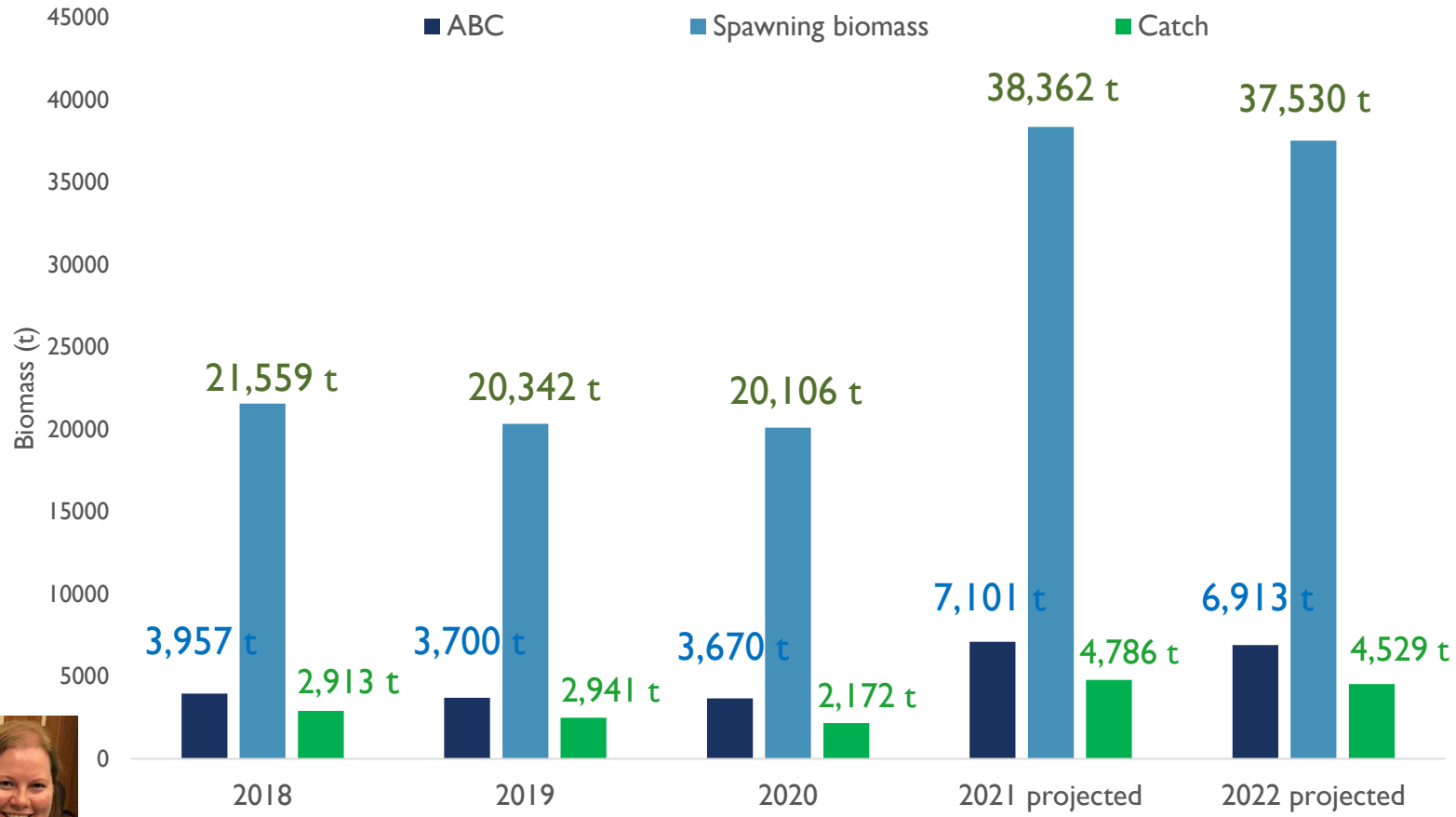
| *Assessment-related considerations* | *Population dynamics considerations* | *Environmental/ ecosystem considerations* | *Fishery Performance considerations* |
|---|---|---|---|
| Level 2: Substantially increased concerns | Level 1: No apparent concern | Level 1: No apparent concern | Level 1: No apparent concern |

- The GOA dusky rockfish assessment appears to fit available data well, the 2019 GOA trawl survey was undertaken as planned and data are included in this year's assessment, and the fishery and environmental considerations appear to be within normal bounds.
- We have some concerns about the estimated increase in biomass and resulting increase in ABC and the model retrospective pattern.
  - The geospatial model-based abundance index has low uncertainty which may be driving the estimated increase in biomass and ABC.
  - Because GOA dusky rockfish ABC is not historically fully utilized and because there is an increase in 2019 survey biomass coupled with some evidence of recruitment from age compositions, we are not recommending a reduction in ABC at this time.
  - We anticipate that we will monitor the survey abundance estimates, catch rates, and retrospective trends closely for the next assessment.

# RESULTS - APPORTIONMENT

| Stock | Area | 2020 OFL | 2020 ABC | 2020 TAC | Catch[2] | 2021 OFL | 2021 ABC | 2022 OFL | 2022 ABC |
|---|---|---|---|---|---|---|---|---|---|
| Dusky Rockfish | W | | 776 | 776 | 231 | | 355 | | 346 |
| | C | | 2,746 | 2,746 | 1,857 | | 5,993 | | 5,834 |
| | WYAK | | 115 | 115 | 83 | | 617 | | 601 |
| | EYAK/SEO | | 39 | 39 | 1 | | 136 | | 132 |
| | Total | 4,492 | 3,676 | 3,676 | 2,172 | 8,655 | 7,101 | 8,423 | 6,913 |

| | Western | Central | Eastern | Total |
|---|---|---|---|---|
| Apportionment | 5.0% | 84.4% | 10.6% | 100% |
| 2021 Area ABC (t) | 355 | 5,993 | 753 | 7,101 |




*Estimated catch of 2,172 t for 2020, and estimates of 4,786 t and 4,529 t used in place of maximum permissible ABC for 2021 and 2022

# FUTURE PLANS

- Keep using VAST GAP produced index
- Continue VAST and index weighting explorations
- Monitor catches and index value for next survey

Questions TO the plan team:

- Do you have advice on use of VAST GAP produced indices?
- Do you have advice on weighting for index in the model?

# QUESTIONS?

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