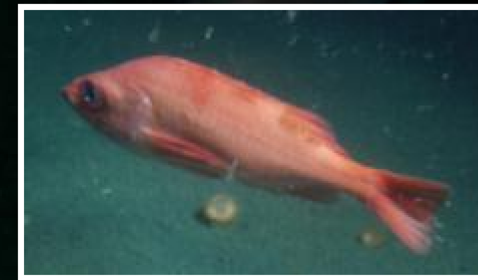
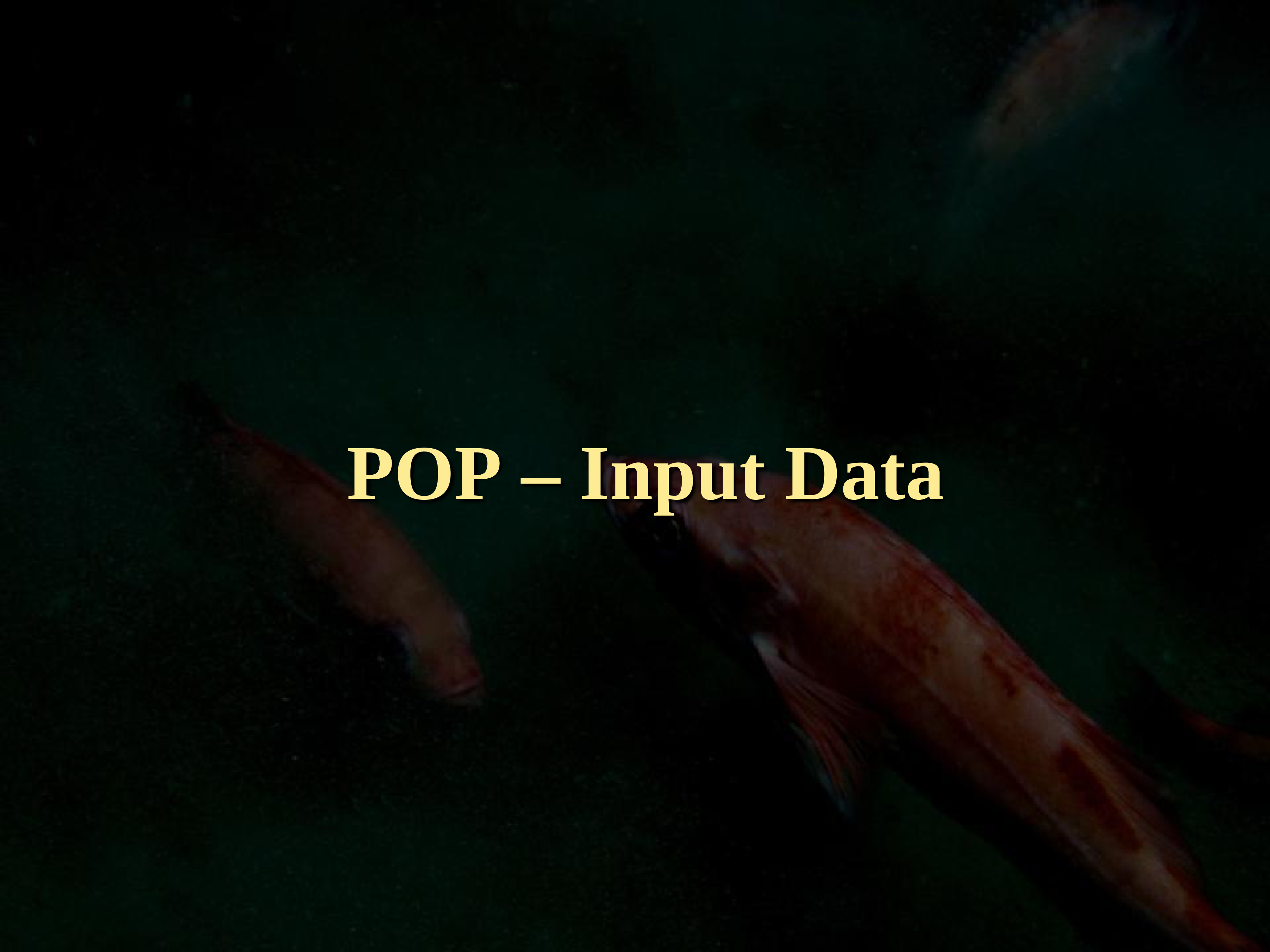
GOA Pacific ocean perch

Pete, Dana, Chris, Ben, Darin

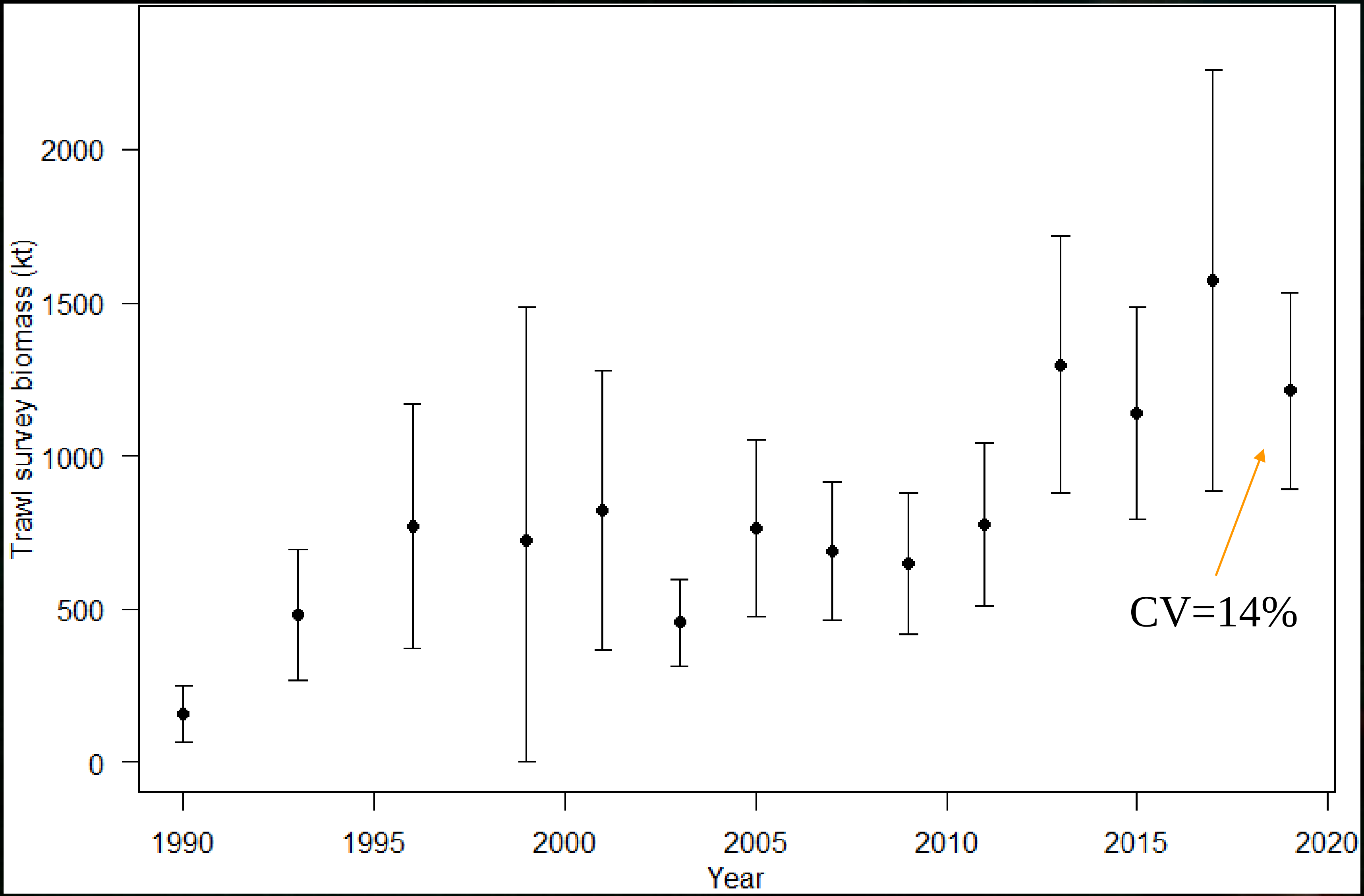


- No model changes this year
- Outline:
  - Input data (Biomass & Catch)
  - Model fits
  - Model results
  - Recommendations
  - Apportionment
  - Risk matrix
  - Future work

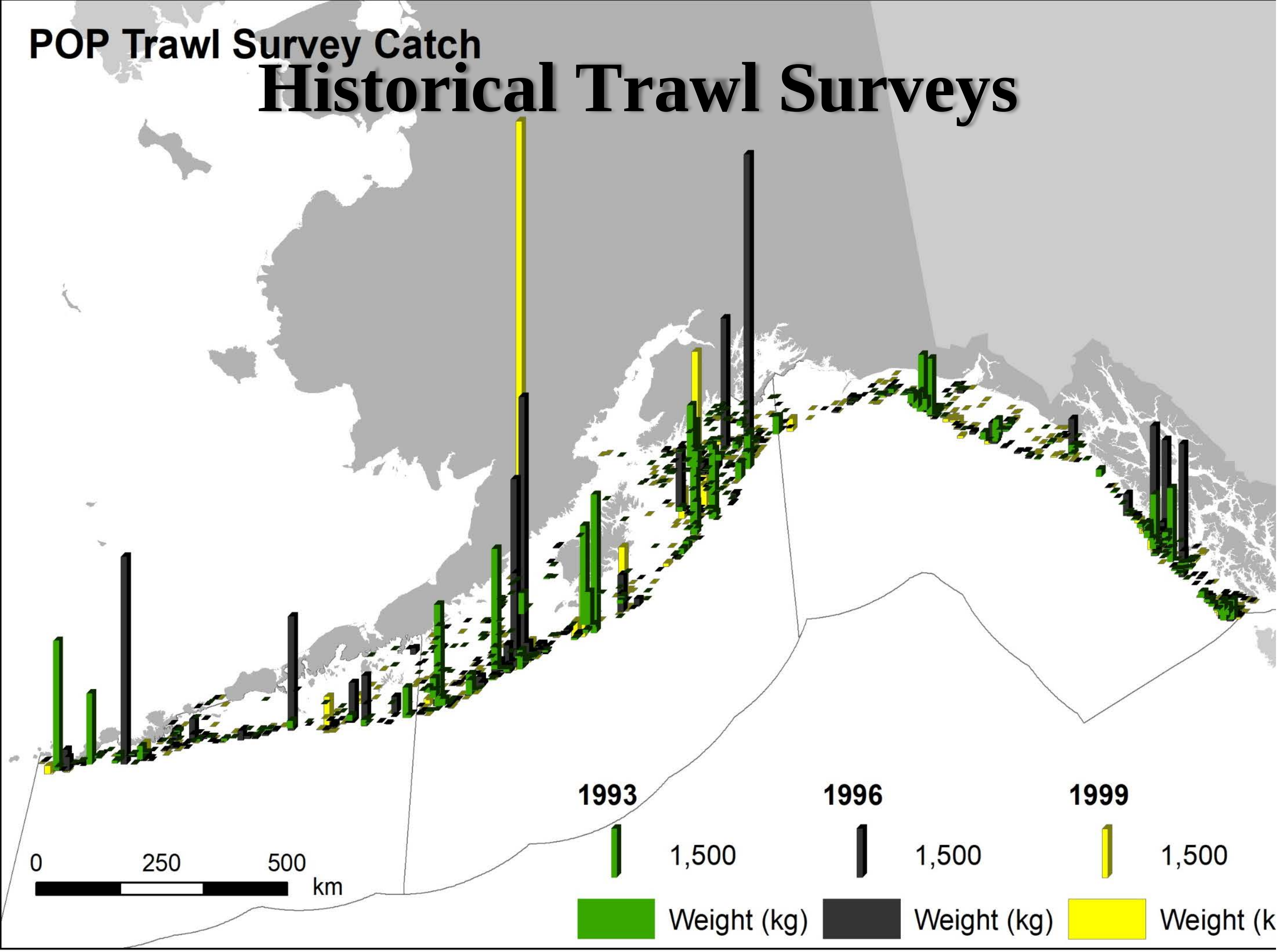


POP – Input Data

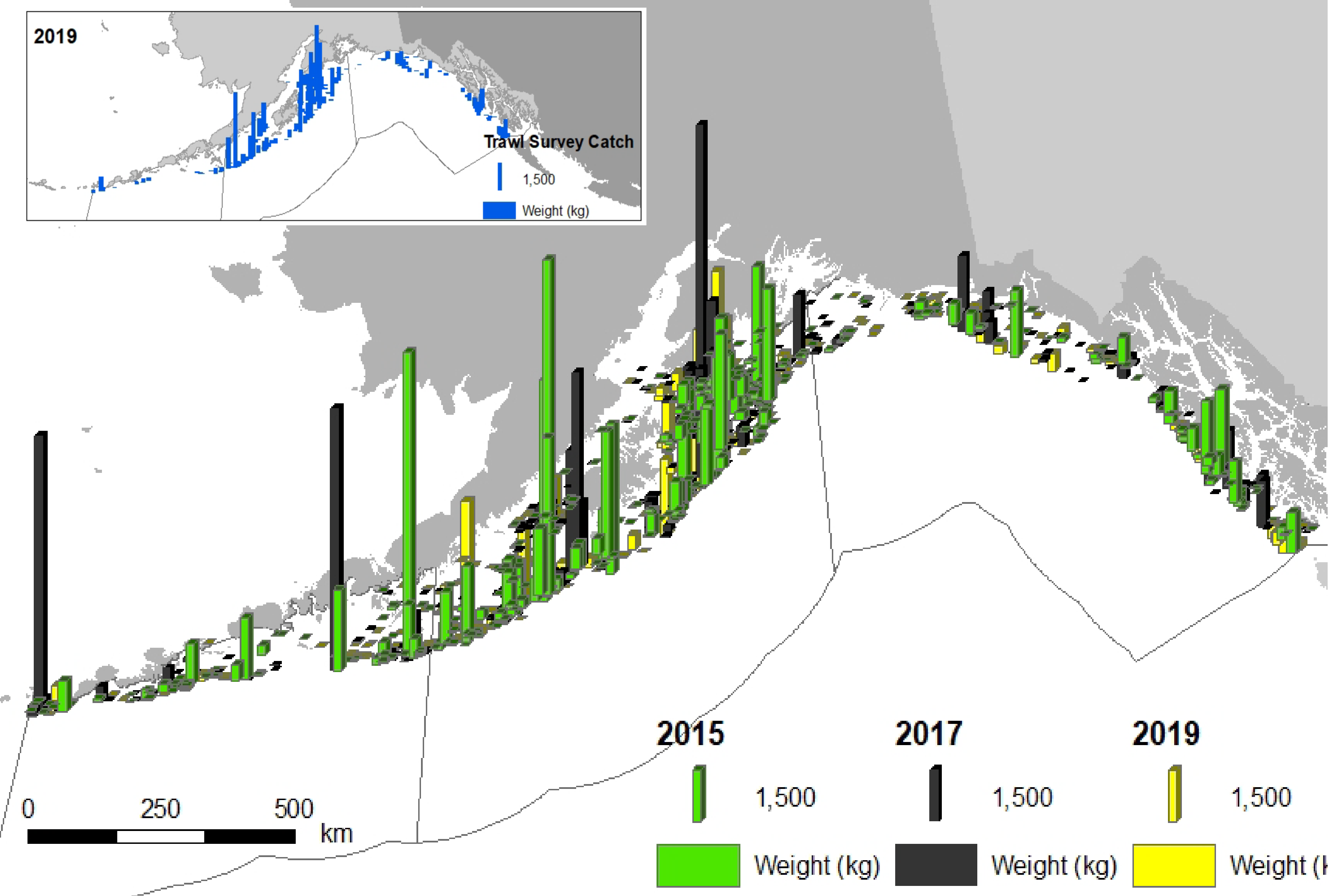
Survey Biomass



Historical Trawl Surveys

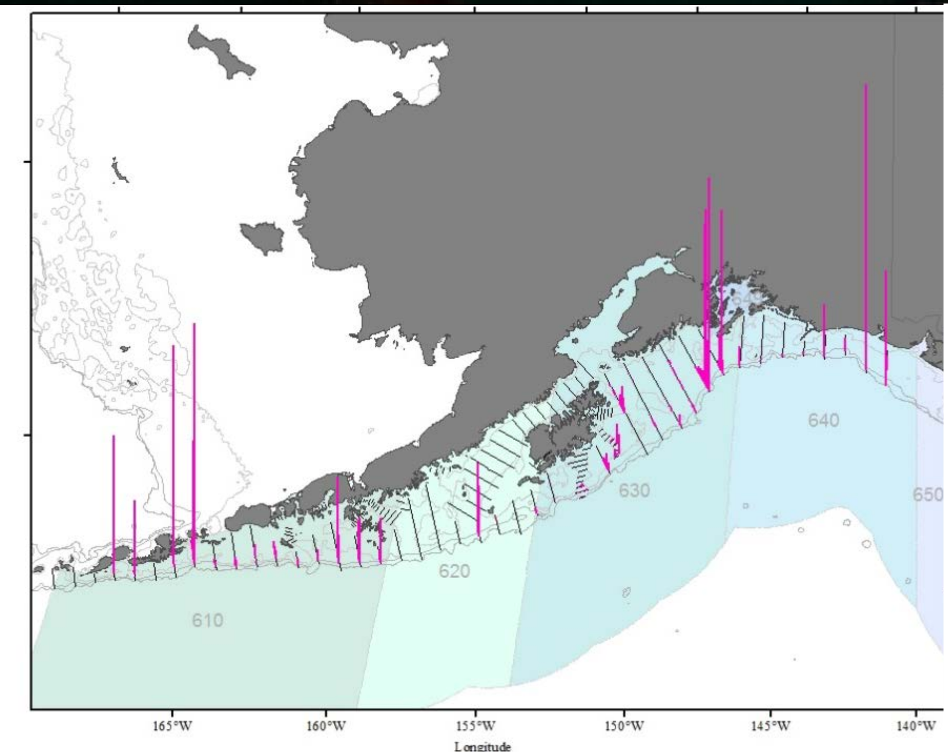


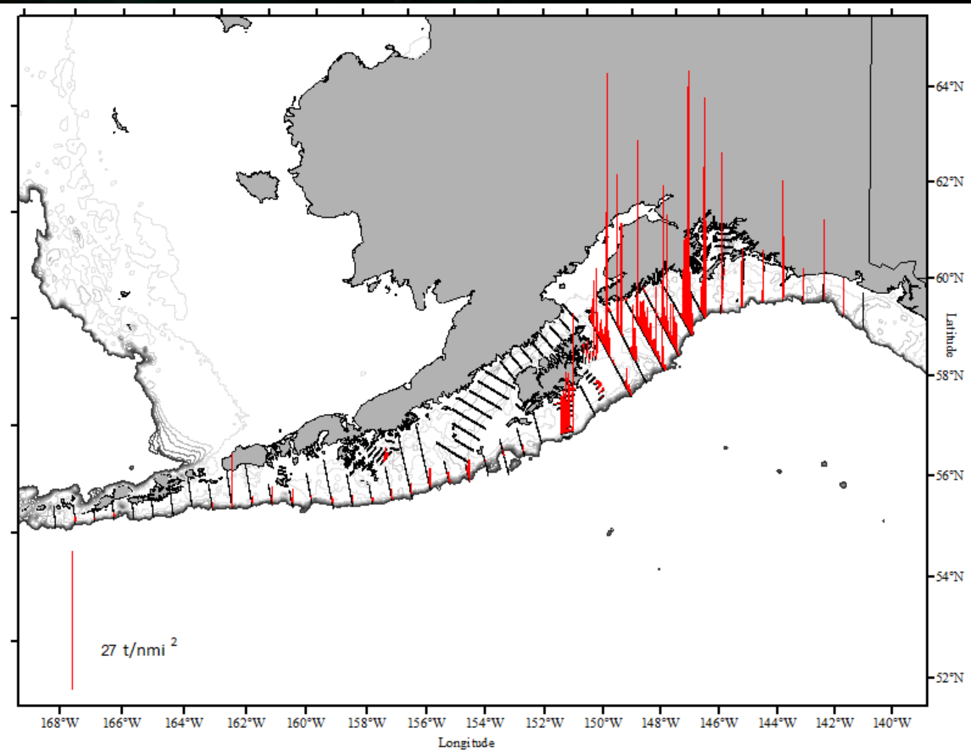
Recent Trawl Surveys



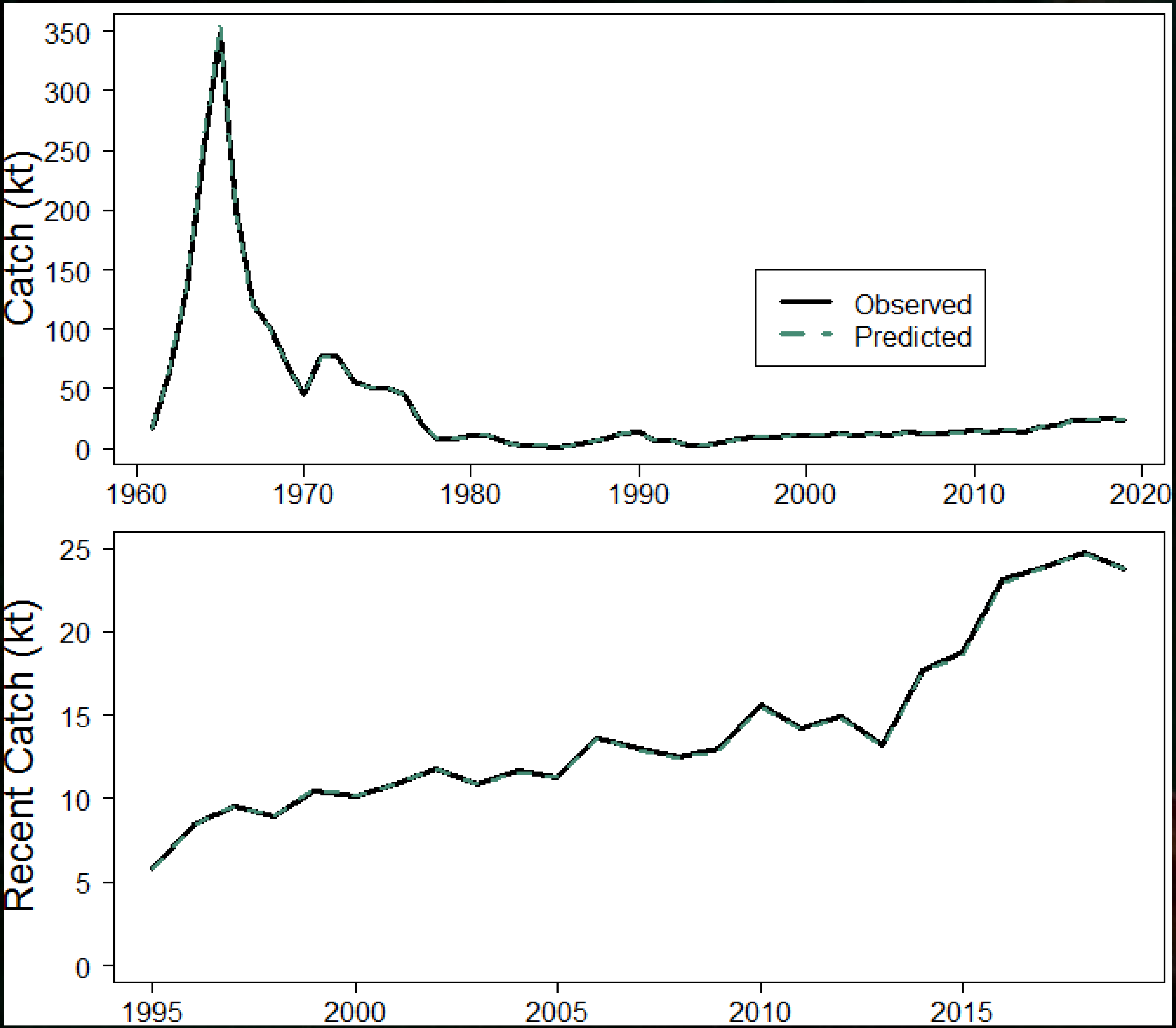
POP – MACE survey (new section)

- MACE summer acoustic survey
  - 2017 estimate = 215,074 t
  - 2019 estimate = 140,668 t (-35%)
- NOT a POP survey, should expect variability





Catch



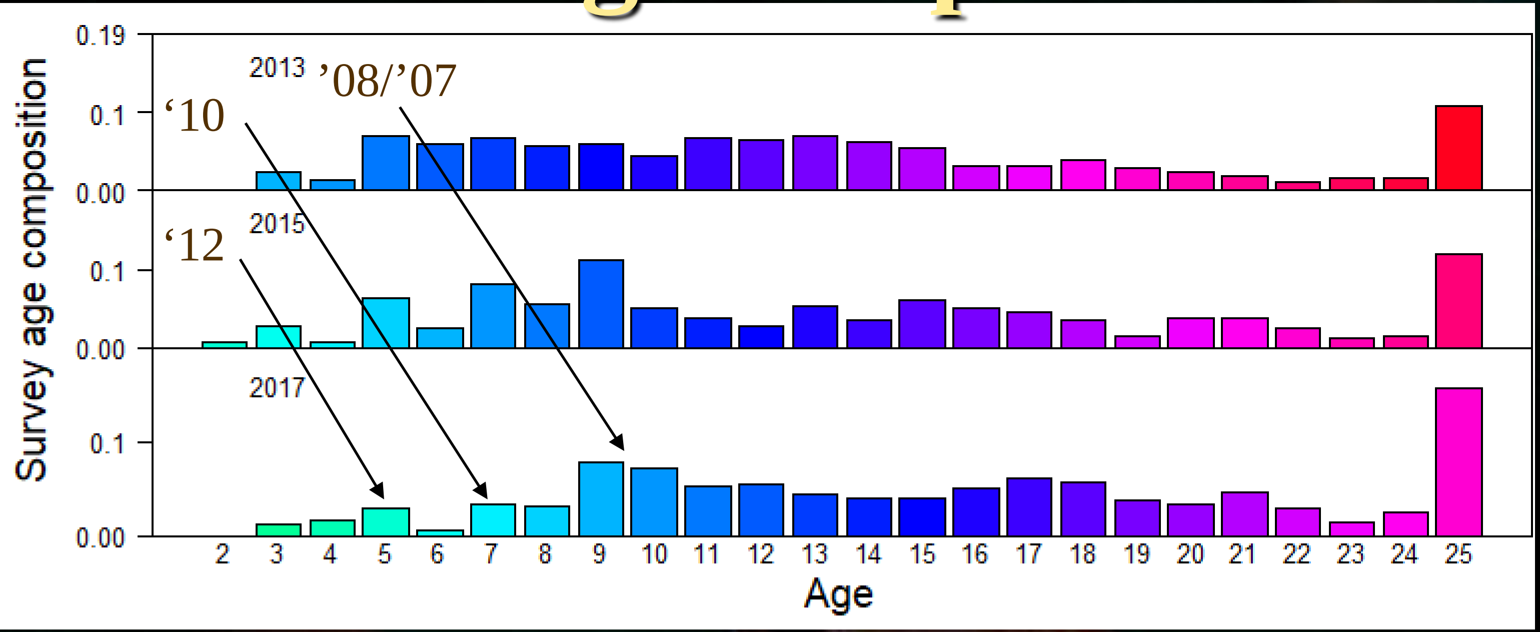
Catch (kt)
350
300
250
200
150
100
50
0
1960
1970
1980
1990
2000
2010
2020
Observed
Predicted
Recent Catch (kt)
25
20
15
10
5
0
1995
2000
2005
2010
2015

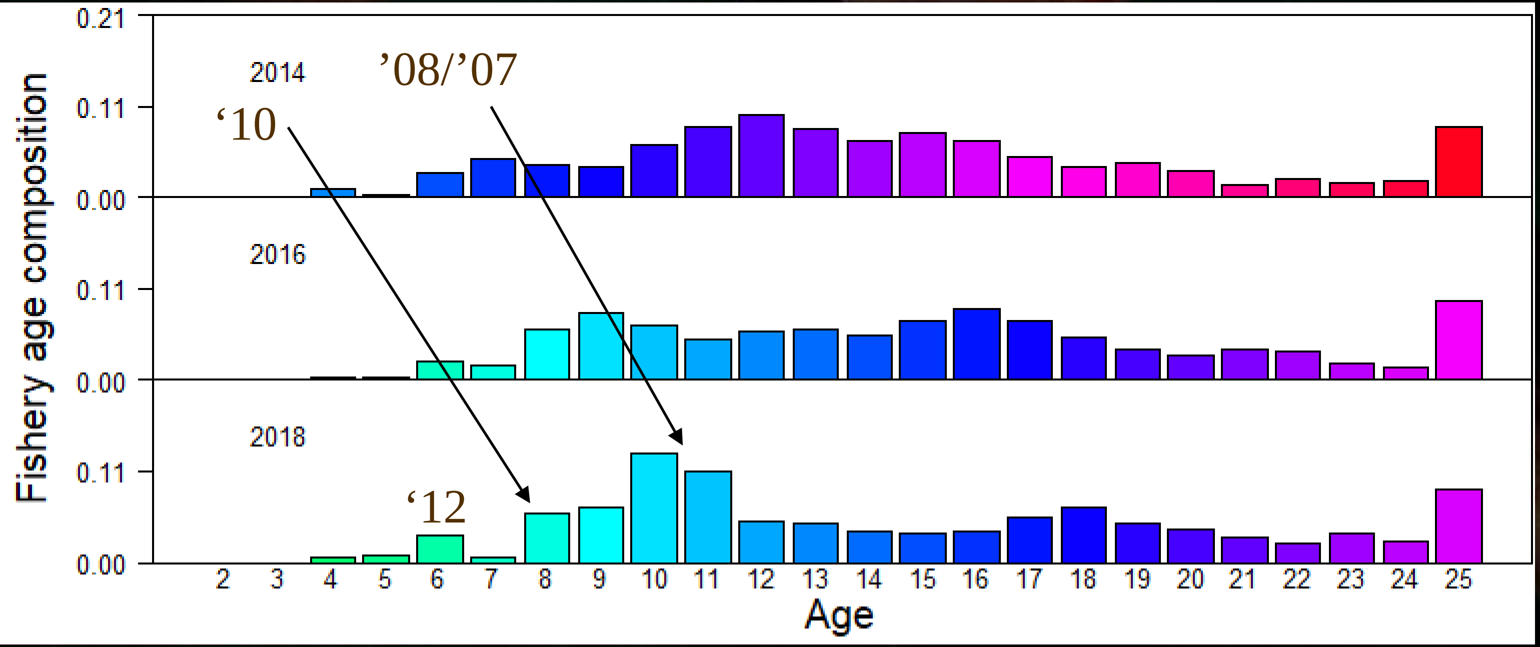
Economic performance

Ex-vessel	Avg 2009-13	2014	2015	2016	2017	2018
Total catch (thousands of mt)	24.74	28.9	29	34	31.8	**34.2**
Retained catch (thousands of mt)	22.6	25.8	26.7	30.8	26.9	**31.4**
Catcher Processors #	**14.4**	9	8	12	11	9
Catcher Vessels #	**179**	173	139	130	126	112
Catcher Vessel Share of Retained	45%	46%	46%	**49%**	42%	47%
Ex-vessel value (millions of US$)	$10.0	$11.9	$12.4	$13.9	$12.1	**$14.8**
Central Gulf share of GOA rockfish catch	70%	84%	84%	**87%**	84%	84%
POP share of GOA rockfish catch	58%	59%	65%	67%	**73%**	72%

First-wholesale	Avg 2009-13	2014	2015	2016	2017	2018
First-wholesale value (millions of US$)	$33.18	$34.10	$34.20	$40.00	$39.20	**$45.40**
POP share of value	58%	58%	63%	62%	**72%**	71%

Age comps


Survey age composition
2013
2015
2017
'10
'08/'07
'12
0.19
0.1
0.00
Age

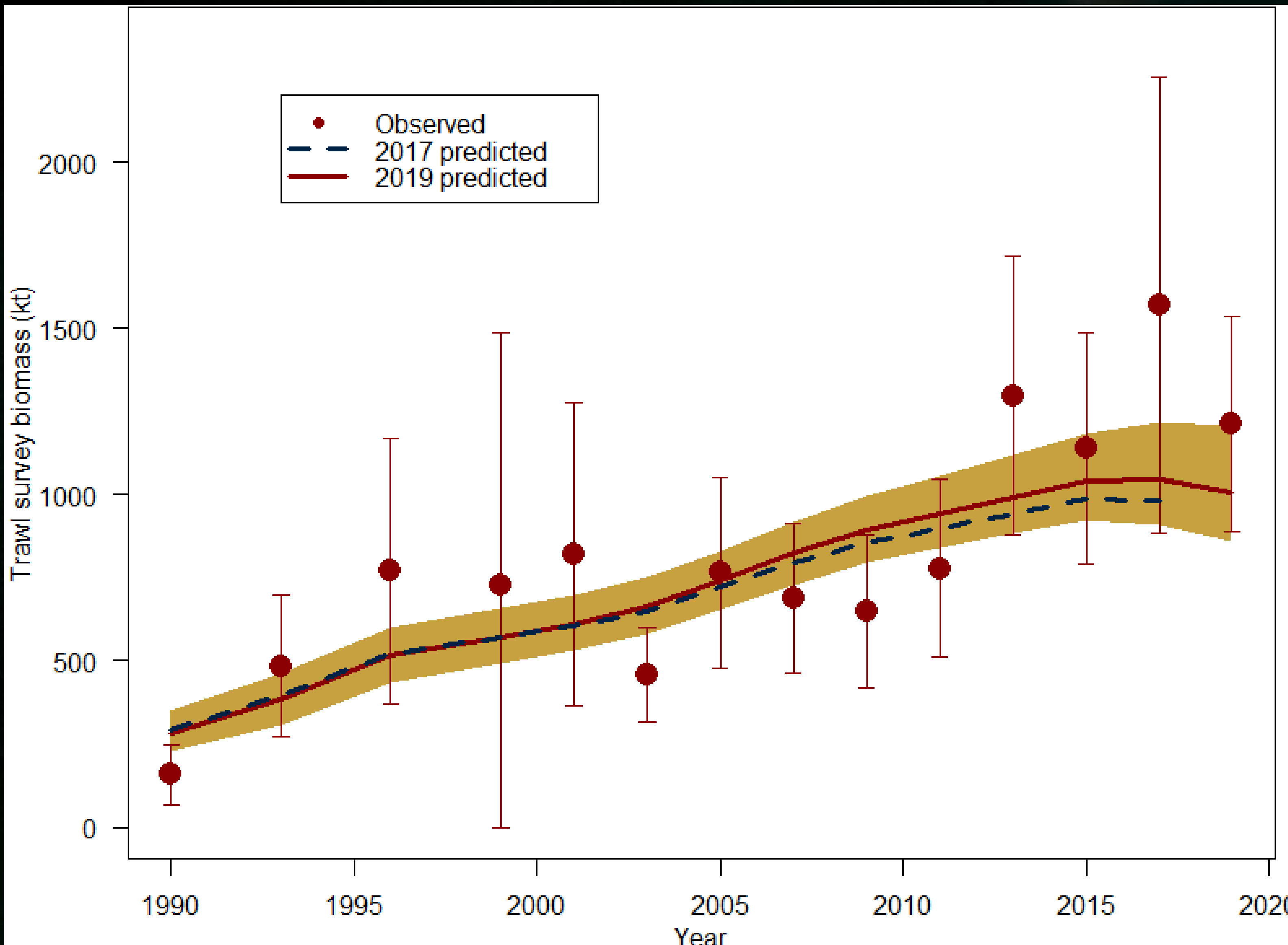

Fishery age composition
2014
2016
2018
'10
'08/'07
'12
0.21
0.11
0.00
Age

POP – Model fits

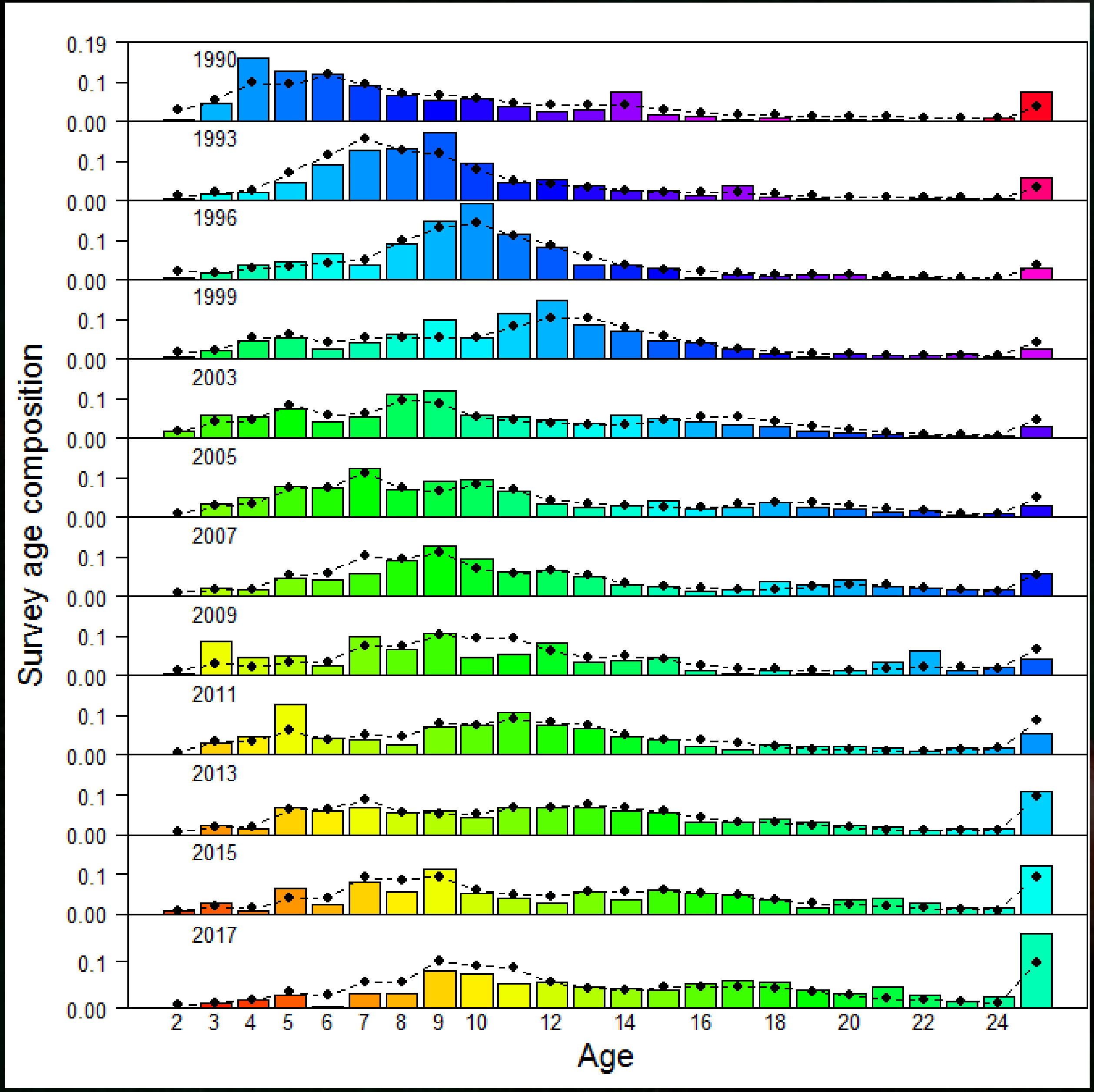
POP – Likelihoods

Likelihoods	17.1 (2017)	17.1 (2019)
Catch	0.18	0.21
Survey Biomass	13.23	13.90
Fishery Ages	19.28	20.83
Survey Ages	19.55	22.34
Fishery Sizes	65.51	66.42
Maturity	103.52	103.52
Data-Likelihood	221.27	227.23
Penalties/Priors		
Recruitment Devs	15.92	16.26
F Regularity	5.08	5.43
σ_r prior	6.64	6.69
q prior	1.39	1.22
M prior	3.73	3.26
Objective Fun Total	254.04	260.09

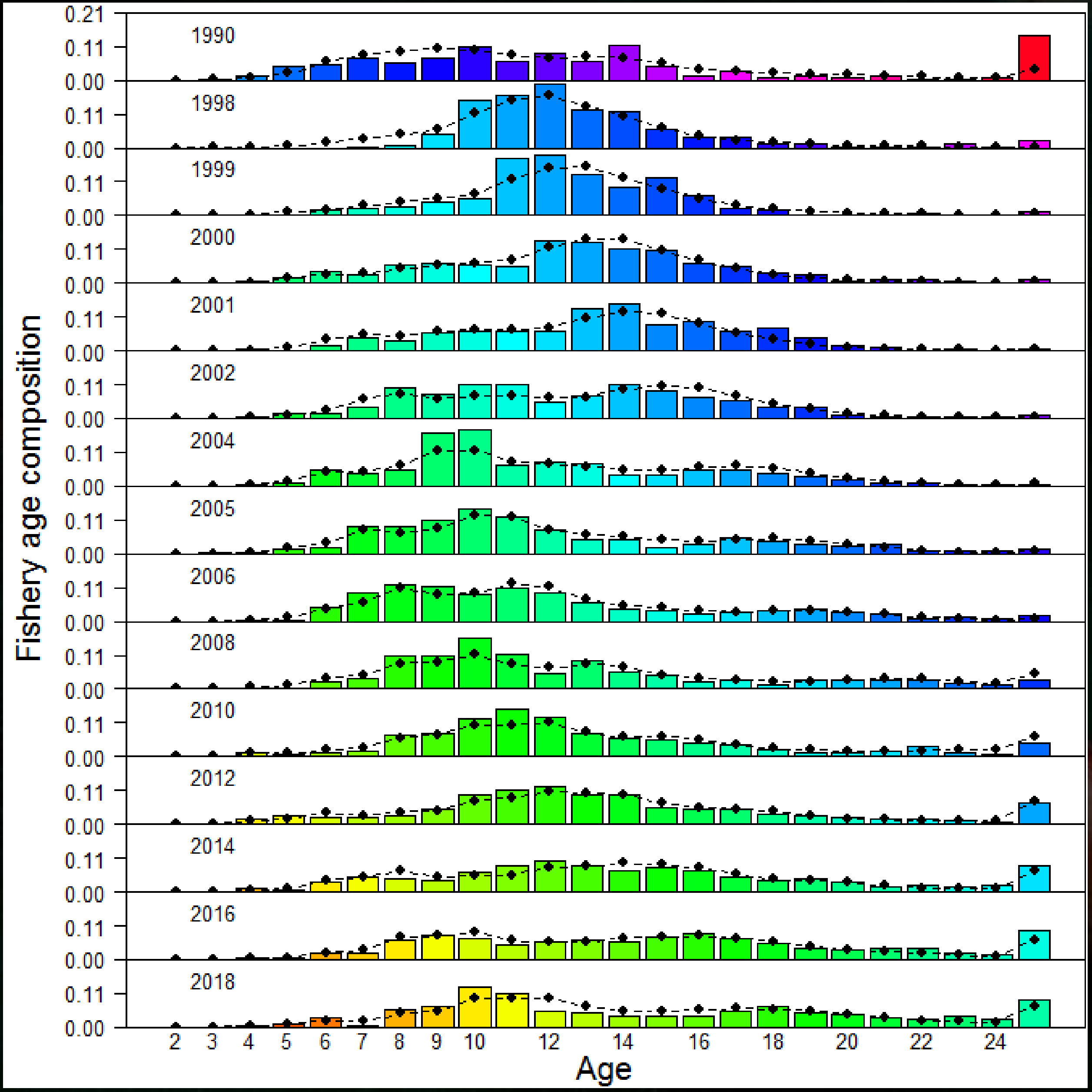
Survey Biomass



Survey Age Comps



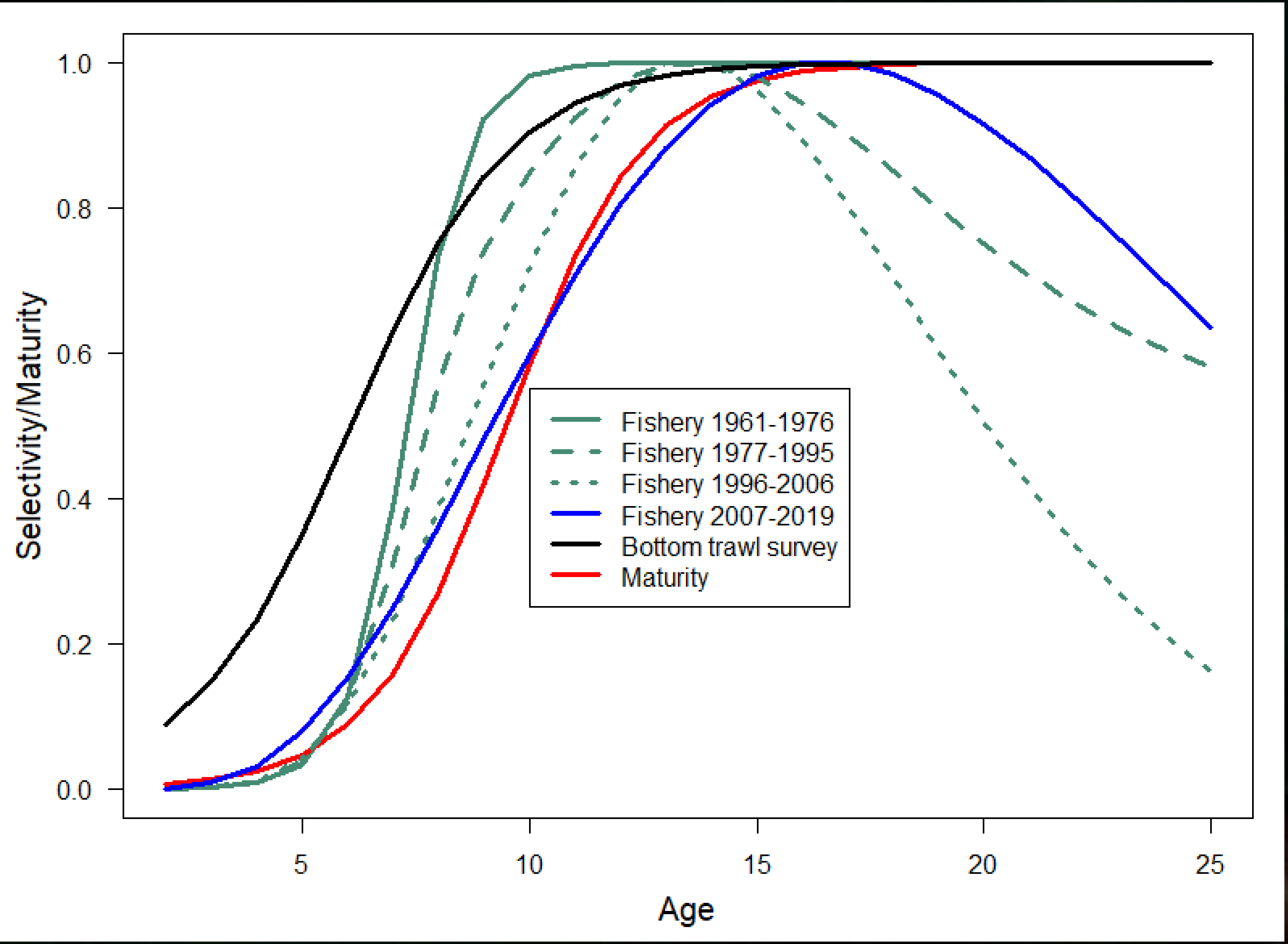
Fishery Age Comps



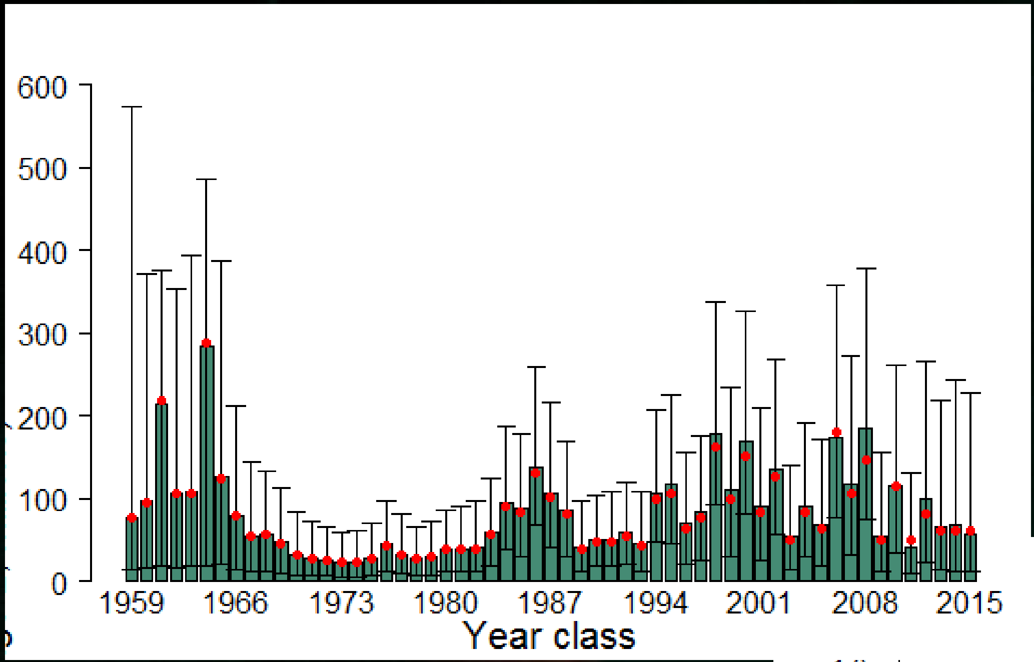
POP – Model results

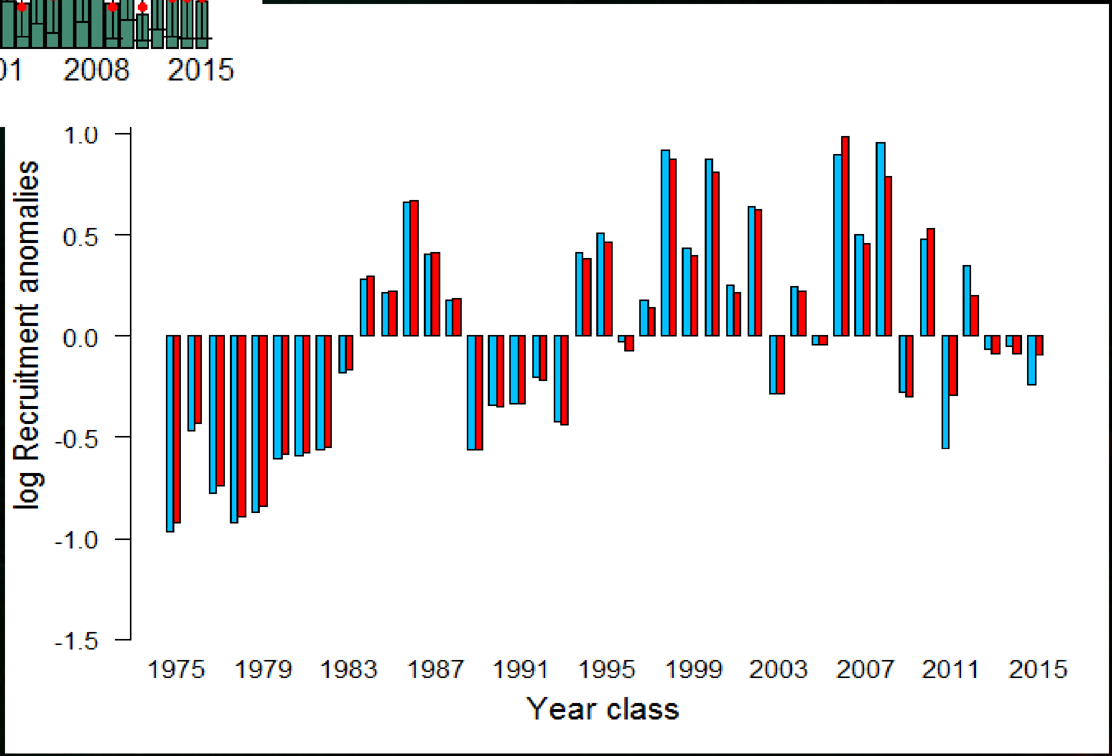
Parameter Ests.	17.1 (2017)	17.1 (2019)
Active parameters	158	162
q	2.11	2.01
M	0.066	0.065
σ_r	0.82	0.82
Mean Recruitment	60.84	62.09
$F_{40\%}$	0.094	0.09

Selectivity/Maturity

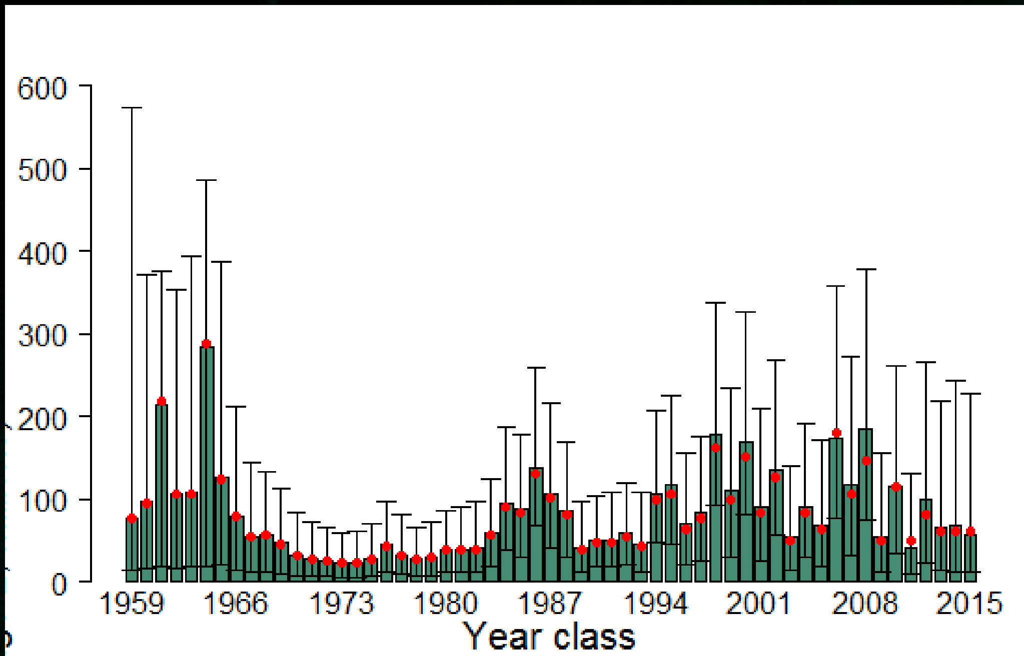


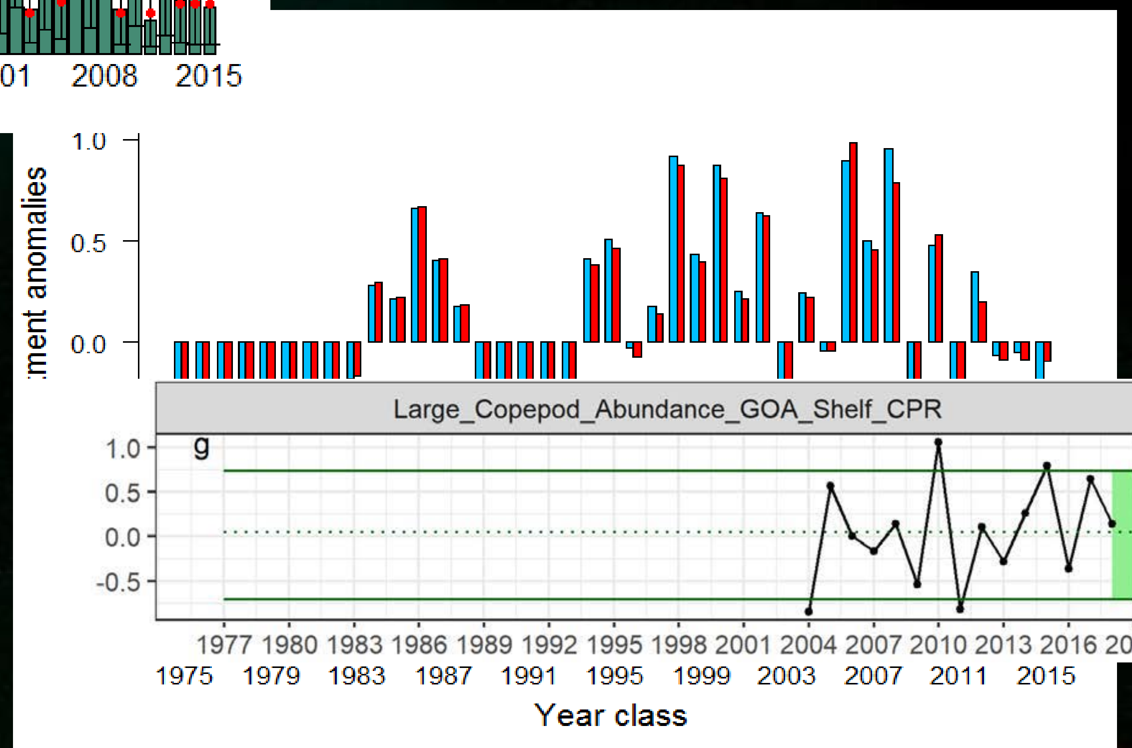
Recruitment (age-2)



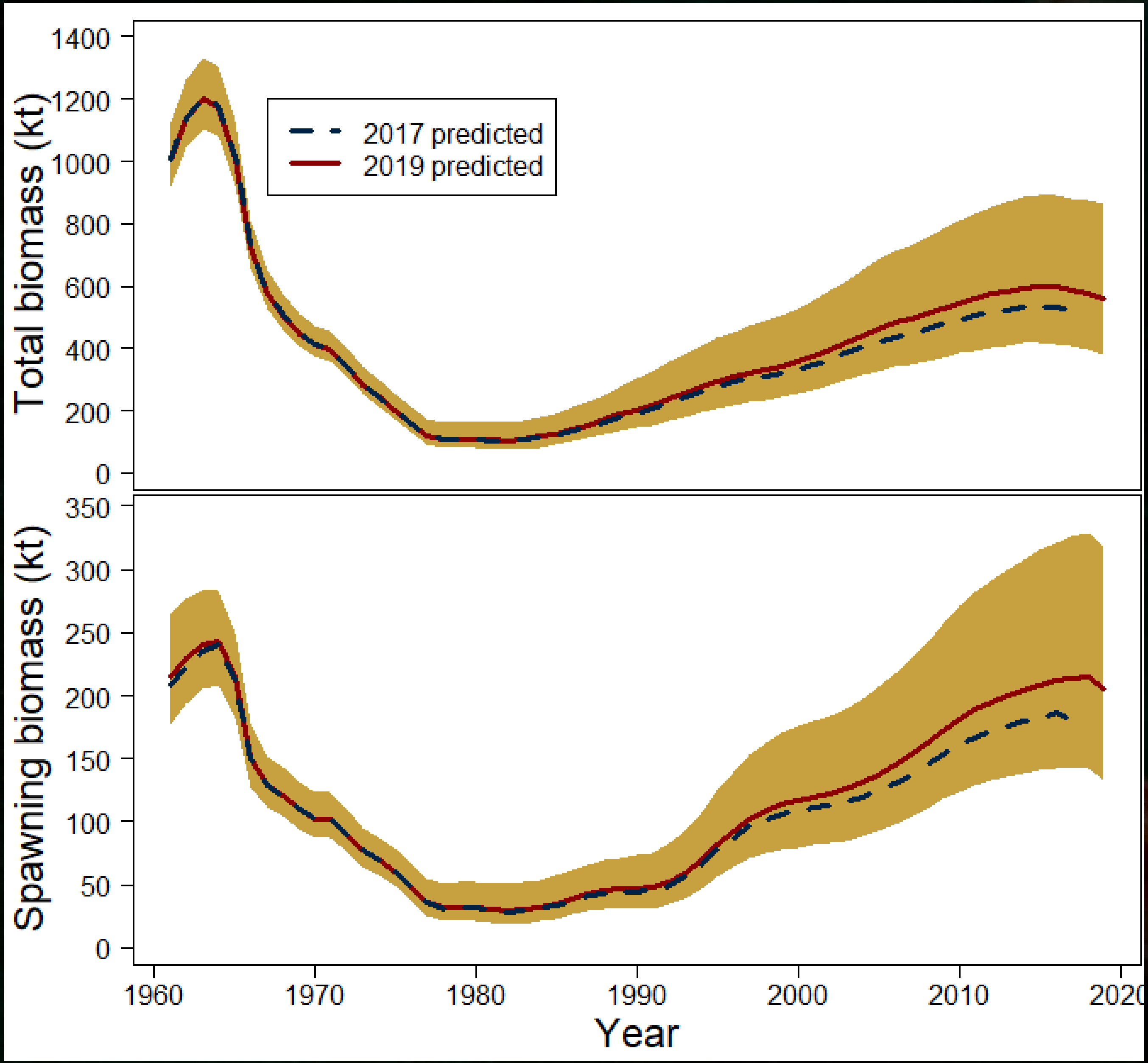


Recruitment (age-2)

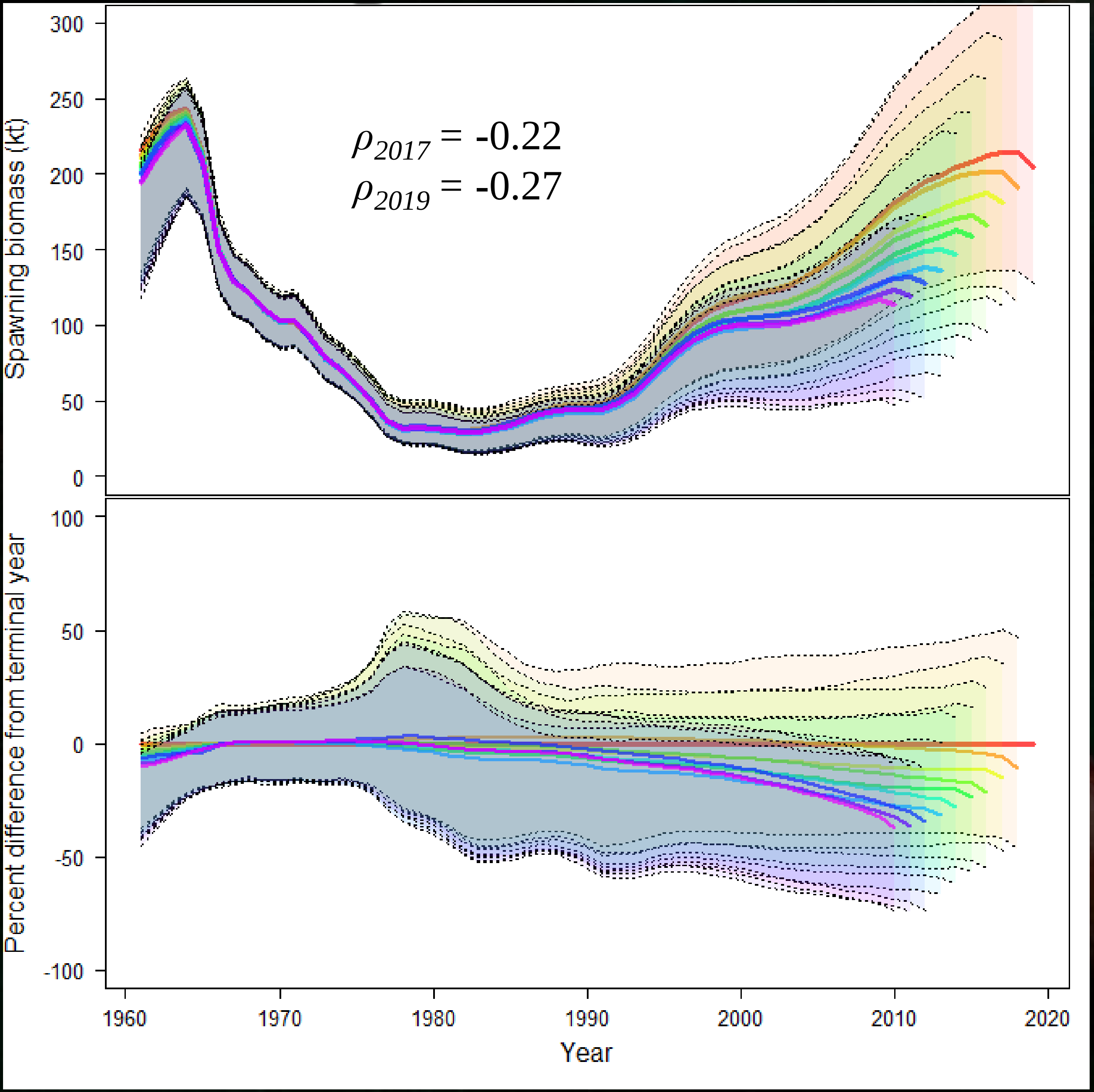




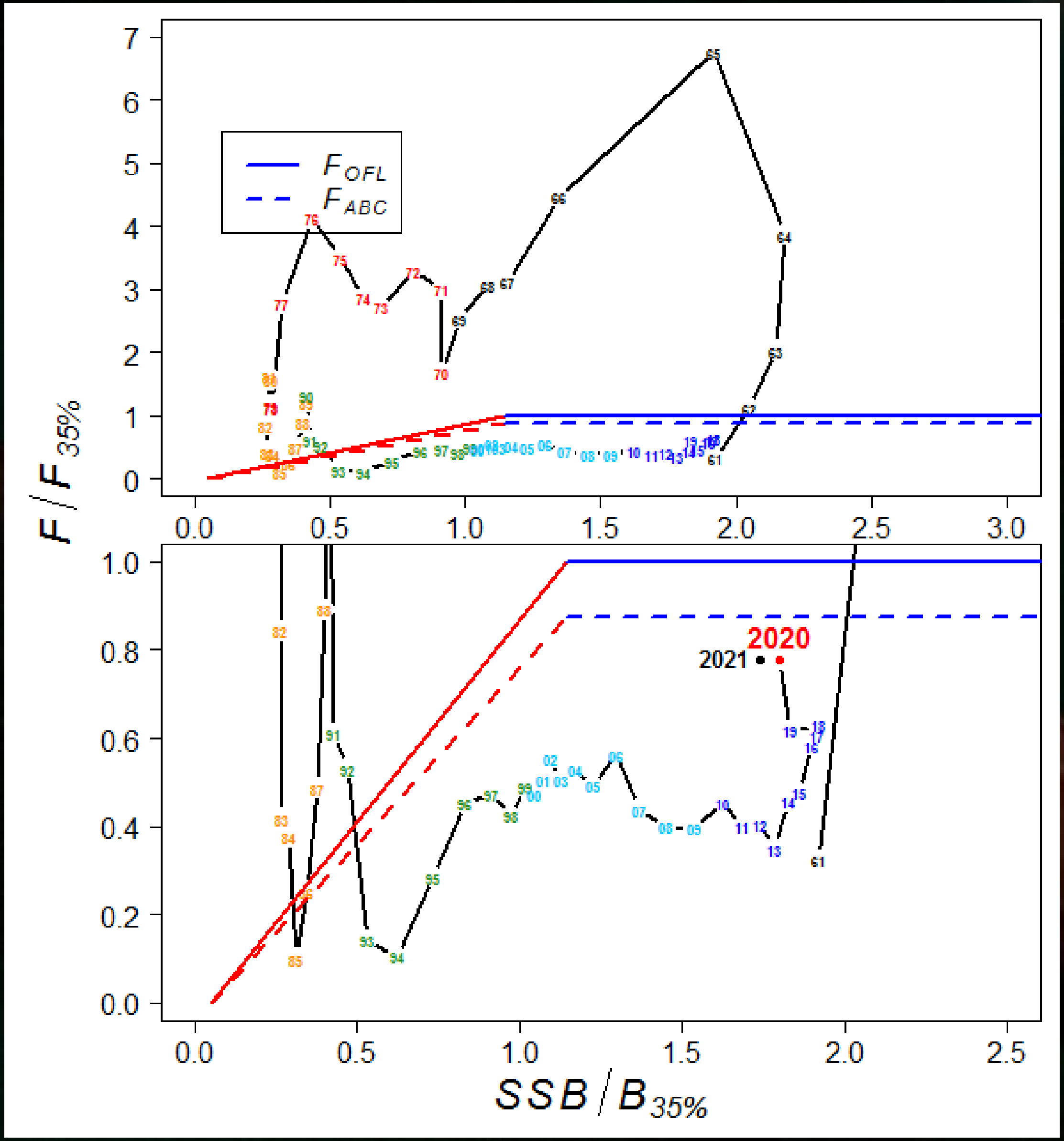
Estimated biomass



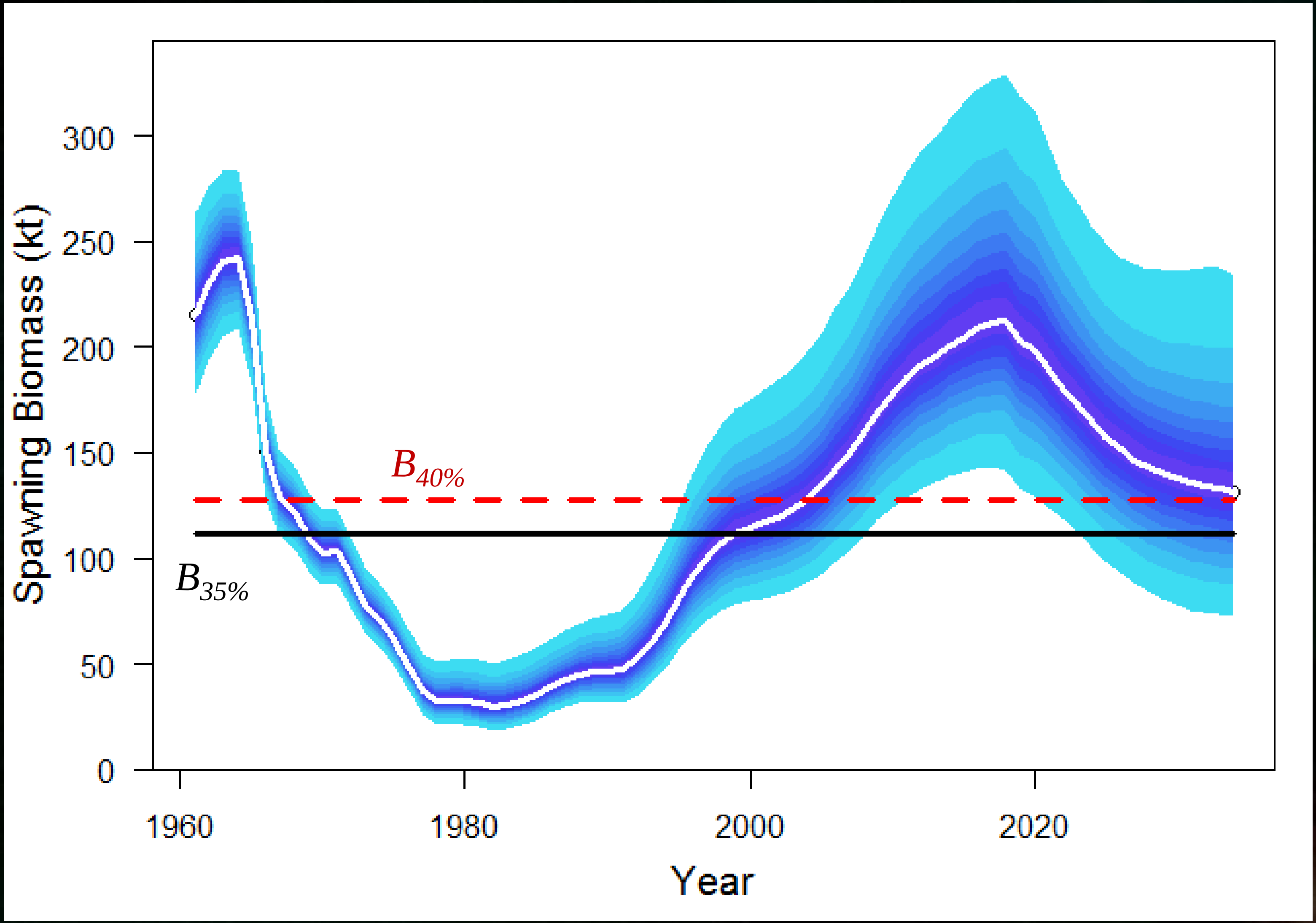
Retrospective biomass



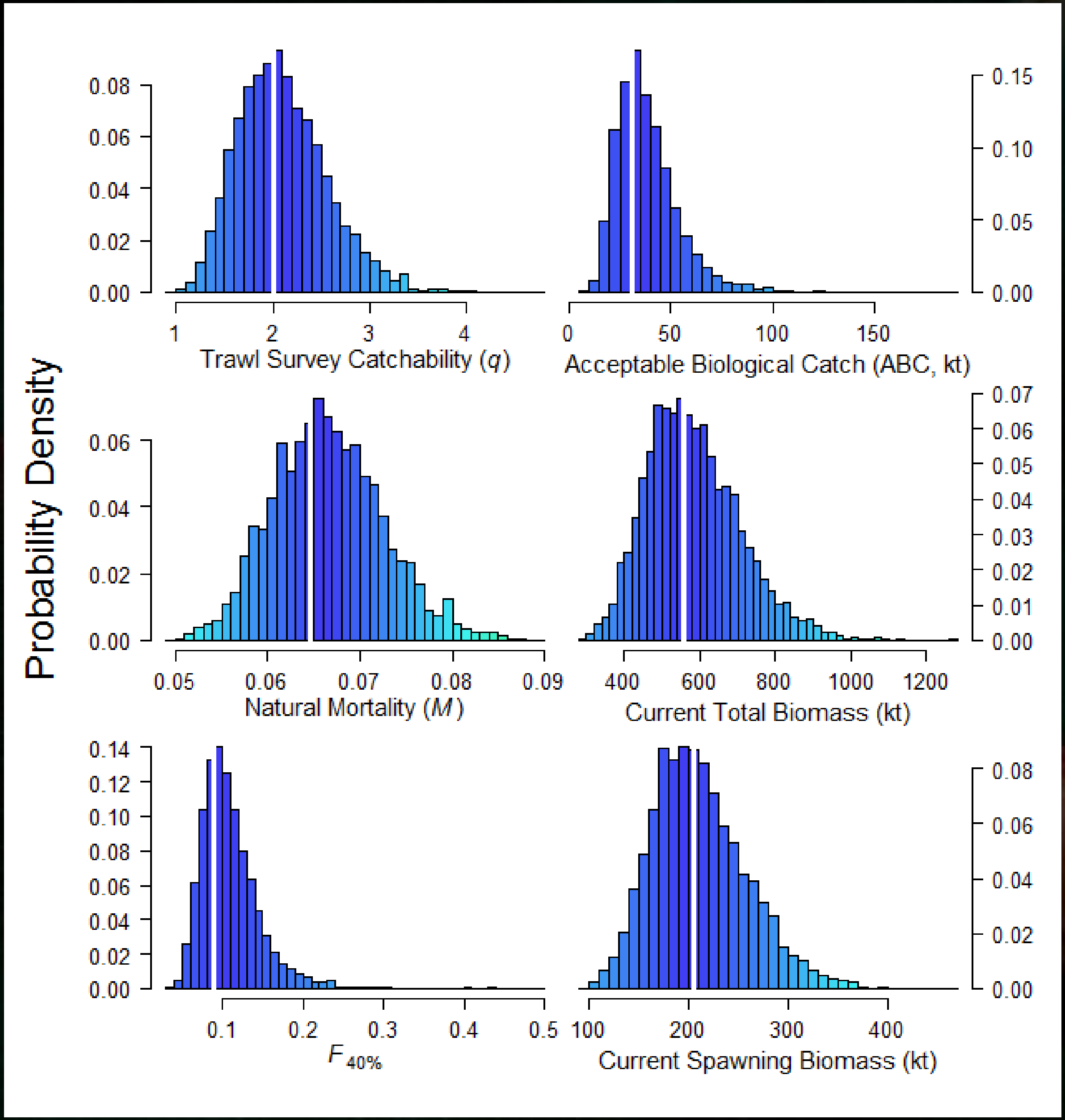
Management path



Projection & uncertainty

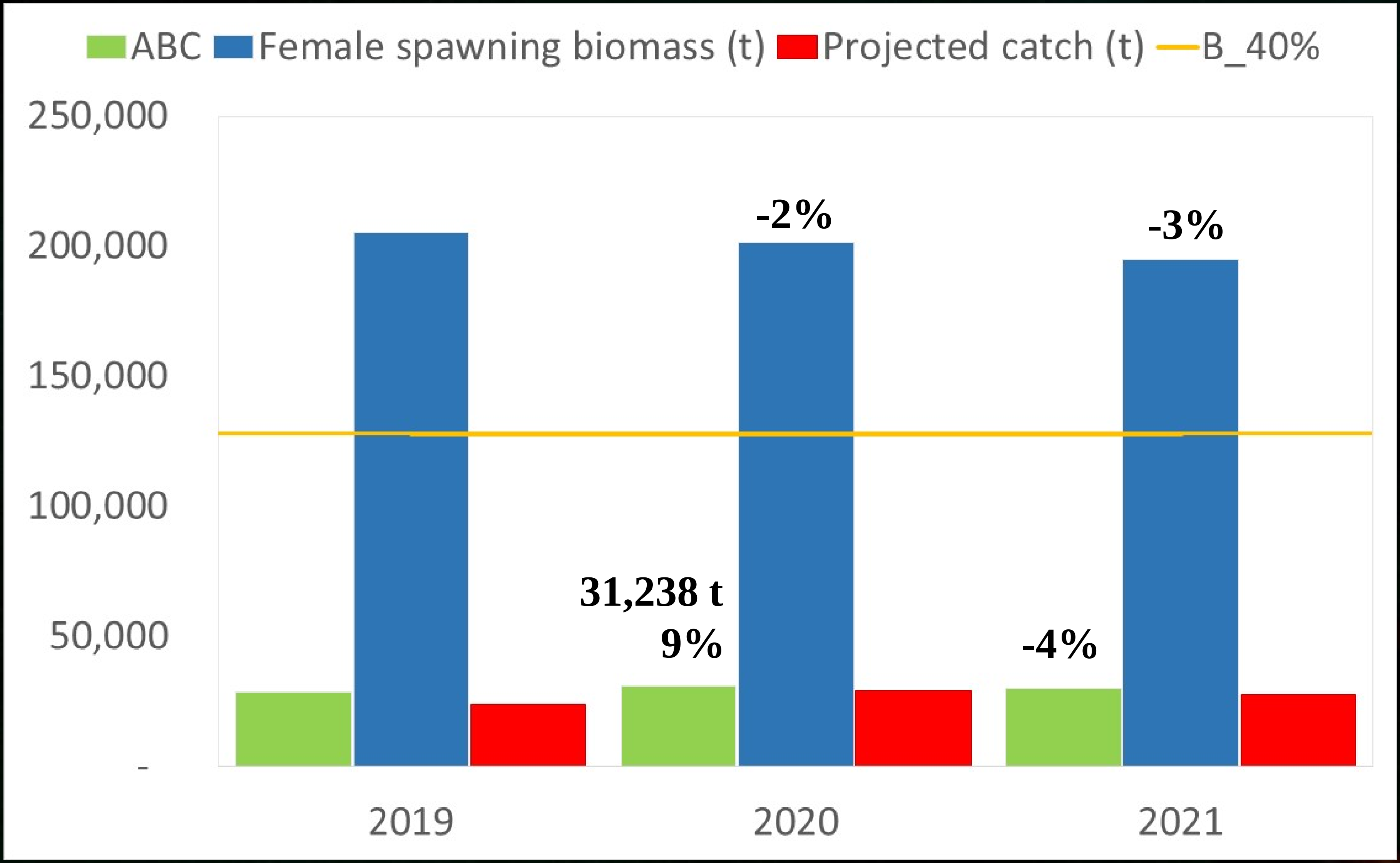


Key parameter uncertainty



POP – Recommendations

Pacific ocean perch



Pacific ocean perch

Quantity	As estimated or specified *last* year for: 2019	2020	As estimated or recommended *this* year for: 2020	2021[1]
M (natural mortality)	0.066	0.066	0.065	0.065
Tier	3a	3a	3a	3a
Projected total (age 2+) biomass (t)	496,922	481,608	544,569	524,883
Projected Female spawning biomass	176,934	172,345	201,518	194,795
$B_{100\%}$	293,621	293,621	319,837	319,837
$B_{40\%}$	117,448	117,448	127,935	127,935
$B_{35\%}$	102,767	102,767	111,943	111,943
F_{OFL}	0.113	0.113	0.108	0.108
$maxF_{ABC}$	0.094	0.094	0.090	0.090
F_{ABC}	0.094	0.094	0.090	0.090
OFL (t)	33,951	32,876	**37,092**	35,600
maxABC (t)	28,555	27,652	**31,238**	29,983
ABC (t)	28,555	27,652	**31,238**	29,983
Status	As determined *last* year for: 2017	2018	As determined *this* year for: 2018	2019
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

POP – Apportionment

Apportionment – ABC

	Western	Central	Eastern	Total
2019 ABC	3,240	19,678	5,687	28,605
2020 ABC	**1,437**	**23,678**	**6,123**	**31,238**
2021 ABC	**1,379**	**22,727**	**5,877**	**29,983**

	WYAK (24%)	EYAK/SE (72%)	Total
2019 ABC	3,298	2,389	5,687
2020 ABC	**1,470**	**4,653**	**6,123**
2021 ABC	**1,410**	**4,467**	**5,888**

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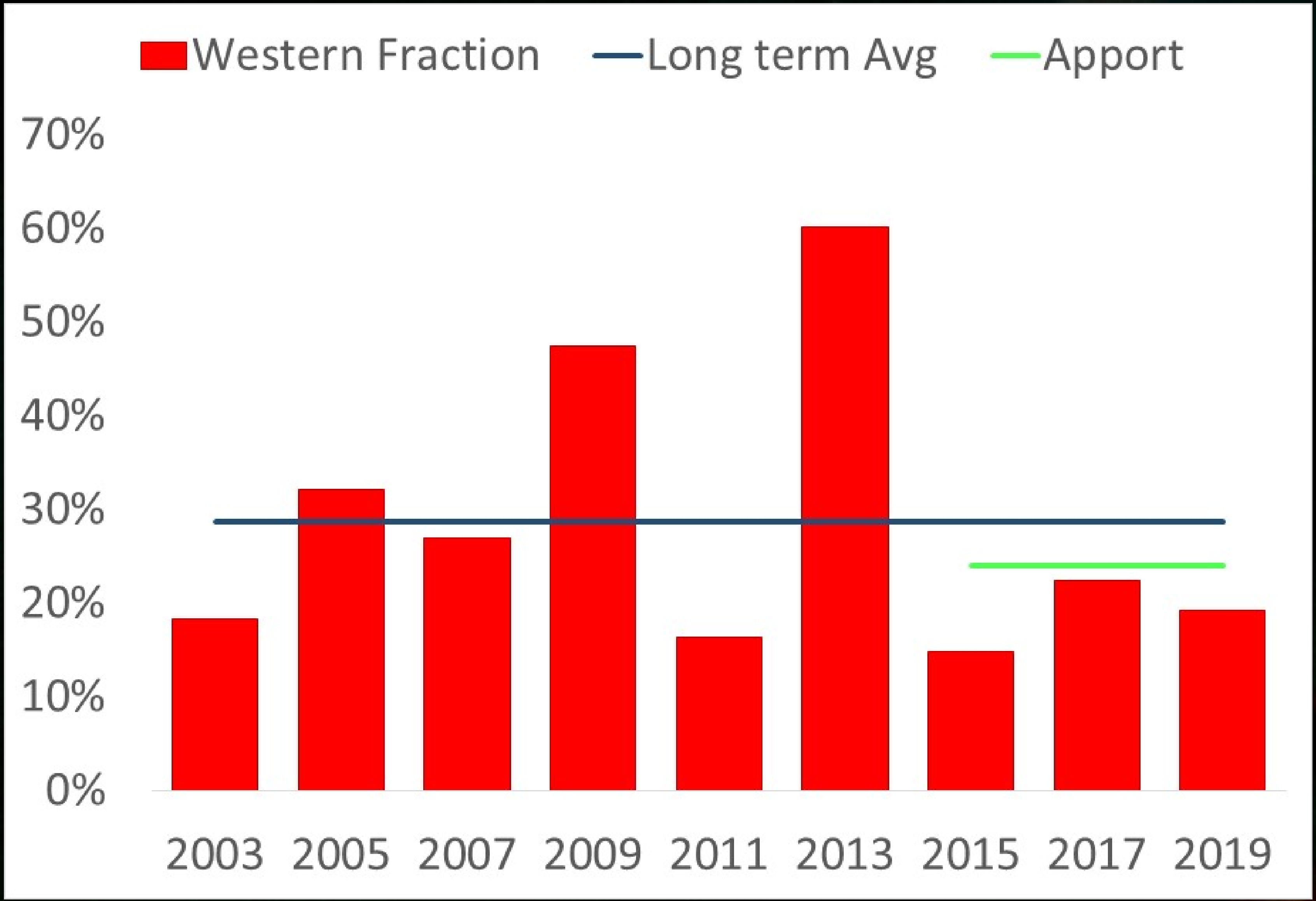
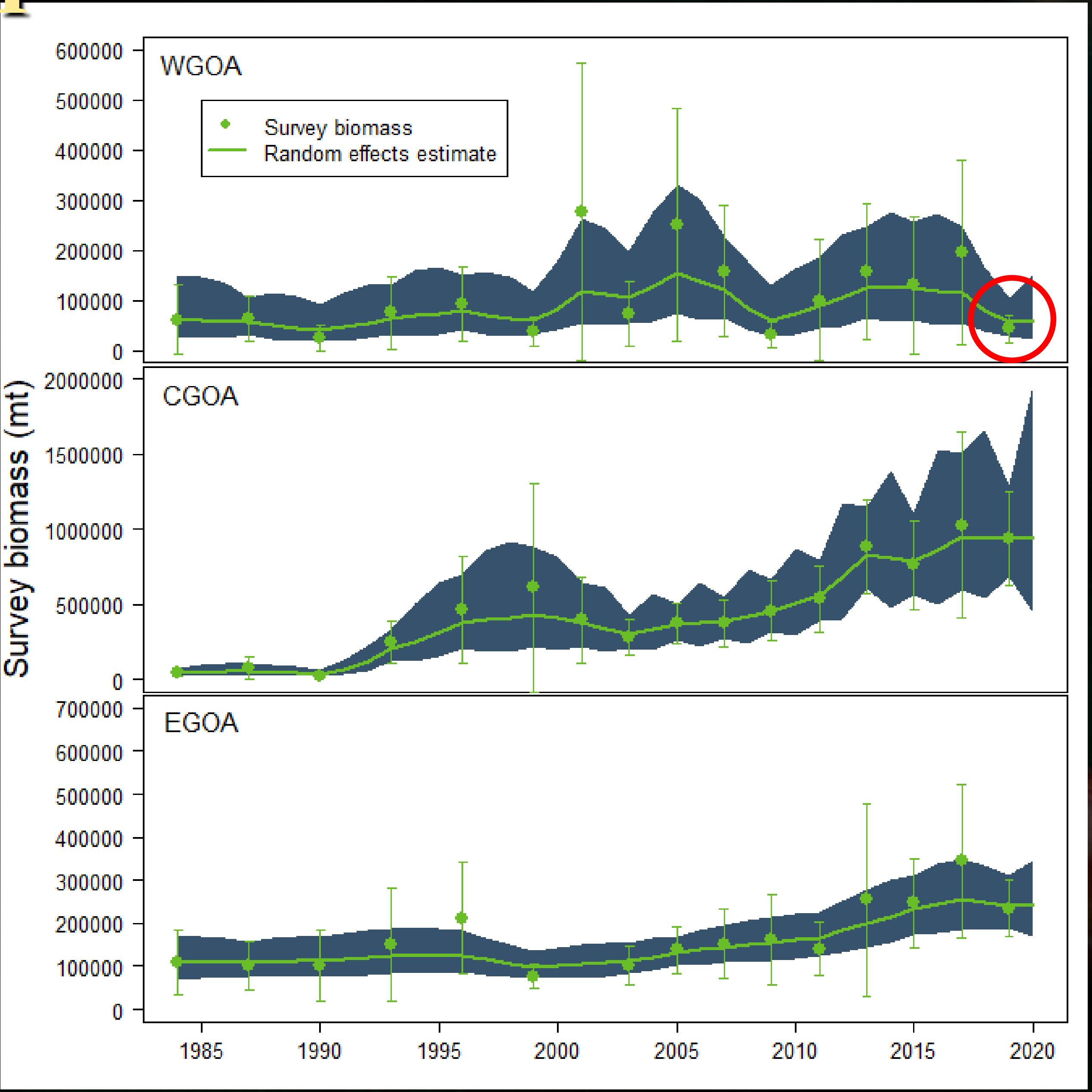
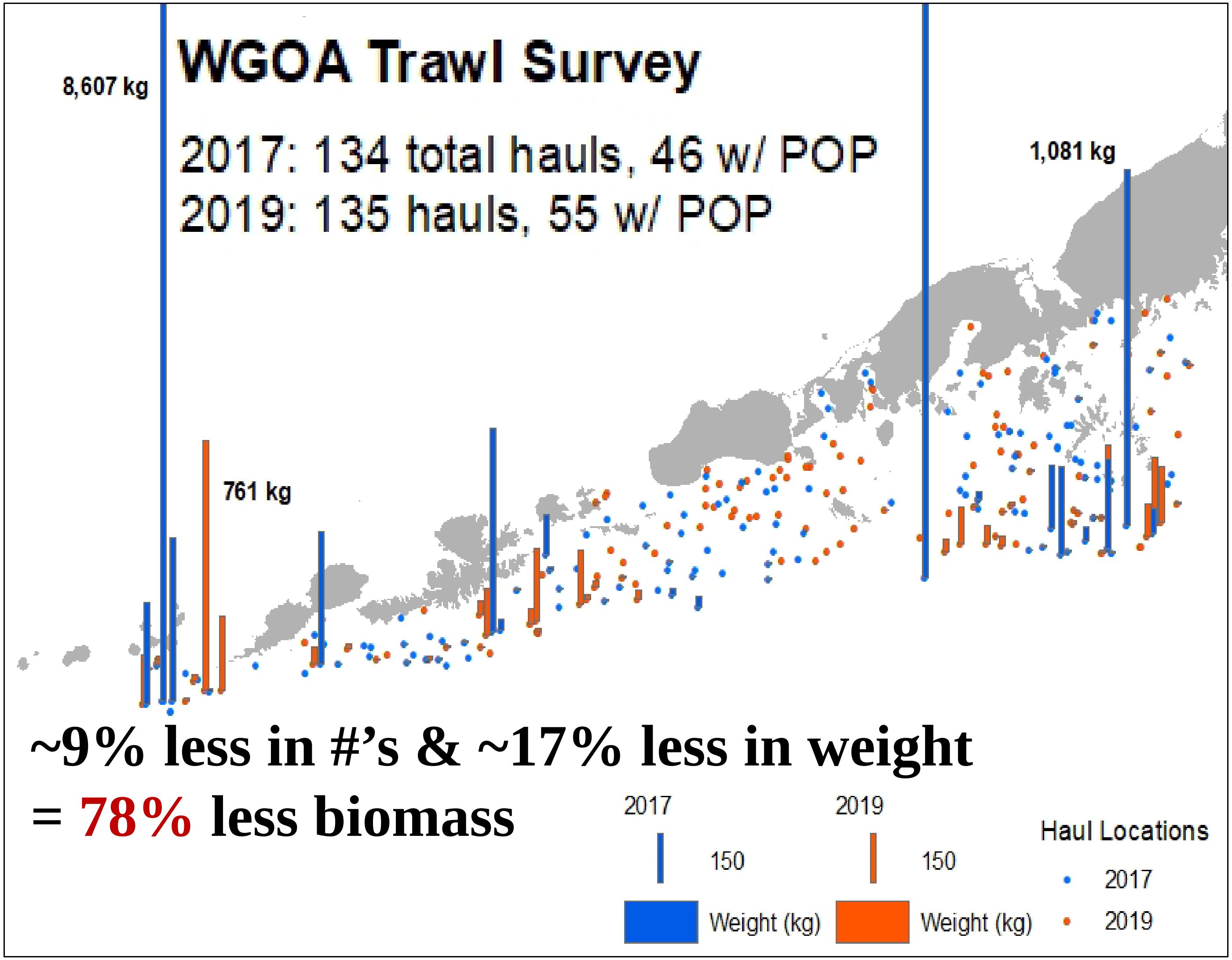
Apportionment – WYAK



Apportionment – Random Effx



Apportionment – WG

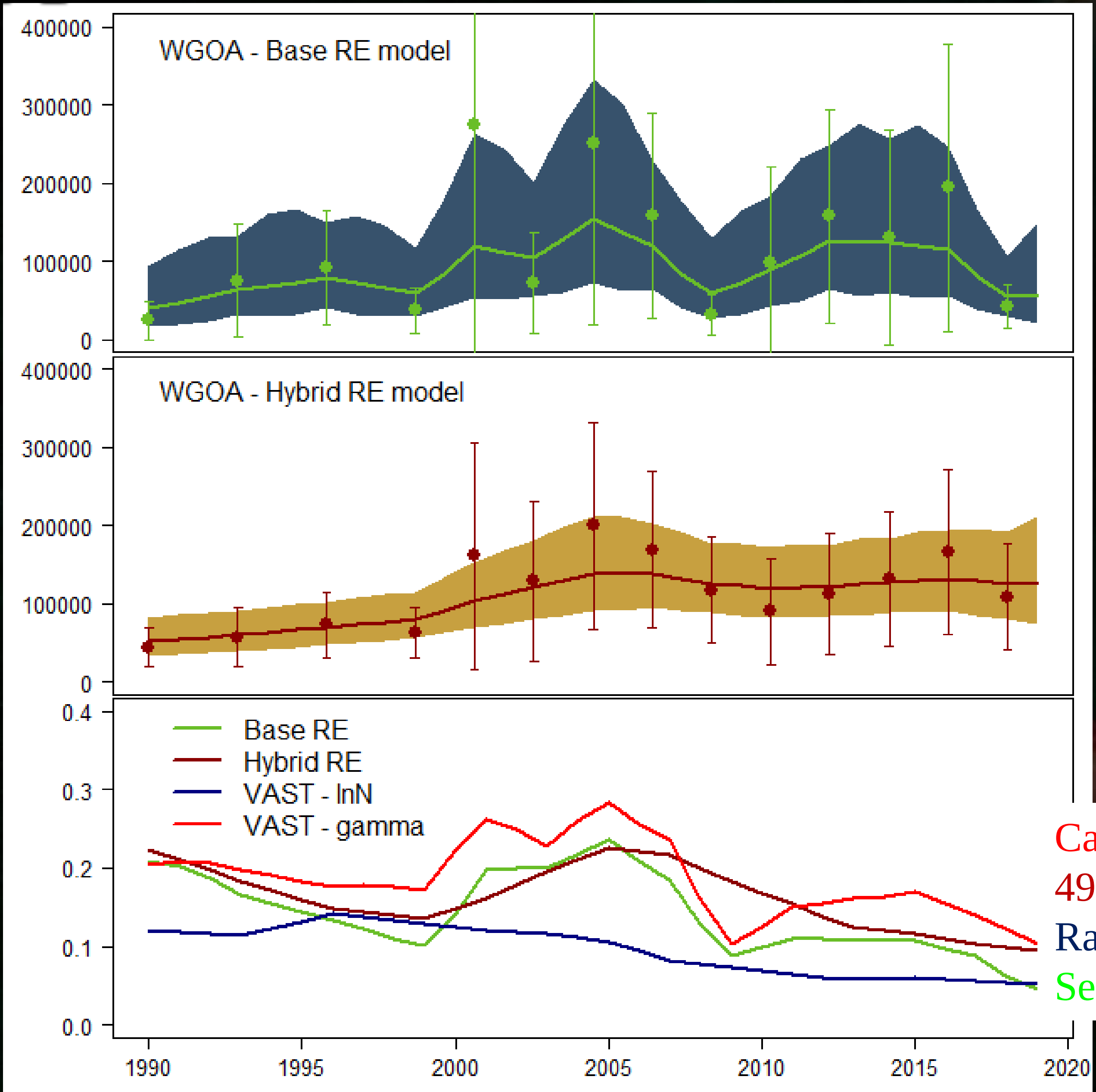


~9% less in #’s & ~17% less in weight
= 78% less biomass

Apportionment – Random Effx

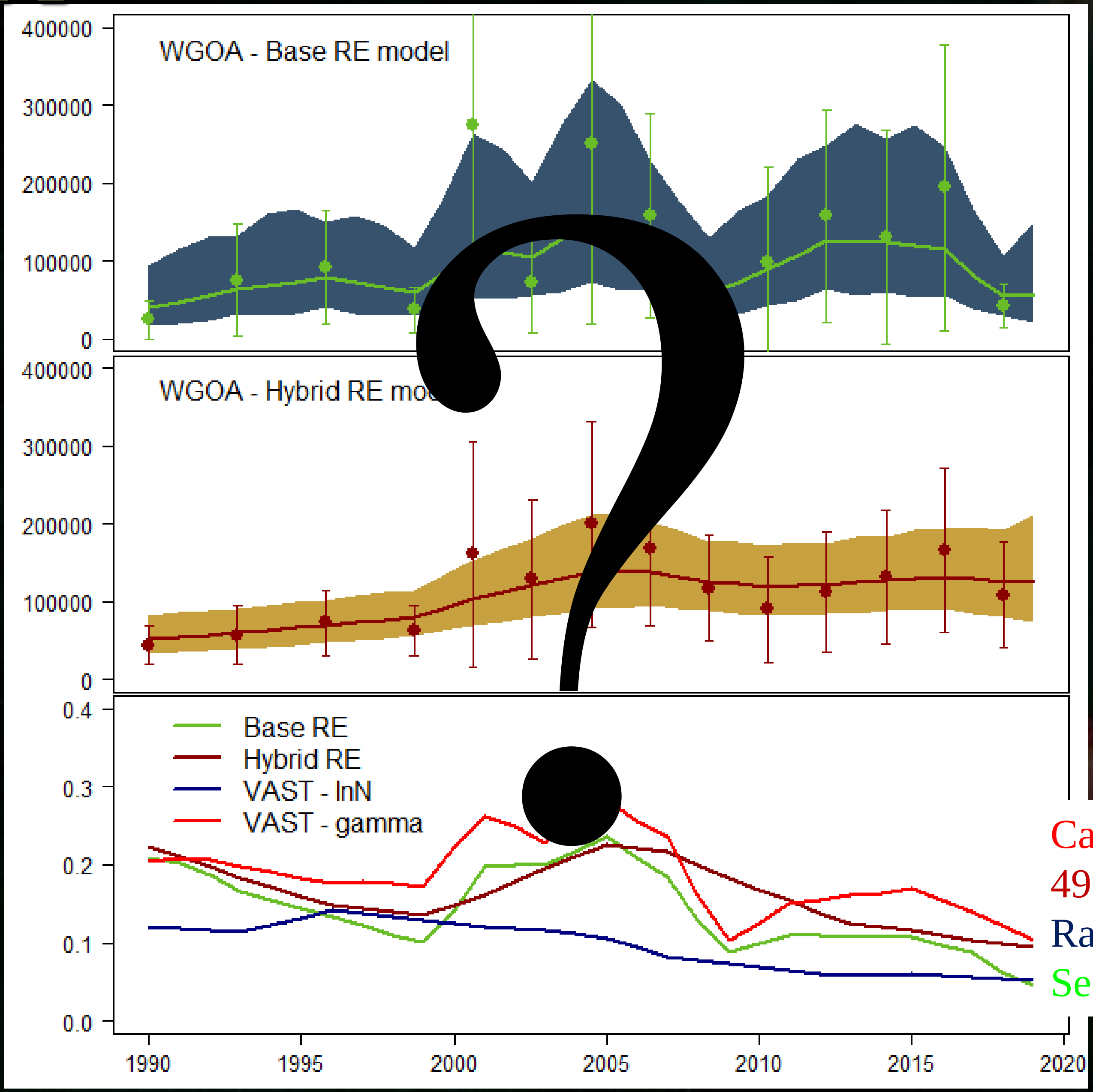
- Keep bumping into this problem of chasing small values with small variance…
- Don't think using fishery CPUE good idea in this case
- Problem with 4:6:9 weighting: didn't deal with uncertainty formally
- Hybrid method: fit 4:6:9 weighted mean (with variance of weighted mean) in RE model

Apportionment – Random Effx



Cardinals = 10%
49ers = 9.5%
Rams = 5.2%
Seachickens = 4.5%

Apportionment – Random Effx



Cardinals = 10%
49ers = 9.5%
Rams = 5.2%
Seachickens = 4.5%

Apportionment – Random Effx

- Good chance we get a couple large hauls in 2021, then back at ~12%, do we want the variability in apportionment?
- But, nothing apparently wrong with survey – we didn't miss them, actually caught them more frequently
- Hybrid attractive option, but not in SAFE
- If working towards VAST for index & apportionment, would be at ~5% anyway (with preferred model)

Apportionment - OFL

	W/C/WYAK	EYAK/SE	Total
2019 OFL	31,170	2,840	34,010
2020 OFL	**31,567**	**5,525**	**37,092**
2021 OFL	**30,297**	**5,303**	**35,600**

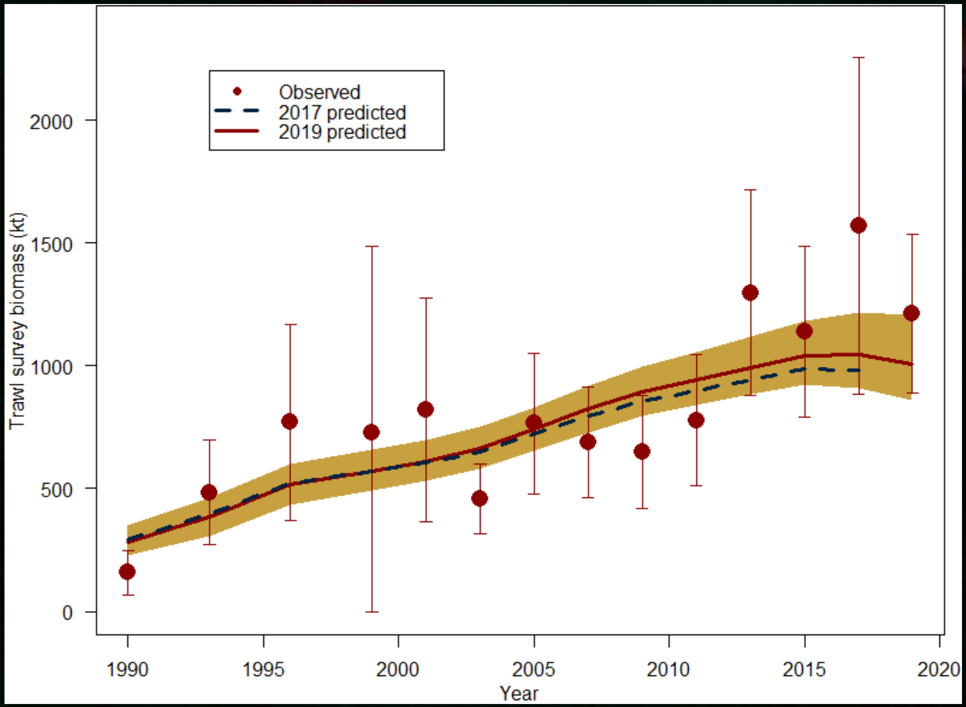
Risk matrix

- No recommended reductions from maxABC

- Was not a 5 min exercise, but…
  - Highlighted interesting aspects of the ‘one-way’ recommendation in this case
  - Served to unite programs at ABL, special thanks to Ellen Yasumiishi for helping with the Environmental/ecosystem considerations

Risk matrix – Assessment

	Assessment-related considerations
Level 1: Normal	Typical to moderately increased uncertainty/minor unresolved issues in assessment.
Level 2: Substantially increased concerns	Substantially increased assessment uncertainty/ unresolved issues.

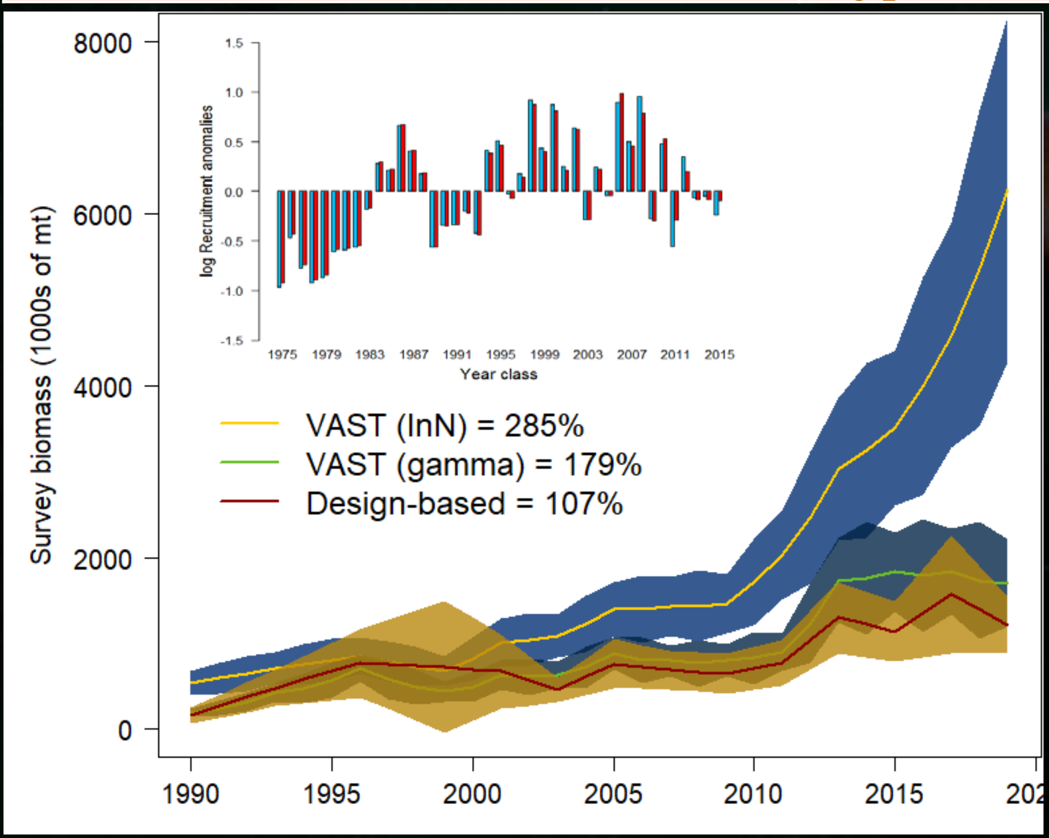


- Consistent underestimation of index since 2013
- Worsening retrospective pattern
- Both cause assessment uncertainty and unresolved issues
- Level 2

Risk matrix – Pop dy

Population dynamics considerations

Level 1: Normal	Stock trends are typical for the stock; recent recruitment is within normal range.
Level 2: Substantially increased concerns	Stock trends are unusual; ***abundance increasing*** or decreasing ***faster than has been seen recently***, or recruitment pattern is atypical.



- 2-4x increase in trawl biomass since 2013 (% inc in plot)
- Level 2

Risk matrix – Env/eco

Environmental/ecosystem considerations

Level 1: Normal	No apparent environmental/ecosystem concerns
Level 2: Substantially increased concerns	Some indicators showing adverse signals relevant to the stock but the pattern is not consistent across all indicators.

- 2019 summer sea surface temps all time high in GOA – indicate similar conditions to heat wave in 2015-2016 (Morgan et al 2019)
- Often indicate smaller and less lipid rich species within zooplankton community in GOA
- Bad? Good? Can’t say…
- Level 1

Risk matrix – Fishery

	Fishery Performance
Level 1: Normal	No apparent fishery/resource-use performance and/or behavior concerns
Level 2: Substantially increased concerns	Some indicators showing adverse signals but the pattern is not consistent across all indicators

- In general, CPUE follows trawl survey trends (exception in WGOA)
- No adverse indicators
- Level 1

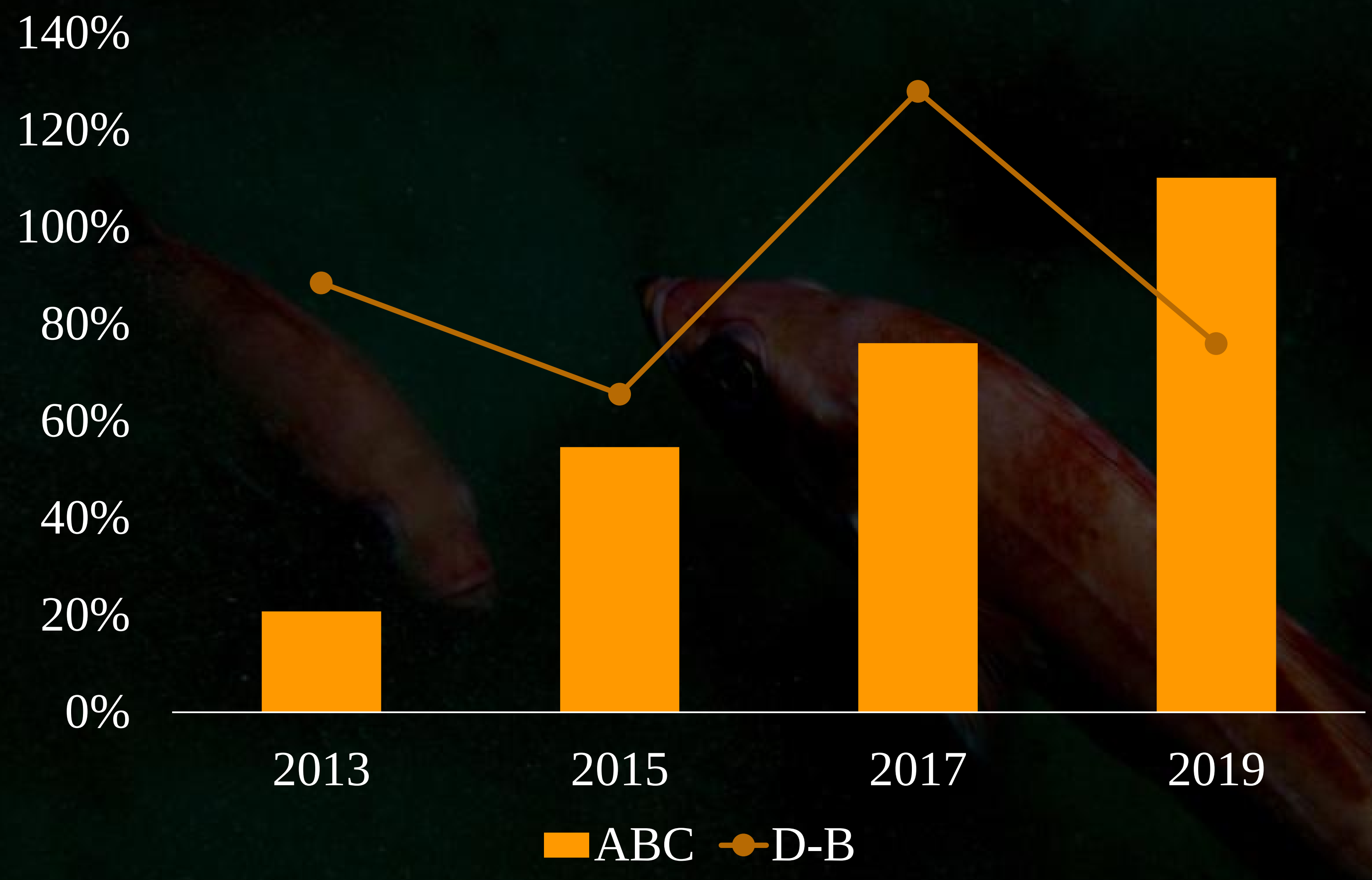
Risk matrix

Assessment-related considerations	*Population dynamics considerations*	*Environmental/ ecosystem considerations*	*Fishery Performance considerations*	*Overall score (highest of the individual scores)*
Level 2: Substantially increased concerns	Level 2: Substantially increased concerns	Level 1: No apparent concern	Level 1: No apparent concern	Level 2: Substantially increased concerns

- Overall, level 2, but no recommendation for decrease
- Healthy pop’n, not driven by single year class, biomass underestimated
- Highlights case of risk matrix usage that could indicate increasing rather than decreasing ABC

Risk matrix

- How is the assessment tracking increase?



POP – Summary/Future work

- All sources of information indicate healthy pop’n
- Coming up on the horizon:
  - CIE in spring: VAST, Acoustics, alt models suggested by PT/SSC
  - Continue to try and get model to explain increase