

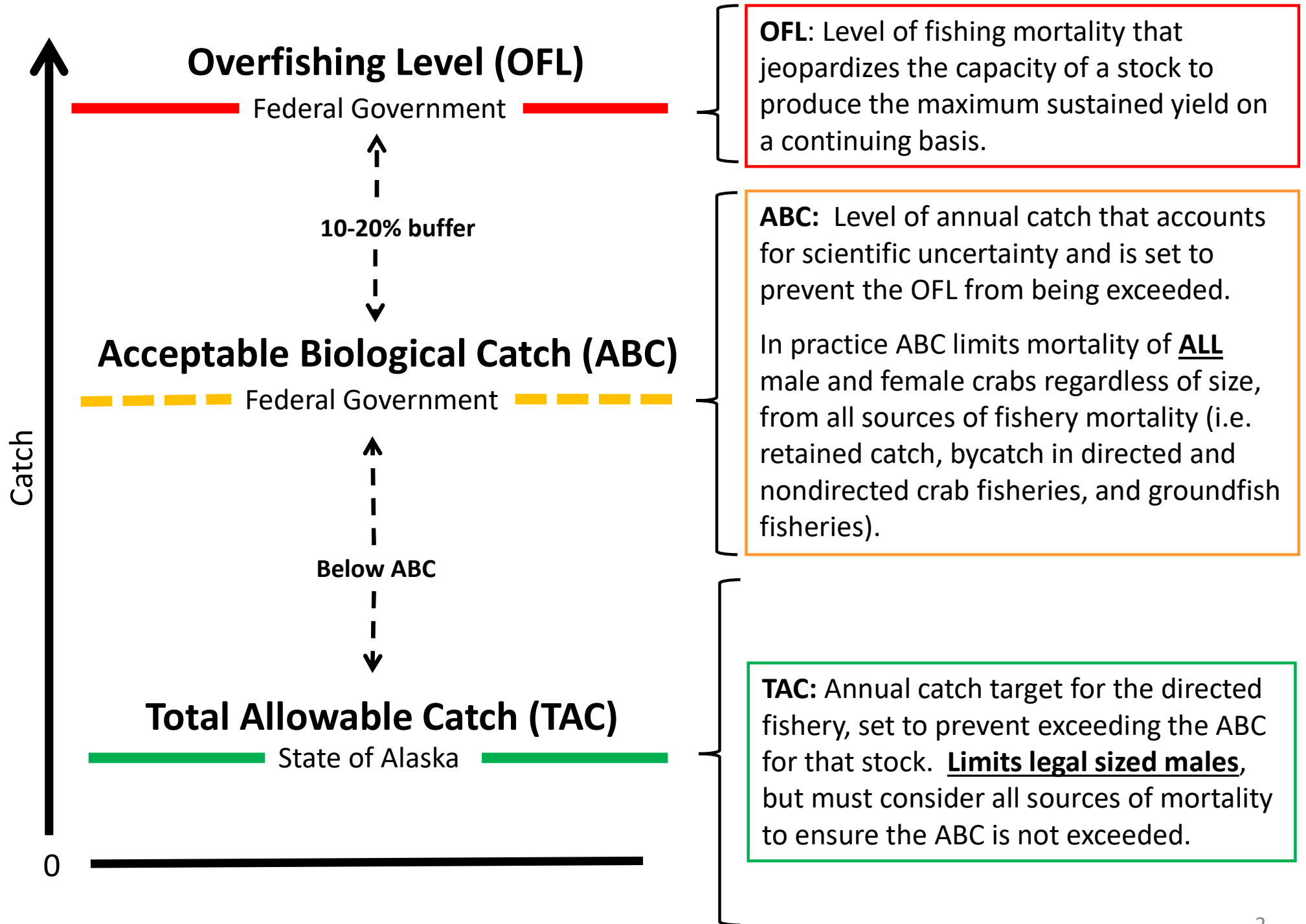
Bering Sea Crab Stock Status

Alaska Department of Fish and Game

Joint Protocol Committee Meeting

October 13, 2022; Anchorage, Alaska





2022/23 Specification Summary

Fishery	OFL (mill lb)	ABC (mill lb)	TAC (mill lb)
Pribilof blue king crab	0.0026 (total catch)	0.0020 (total catch)	0 (directed fishery closed)
Pribilof red king crab	1.51 (total catch)	1.13 (total catch)	0 (directed fishery closed)
St. Matthew blue king	0.15 catch)	0.11 (total male catch)	0 (directed fishery closed)
Bristol Bay red king crab	6.70 (total catch)	5.35 (total catch)	0 (directed fishery closed)
Bering Sea Tanner crab	72.34 (total catch)	54.25 (total catch)	1.165 (EBT), 0.850 (WBT) (retained catch)
Bering Sea snow crab	22.71 (total catch)	16.98 (total catch)	0 (directed fishery closed)

Bering Sea snow crab

Assessment Specifications

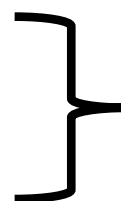
Year	MSST	Biomass (MMB)	TAC	Retained catch	Total catch	OFL	ABC
2015/2016	167.11	201.94	40.57	40.57	47.18	183.2	137.35
2016/2017	153.66	211.86	21.38	21.38	24.25	52.25	46.96
2017/2018	157.41	219.58	18.96	18.96	23.15	62.61	50.04
2018/2019	138.89	271.39	27.56	27.56	33.95	65.48	52.47
2019/2020	125.22	368.83	33.95	33.95	45.86	121.03	96.78
2020/2021	169.09	58.95	44.97	44.97	57.76	210.32	157.74
2021/2022	201.94	90.83	5.51	5.51	7.94	16.53	12.35
2022/2023		121.25				22.71	16.98

OFL = 22.71 million lbs

ABC = 16.98 million lbs

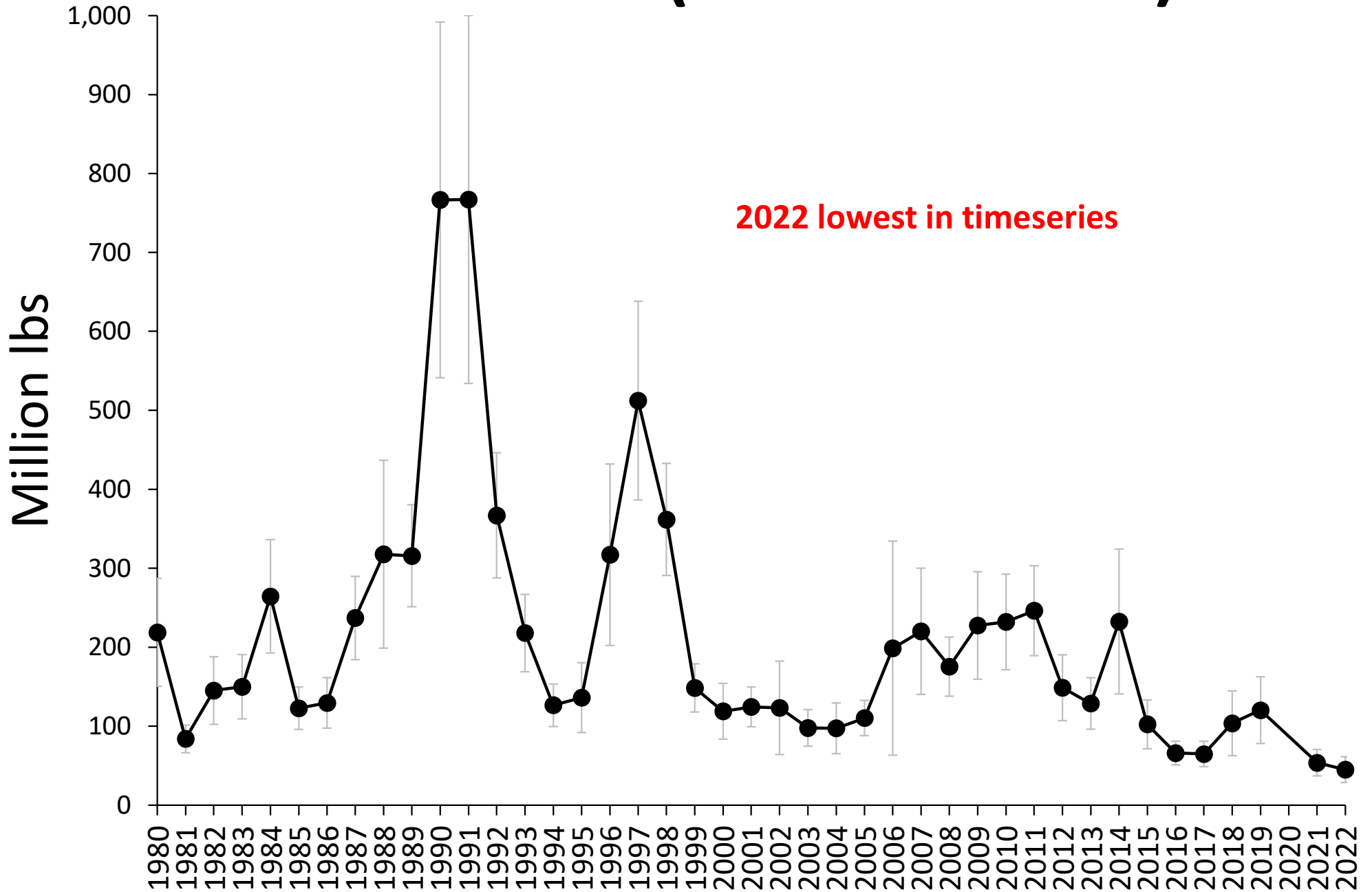
Current stock status = 23%

Projected stock status = 30%

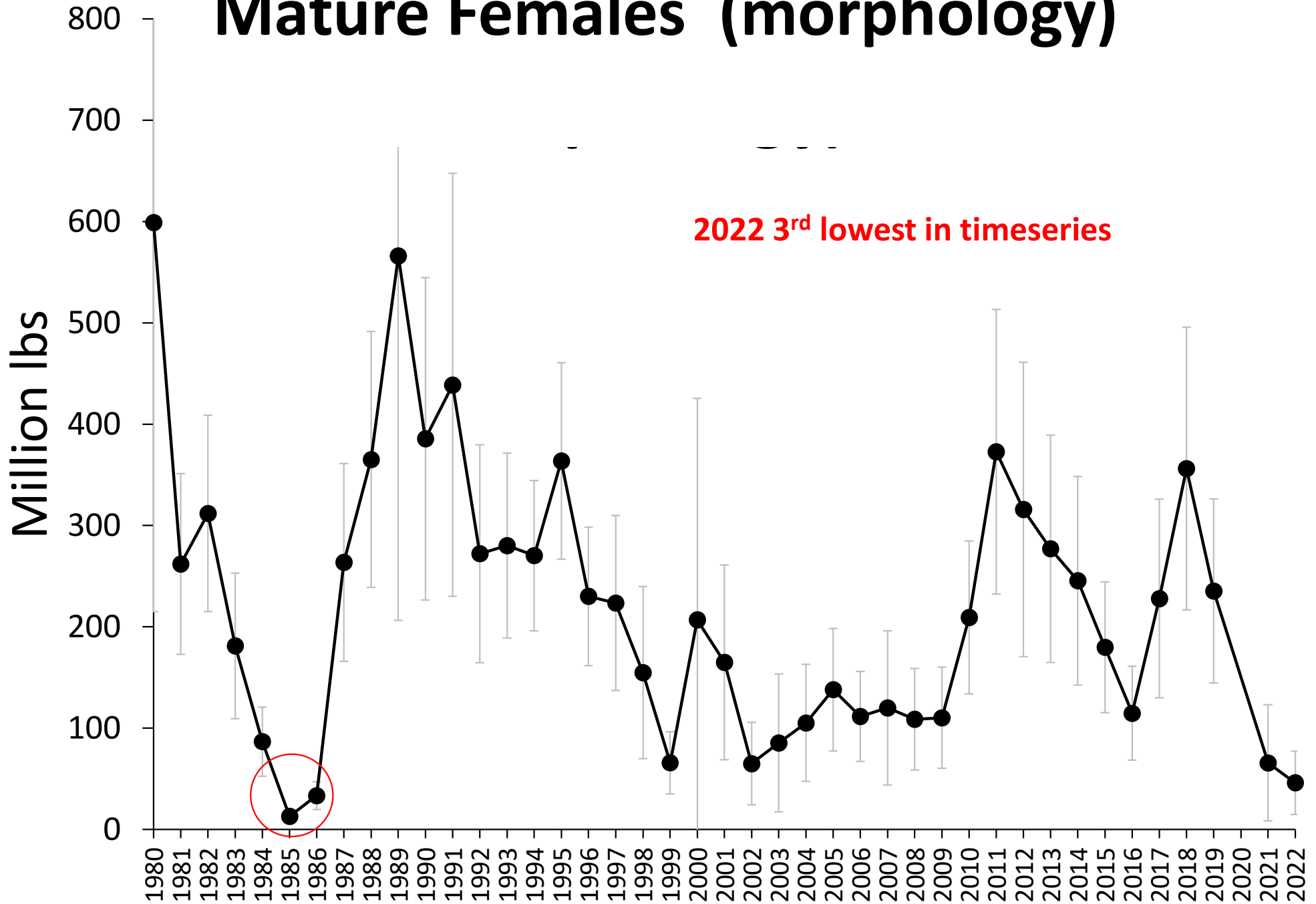


Declared “overfished”
Rebuilding plan in development

Mature males (≥ 95 mm CW)



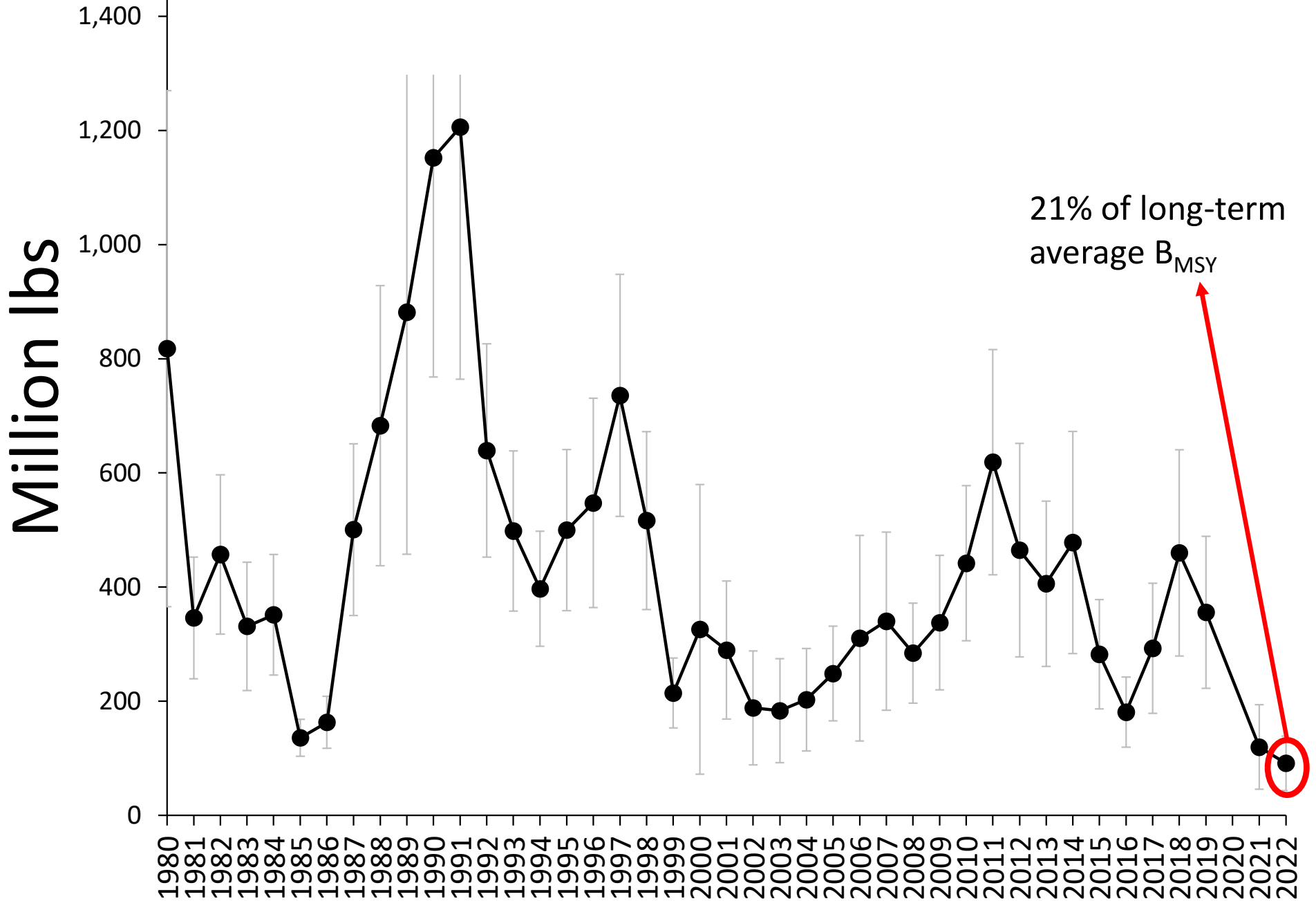
Mature Females (morphology)



2022 3rd lowest in timeseries

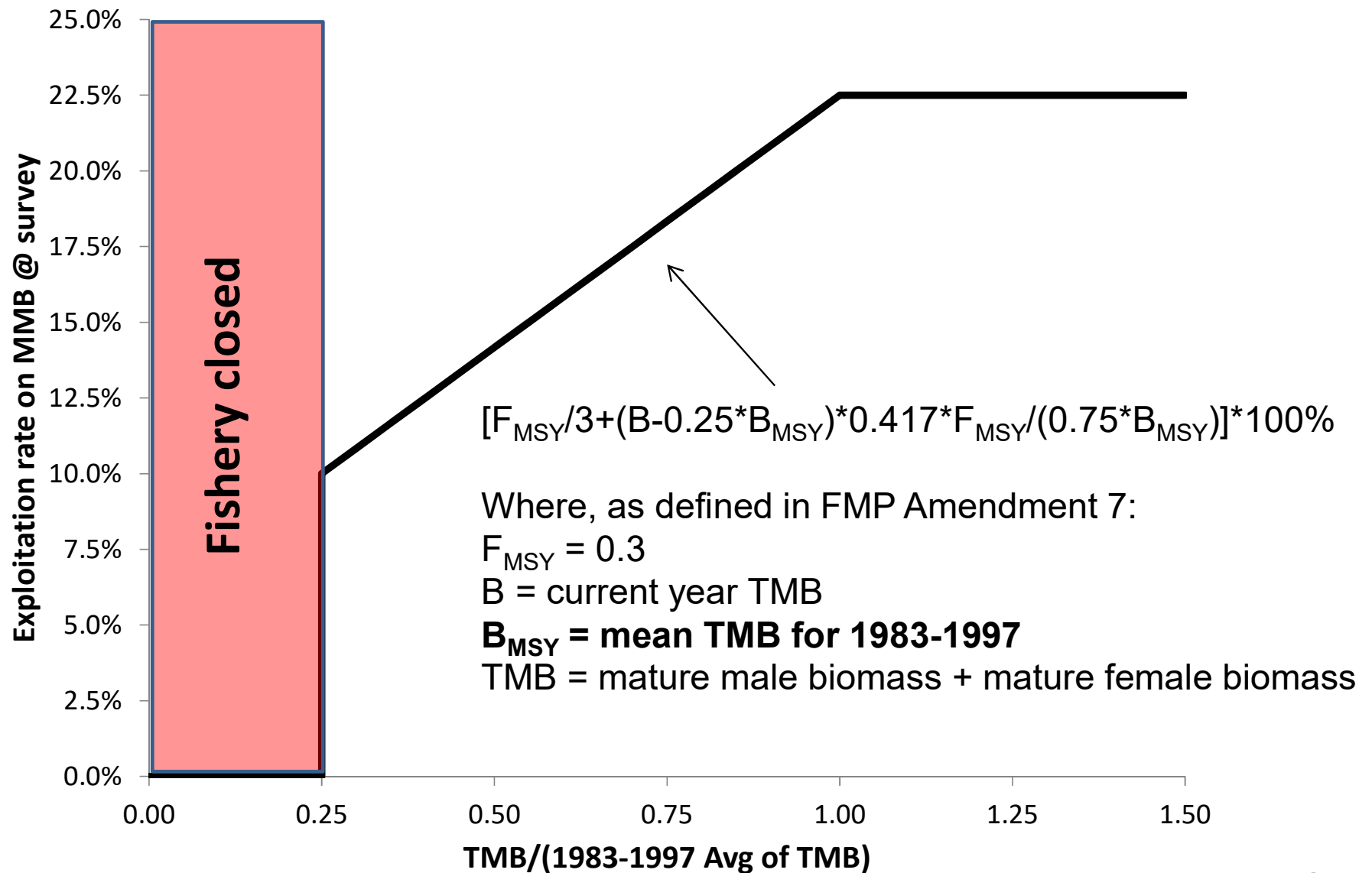
NOAA survey area-swept data

Total Mature Biomass



NOAA survey data

State Harvest Strategy

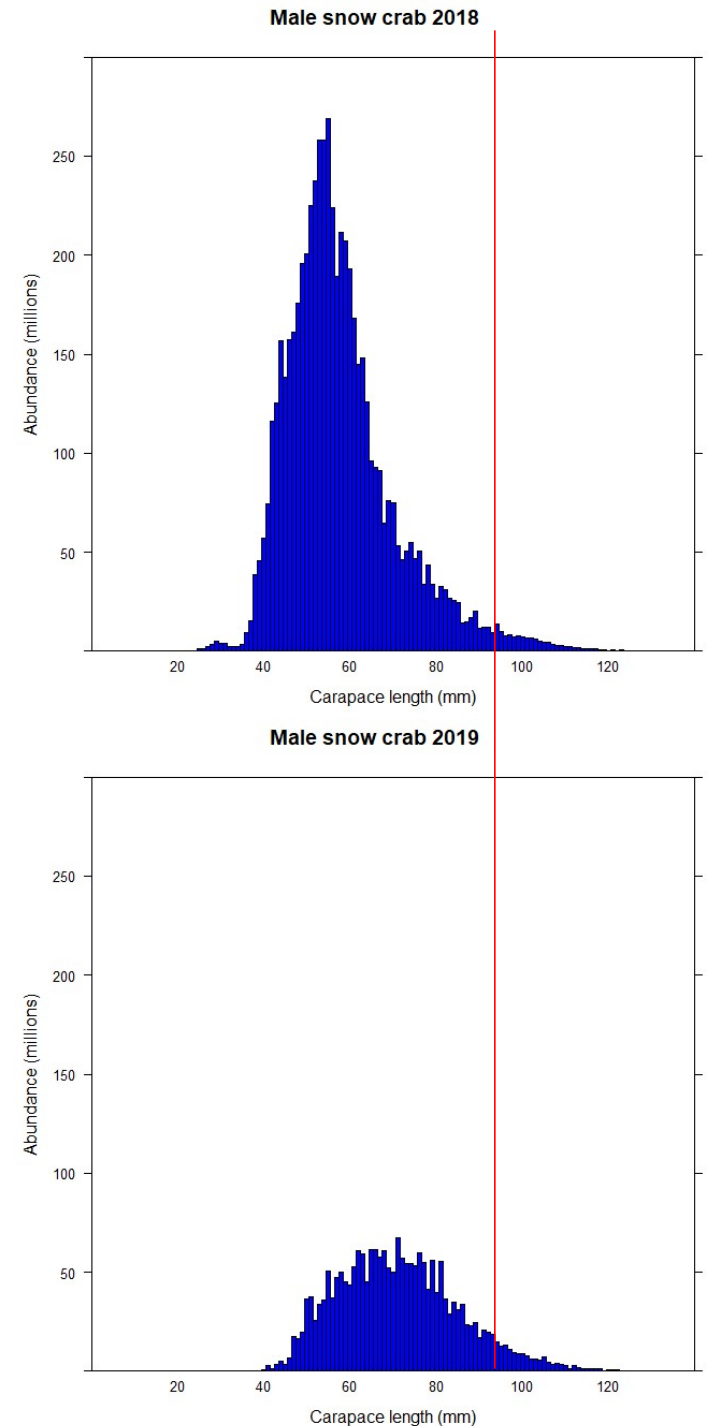


Characterizing the 2018-2022 collapse

2018-2019:

- 2018 strongest juvenile cohort in timeseries
- Most of 2019 decline was in the juvenile sizes: net loss of ~2.5 billion juvenile males (not accounting for survey selectivity)
- Retained catch 27.7 mill lbs
- MMB (>95mm) increased from 104 million lbs to 120 million lbs
- Lots of M for juvenile sizes, but juvenile size class was so strong in 2018 that growth exceeded M

NOAA survey area-swept data

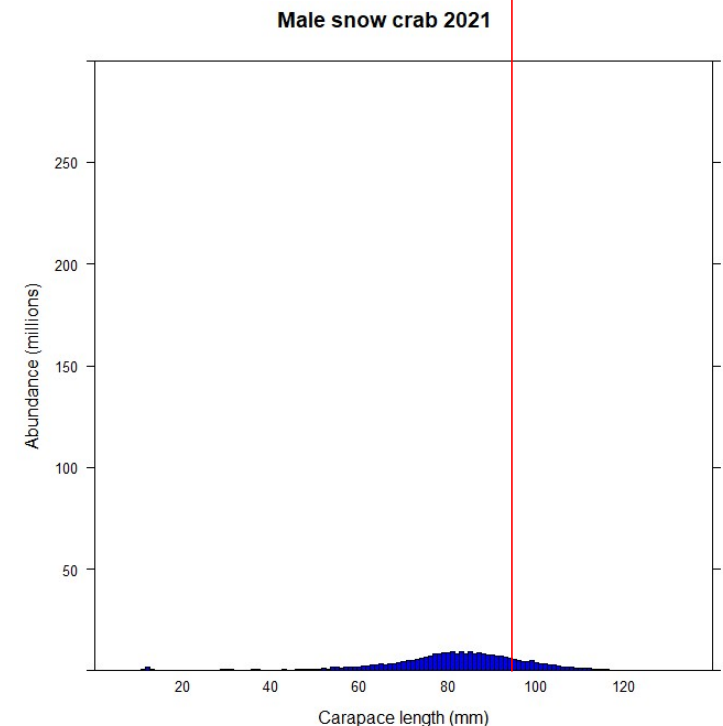
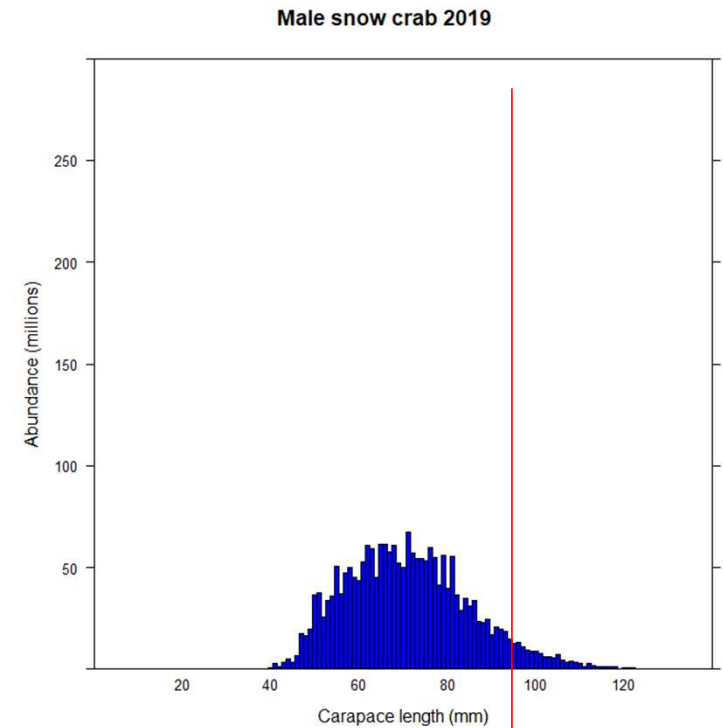


Characterizing the 2018-2022 collapse

2019-2021:

- Poor recruitment
- Juvenile size classes dissipate
- Retained catch during that period 79 million lbs (104 total catch)
- M and F exceeds Growth and R into mature male sizes (≥ 95 mm CW)
- MMB declines from 120 to 54 million lbs (66.5 mill lb)
- No survey in 2020

NOAA survey area-swept data

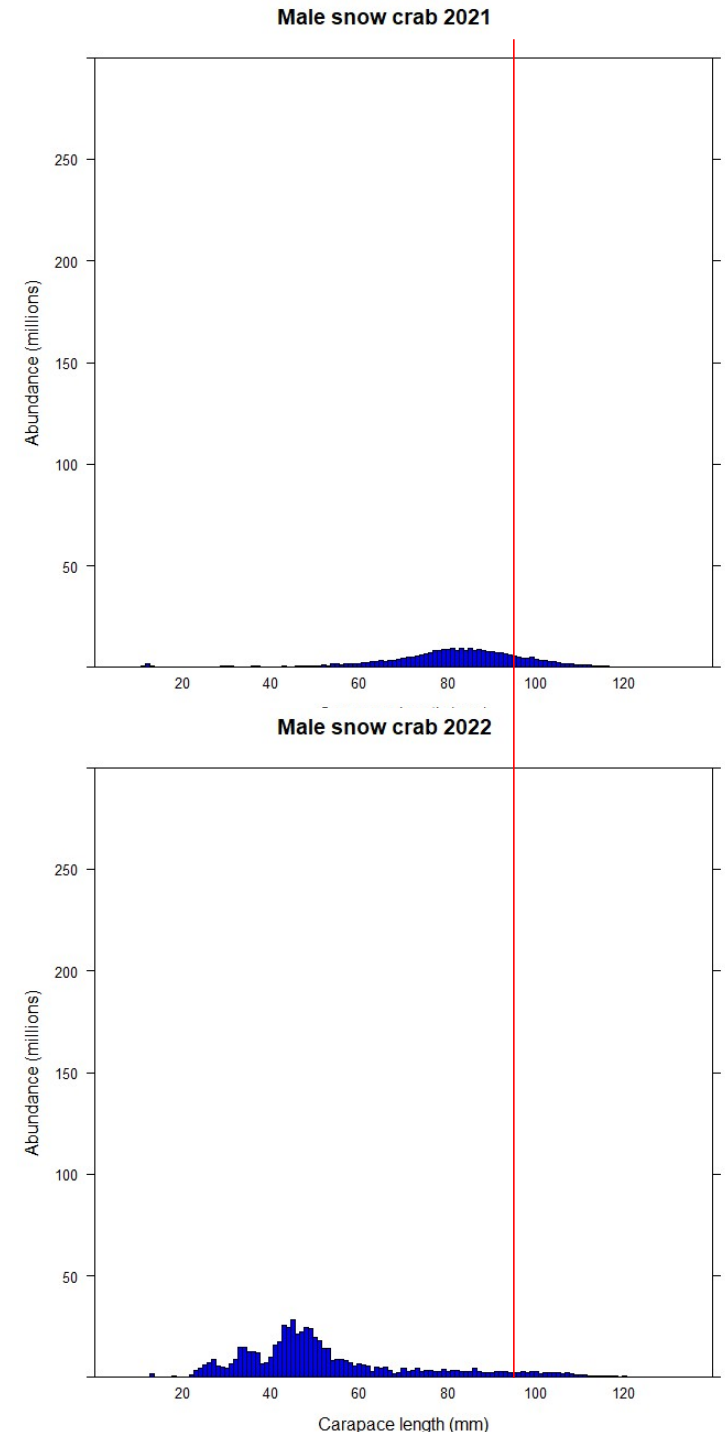


Characterizing the 2018-2022 collapse

2021-2022:

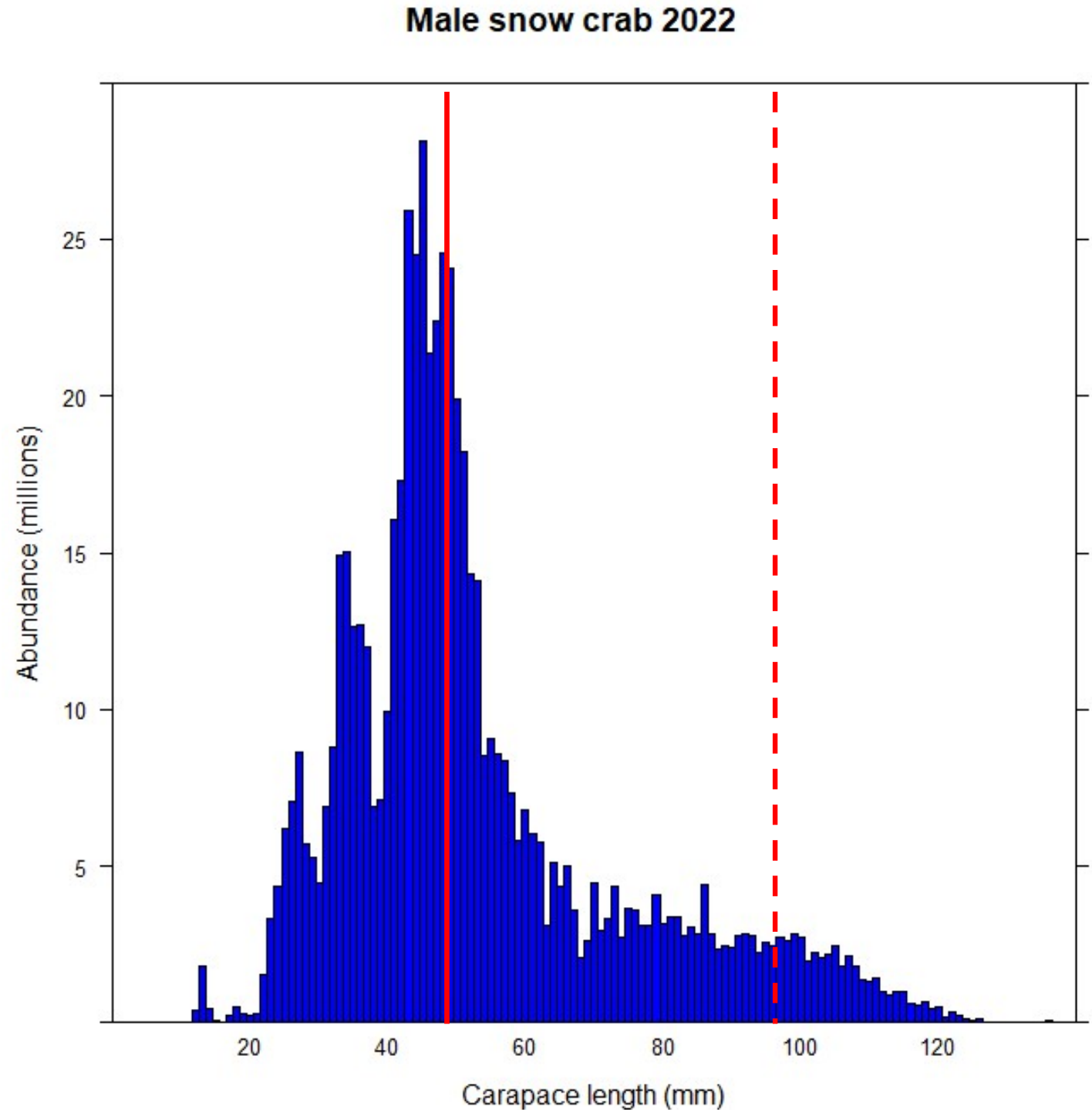
- Juvenile >50 mm size classes dissipate
- M + F exceeds Growth and R into mature male sizes (≥ 95 mm CW)
- MMB declines 40% from 54 to 45 million lbs
 - **9 mill lb decline**, removals in 2021 were 5.5 mill lb (**total catch ~8 mill lbs**)
- Some R to small juvenile sizes

NOAA survey area-swept data

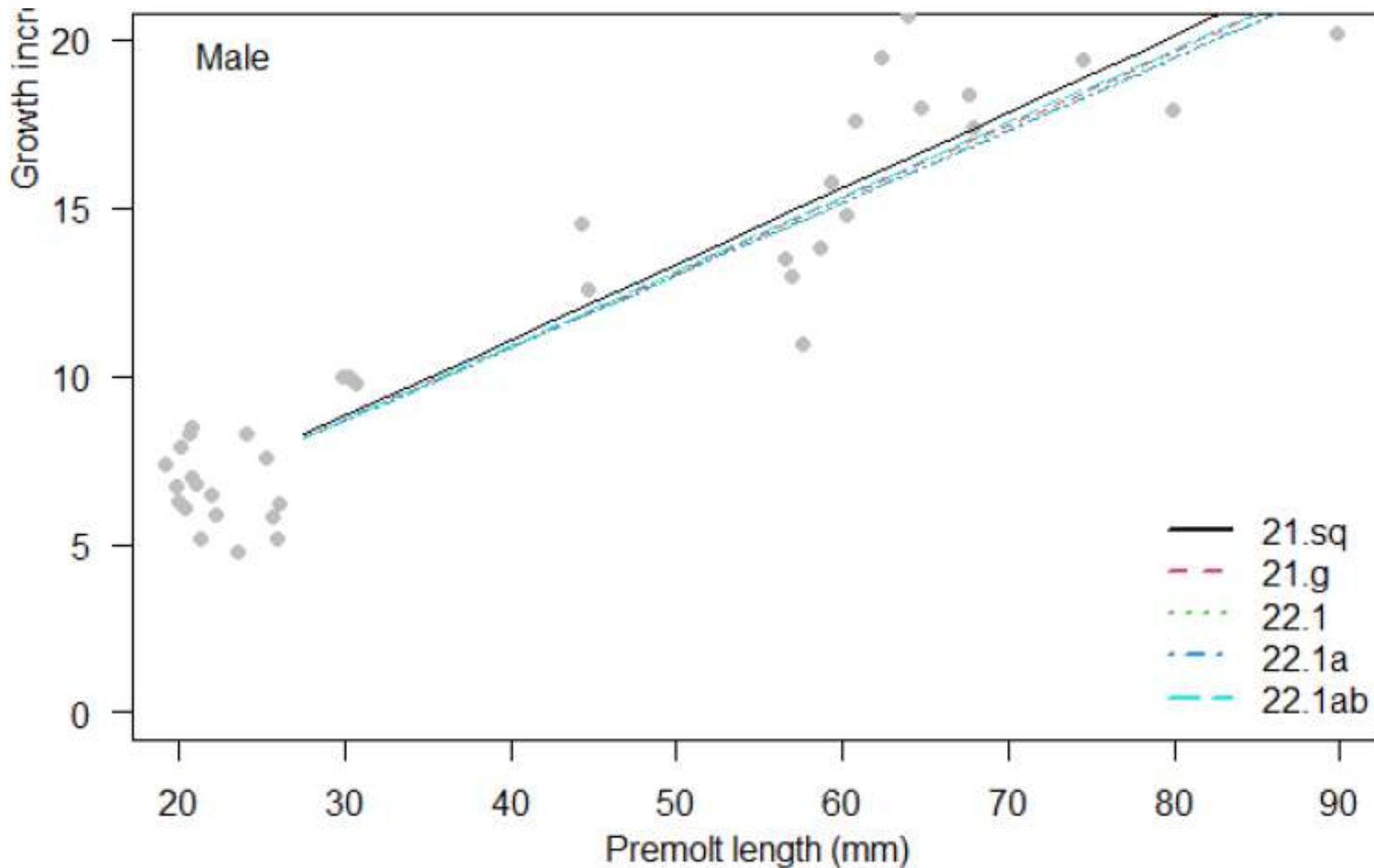


2022 data

- 45 mill lb MMB (≥ 95 mm)
- How long until ~ 50 mm juvenile cohort reaches 95 mm?

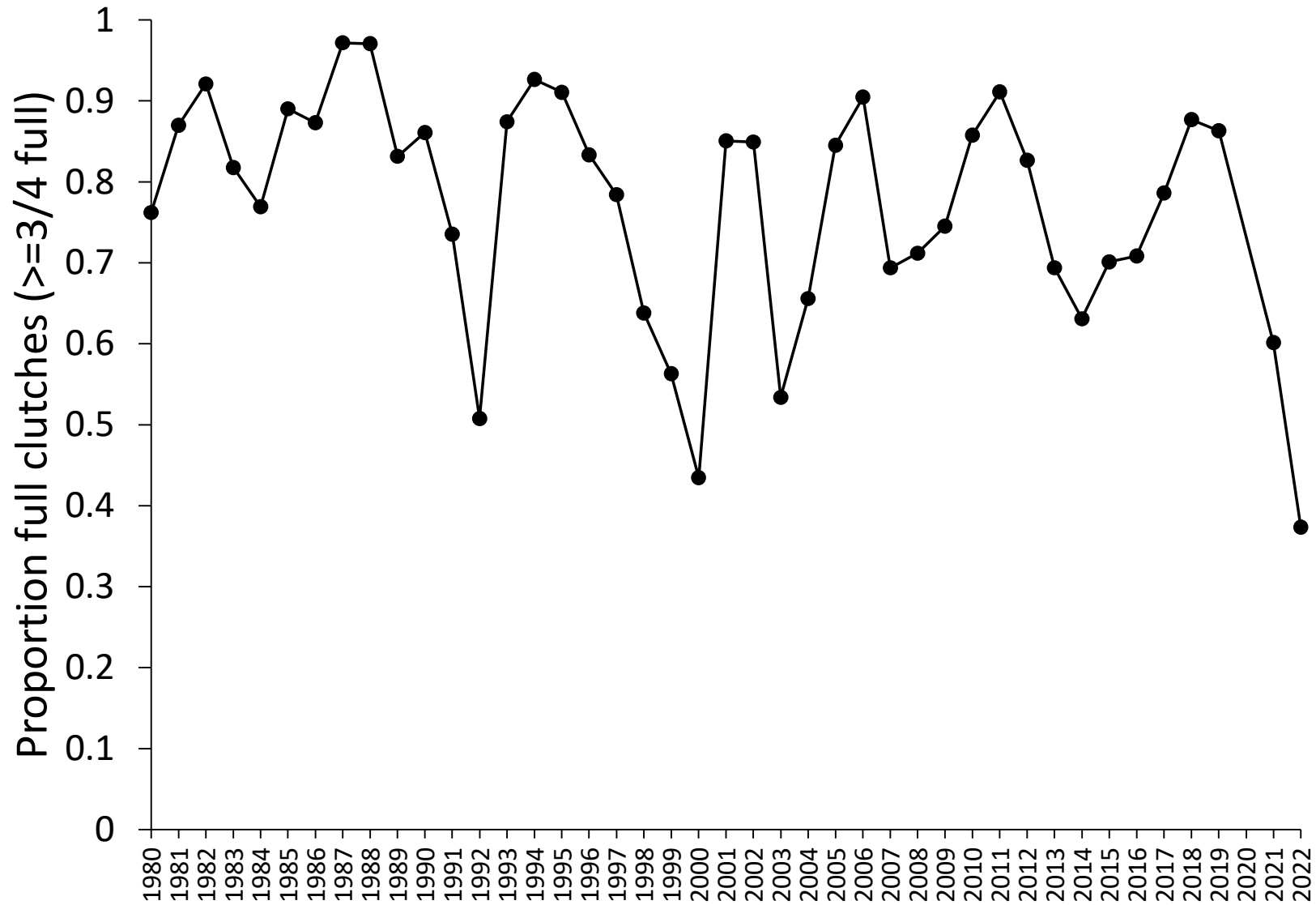


NOAA survey area-swept data



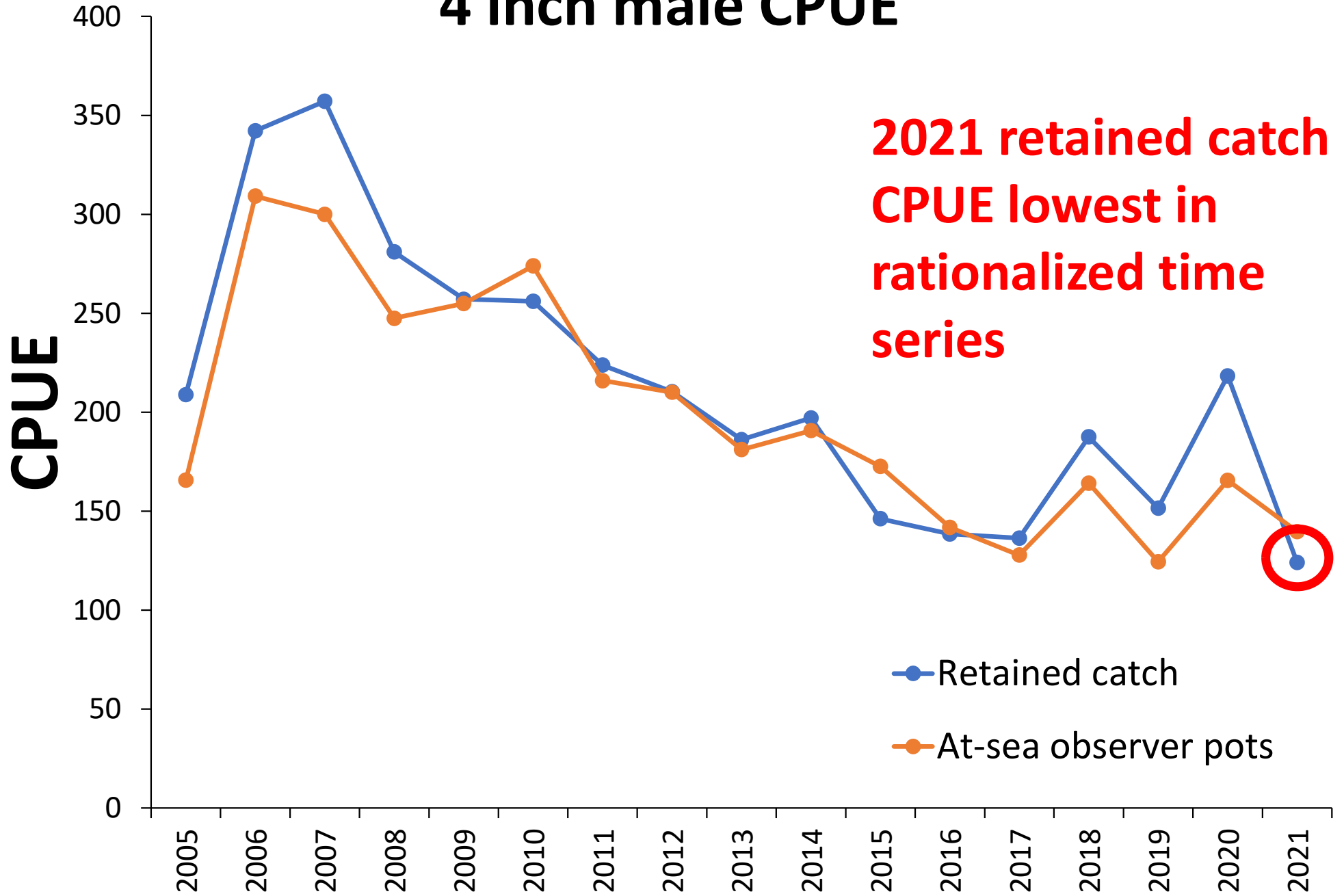
- ~15 mm increase per molt
- ~4 molts to grow from 50 mm to 95 mm
- How many molts per year at those sizes?.....1?
- ~4-ish years from 50 mm cohort to reach ~95mm

More troubling signals

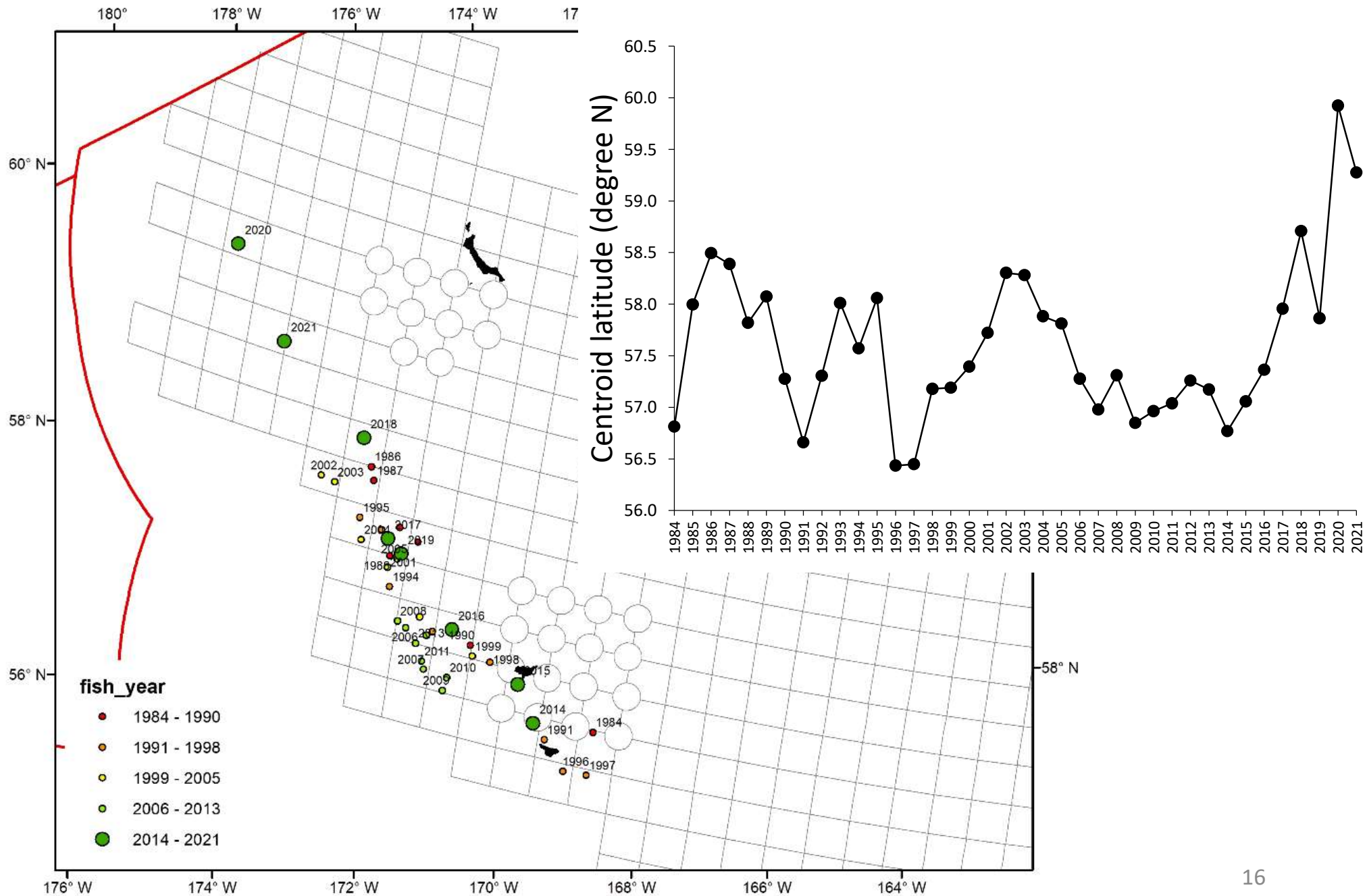


NOAA survey area-swept data

4 inch male CPUE



Snow crab weighted mean centers of catch



Snow crab outlook

- Population at historic lows
 - Survey data, current assessment stock status at 23%
- Future environmental conditions and snow crab recruitment unknown
 - Unknown if recent mortality event is over or when next one will occur
- Likely see further declines in MMB in 2023 survey given size composition of population
 - MMB and 4-inch male numbers likely get worse before they get better
- Some signs of recruitment, but MMB + MFB in water now likely the spawning stock for next 2-4 yrs

Bering Sea Tanner Crab

Assessment Specifications

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2017/18	33.40	95.49	2.50	2.50	5.22	56.03	44.83
2018/19	45.27	182.09	2.44	2.44	4.18	46.01	36.82
2019/20	40.36	123.77	0.00	0.00	1.20	63.62	50.89
2020/21	39.61	124.19	2.35	1.44	2.11	46.58	37.26
2021/22	38.29	136.79	1.10	1.09	1.73	59.89	47.91
2022/23	NA	104.88	NA	NA	NA	72.34	54.25

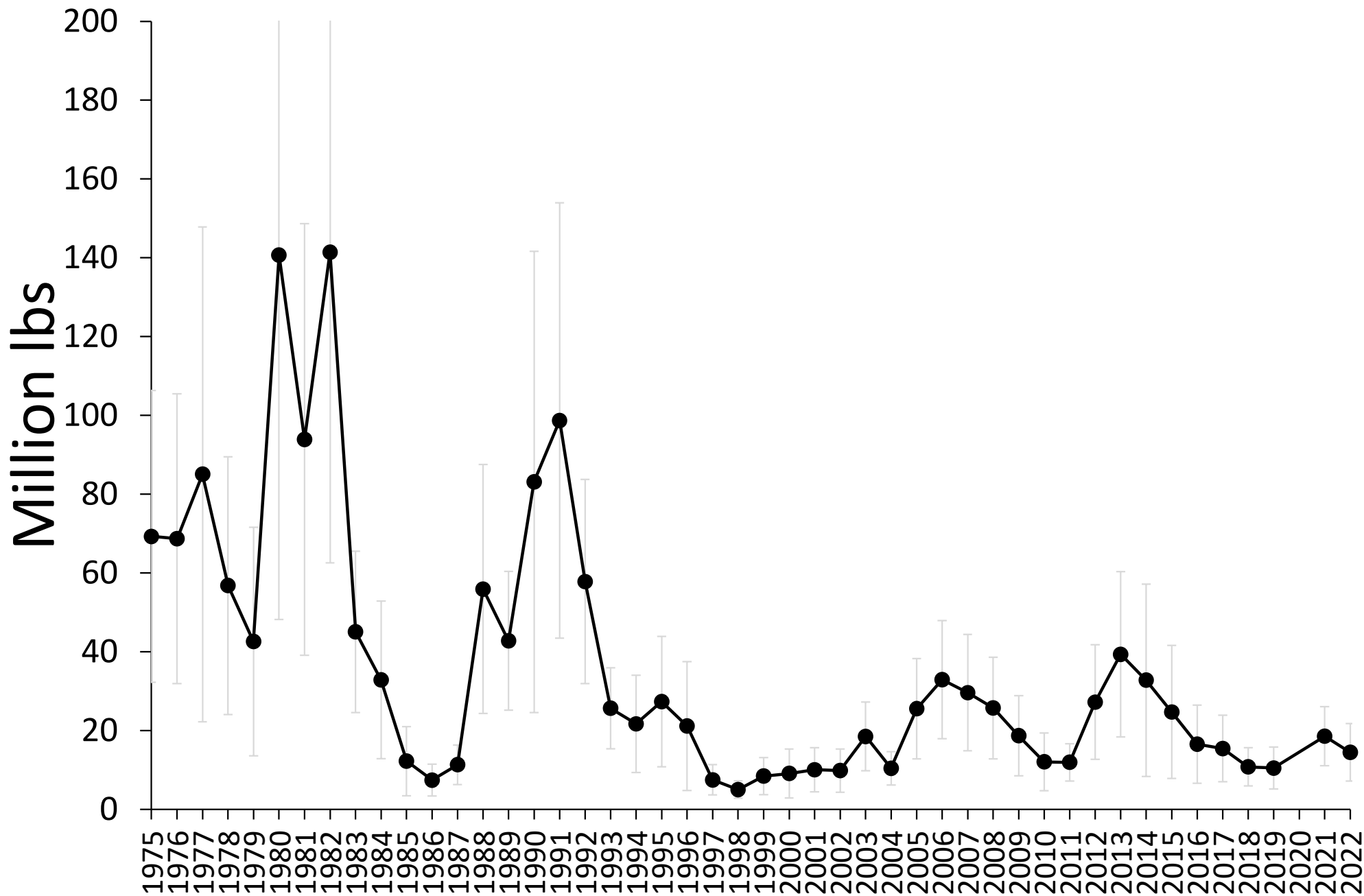
OFL: 72.34 mill lb

ABC: 54.25 mill lb

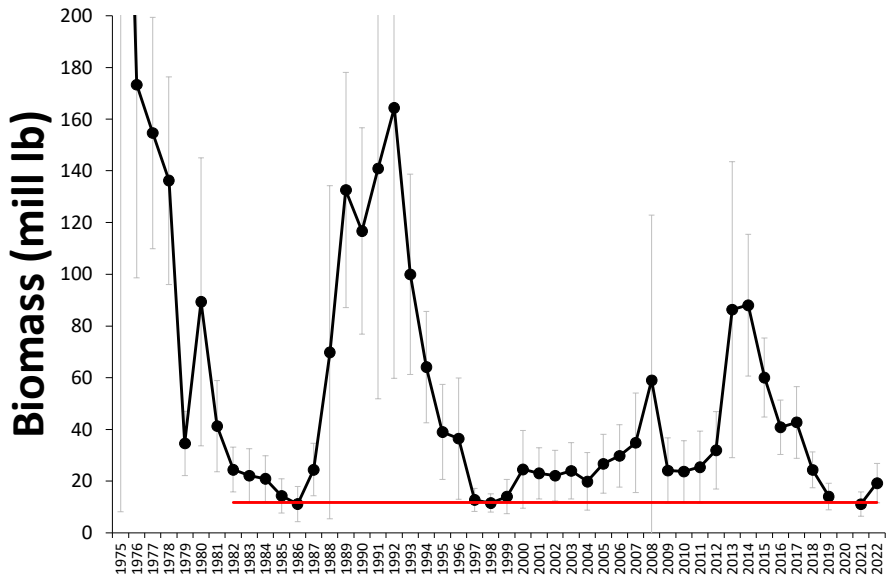
Current stock status=178%

Projected stock status: 137%

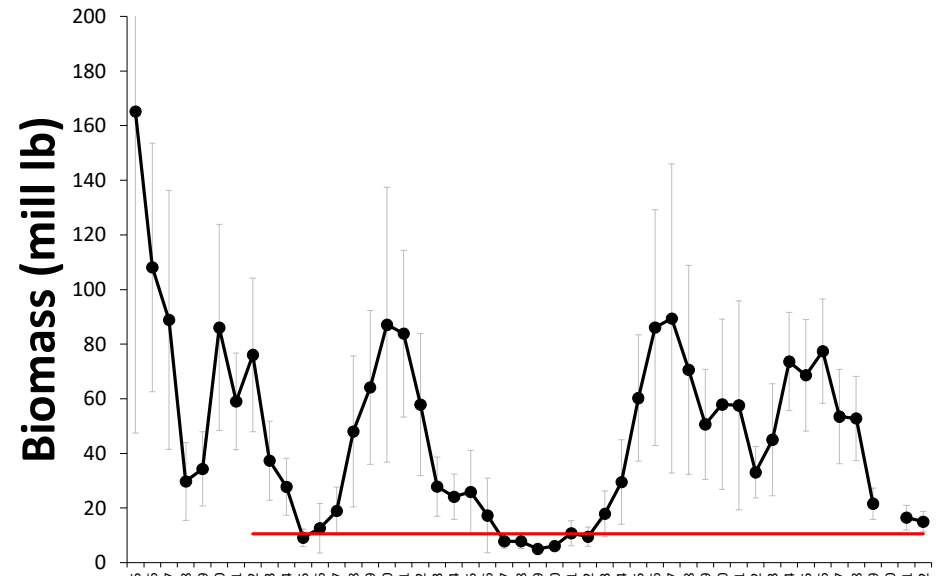
Mature female biomass



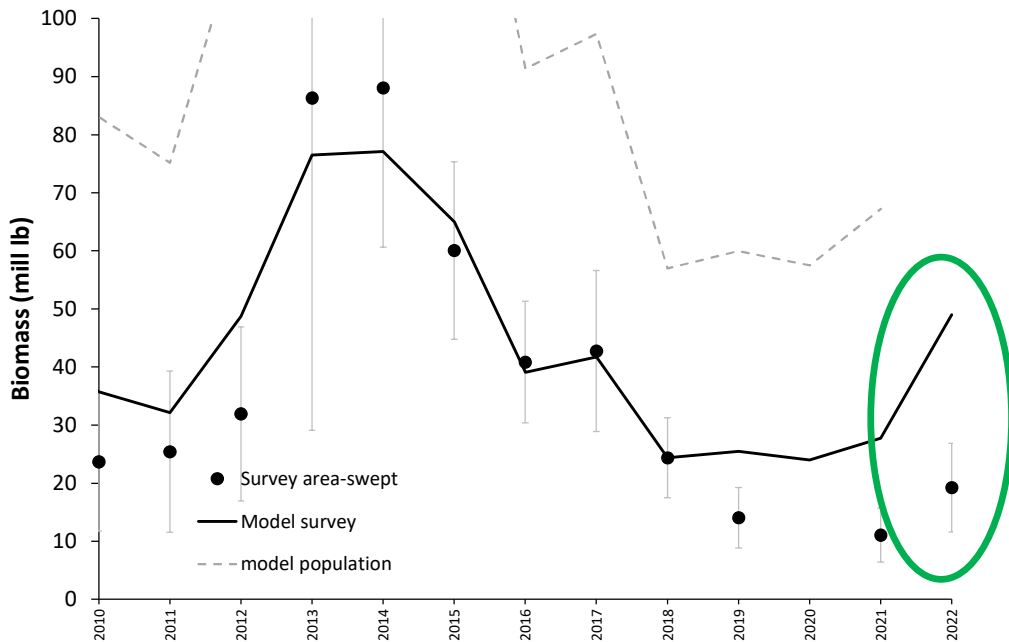
Mature males EAST of 166 W



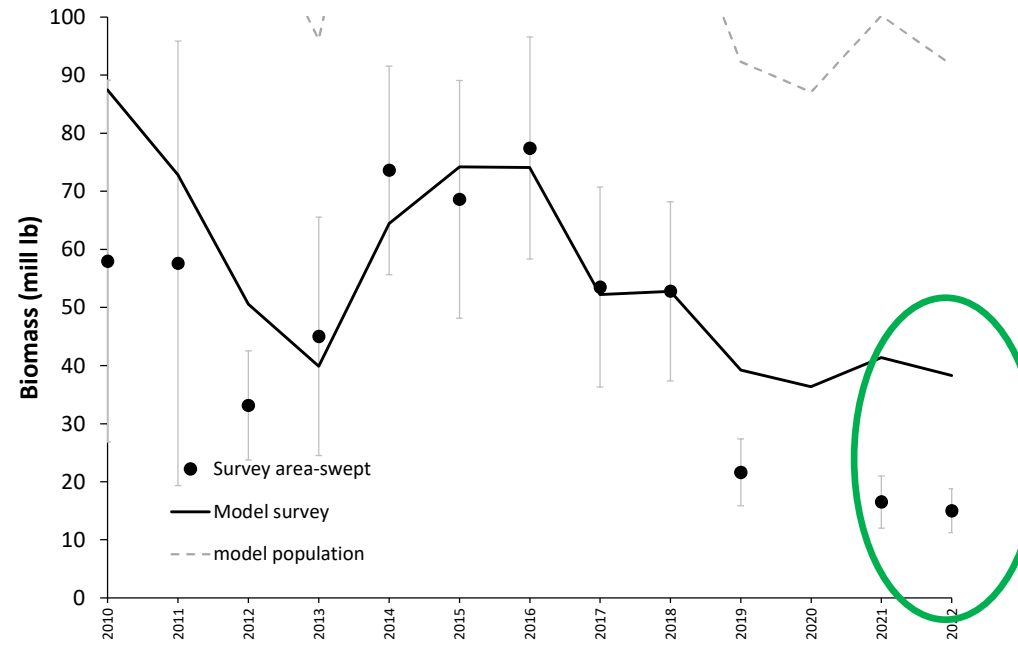
Mature males WEST of 166 W



Mature males EAST of 166 W



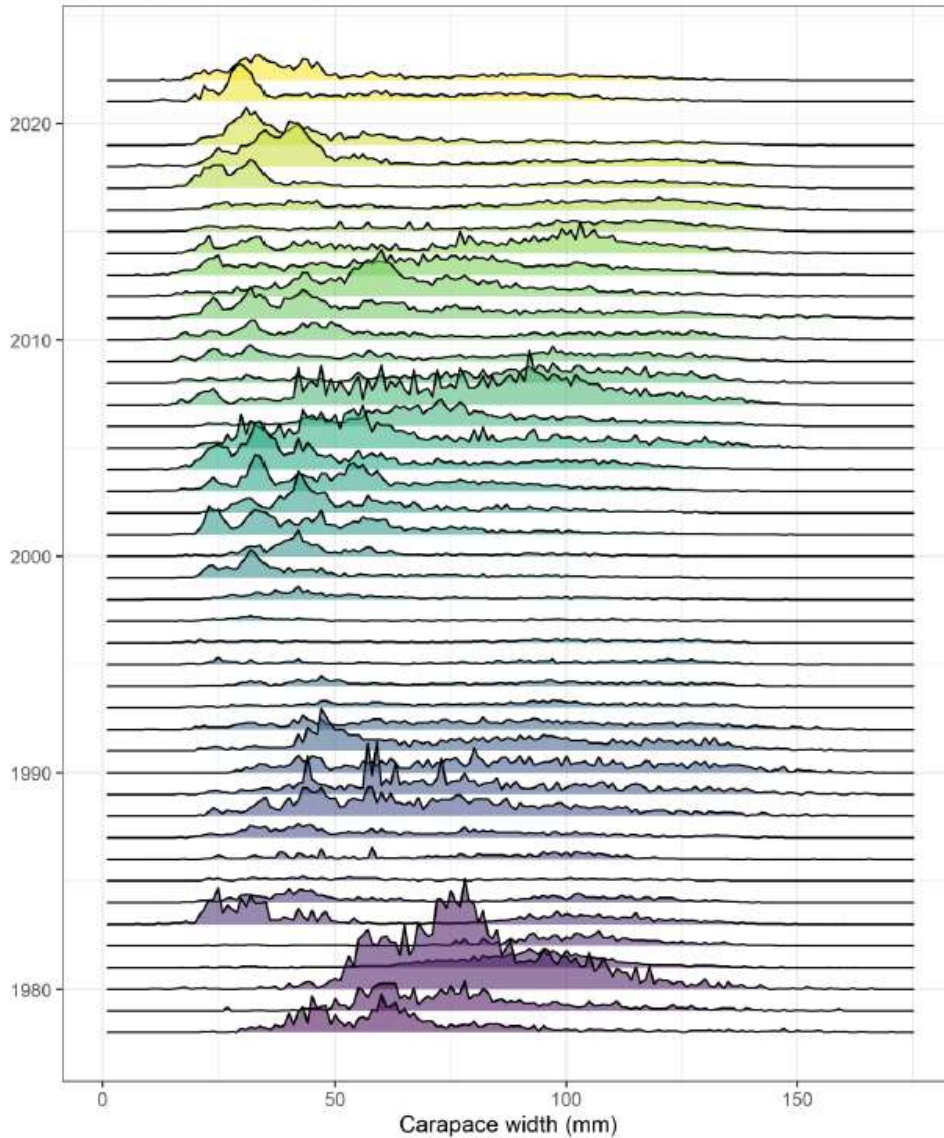
Mature males WEST of 166 W



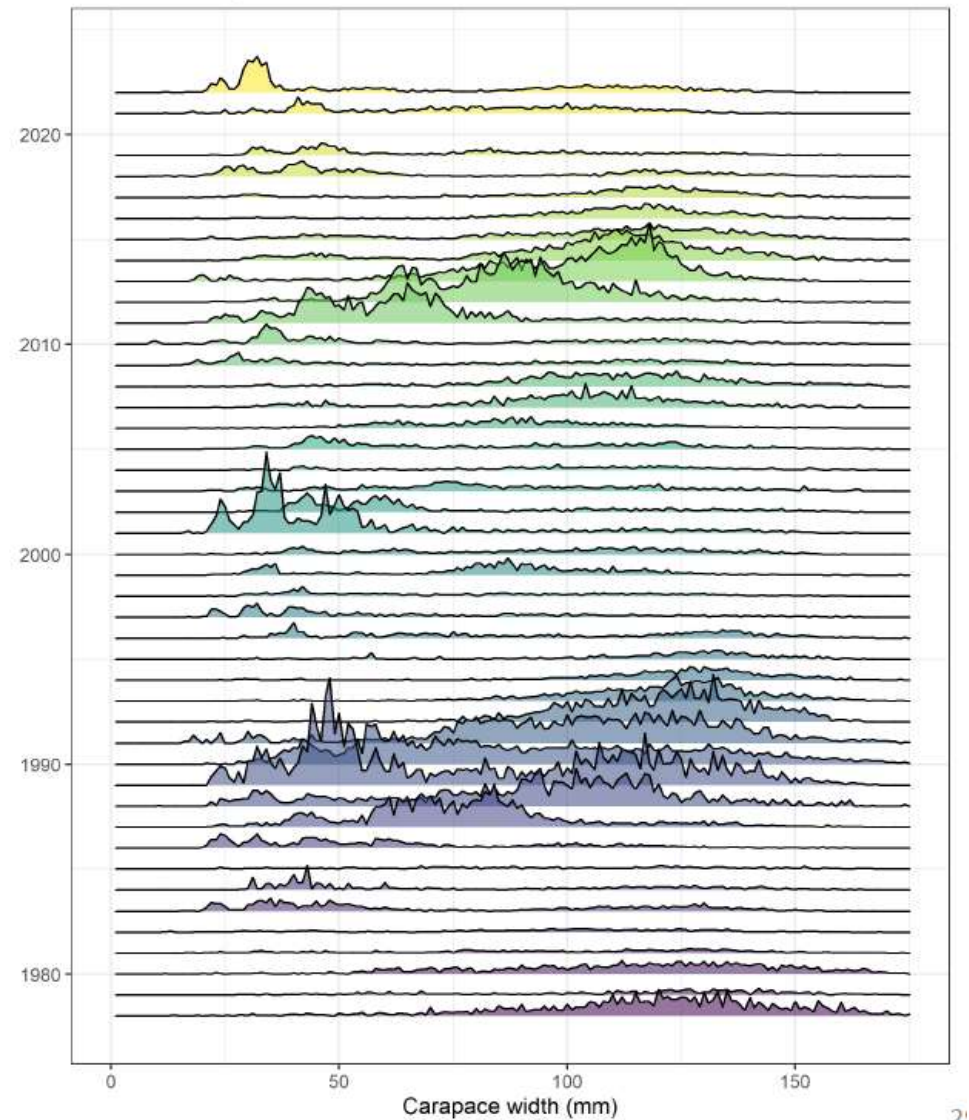
General uncertainty about model estimates

Survey size comps

Male Tanner Crab West



Male Tanner Crab East



21

Strong juvenile cohorts not propagating to industry preferred size in recent years

Tanner crab outlook

- Good signs of recruitment, but strong juvenile cohorts not propagating to larger sizes
- Unclear what is causing population bottleneck
- Warm conditions likely to become more frequent in future
- Effects on Tanner crab unknown

Bristol Bay Red King Crab

Assessment Specifications

Status and catch specifications (million lb, model 21.1b):

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2018/19	23.4 ^B	37.3 ^B	4.31	4.31	5.85	11.76	9.41
2019/20	28.0 ^C	31.4 ^C	3.80	3.91	4.89	7.50	6.00
2020/21	26.7 ^D	30.8 ^D	2.77	2.65	3.47	4.72	3.54
2021/22	26.5	36.7	0	0.04	0.22	4.91	3.92
2022/23		37.4				6.70	5.35

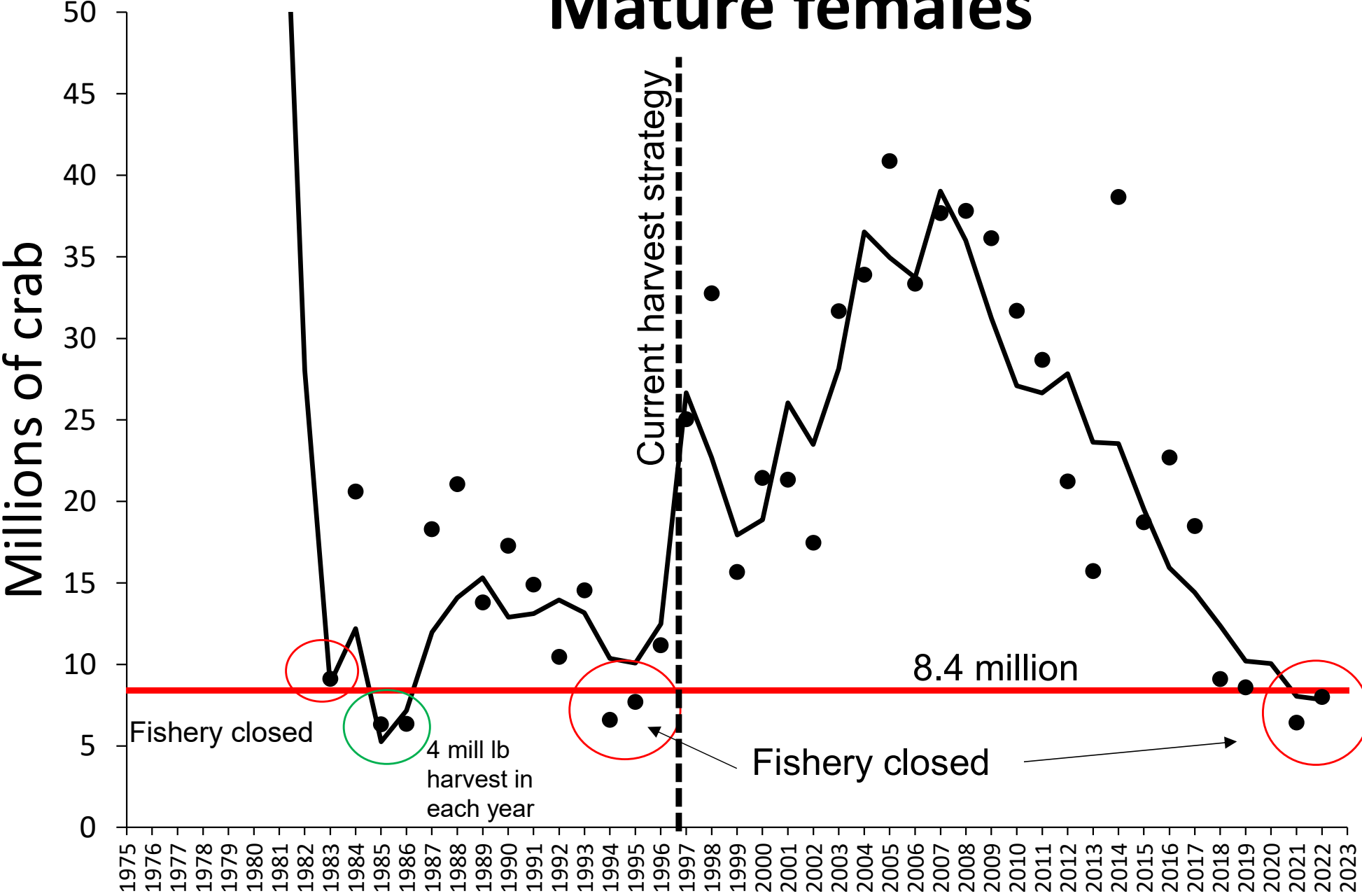
OFL: 6.70 mill lb

ABC: 5.35 mill lb

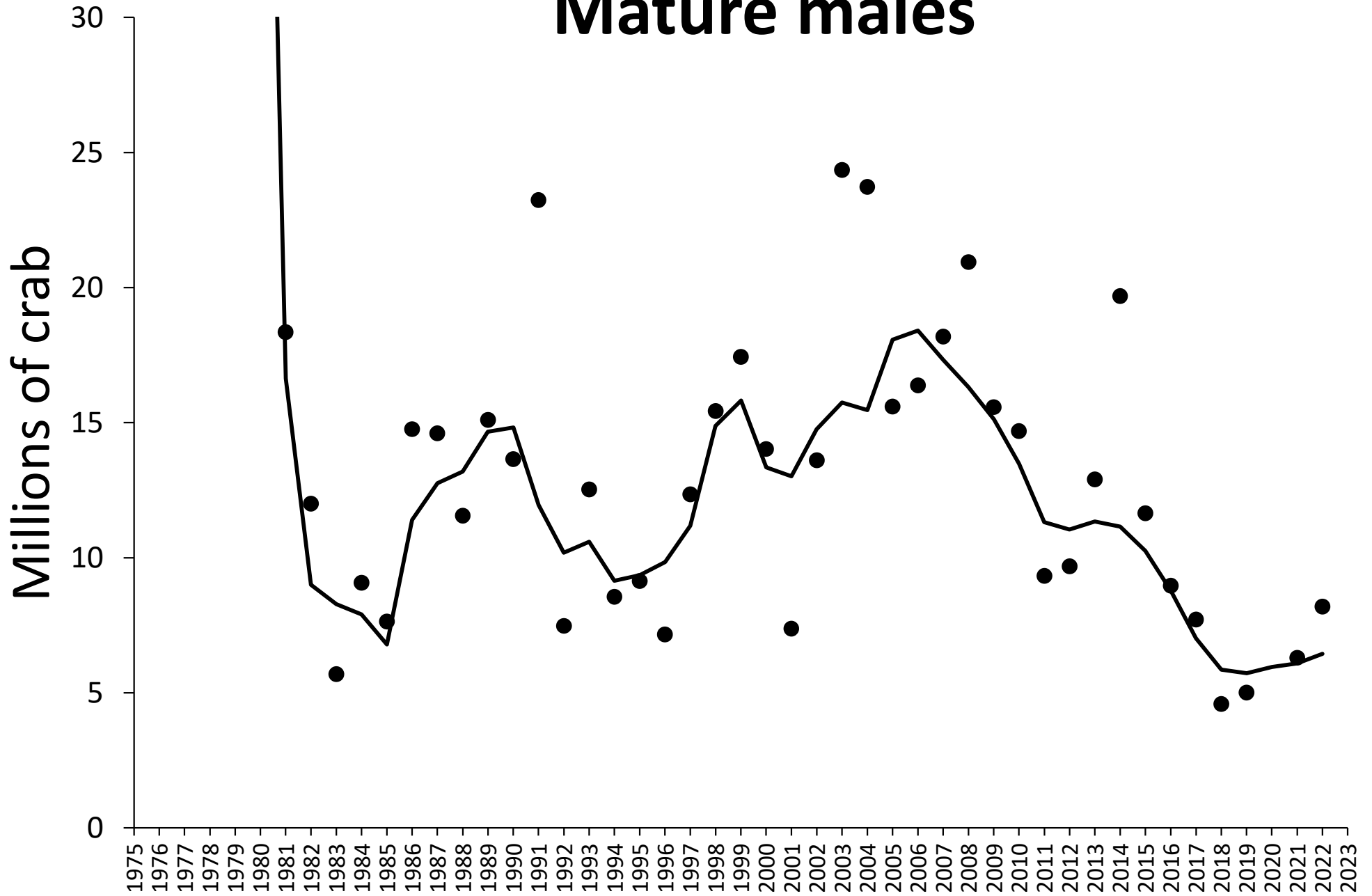
Current stock status: 69%

Projected stock status: 71%

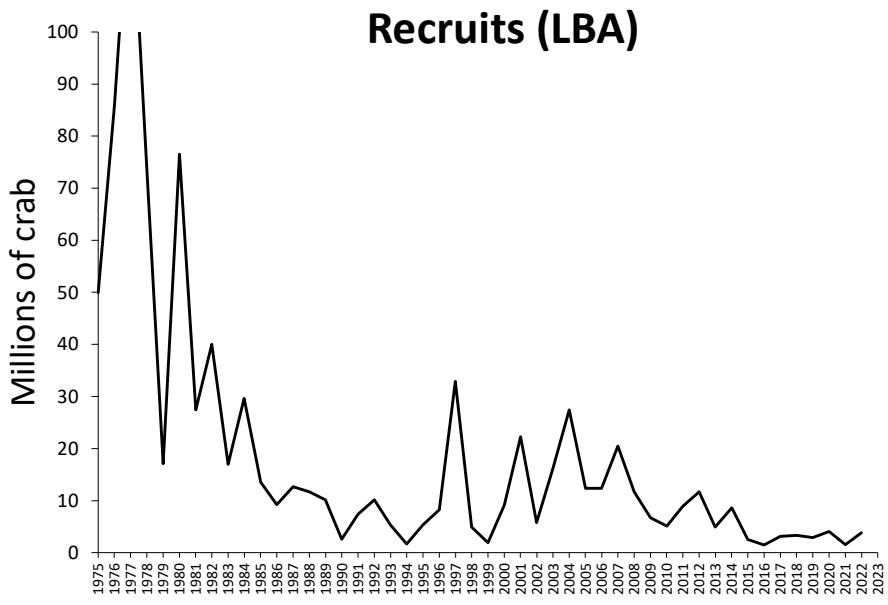
Mature females



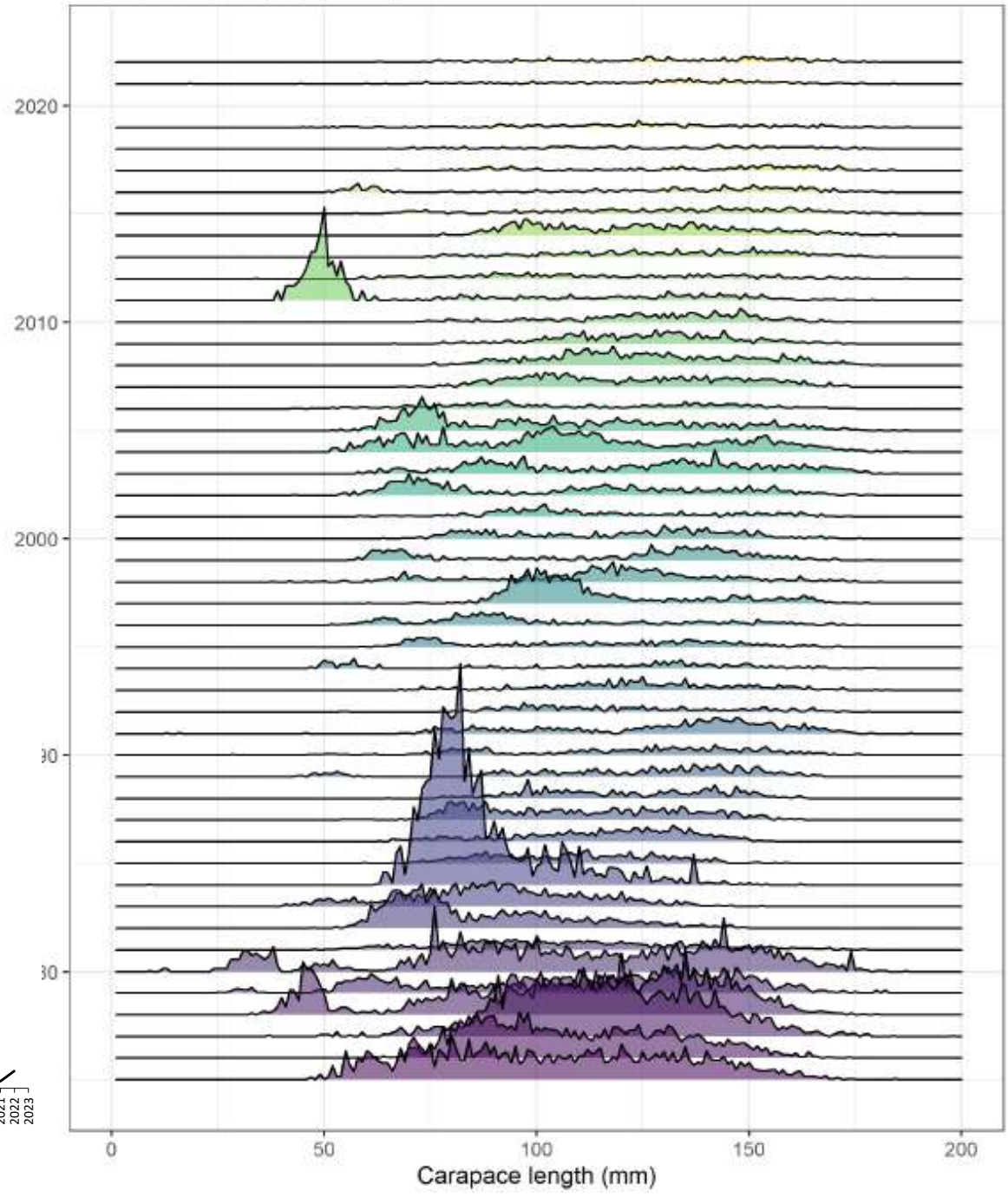
Mature males



Low recruitment



Male Bristol Bay Red King Crab



BBRKC outlook

- Abundance increases after prolonged decline
 - Males: increases 2 years in a row
 - Females: 2022 up from 2021 but still at very low level
- Low estimated recruitment
- Females below harvest strategy closure threshold
- Length frequencies discouraging, no strong signal of small crabs
- Fluctuating environmental conditions
 - Impacts on BBRKC uncertain

SMBKC, PIRKC, PIBKC

SMBKC

- Declared overfished in 2018, current stock status 36%
- OFL: 0.146 mill lb; ABC: 0.110 mill lb
- Some weak signs of recruitment

PIRKC

- Current stock status 227%
- OFL: 1.51 mill lb; ABC: 1.13 mill lb
- Low precision in population estimates, concerns with BKC bycatch very high

PIBKC

- Declared overfished in 2002, current stock status 4%
- OFL: 0.0026 mill lb; ABC: 0.0019 mill lb
- Extremely depressed, no signs of recovery