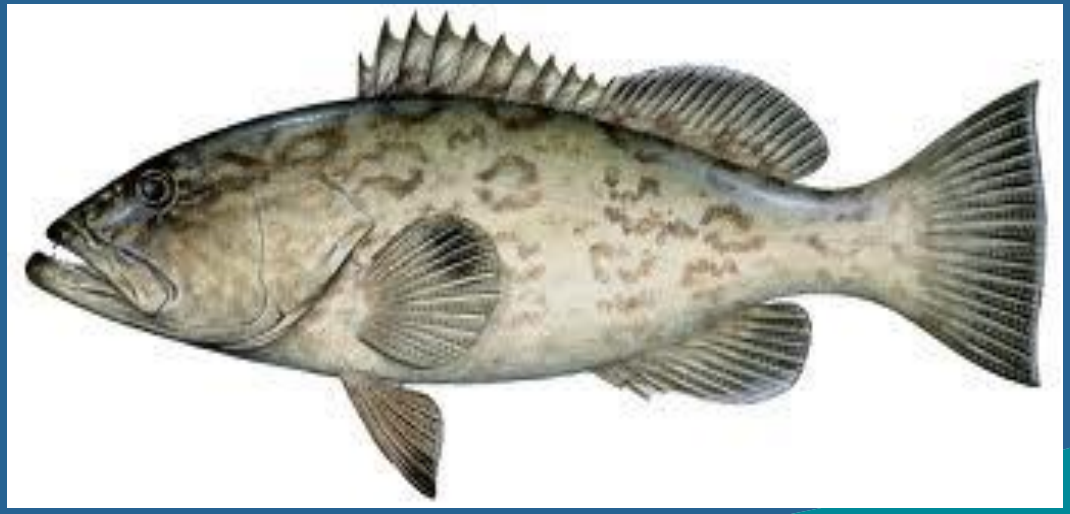
SEDAR 71
South Atlantic Gag Grouper

NOAA FISHERIES

Southeast Fisheries Science Center



SAFMC meeting

June 2021

Gag Grouper Assessment History

- SEDAR 10 benchmark: Overfishing occurring but not yet overfished
  - Terminal year 2004
  - Fishing status: F_{2004}/F_{msy} = 1.46; Population status: $SSB_{2004}/MSST$=1.06

- 2014 Update: Overfishing occurring but not yet overfished
  - Terminal year 2012
  - Fishing status: $F_{(2010\text{-}2012)}/F_{msy}$ = 1.23; Population status: $SSB_{2012}/MSST$=1.13

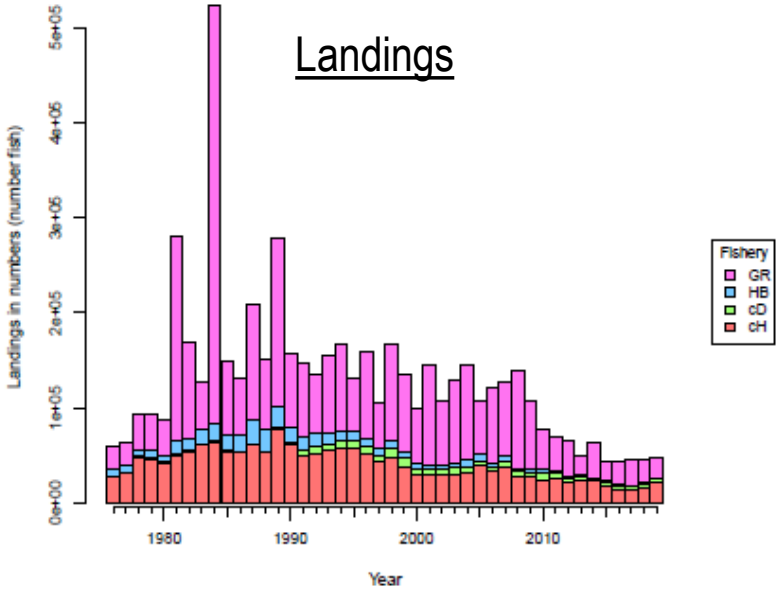
- SEDAR 71 operational assessment:
  - Terminal year 2019
  - Fishing status: $F_{(2017\text{-}2019)}/F_{msy}$ = 2.15 ; Population status: $SSB_{2019}/MSST$=0.2
  - Key features:
    - Added fishery-independent SERFS video index
    - Continued declines in abundance & low recruitment since the 2014 update

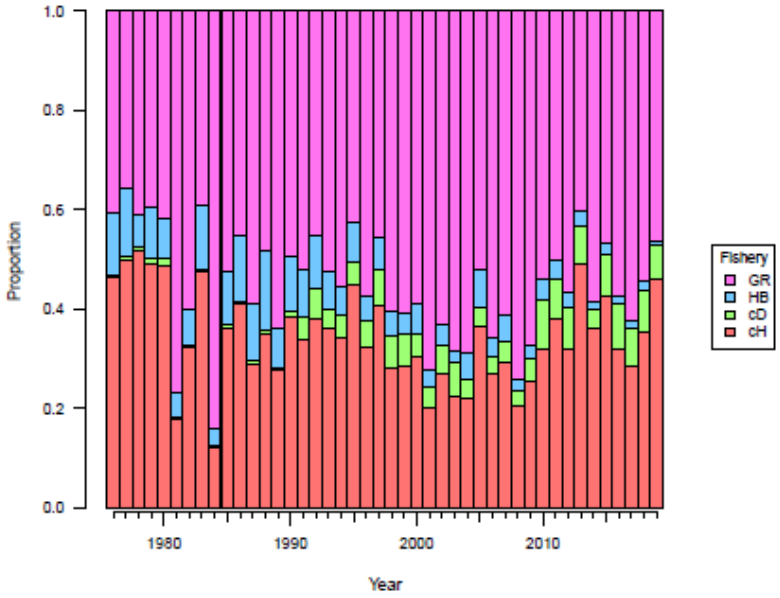
SEDAR 71 Assessment Process

- Operational assessment: maintain consistency with prior assessment but allow for some modifications
- Data scoping webinar (May 2020)
- 5 Assessment webinars (Oct 2020 – Mar 2021)
- SSC review webinar (May 3, 2021)

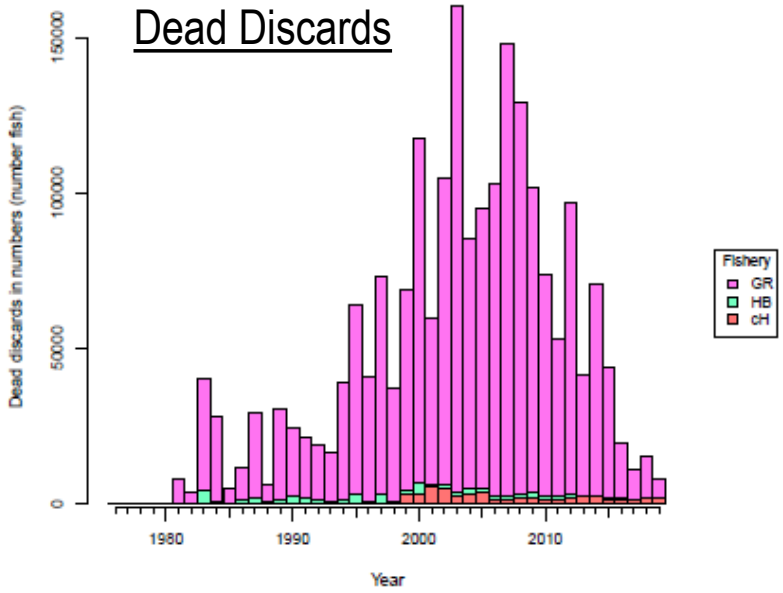
Fishery Removals

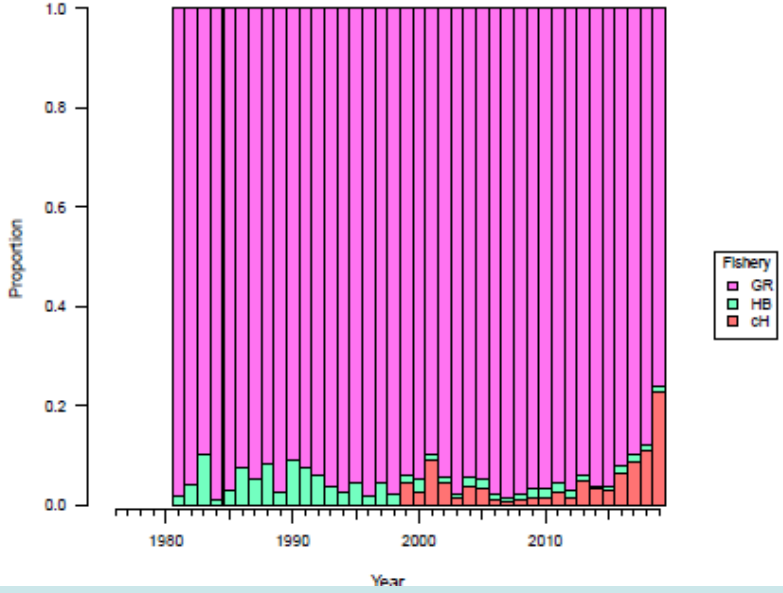
Landings



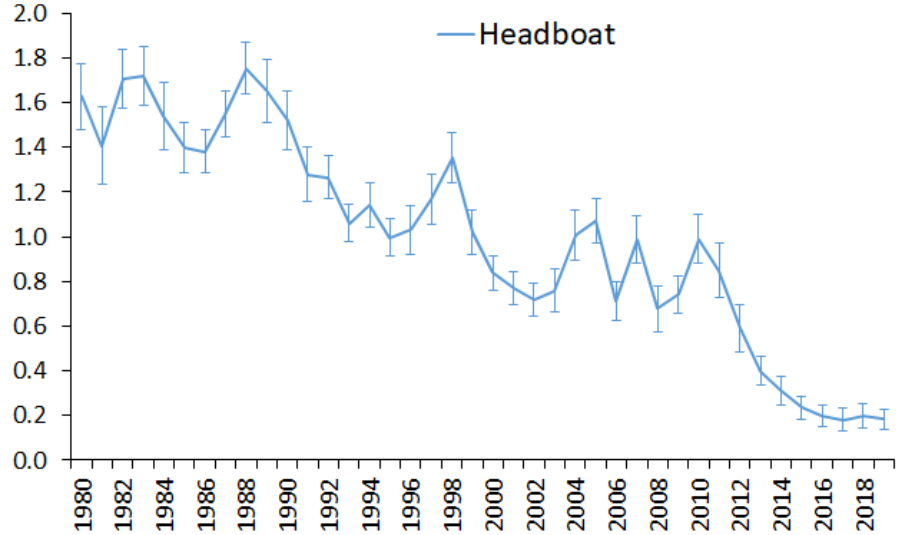


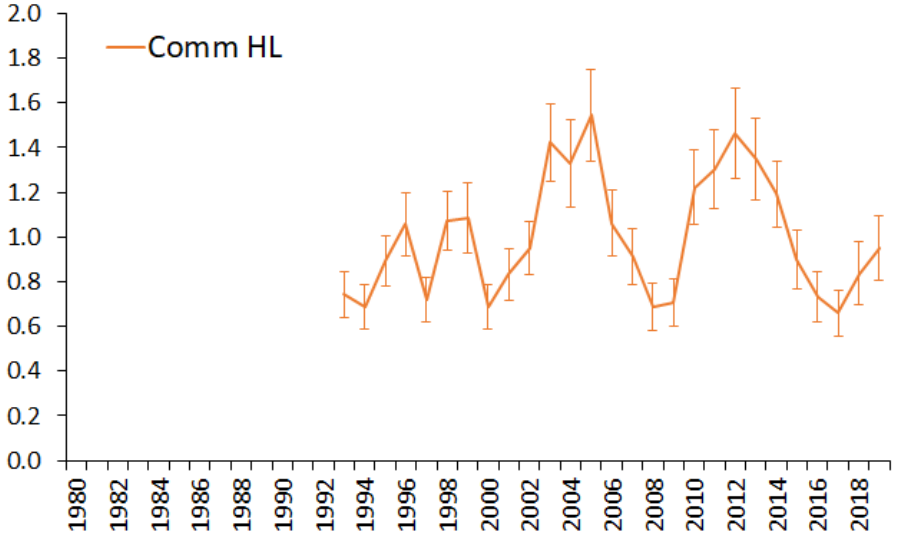
Dead Discards

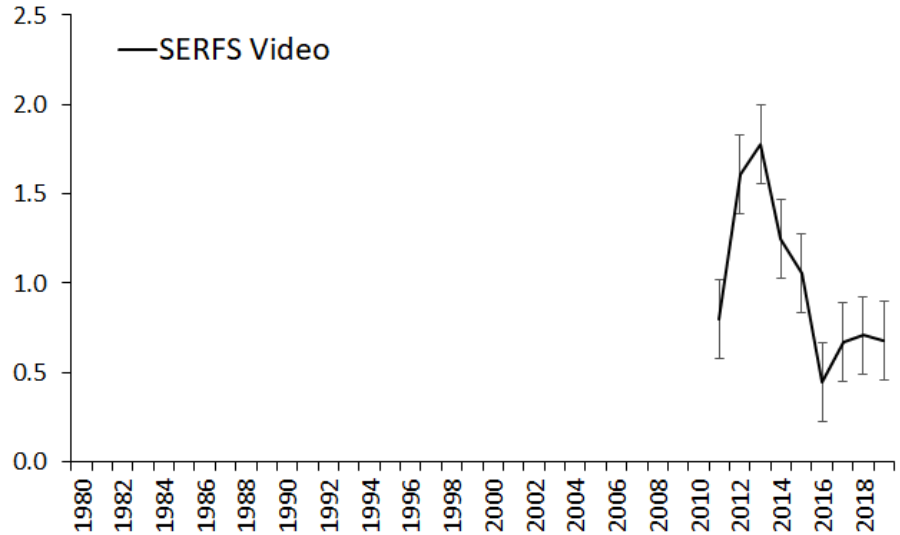


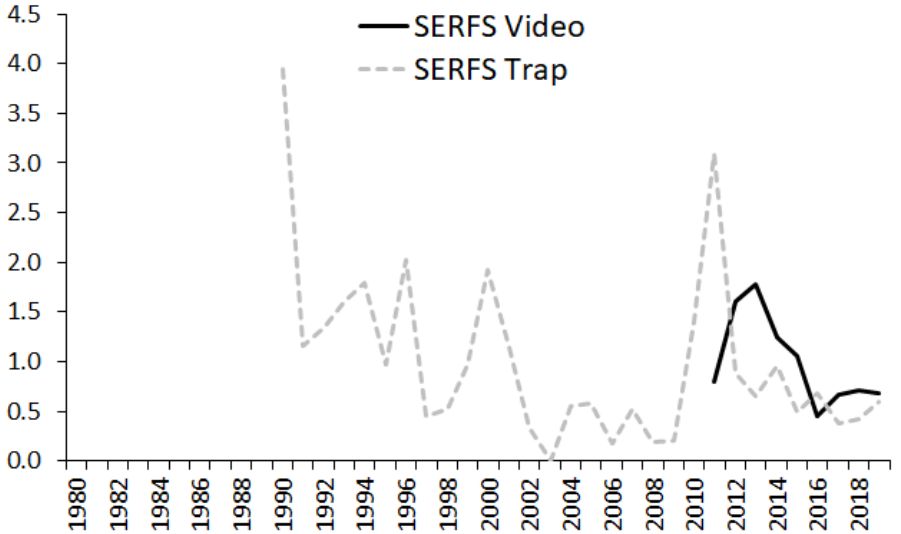


Indices of Abundance







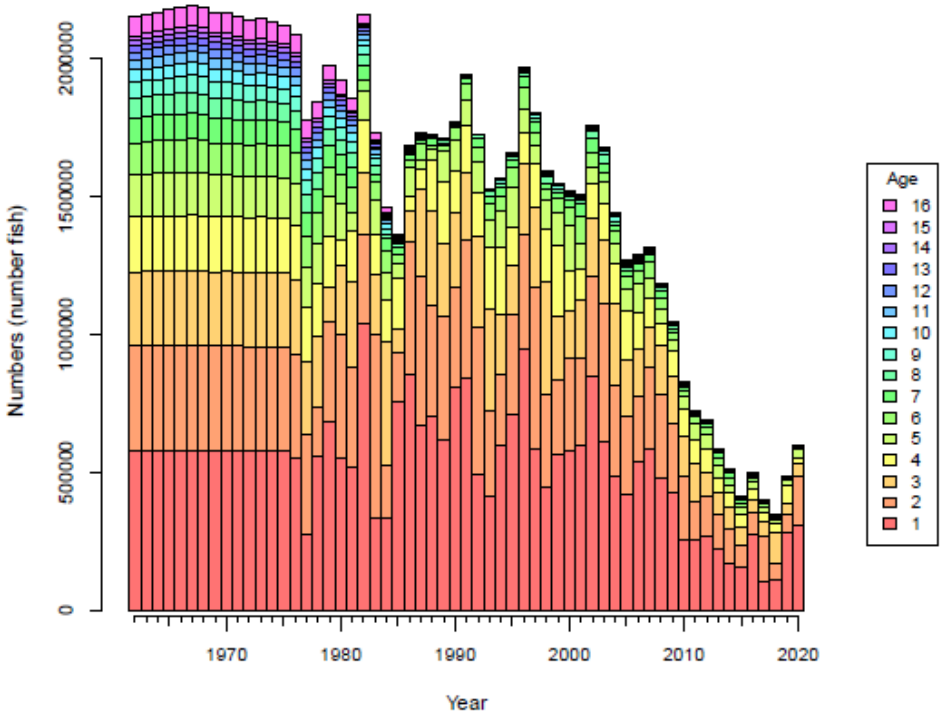


New Data and Information for SEDAR 71

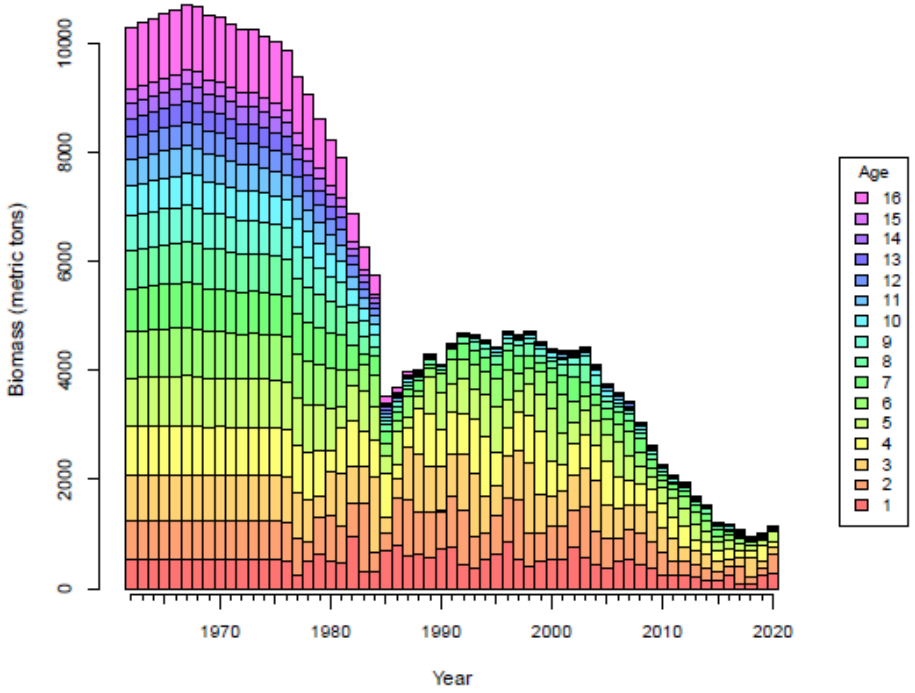
- Added 7 additional years of data (2013-2019)
- General recreational landings and discards based on current MRIP methods
- All landings, indices, and compositions computed using current methods
- Life history parameters
  - Updated growth curve, maturity schedule, natural mortality, time-invariant sex ratio
- Separate fishery growth curve for the population and the landings
- Length compositions for headboat discards (not available for last update)

BAM Base Run: Number and Biomass

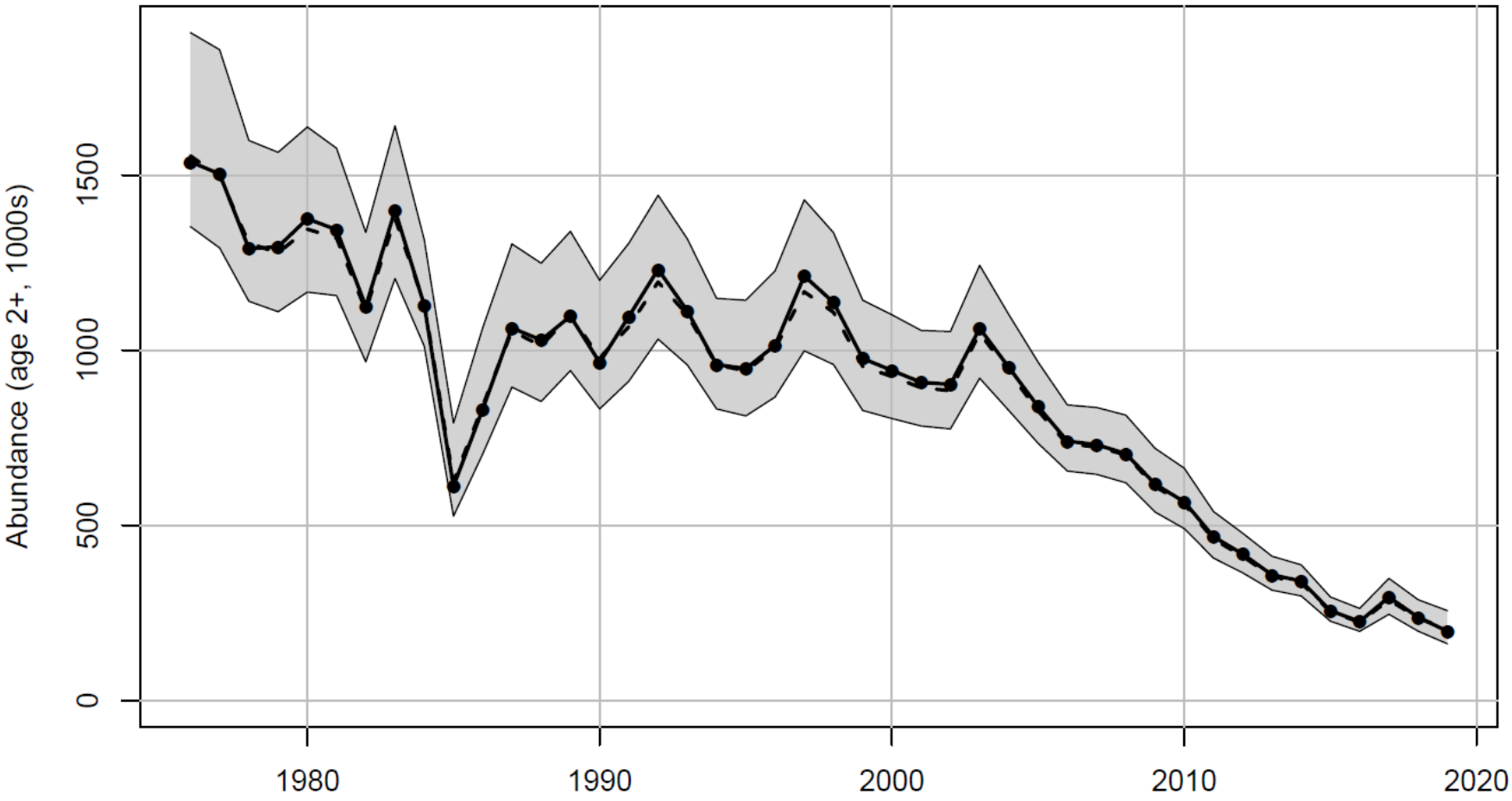
Numbers-at-age



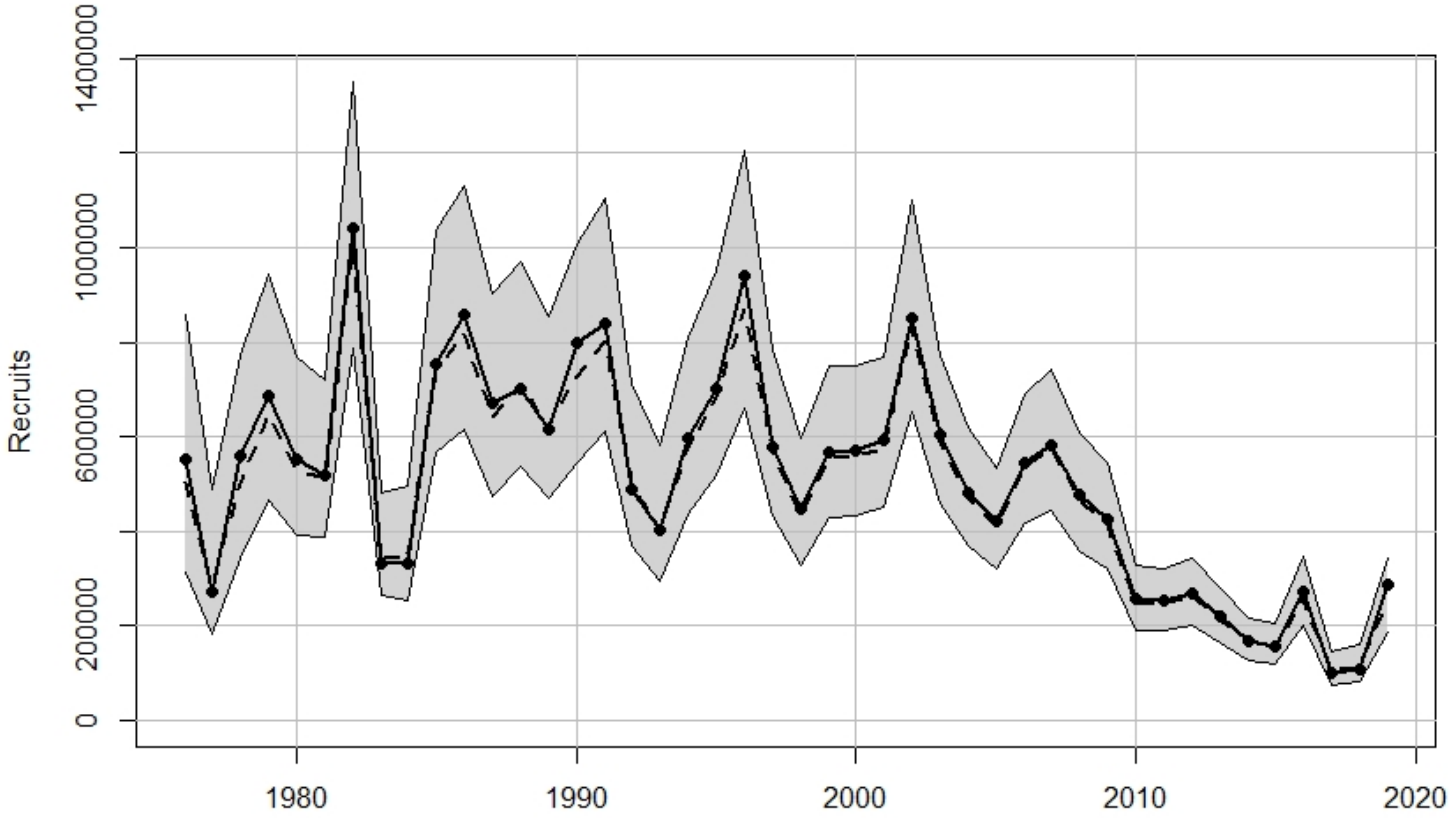
Biomass-at-age



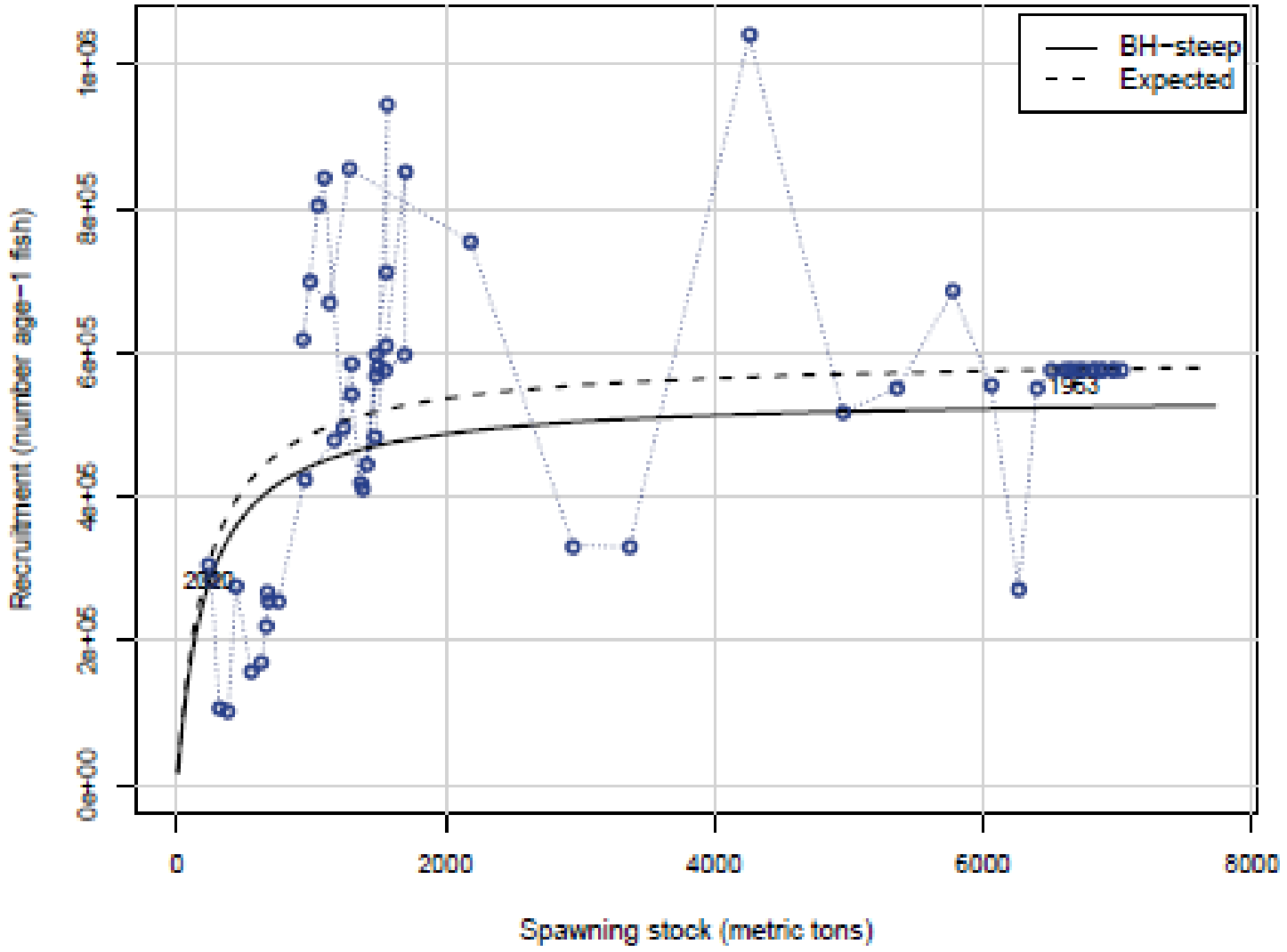
Uncertainty Analysis: Abundance



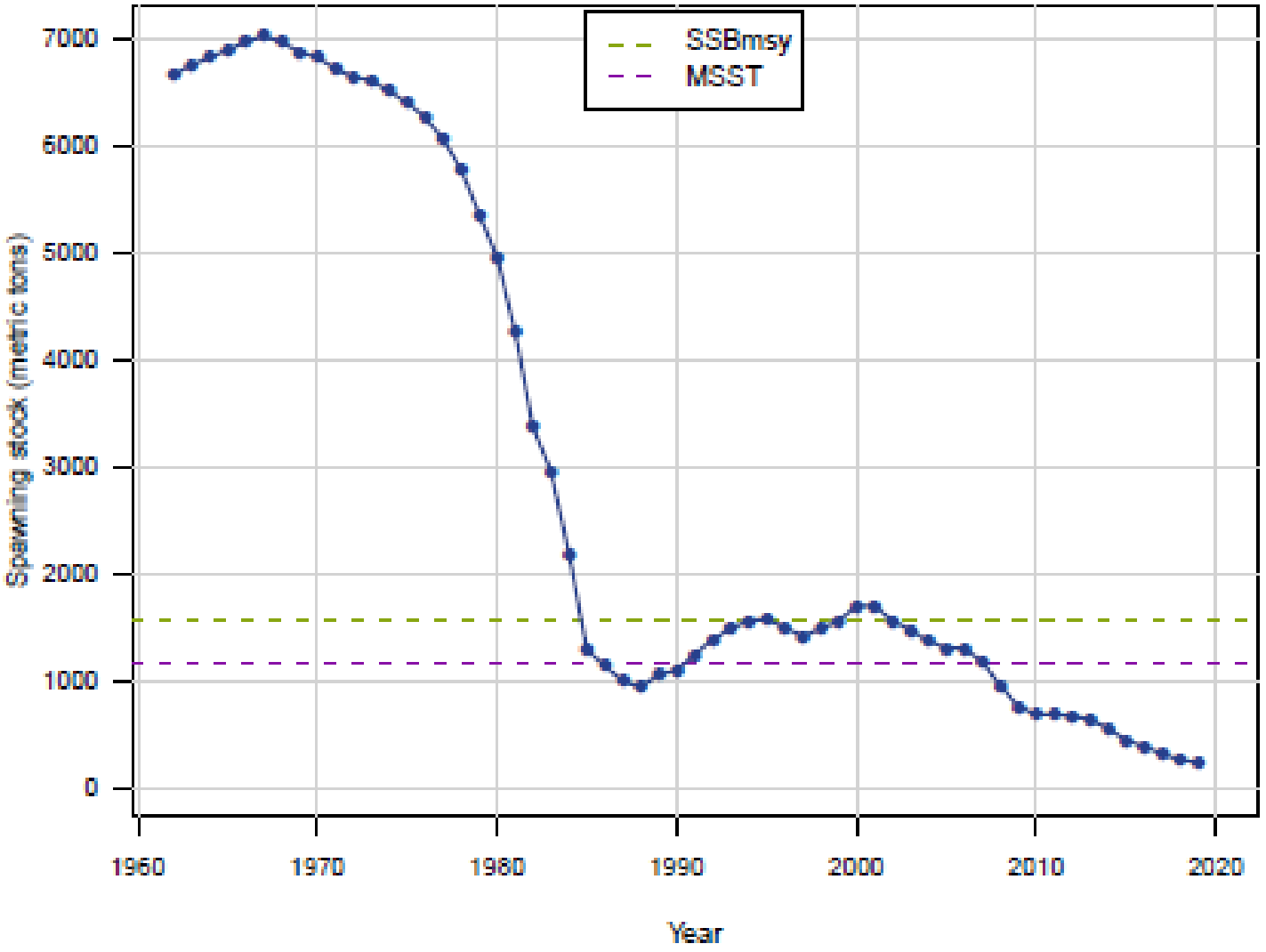
BAM Base Run: Recruitment



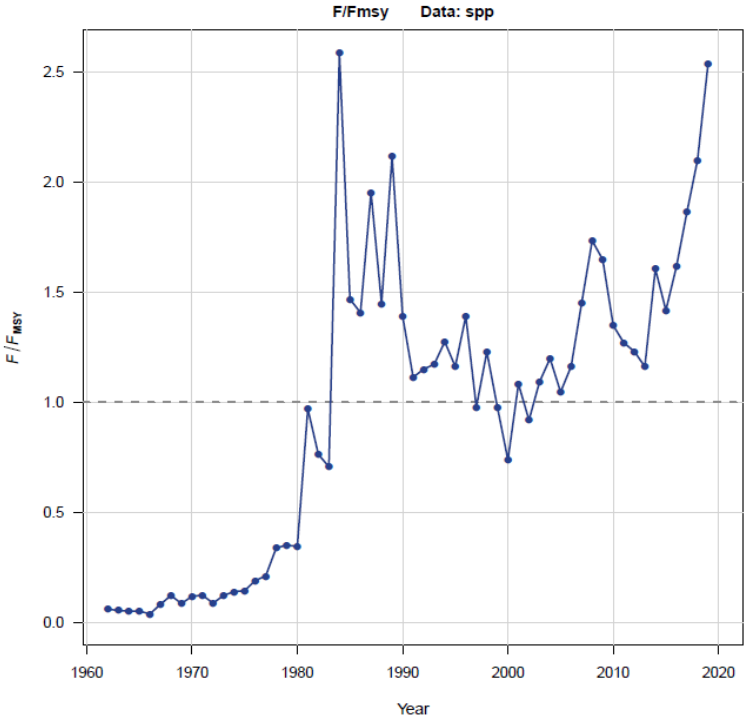
BAM Base Run: Stock-Recruitment

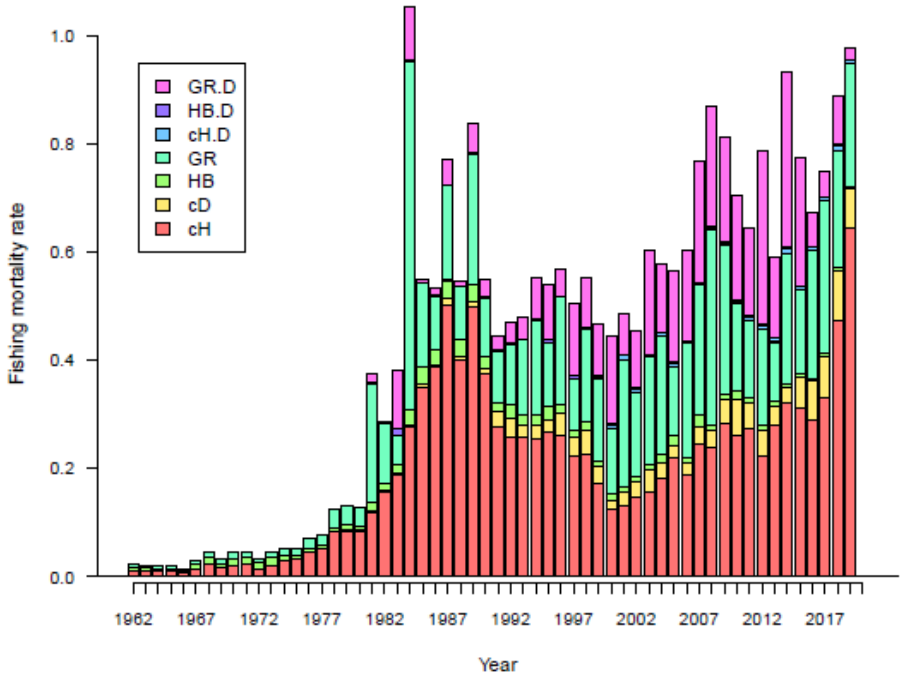


BAM Base Run: Spawning Stock

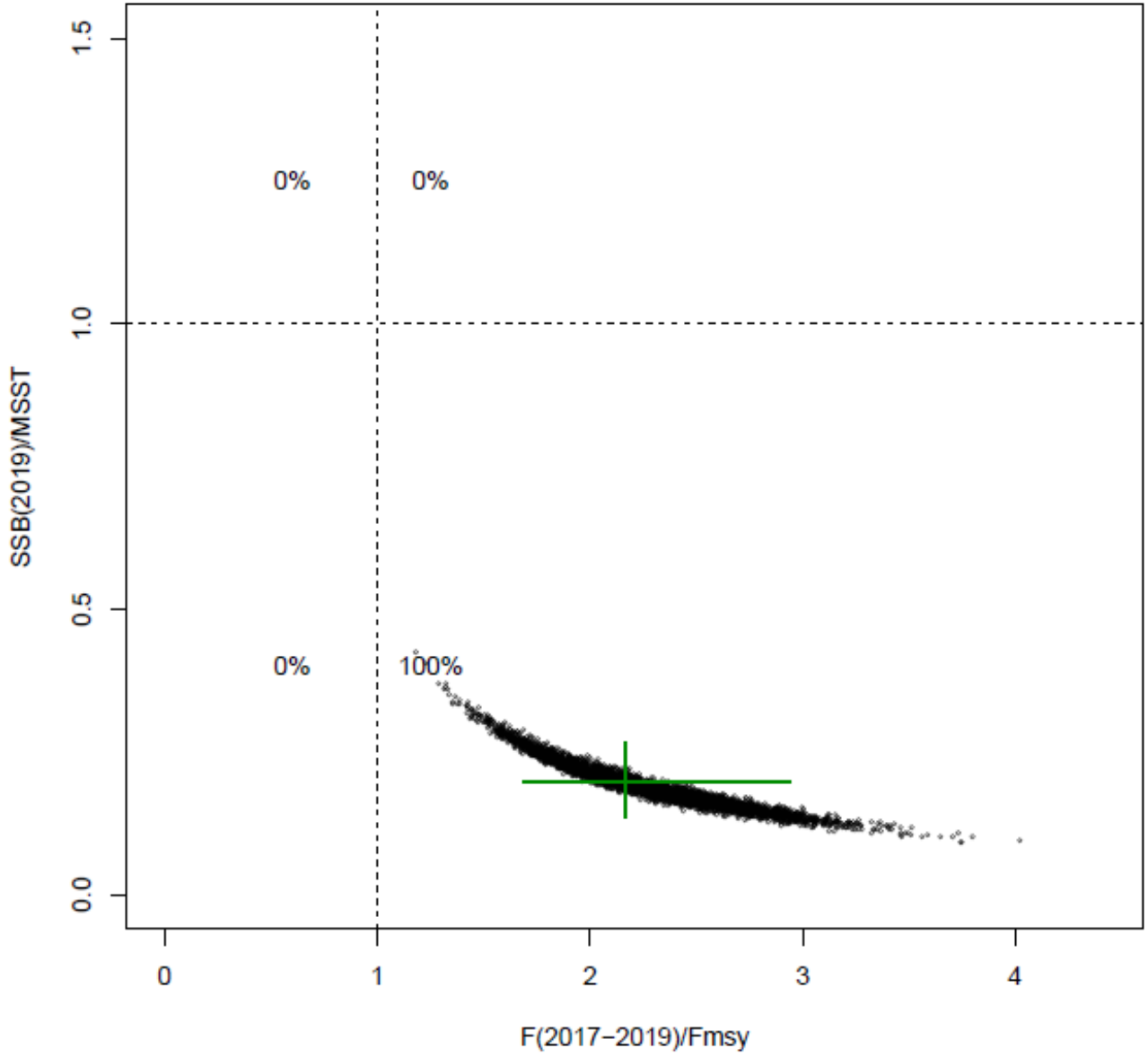


BAM base run: Fishing mortality





Uncertainty Analysis: Status Indicators



Summary of Assessment Results

- Gag grouper are overfished and currently experiencing overfishing
- Overfishing has occurred since 1980s (consistent with prior assessments)
- Prior assessments indicate popn has been near stock size threshold until early 2010s; current assessment indicates well below thresholds
- Fishery-dependent and fishery-independent indices indicate 2-3 fold declines in abundance in last 10 years
- Low estimated recruitment in last 10 years of assessment
- Recent fishing mortality remains high and driven by commercial handline and general recreational fleets
- Assessment results are highly robust to the range of uncertainty considered

Projection Configurations

- Interim years
  - 2020 through 2022; first year of management 2023
  - $L_{current}$ (average landings from last 3 years of the assessment)
  - Generation time of Gag = 11 yrs

- Determine T_{min}=time to recover (SSB > SSB_{msy}) when F=0 for 'average' & 'low' recruitment
  - "Average" recruitment = mean recruitment from SR curve (all years)
  - "Low" recruitment = mean recruitment from last 10 assessment years (2010-2019)

- Alternative requested rebuilding time frames (T_{max})

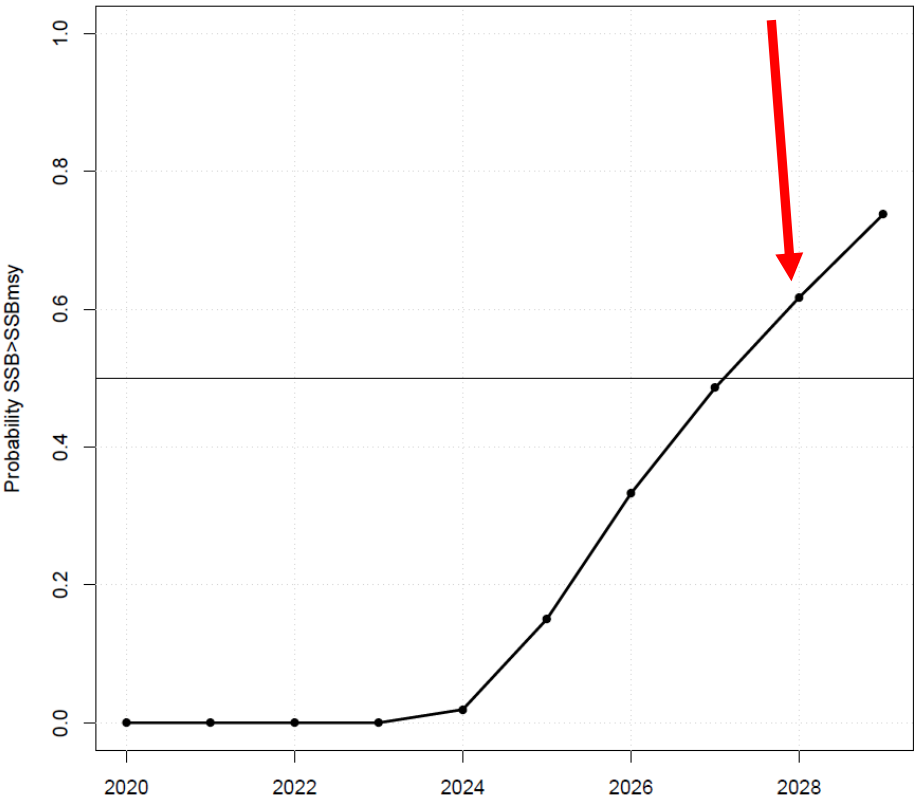
	T_{max}
1. T_{max} = 10 yrs	10 yrs
2. T_{max} = 2 generations = 2 x 11 = 22 yrs	22 yrs
3. T_{max} = T_{min} + one generation	
• T_{max} = 20 yrs (low recruitment)	20 yrs
• T_{max} = 22 years (avg recruitment)	22 yrs
4. T_{max} = 75%Fmsy	14 yrs

3. OFL projection with F = F_{msy} through the longest T_{max} identified above (22 years)

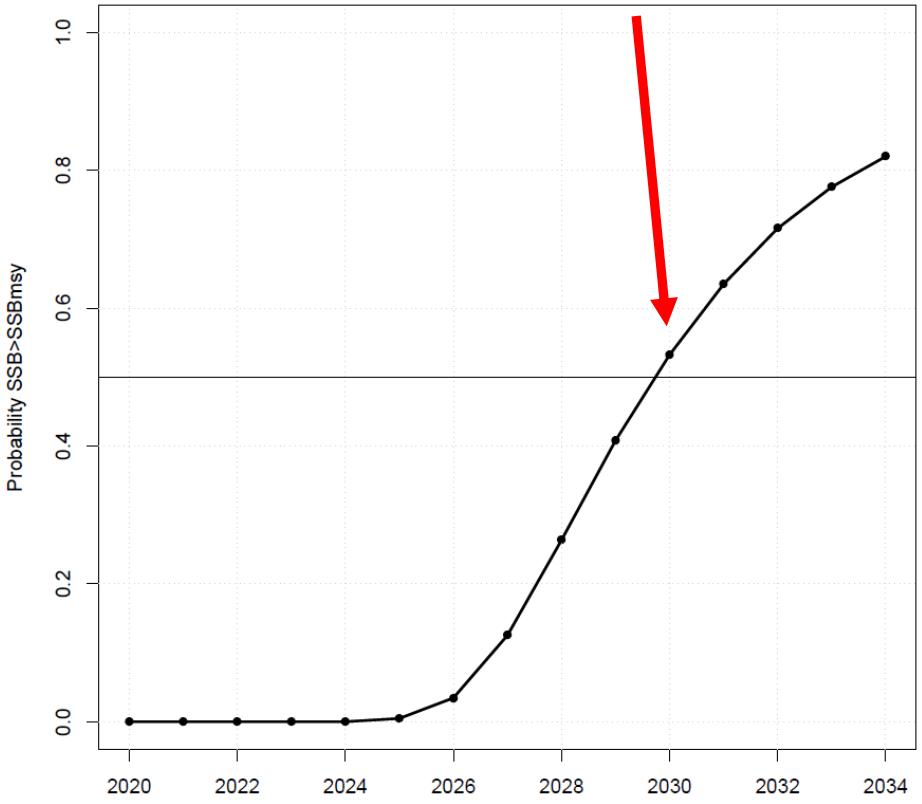
Time to Rebuild at F = 0

Stock rebuilds in 9 years under average recruitment and 11 years under low recruitment

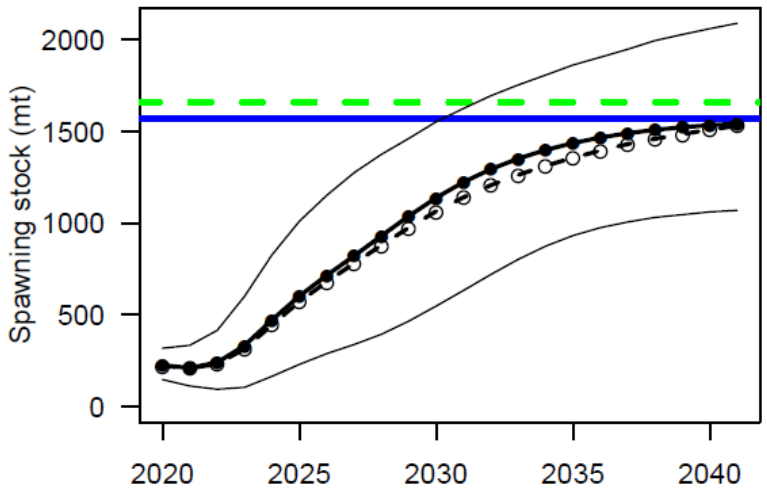
Average recruitment (2028, 9 years)

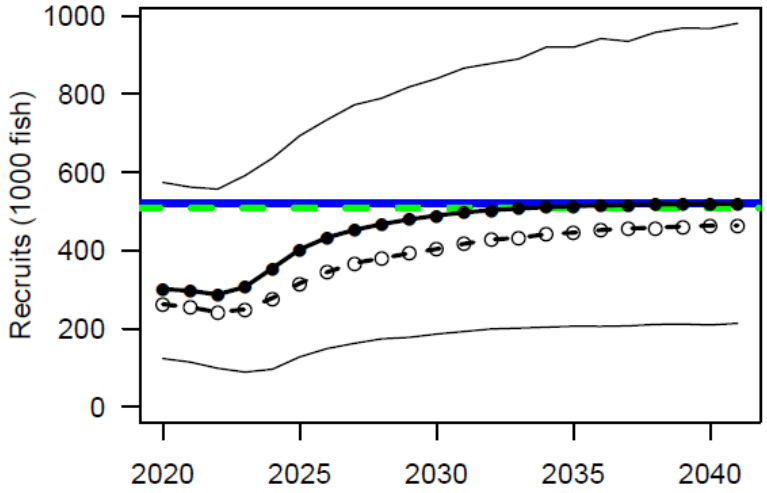


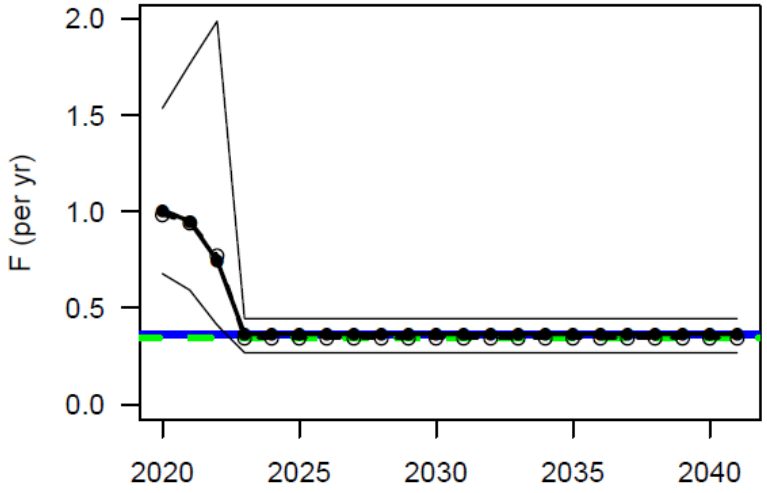
Low recruitment (2030, 11 years)

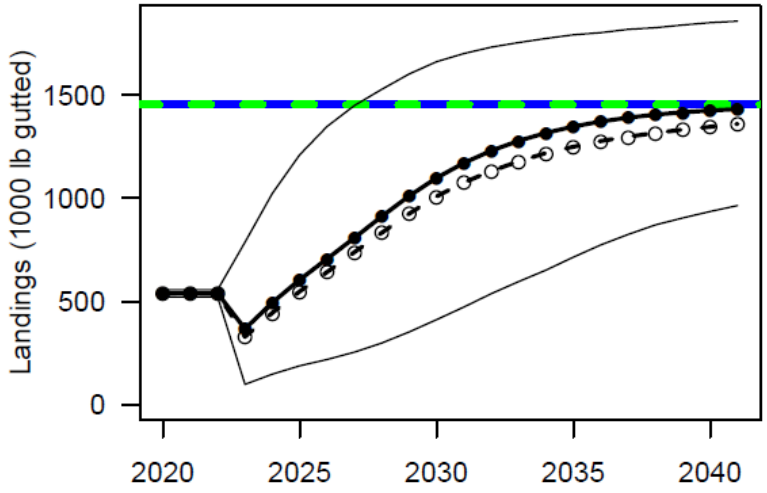


OFL Projection for maximum T_{max} (22 yrs)

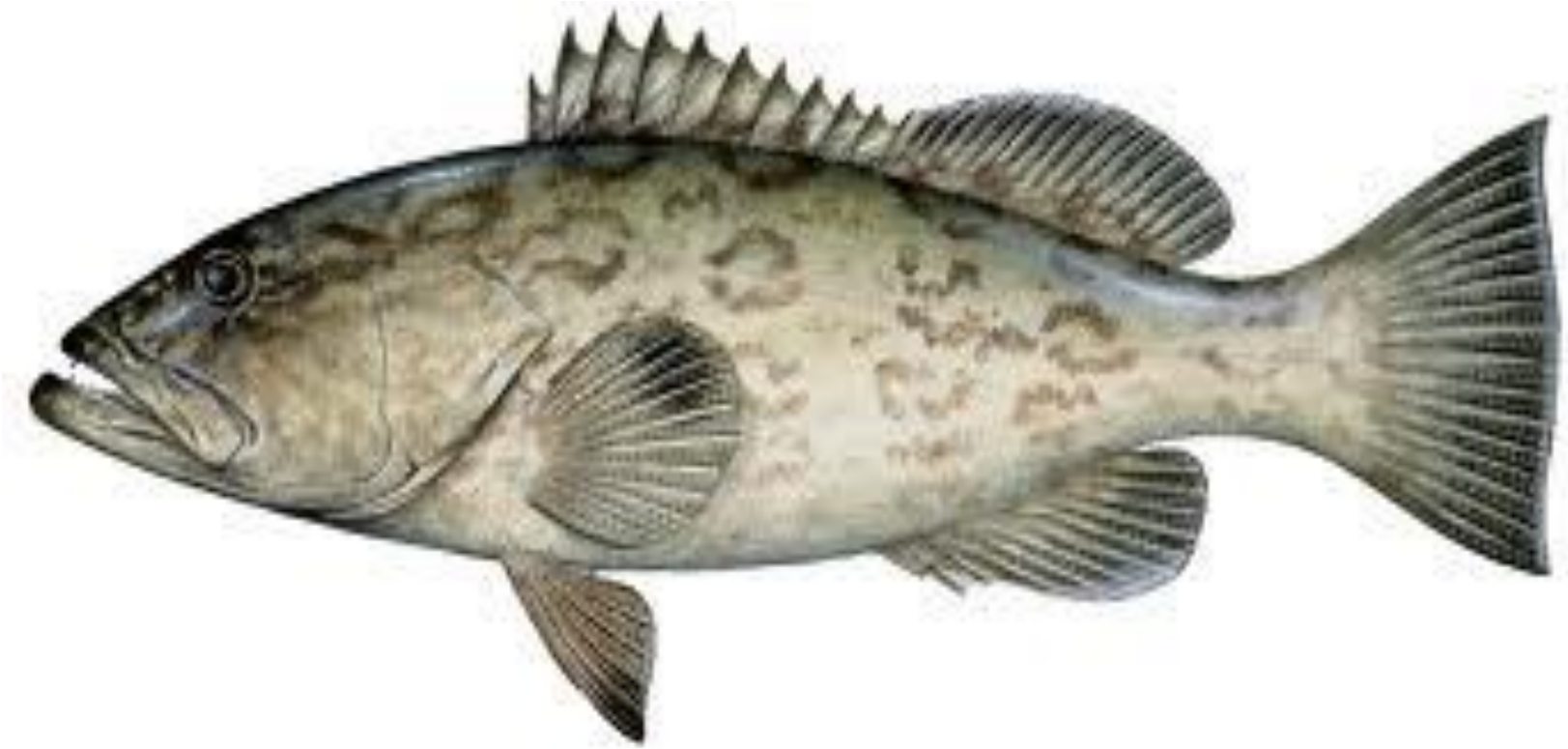








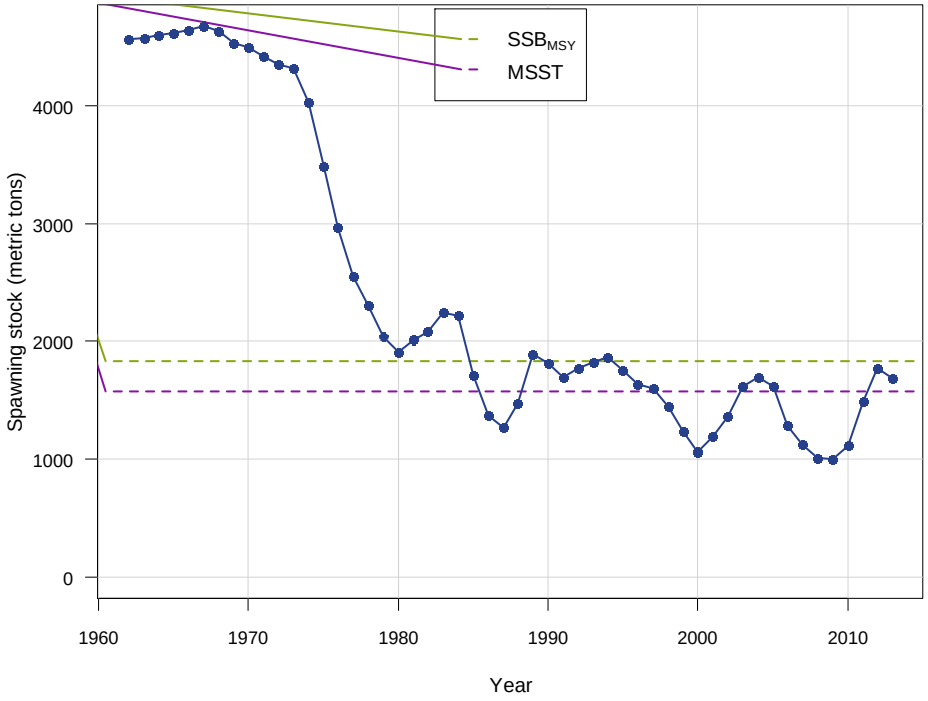
The End

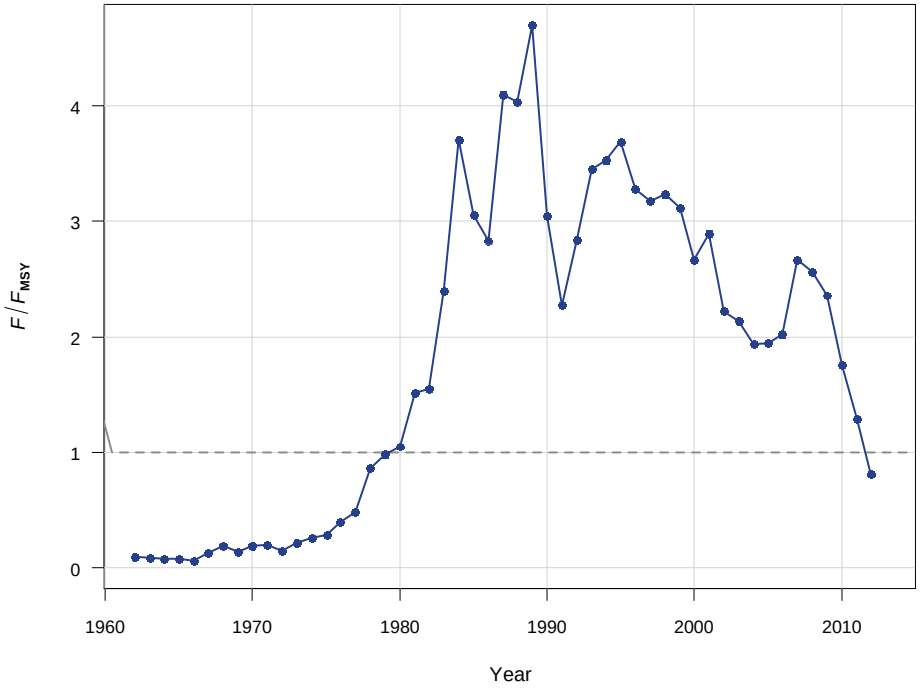


OFL Projection for maximum T_{max} (22 yrs)

year	R.base (1000)	R.med (1000)	F.base	F.med	S.base (mt)	S.med (mt)	L.base (1000)	L.med (1000)	L.base (1000 lb gutted)	L.med (1000 lb gutted)	D.base (1000)	D.med (1000)	D.base (1000 lb gutted)	D.med (1000 lb gutted)
2020	301	262	1.01	0.99	225	223	49	49	539	539	25	22	104	93
2021	296	254	0.95	0.95	212	210	56	55	539	539	24	22	104	96
2022	287	242	0.75	0.77	241	233	56	55	539	539	19	18	82	78
2023	306	249	0.36	0.35	333	315	36	32	367	329	10	8	42	36
2024	354	278	0.36	0.35	473	446	45	40	494	445	11	9	48	40
2025	402	316	0.36	0.35	603	572	53	47	605	549	13	10	54	45
2026	433	344	0.36	0.35	716	680	60	54	706	642	14	11	60	49
2027	452	368	0.36	0.35	822	781	68	62	808	739	15	12	64	53
2028	467	380	0.36	0.35	931	880	76	69	912	833	15	13	67	56
2029	479	393	0.36	0.35	1039	976	83	75	1011	925	16	13	69	58
2030	489	403	0.36	0.35	1139	1065	89	81	1098	1009	16	14	71	60
2031	497	417	0.36	0.35	1224	1141	94	85	1171	1077	17	14	72	61
2032	503	428	0.36	0.35	1295	1208	97	89	1230	1132	17	14	73	63
2033	507	432	0.36	0.35	1353	1264	100	92	1278	1179	17	14	74	64
2034	511	441	0.36	0.35	1399	1313	103	95	1317	1219	17	15	75	65
2035	513	445	0.36	0.35	1437	1357	105	97	1348	1249	17	15	75	66
2036	515	452	0.36	0.35	1467	1396	106	98	1372	1277	17	15	76	66
2037	516	456	0.36	0.35	1491	1432	107	100	1391	1298	17	15	76	67
2038	518	458	0.36	0.35	1509	1460	108	101	1405	1316	17	15	76	67
2039	518	462	0.36	0.35	1524	1486	109	102	1417	1332	17	15	76	68
2040	519	463	0.36	0.35	1535	1511	109	103	1425	1346	17	15	77	68
2041	520	464	0.36	0.35	1543	1531	110	104	1432	1360	17	15	77	69

Status from 2014 Update





Management Quantities

Table 15 in the report

Quantity	Units	Estimate	Median	SE
F_{MSY}	y^{-1}	0.37	0.35	0.06
B_{MSY}	mt whole	4278.4	4368.7	627.2
SSB_{MSY}	mt whole	1563.9	1659.4	269.7
MSST	mt whole	1172.9	1244.5	202.3
MSY	1000 lb gutted	1455.1	1453.5	41.6
D_{MSY}	1000 fish	17.6	16.7	4.0
R_{MSY}	1000 age-1 fish	521	509	104
$F_{2017-2019}/F_{\text{MSY}}$	—	2.15	2.27	0.38
$\text{SSB}_{2019}/\text{MSST}$	—	0.20	0.19	0.04
$\text{SSB}_{2019}/\text{SSB}_{\text{MSY}}$	—	0.15	0.14	0.03