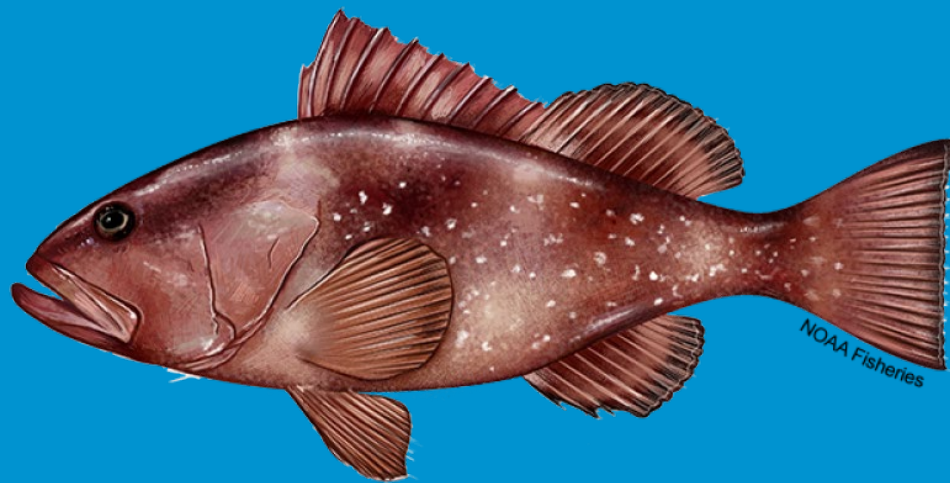




NOAA
FISHERIES

SEDAR 88: Gulf of Mexico Red Grouper

Operational Assessment for the Gulf Reef Fish AP

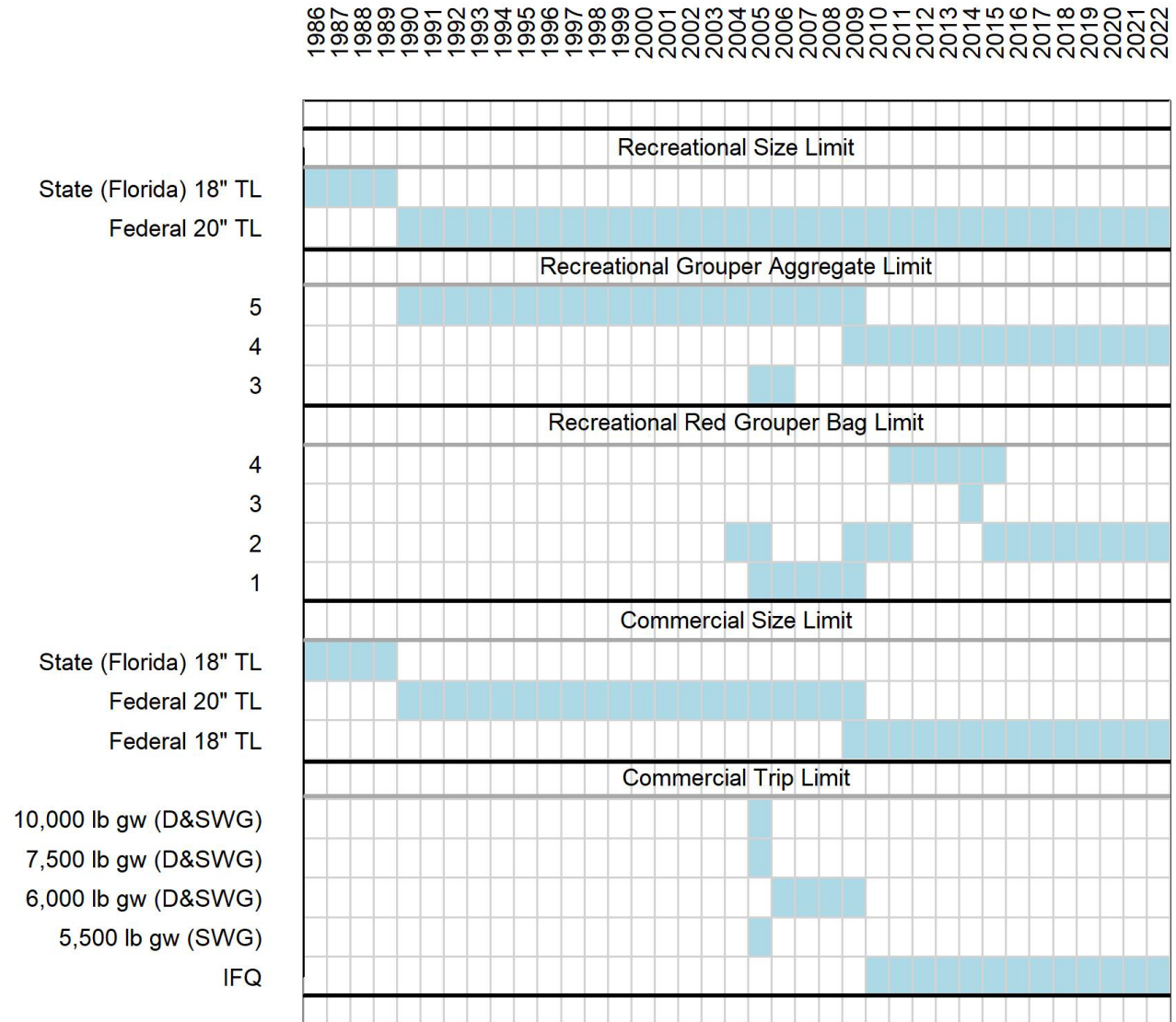


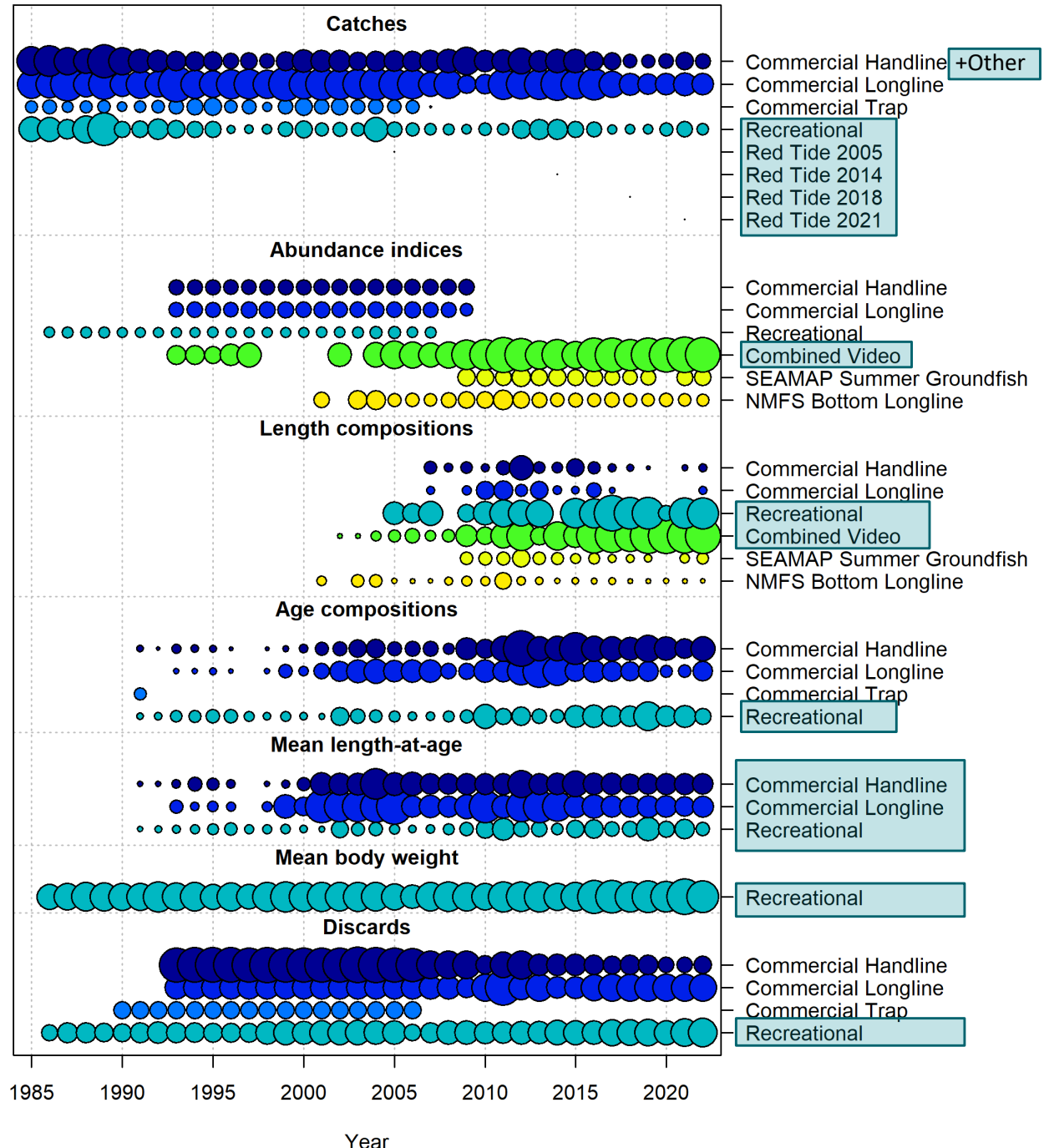
Ryan Rindone for:
SEFSC Gulf Fisheries Branch

March 17, 2025

Management

- Commercial:
 - 1986-1989: Florida size limit
 - 1990-2009: State and Federal size limits
 - 2010-2022: IFQ period
- Recreational:
 - 1986-1989: Florida size limit
 - 1990-2022: Federal size limit

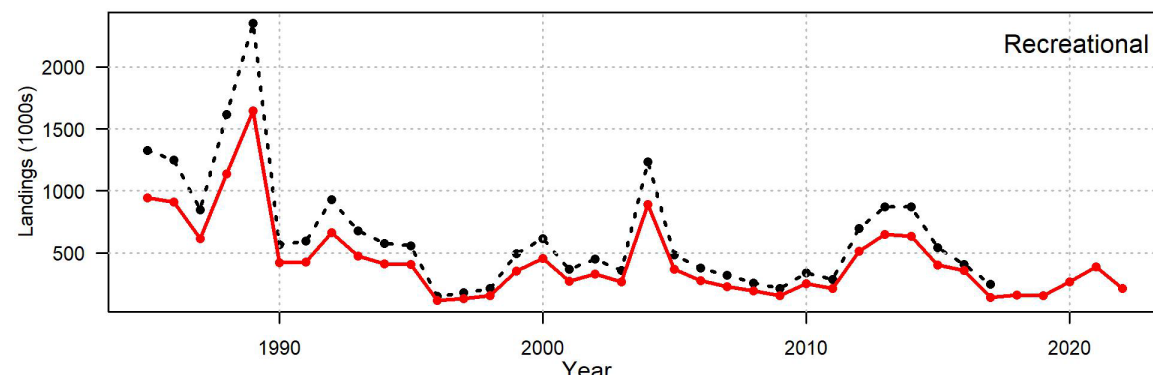
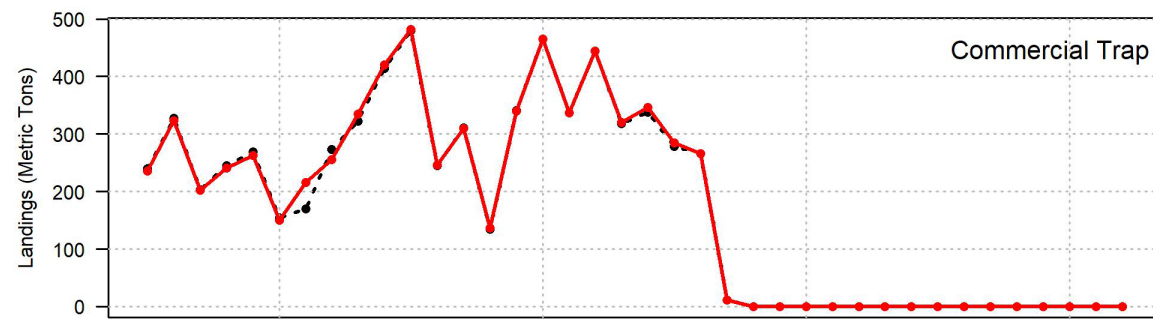
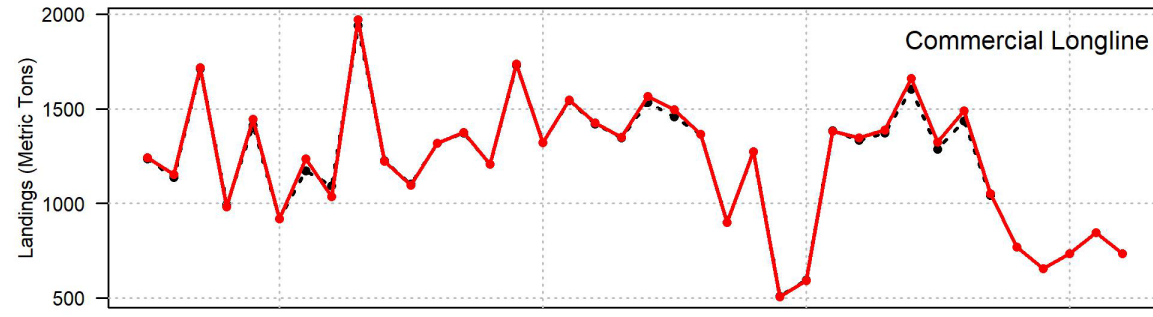
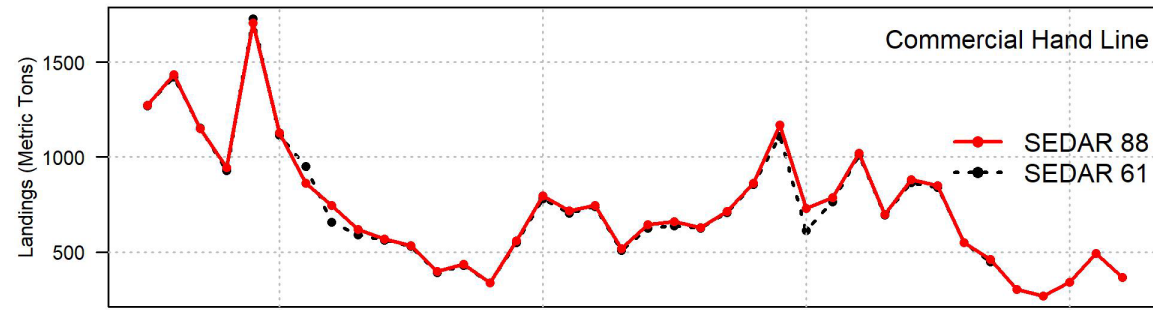
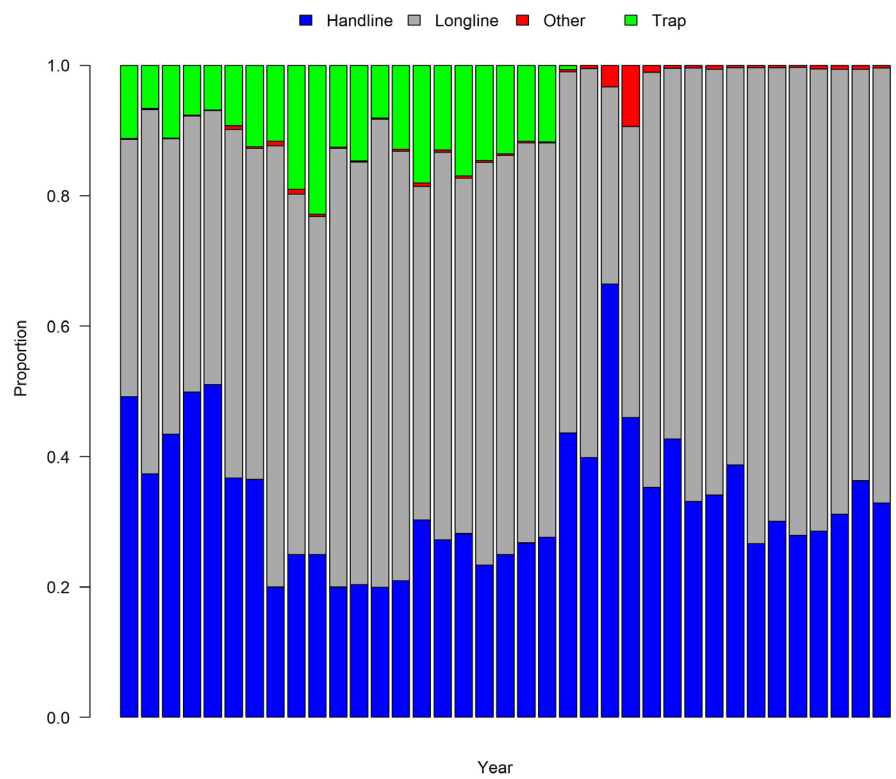




Landings

Notable change:

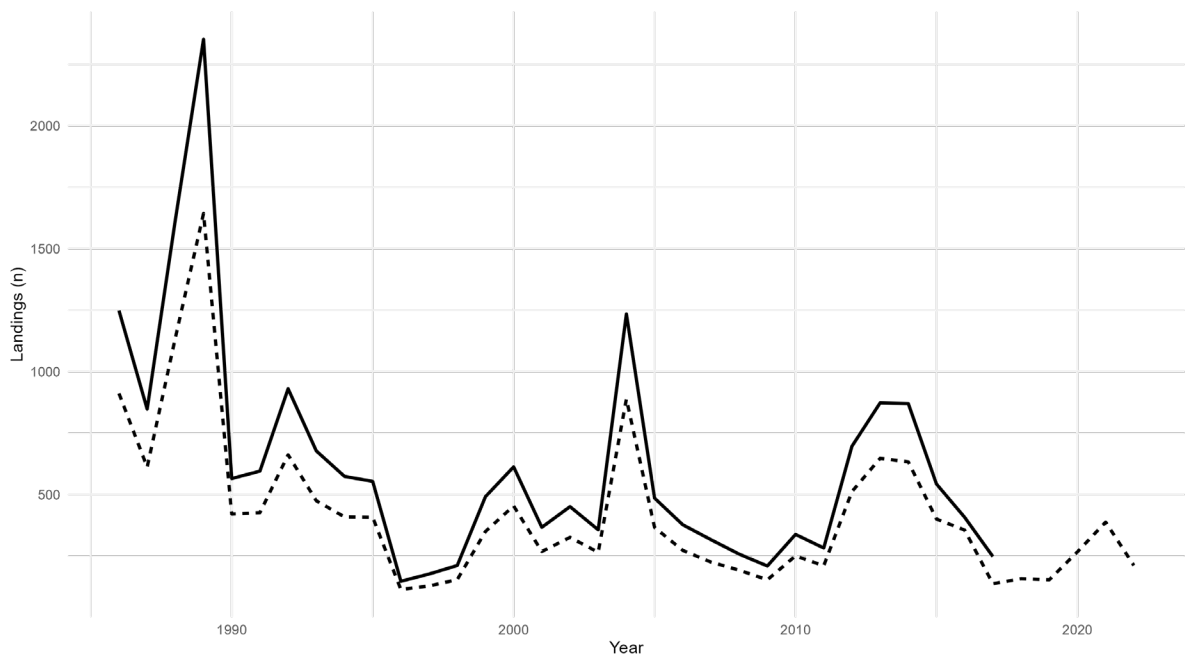
- S61 did not include 'Other' landings
- Added to Handline for S88



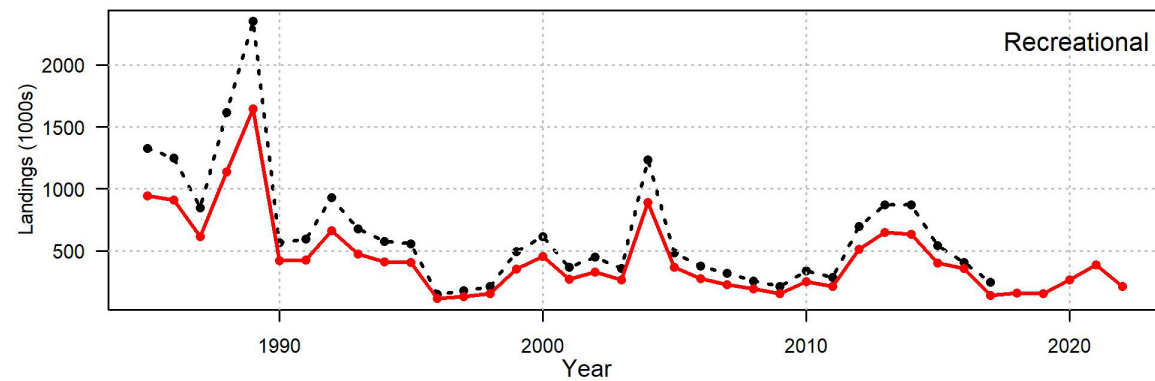
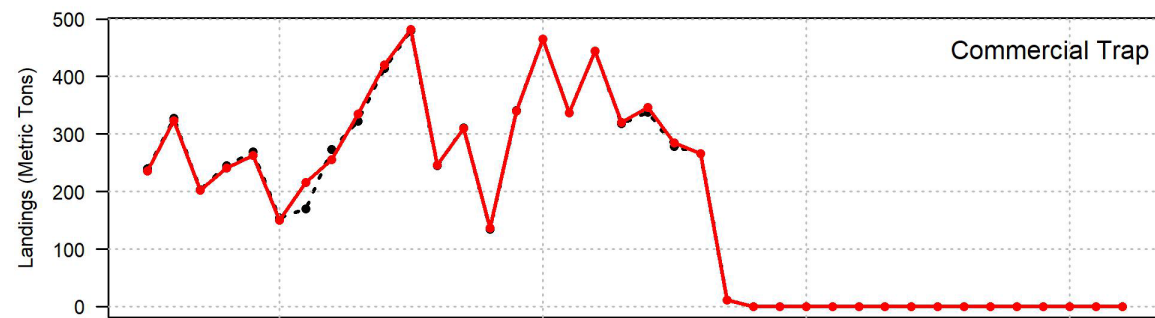
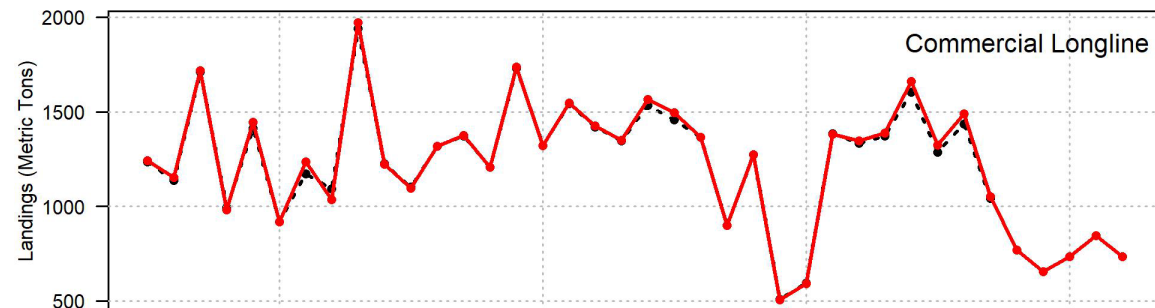
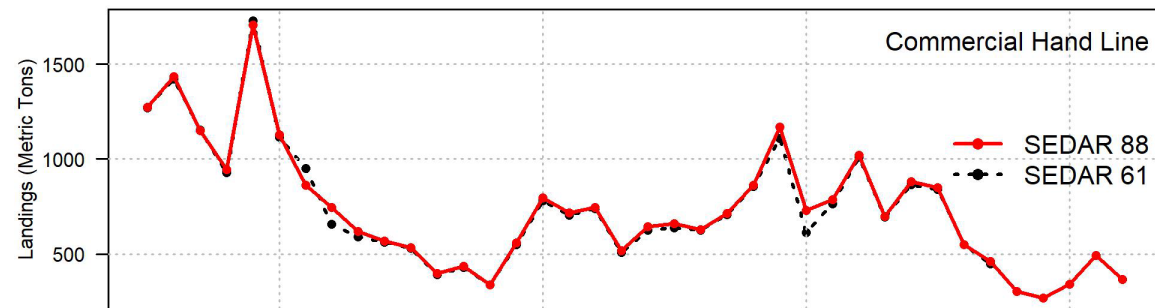
Landings

Notable change:

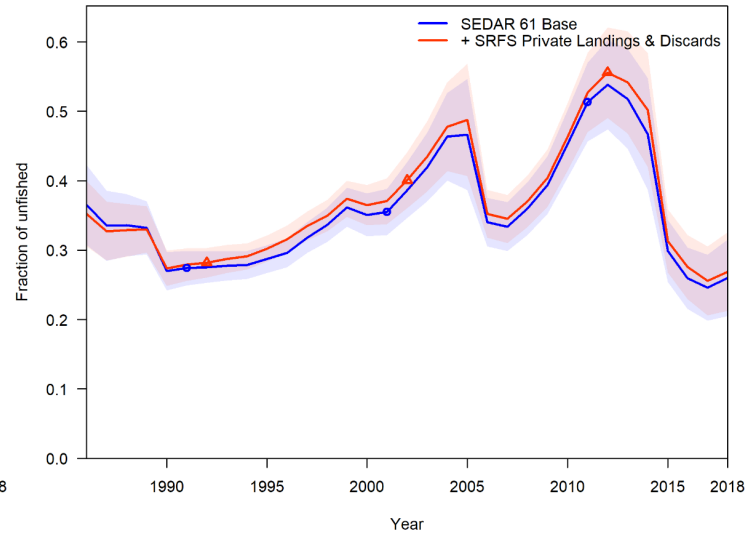
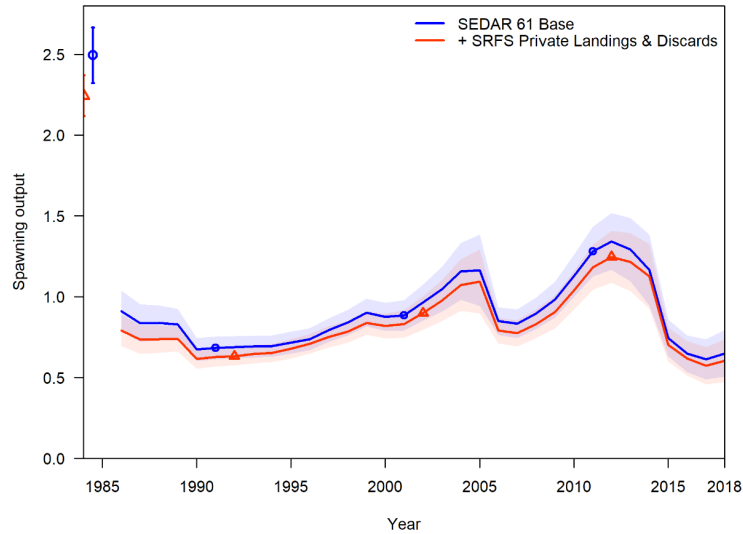
- SRFS replaced MRIP for Florida private mode landings estimates ([WP-17](#))



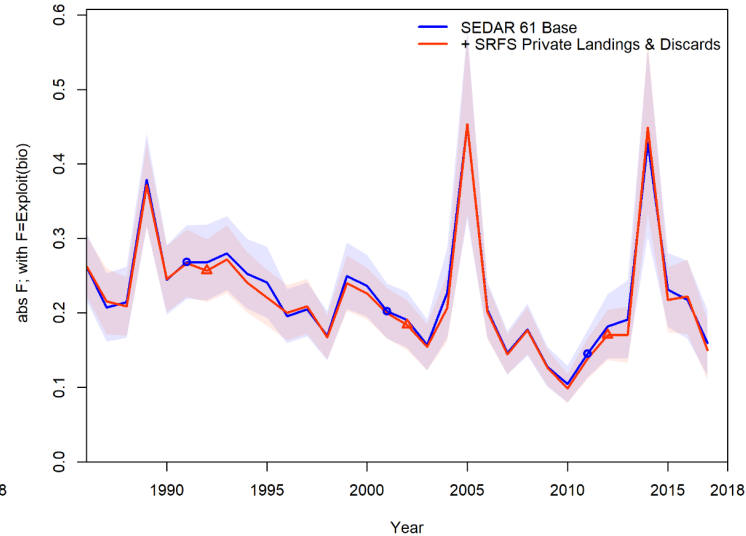
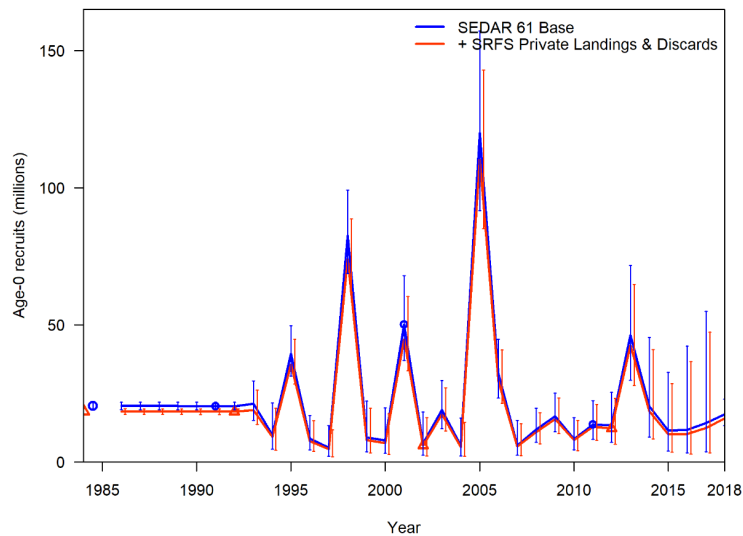
SEDAR
— SEDAR61
- - SEDAR88



Effects of Data Changes: SRFS

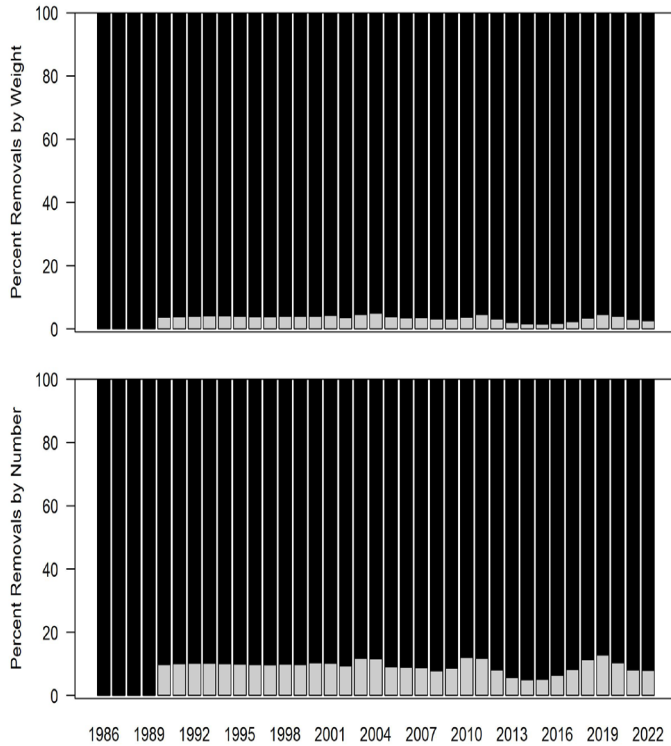


- Recreational landings and discards replaced with SRFS data for Florida private vessel estimates

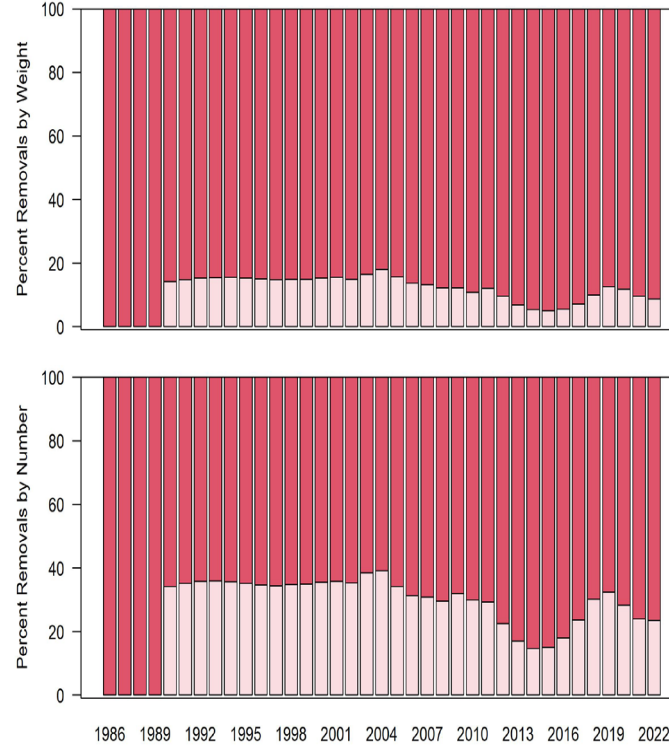


Discards

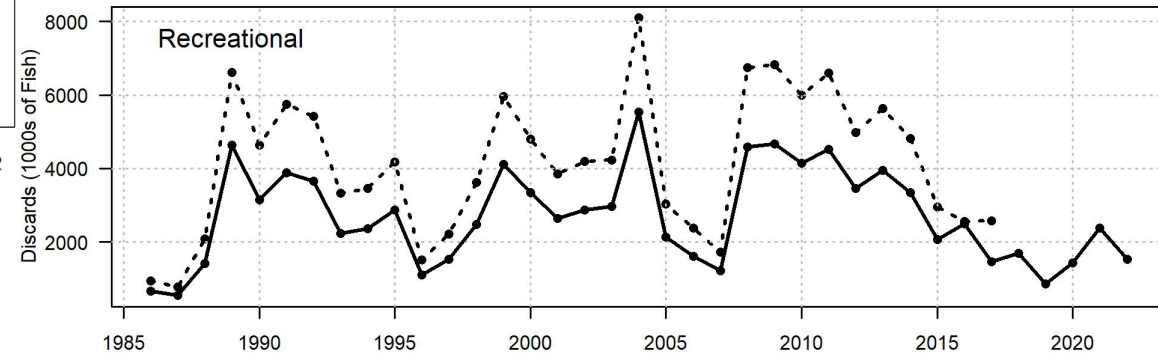
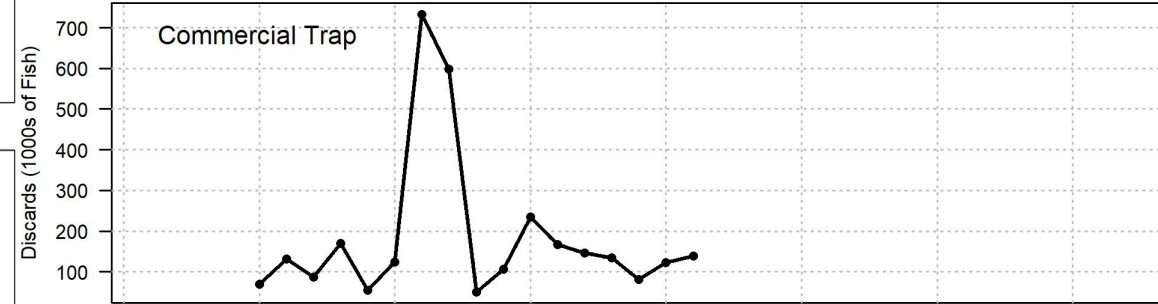
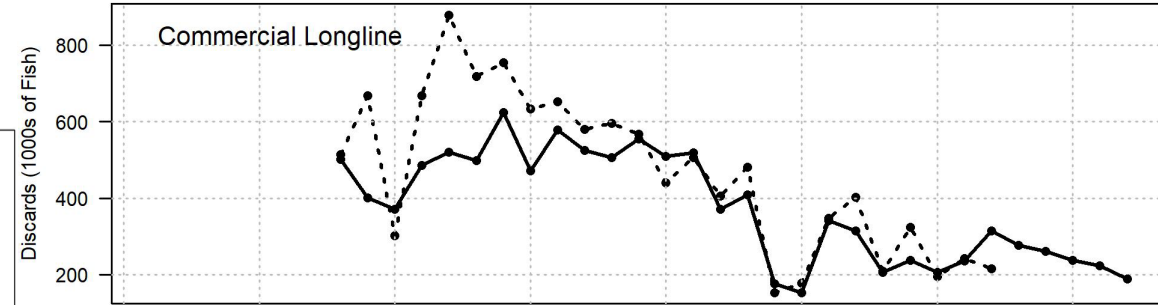
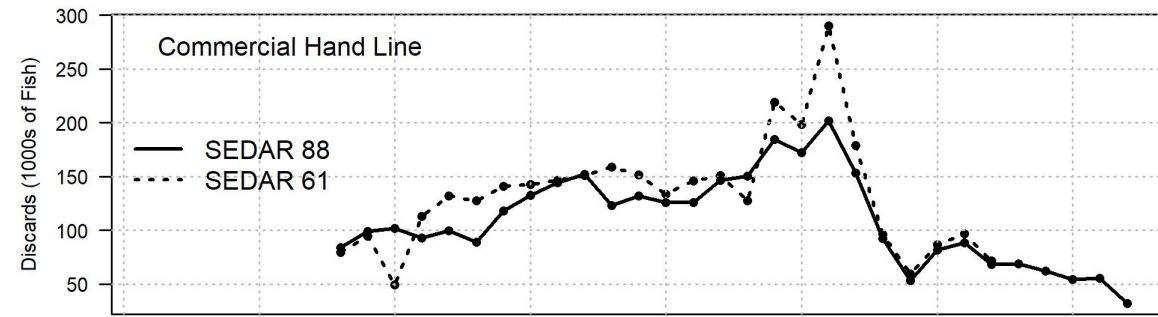
Handline



Longline



* light colors = discards

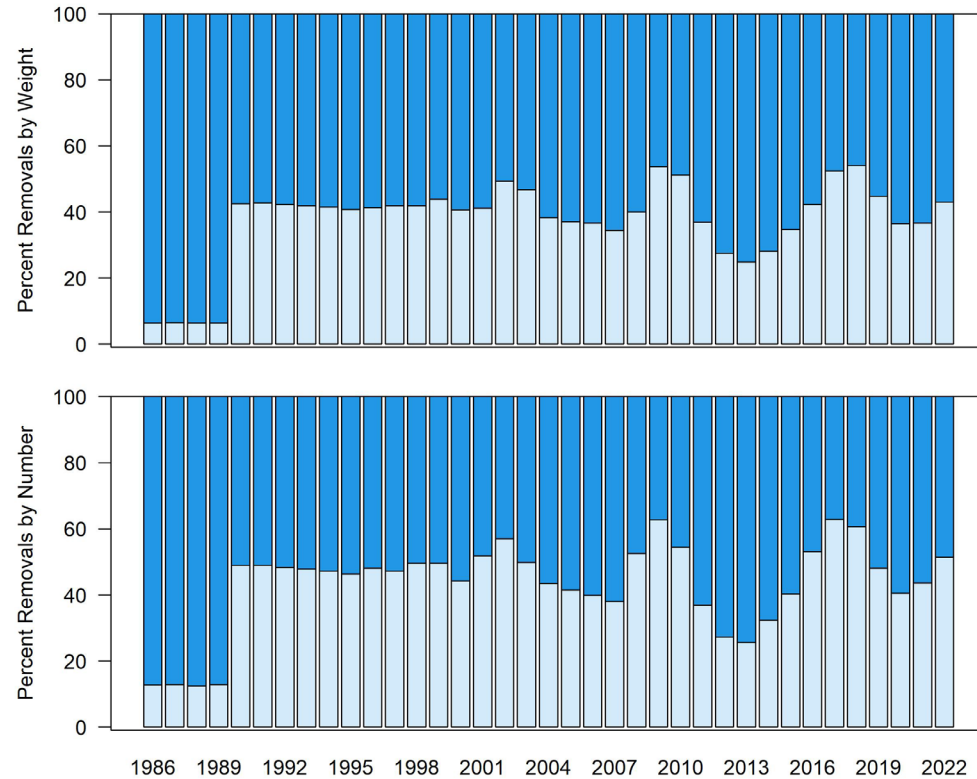


Discards

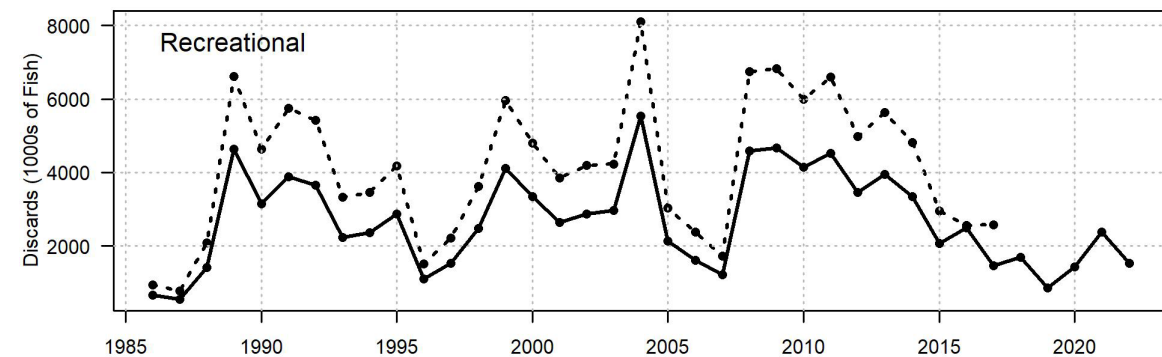
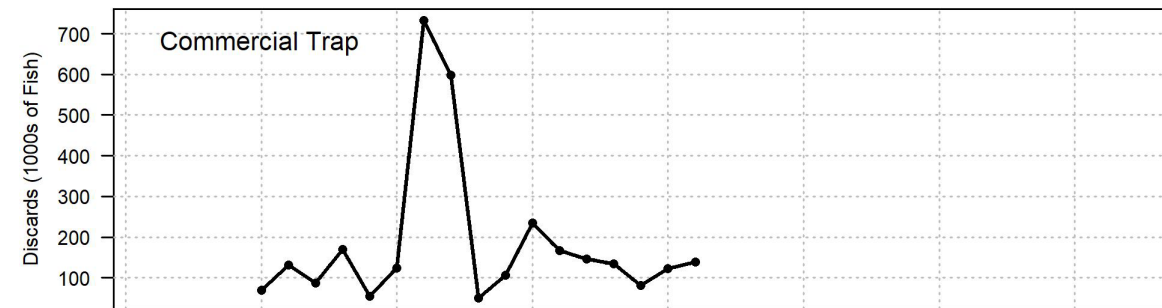
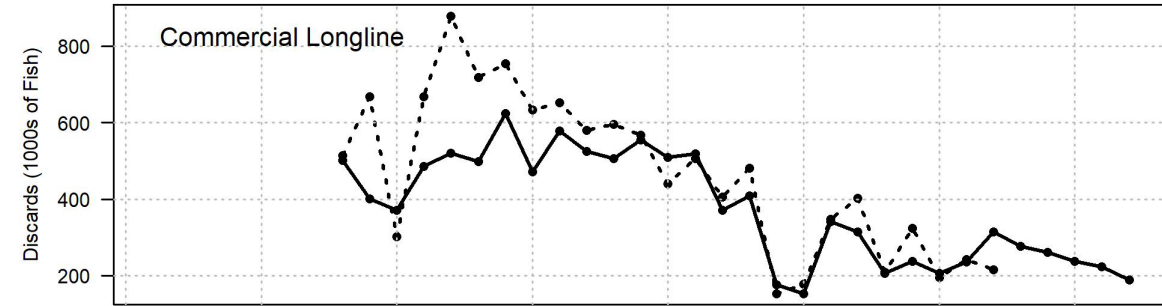
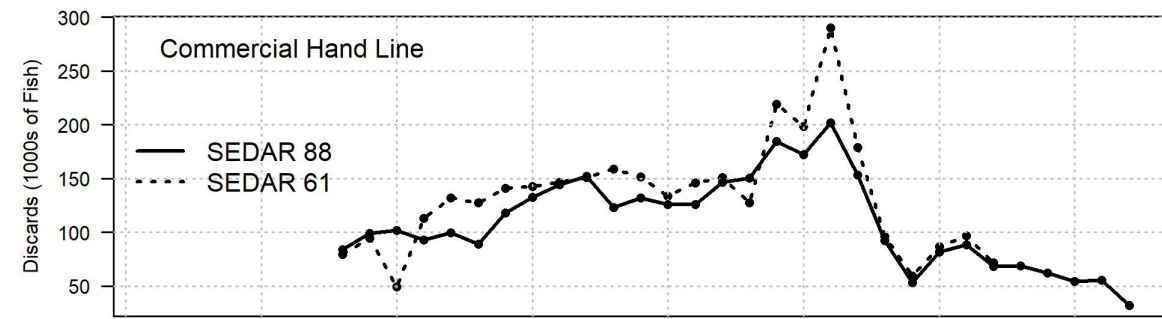
Notable change:

- SRFS replaced MRIP for Florida private mode discards estimates (**WP-17**)

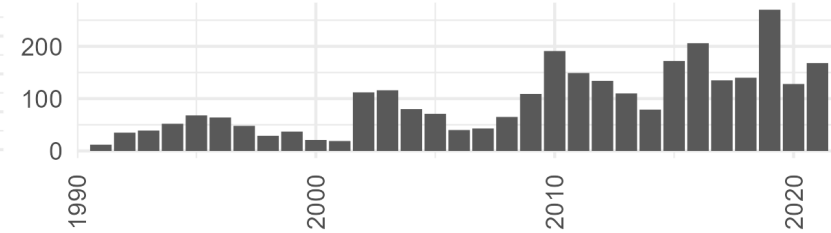
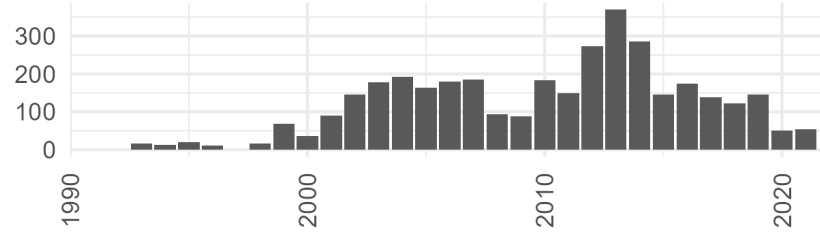
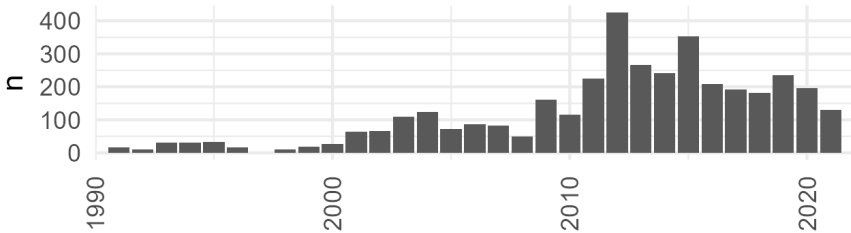
Recreational



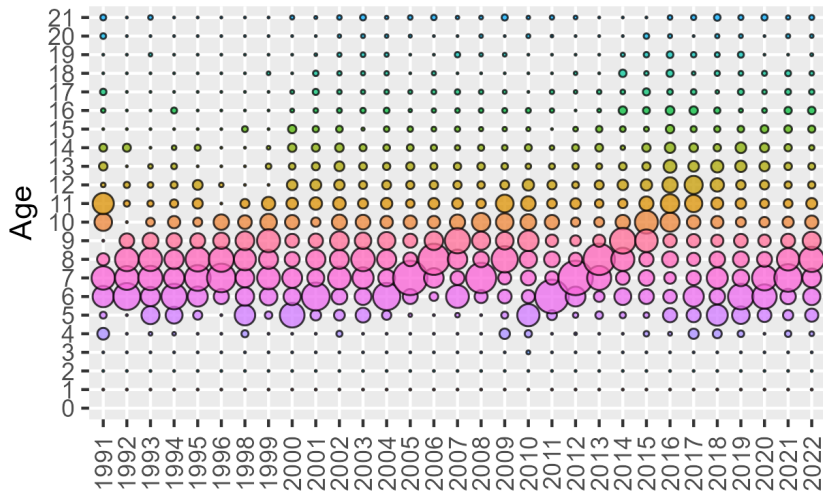
* lighter color = discards



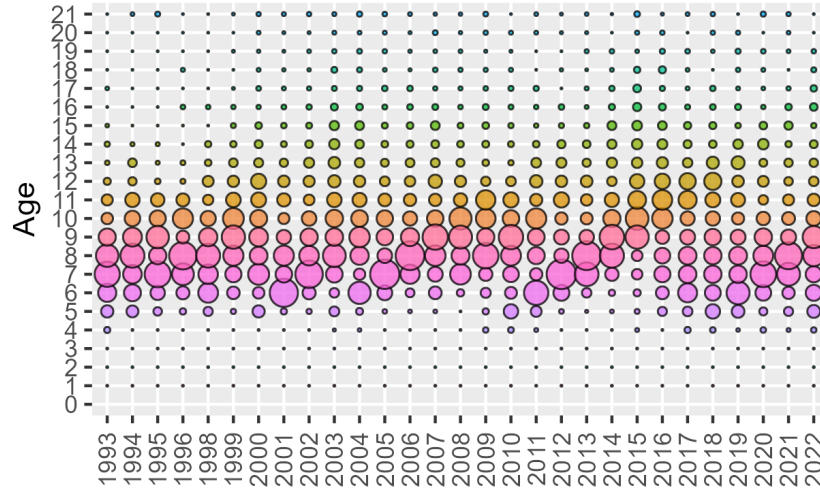
Age Compositions



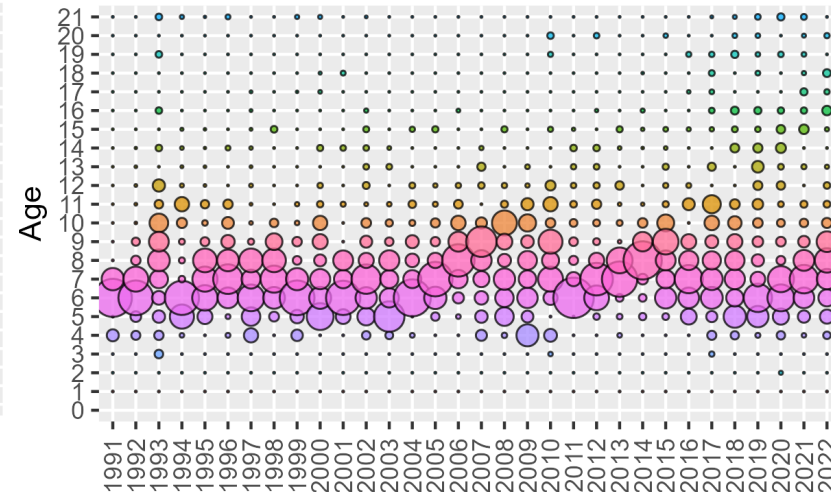
Commercial Handline



Commercial Longline



Recreational



NOAA
FISHERIES

Combined Video Survey

- Habitat-based approach to combining relative abundance data (WP-16)
- G-FISHER survey 2020 start

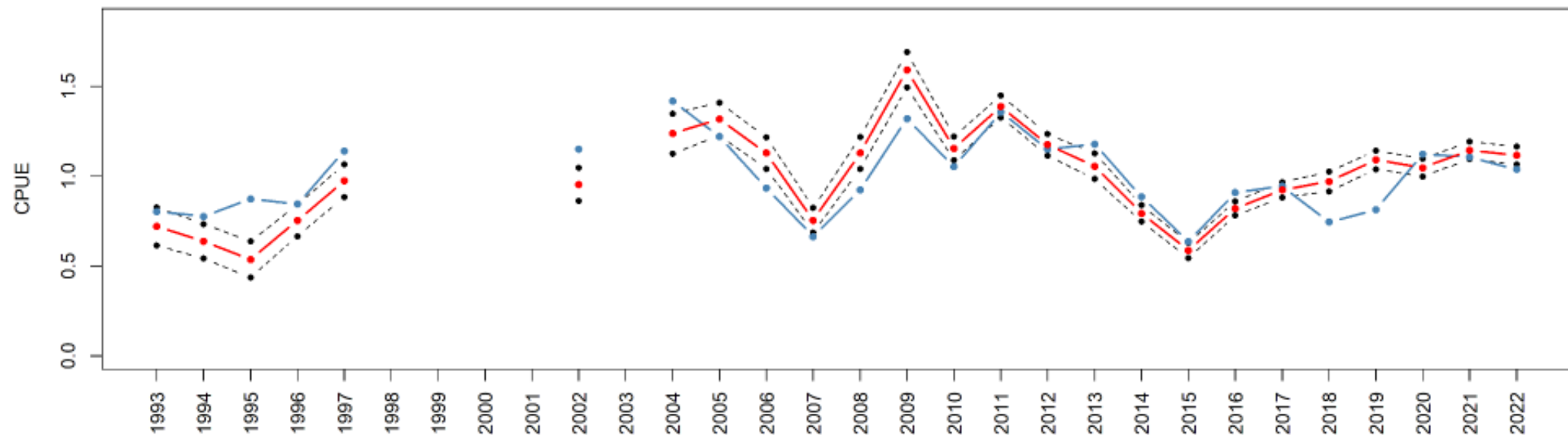
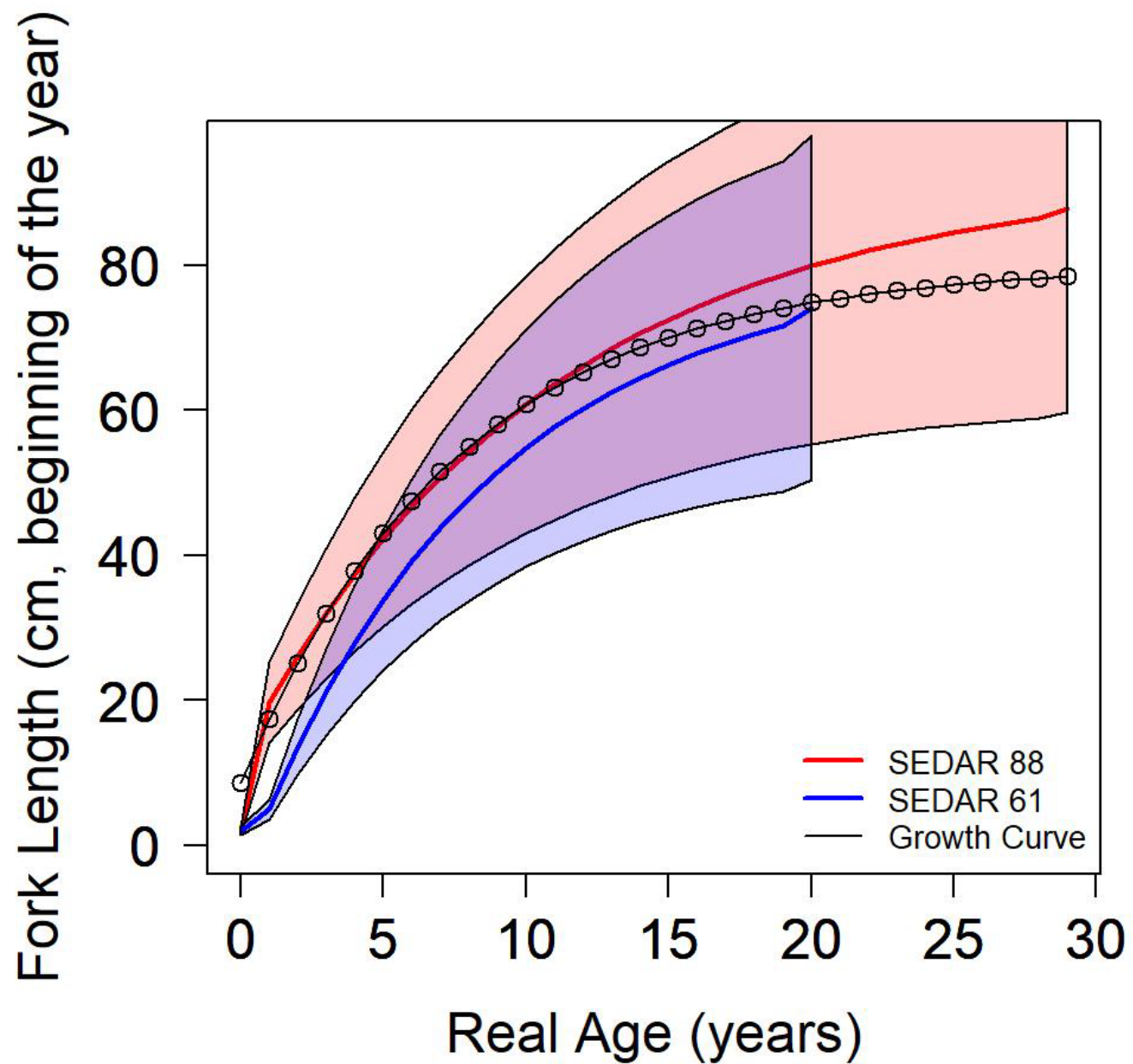


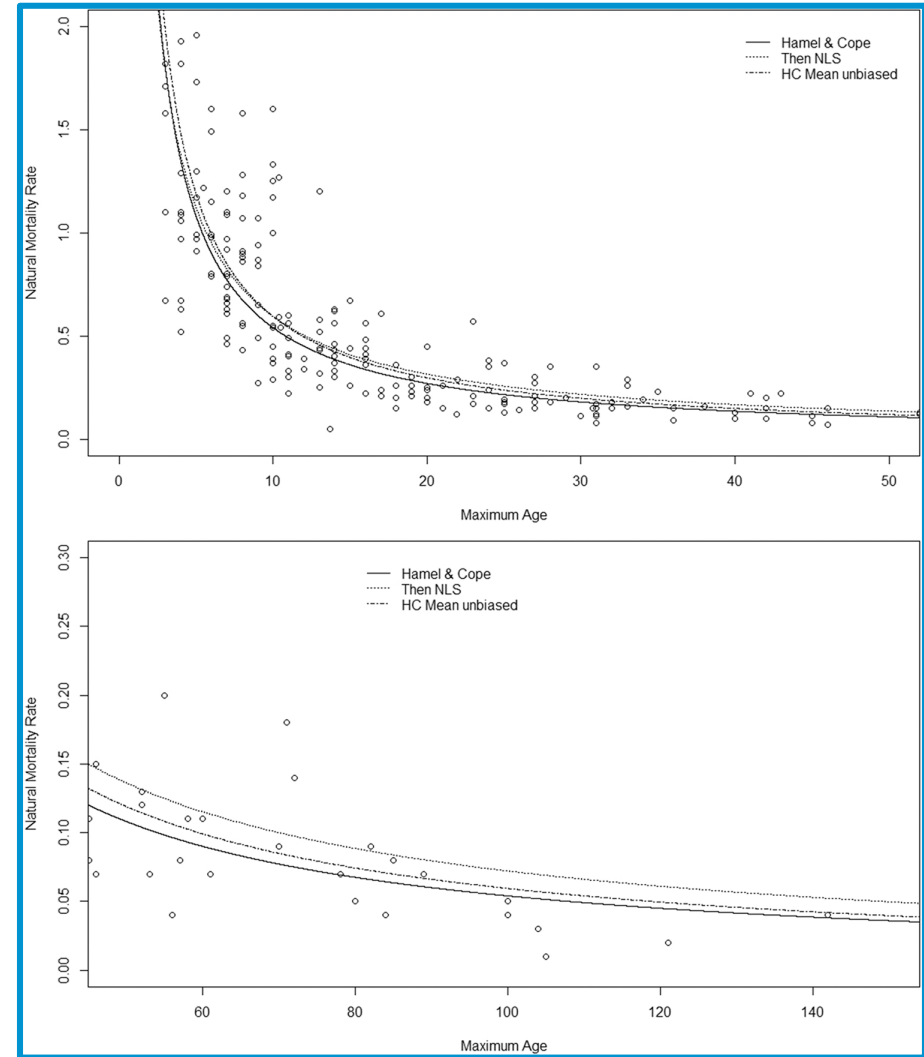
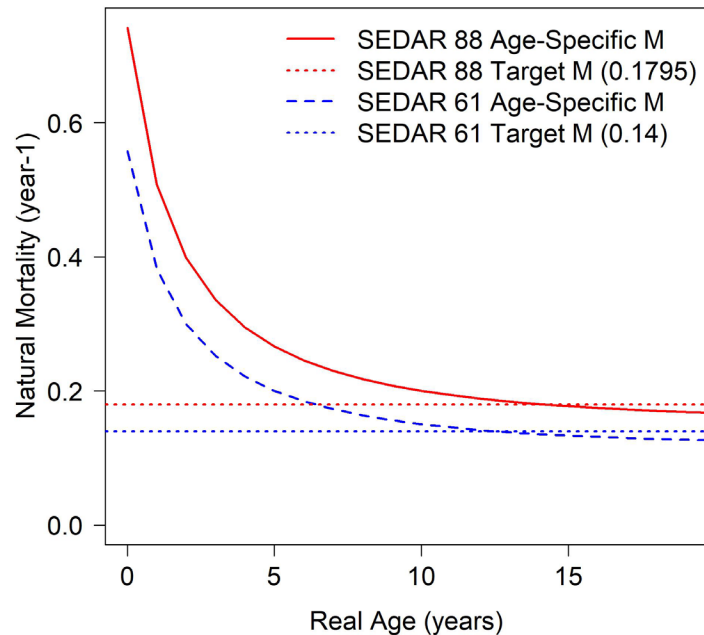
Figure 10. Standardized index of abundance (solid red line) with 2.5% and 97.5% confidence intervals (black dotted lines) and nominal CPUE (solid blue line) for Red Grouper in the eastern Gulf of Mexico.

Growth



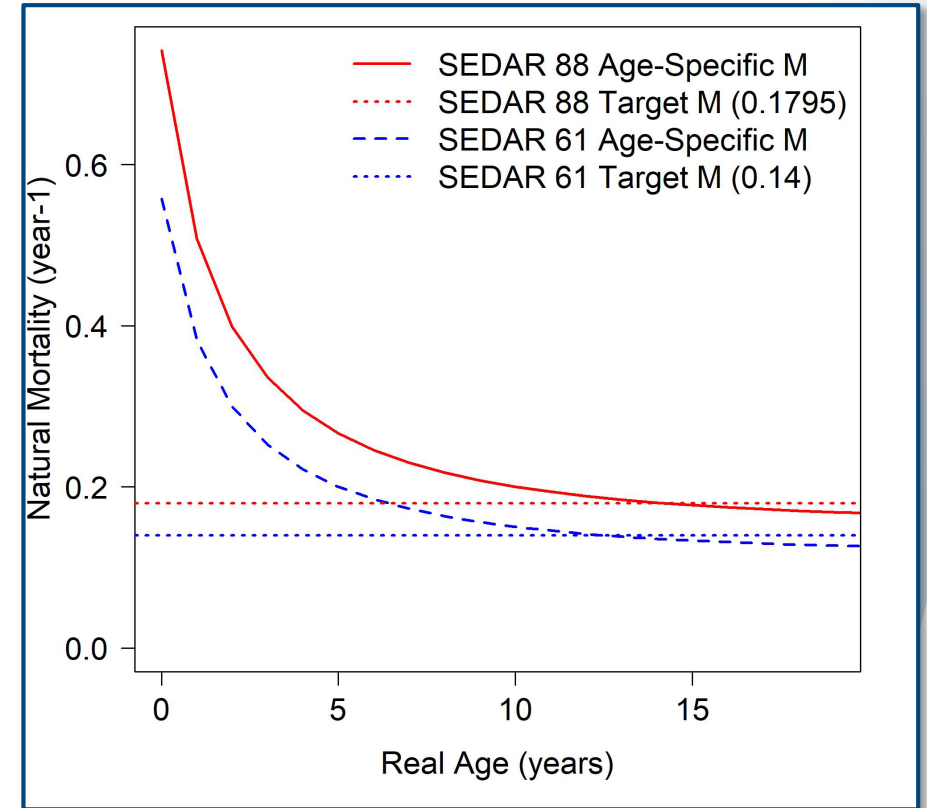
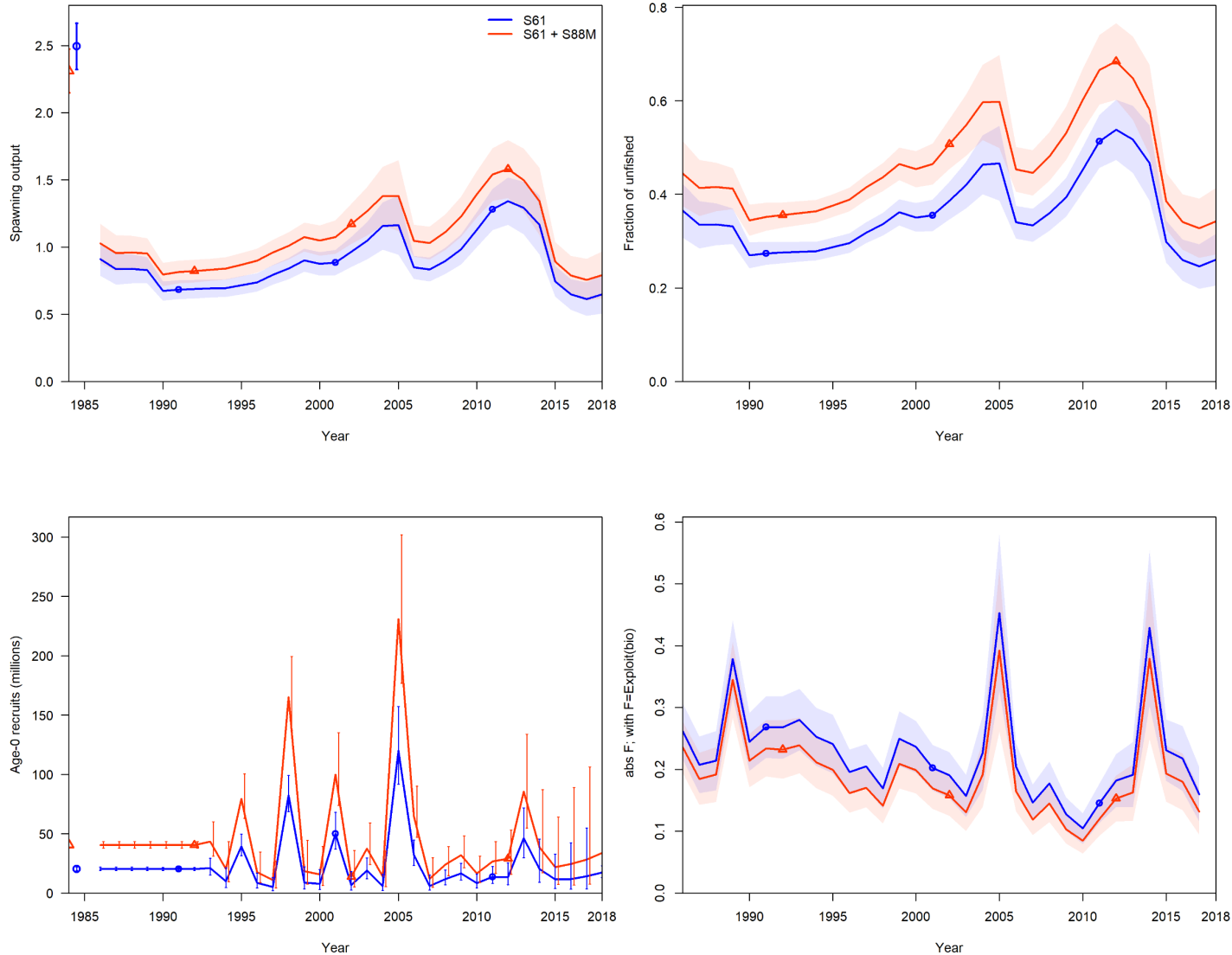
Natural Mortality

- Hamel and Cope (2022)
 - Estimate M from max age
 - Updated point estimate of M from 0.1795 (Then et al) to 0.1862
- Lorenzen M curve calculated internally from point estimate



Hamel, Owen S., and Jason M. Cope. "Development and considerations for application of a longevity-based prior for the natural mortality rate." *Fisheries Research* 256 (2022): 106477.

Effects of Model Changes: Updating M

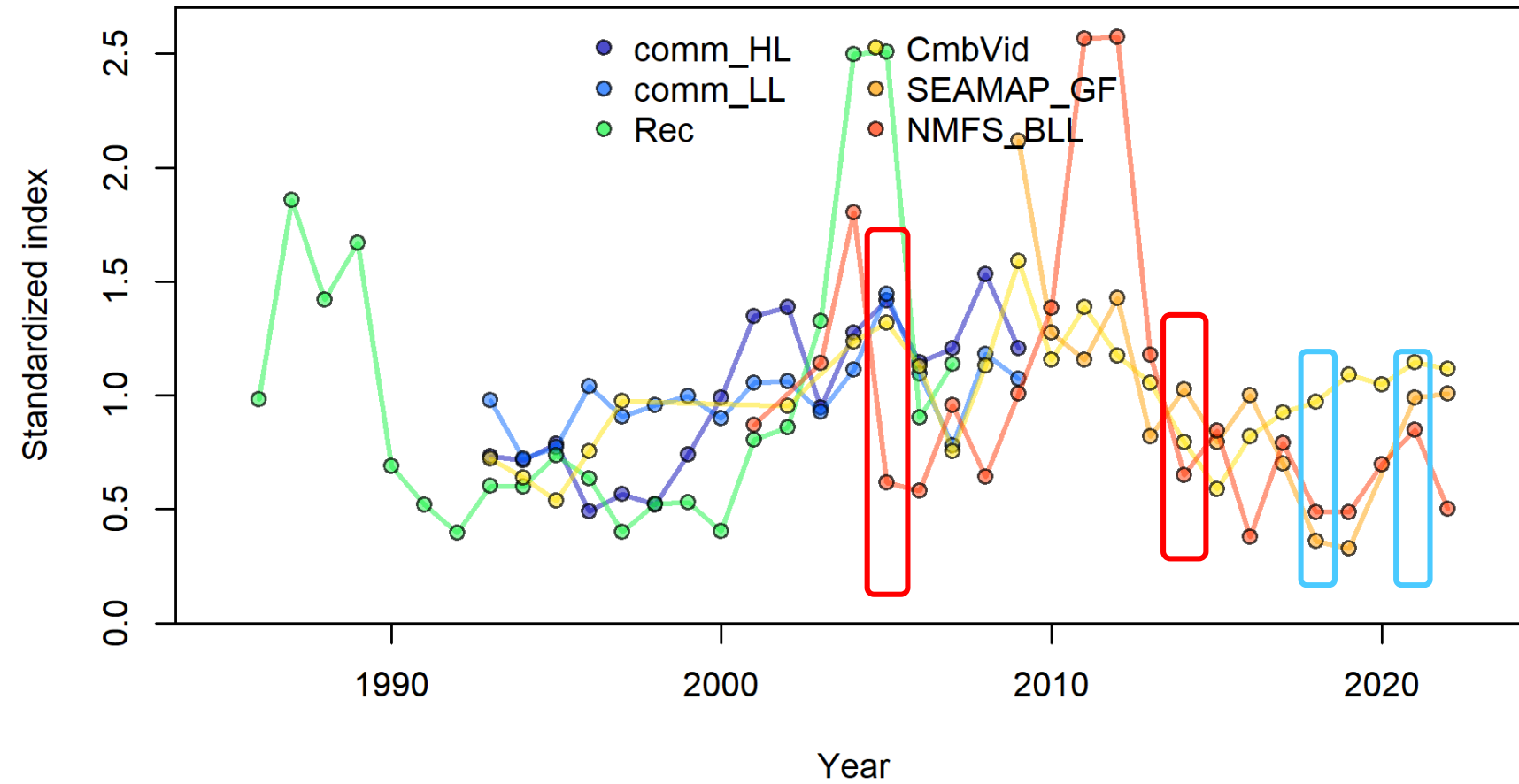


*Hamel & Cope point estimate



NOAA
FISHERIES

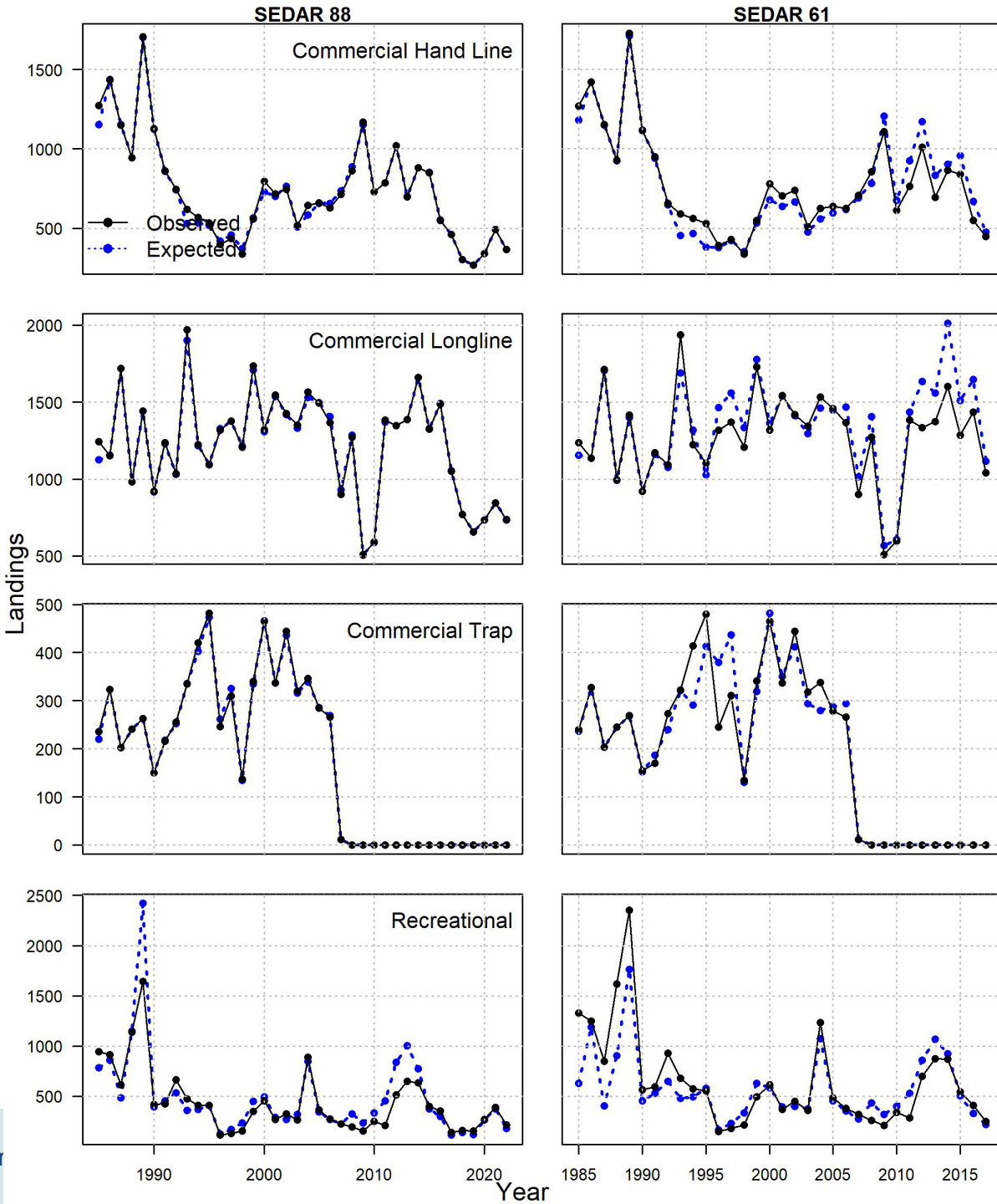
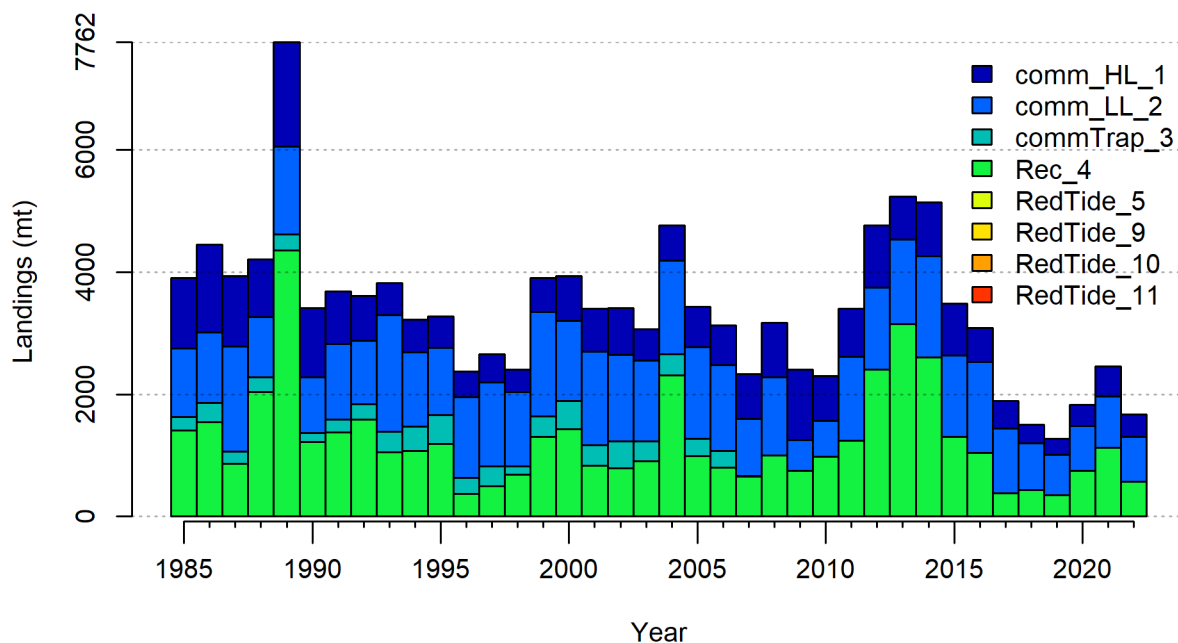
Red Tide Years



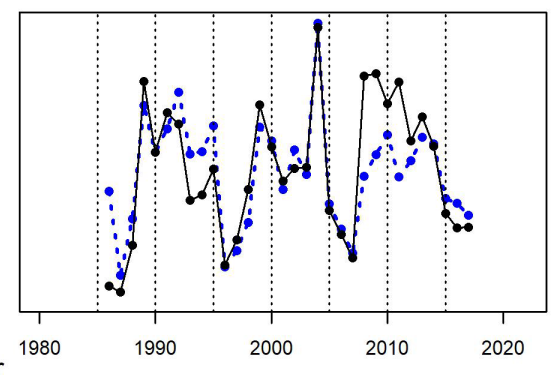
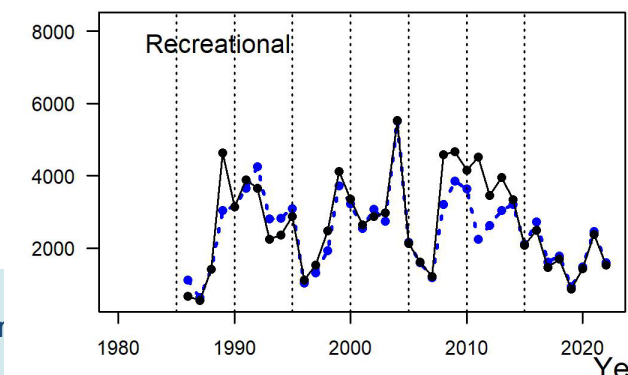
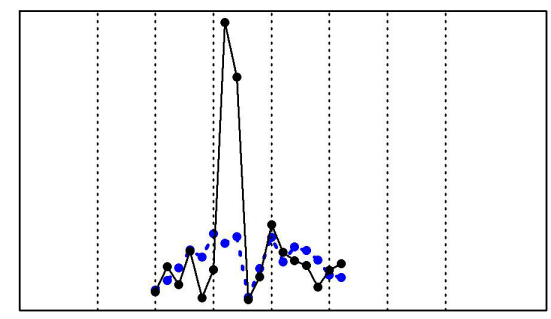
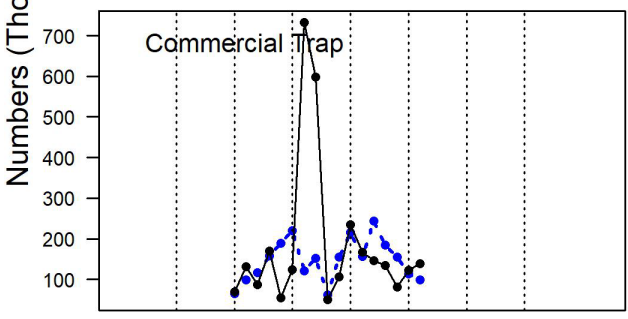
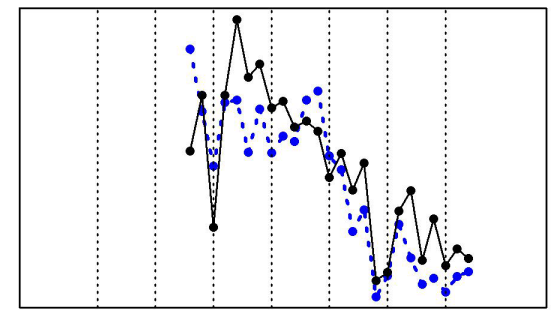
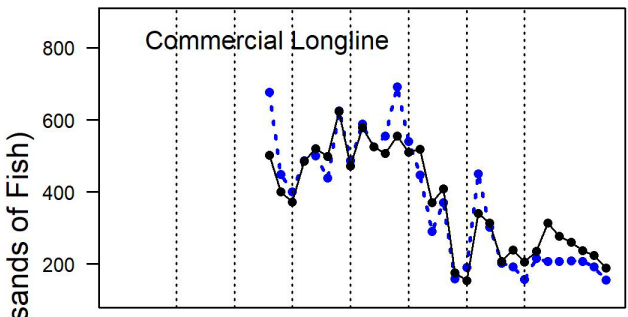
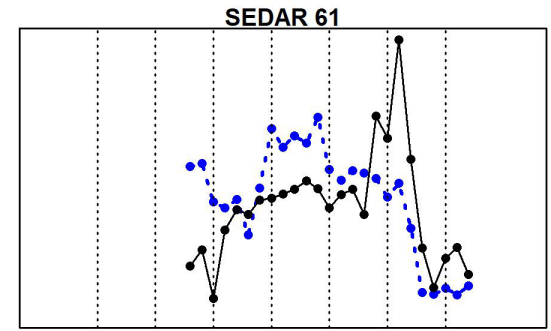
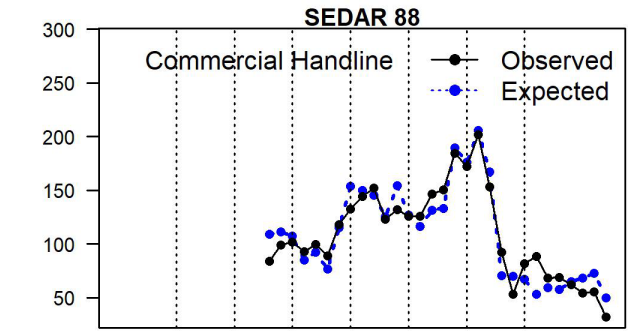
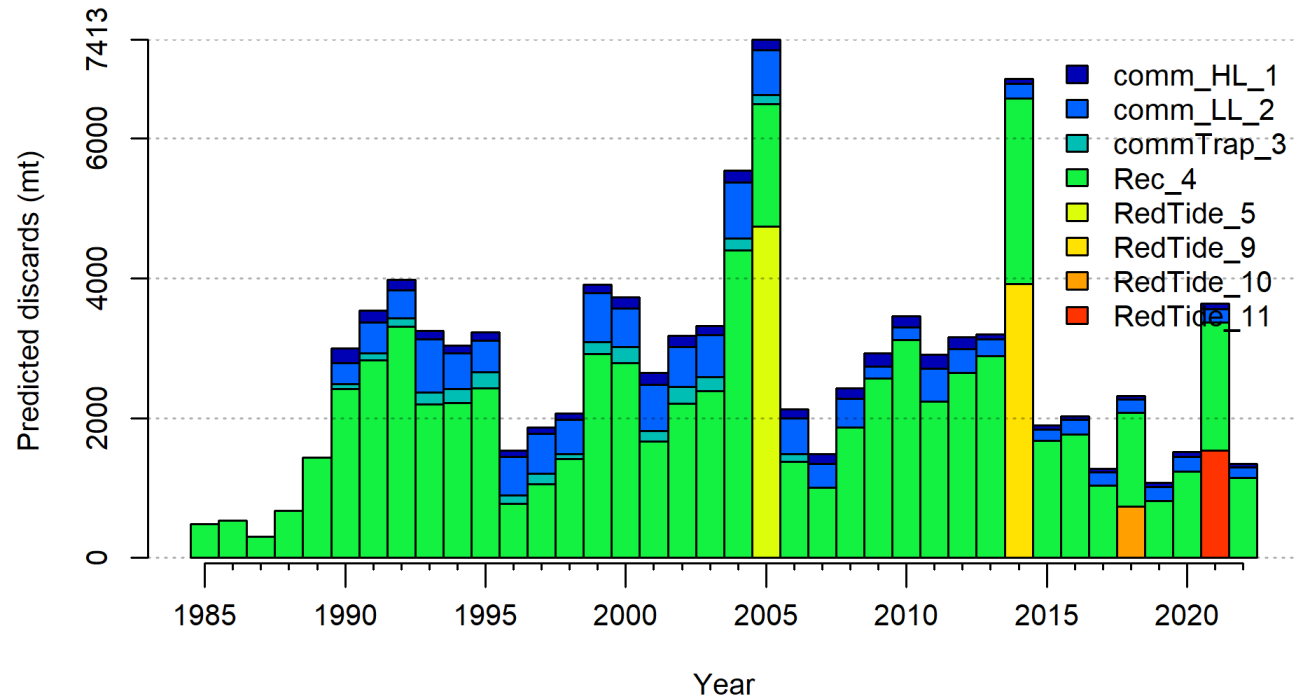
- 2005 and 2014 outlined in red
- 2018 and 2021 outlined in blue

Landings

- Tighter fits for both commercial and recreational fleets from SEDAR 61
- Tight fits from 2010+ (IFQ years log-scale SE = 0.01)



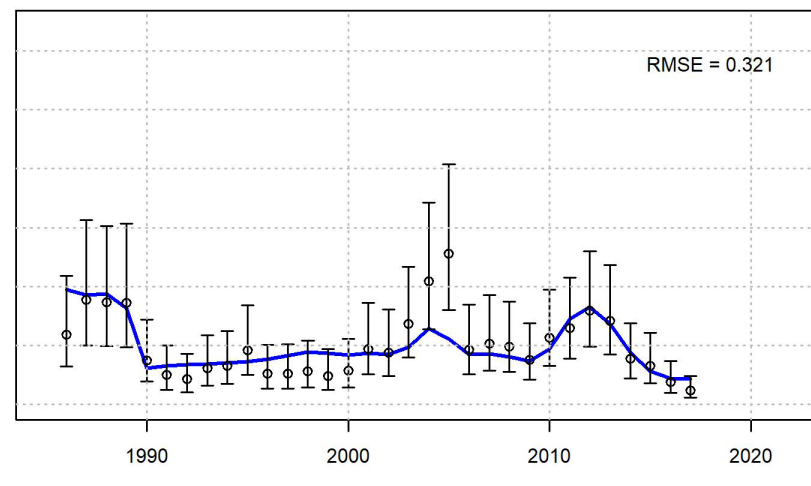
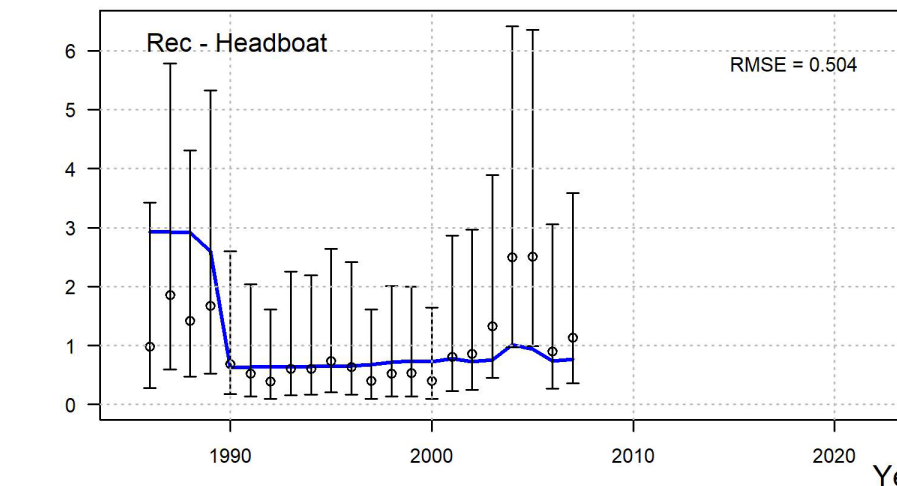
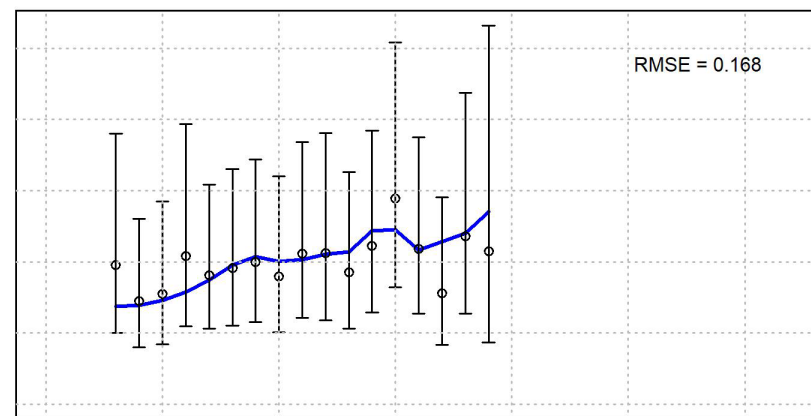
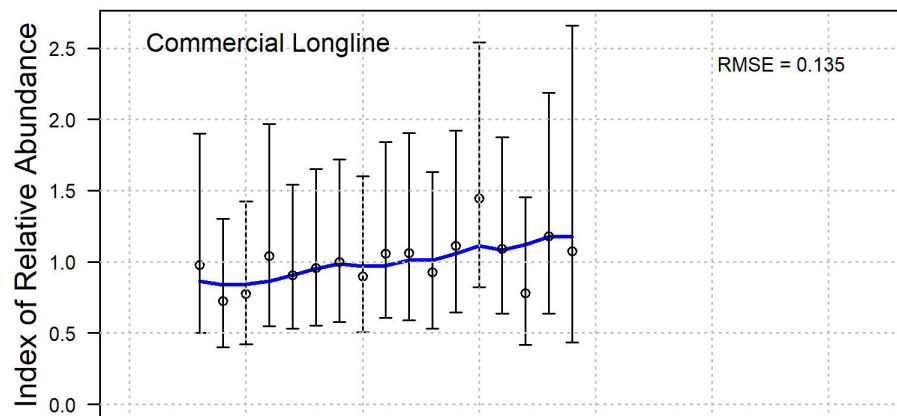
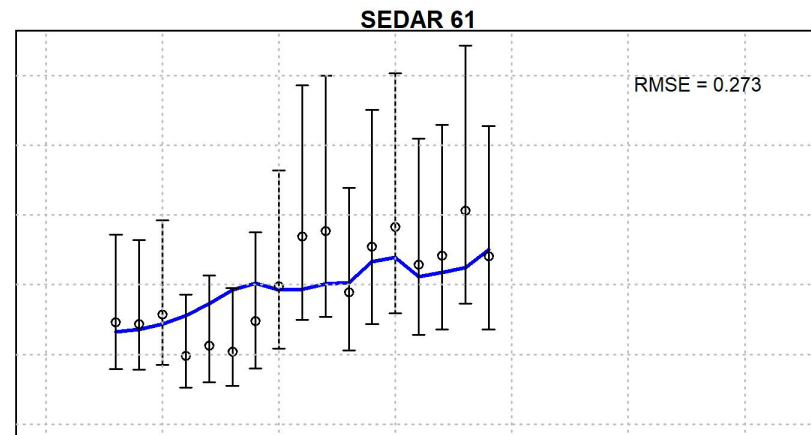
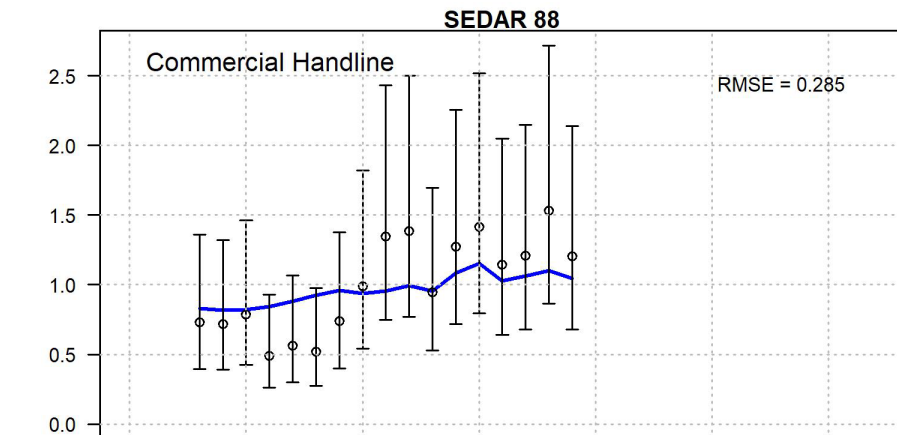
Discards



Indices

Fishery Dependent:

- Handline and Longline unchanged from S61
- Recreational – SRHS
 - Truncated in 2007

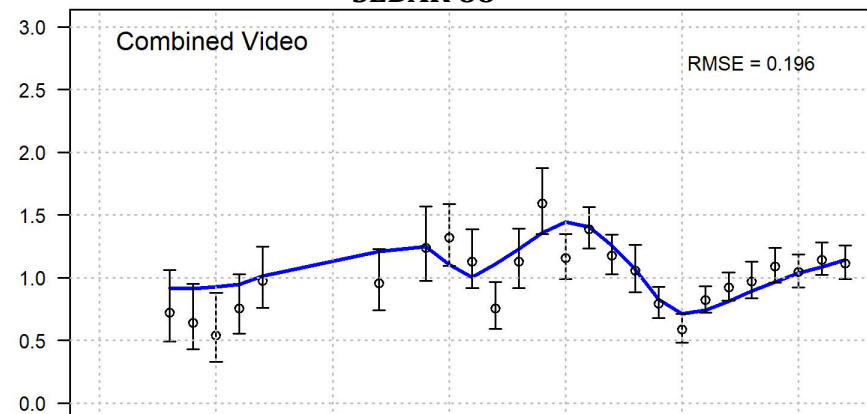


Indices

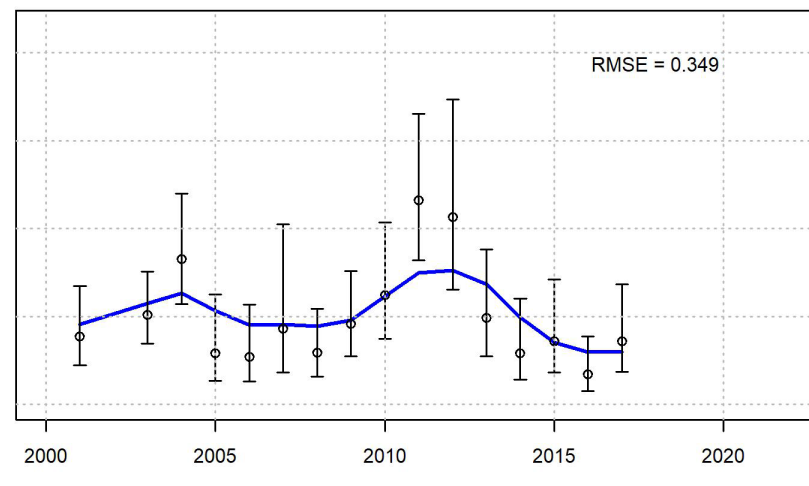
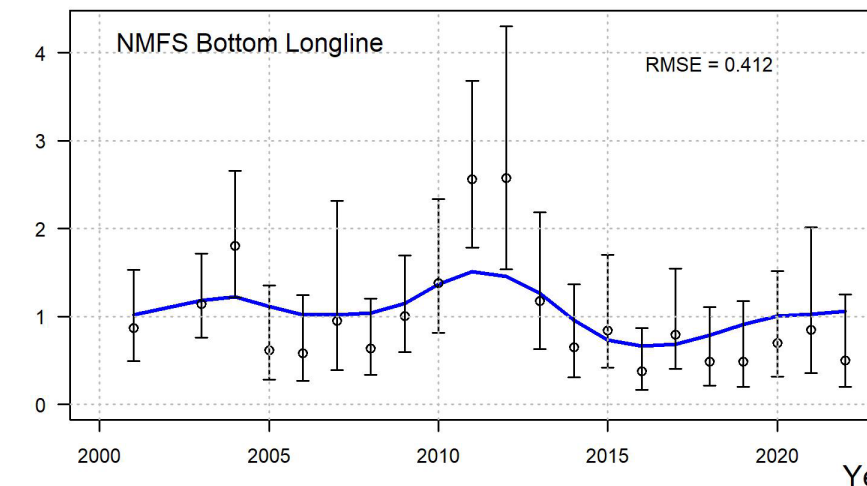
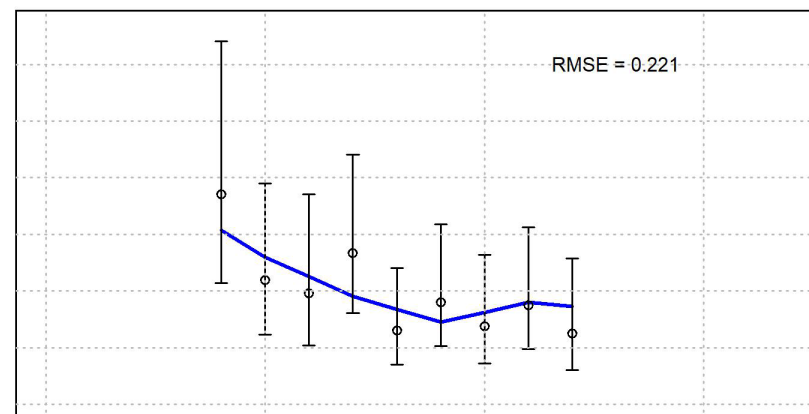
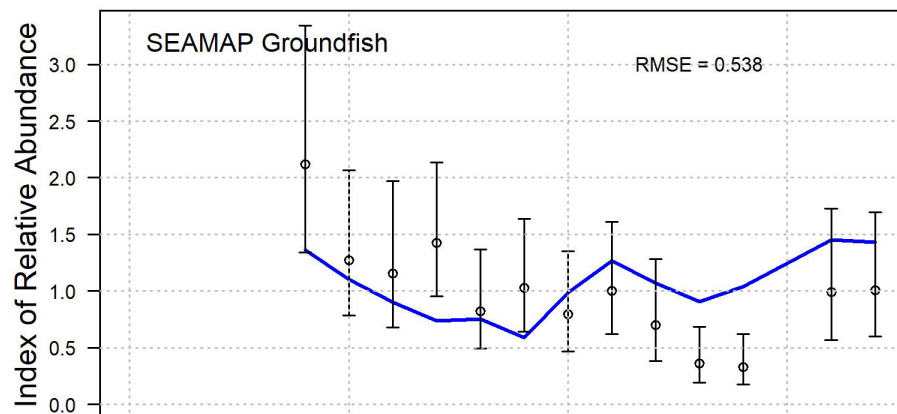
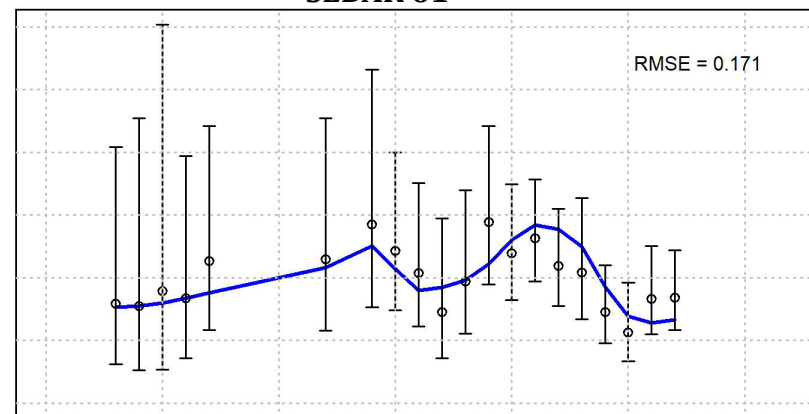
Fishery Independent:

- G-FISHER begins 2020 for Combined Video
- SEAMAP GF: 2020 dropped due to COVID

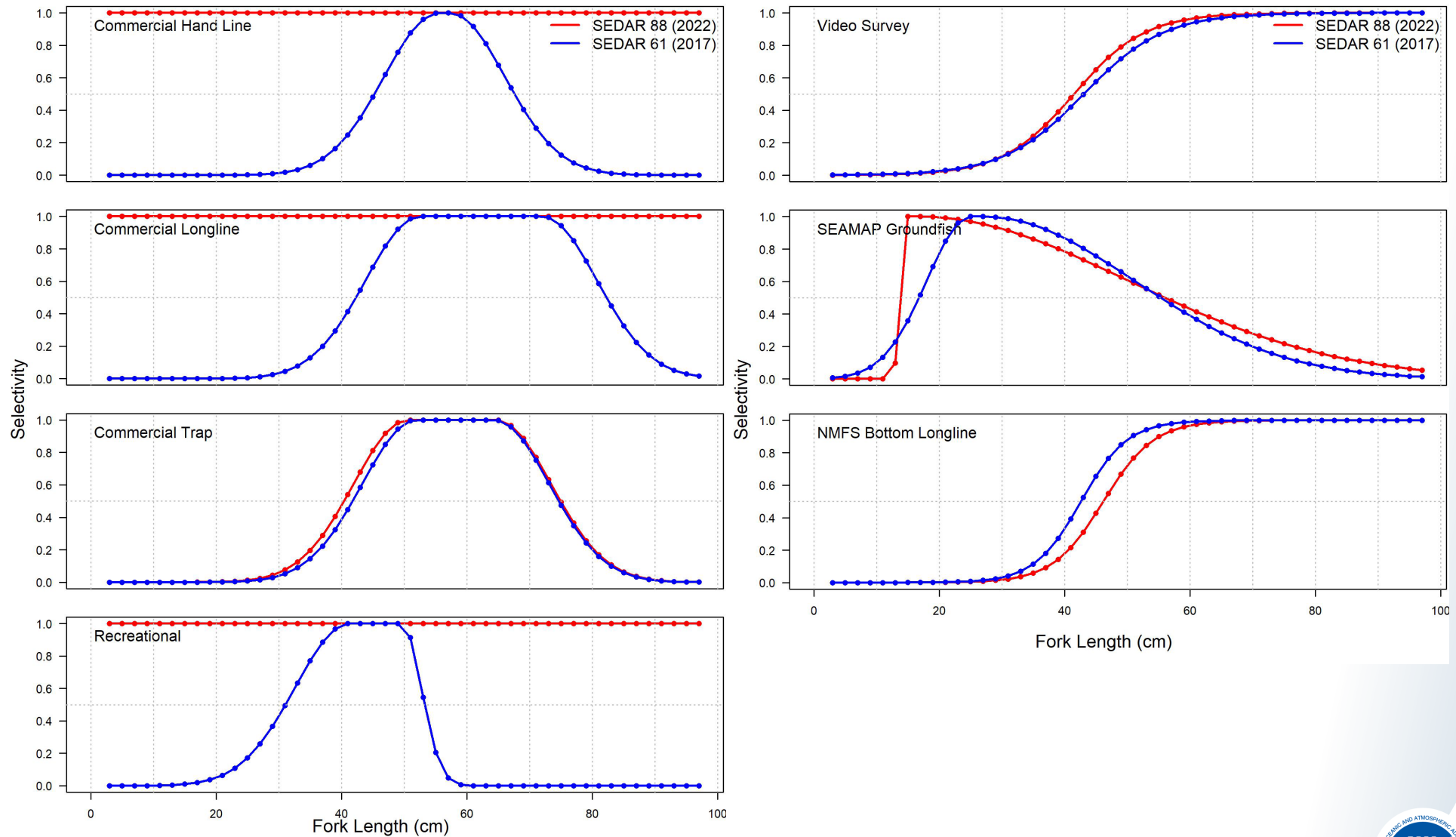
SEDAR 88



SEDAR 61



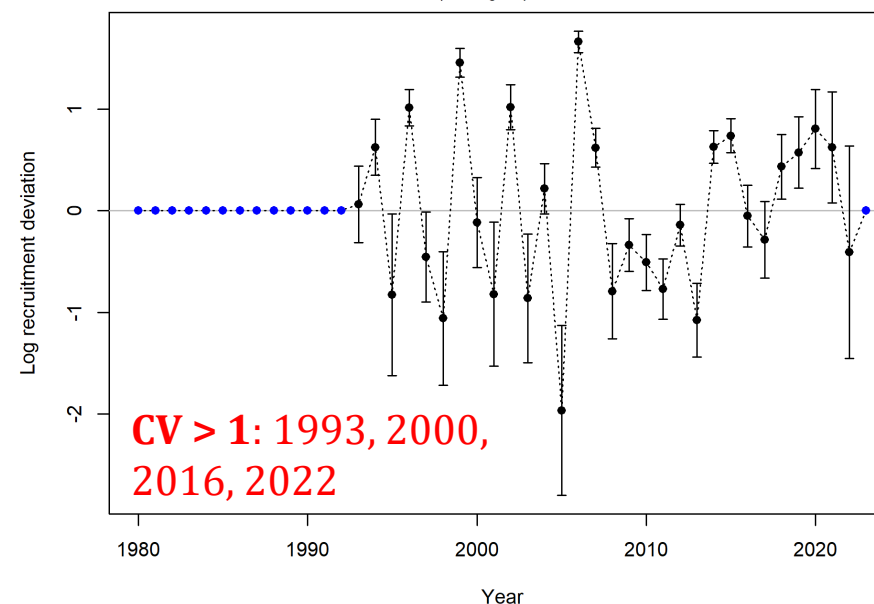
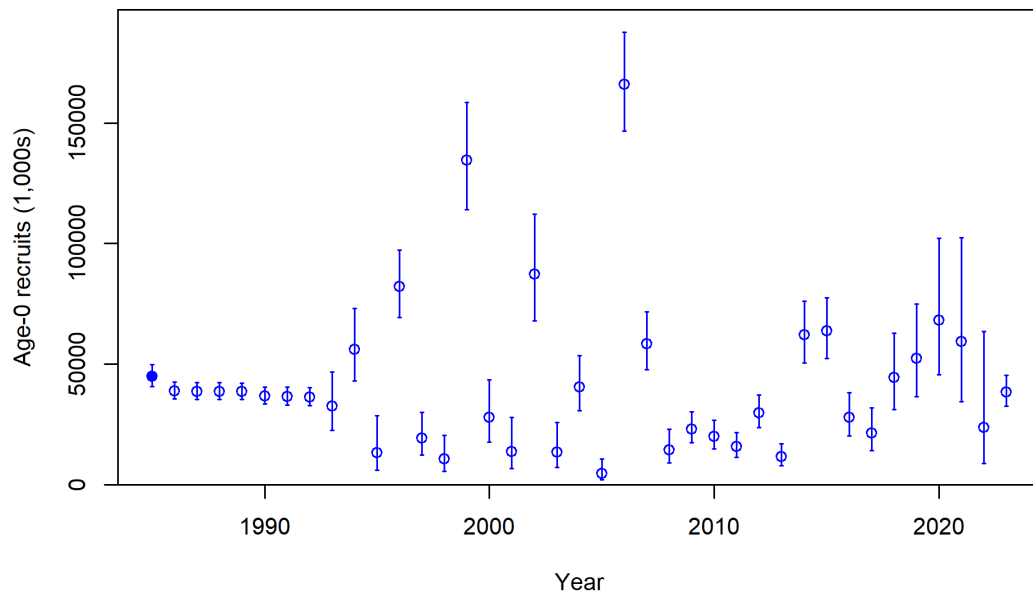
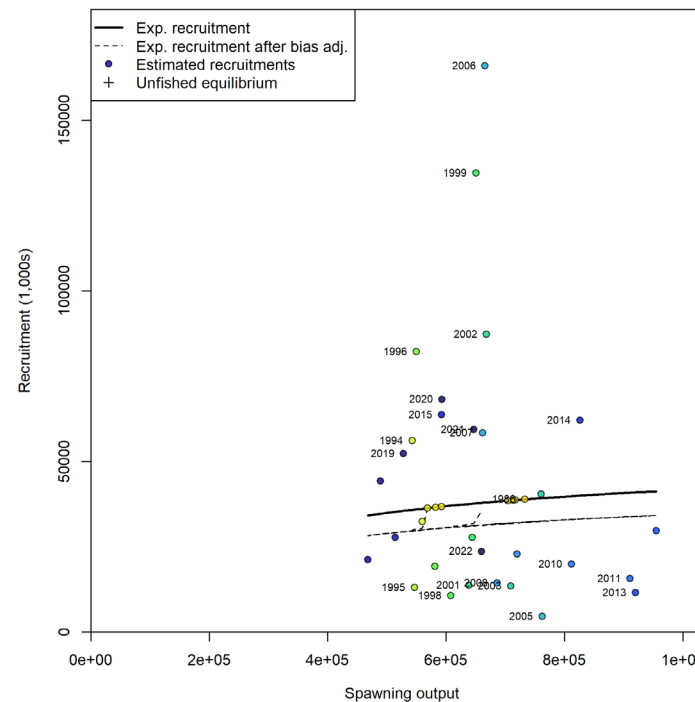
Length Selectivity



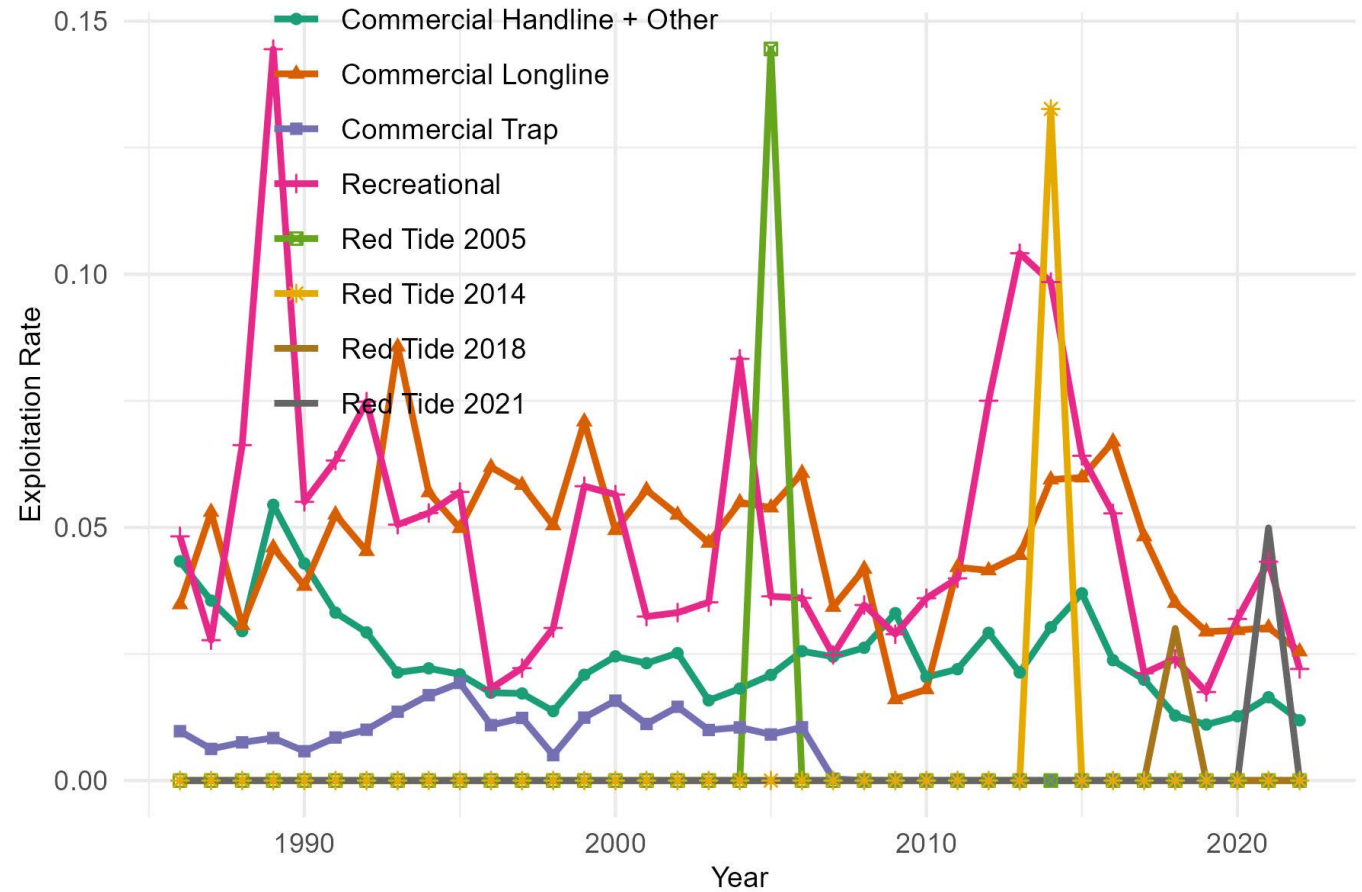
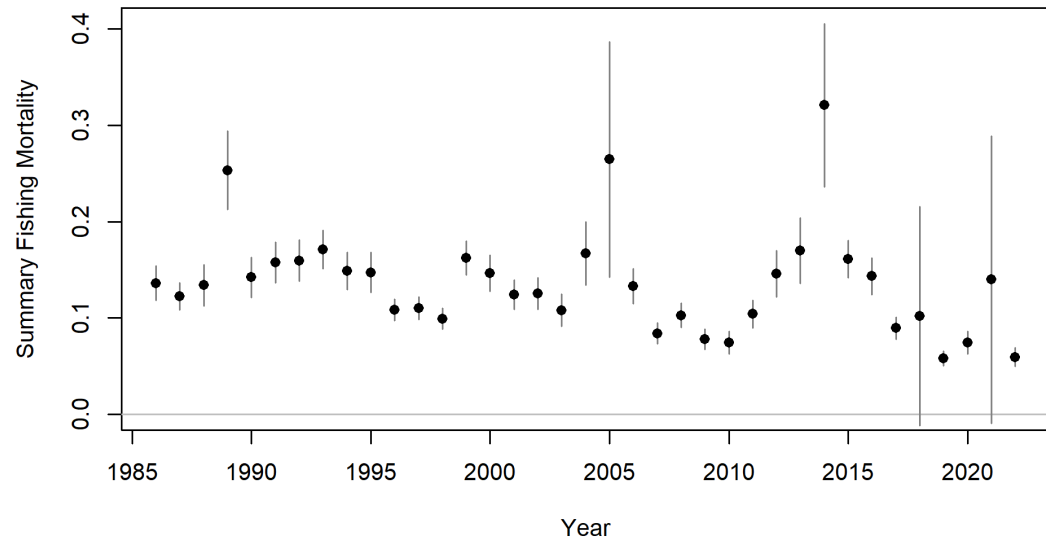
Recruitment

Parameter	Value
Ln(R0)	10.713 (0.005)
Steepness	0.661 (0.086)
SigmaR	0.647 (0.094)

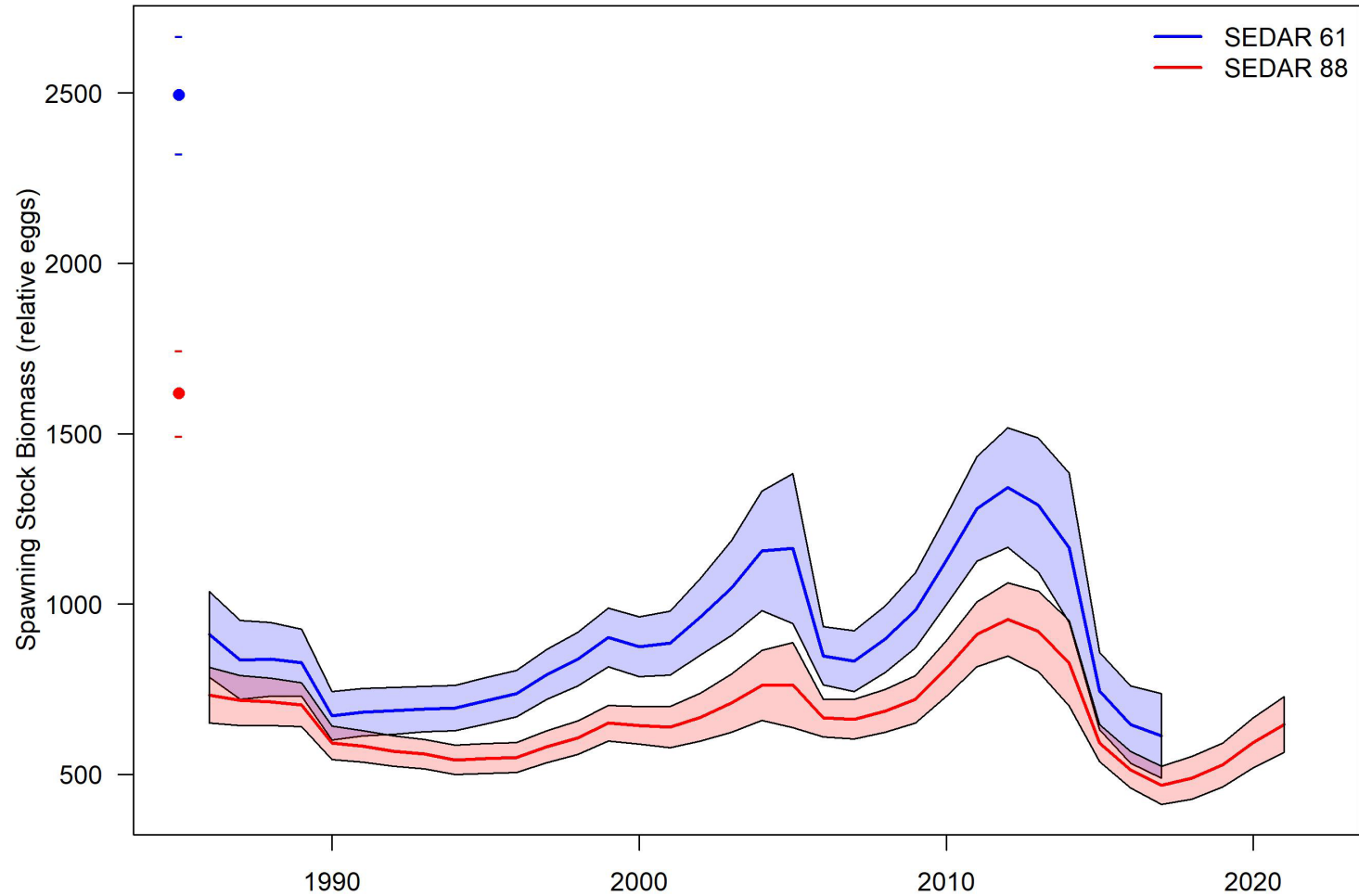
0.55 - 0.8



Exploitation Rate

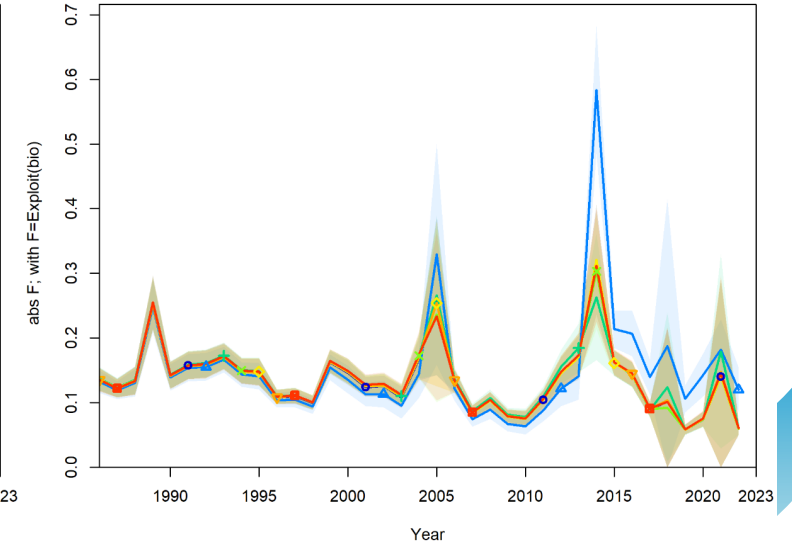
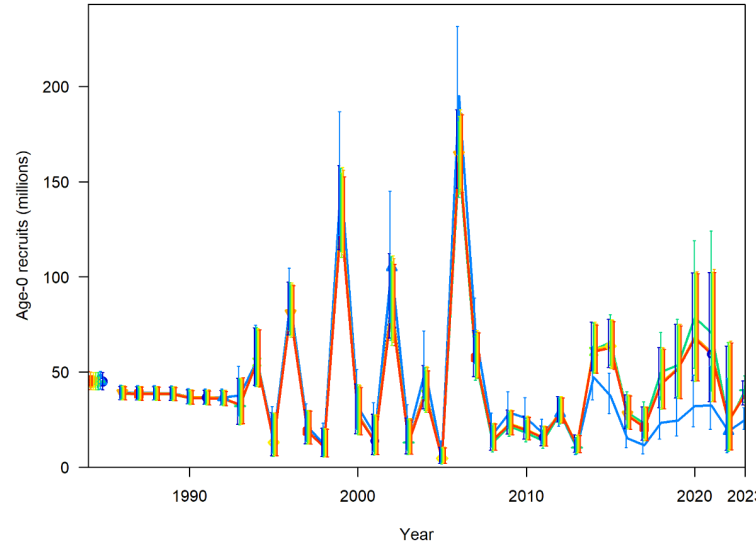
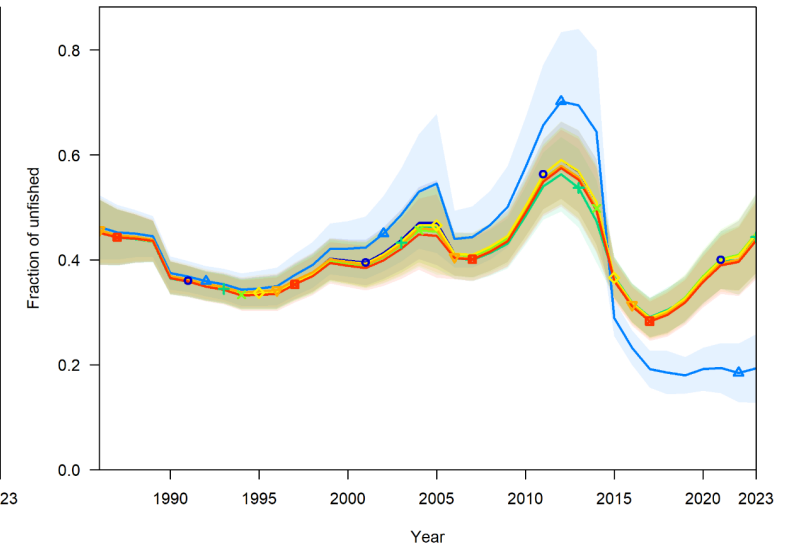
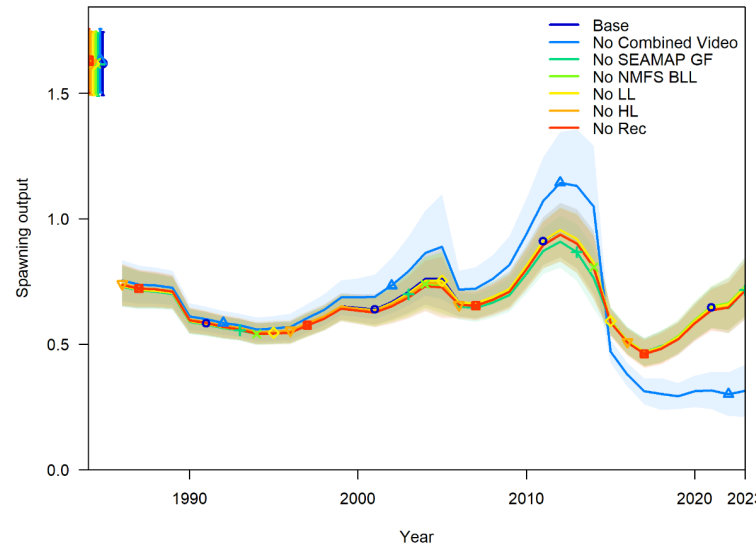


SSB and SSB/SSB0 trajectories



Jack-knife

- Purpose: determine which index or indices were most influential on derived quantities
- Removal of Combined Video Index has strong effect on time series trends



Conclusions

- SEDAR 88 OA Base Model incorporated the best available data, addressed the TORs, and showed an improved model with better fits and diagnostics

Improvements

- Data inputs from best practices methods
- Fit to mean weight recreational landings
- Fit to age compositions

Outstanding Issues

- Poor fits to indices
- Recruitment uncertainty
- Red tide mortality uncertainty in recent years

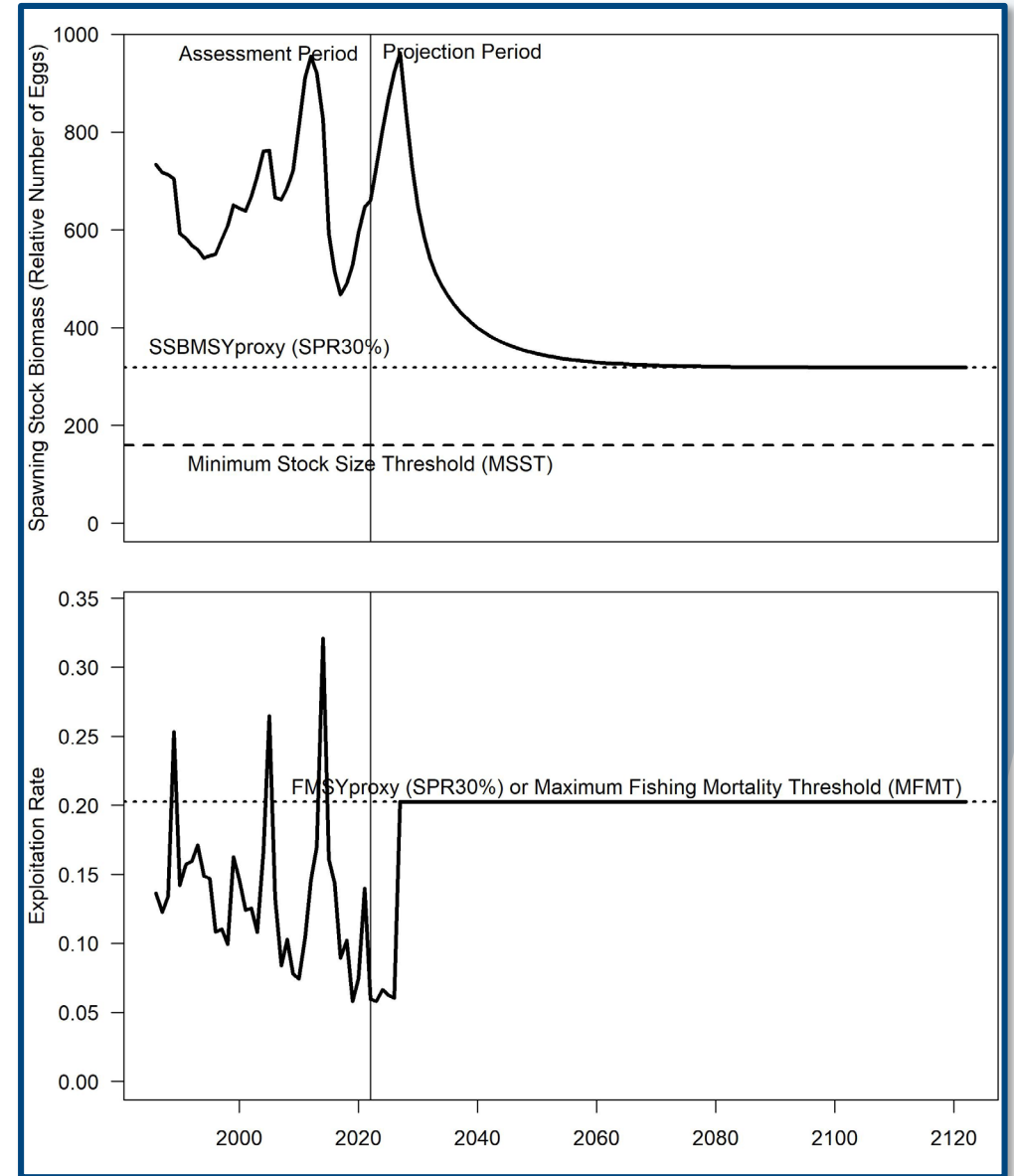
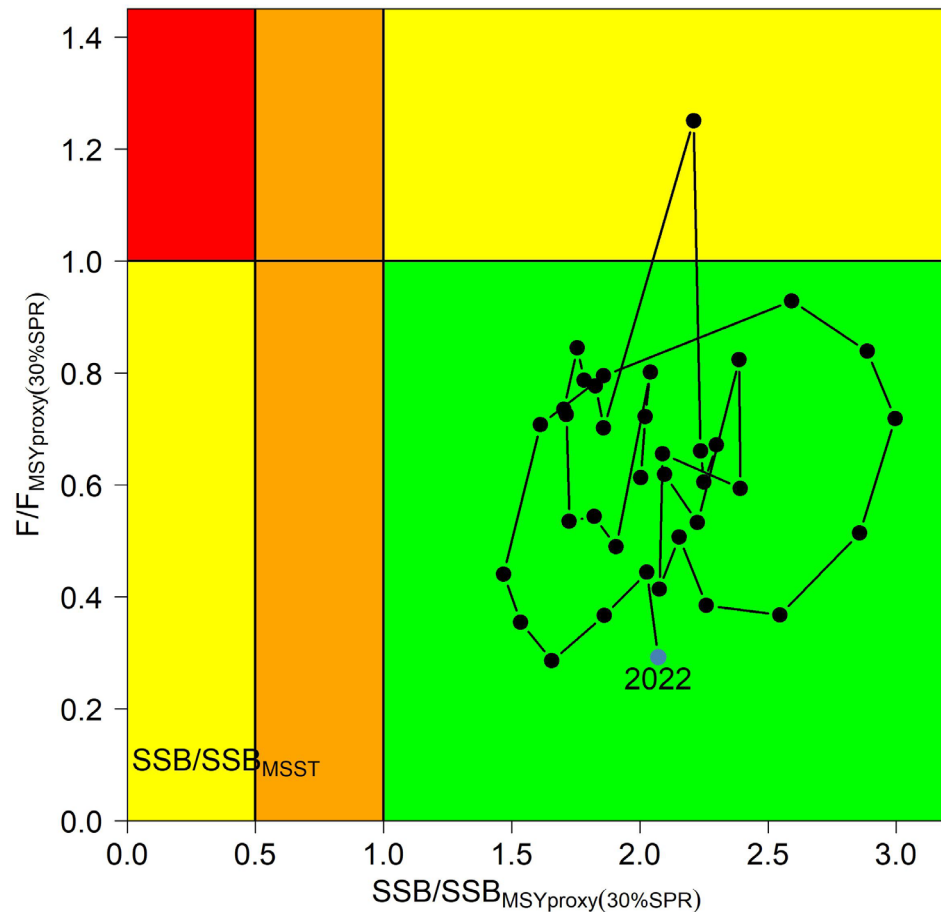


MSRA Benchmarks & Reference Points: 30%SPR

Criteria	Definition	Value
Base M	Target M for fully selected ages in the Lorenzen (2000) scaling	0.186
Steepness	Steepness of the Beverton-Holt stock-recruit relationship	0.661
Unfished Recruitment (R0)	Unfished recruitment (1,000s)	44,927
Generation Time	Fecundity-weighted mean age	9.78
Unfished SSB (SSB0)	Unfished spawning stock biomass (Relative number of eggs)	1,618,300
Mortality Rate Criteria		
$F_{MSYproxy}$	Equilibrium F that achieves SPR30%	0.203
MFMT	$F_{MSYproxy}$	0.203
Fcurrent	Geometric mean of the last 3 years of the assessment (F2020-2022)	0.073
Fcurrent/MFMT	Current stock status based on MFMT	0.363
Biomass Criteria		
$SSB_{MSYproxy}$	Equilibrium SSB at FSPR 30 %	318,790
MSST	0.5 * SSBSPR30%	159,395
$SSB_{current}$	SSB in 2022	660,063
$SSB_{current}/SSB_{FMSYproxy}$	Current stock status based on SSBSPR30% (Equilibrium)	2.07
$SSB_{current}/MSST$	Current stock status based on MSST	4.14
$SSB_{current}/SSB0$	SSB ratio in 2022	0.41

Stock Status: 30% SPR

- Gulf of Mexico Red Grouper is **not overfished** nor undergoing overfishing at 30% SPR

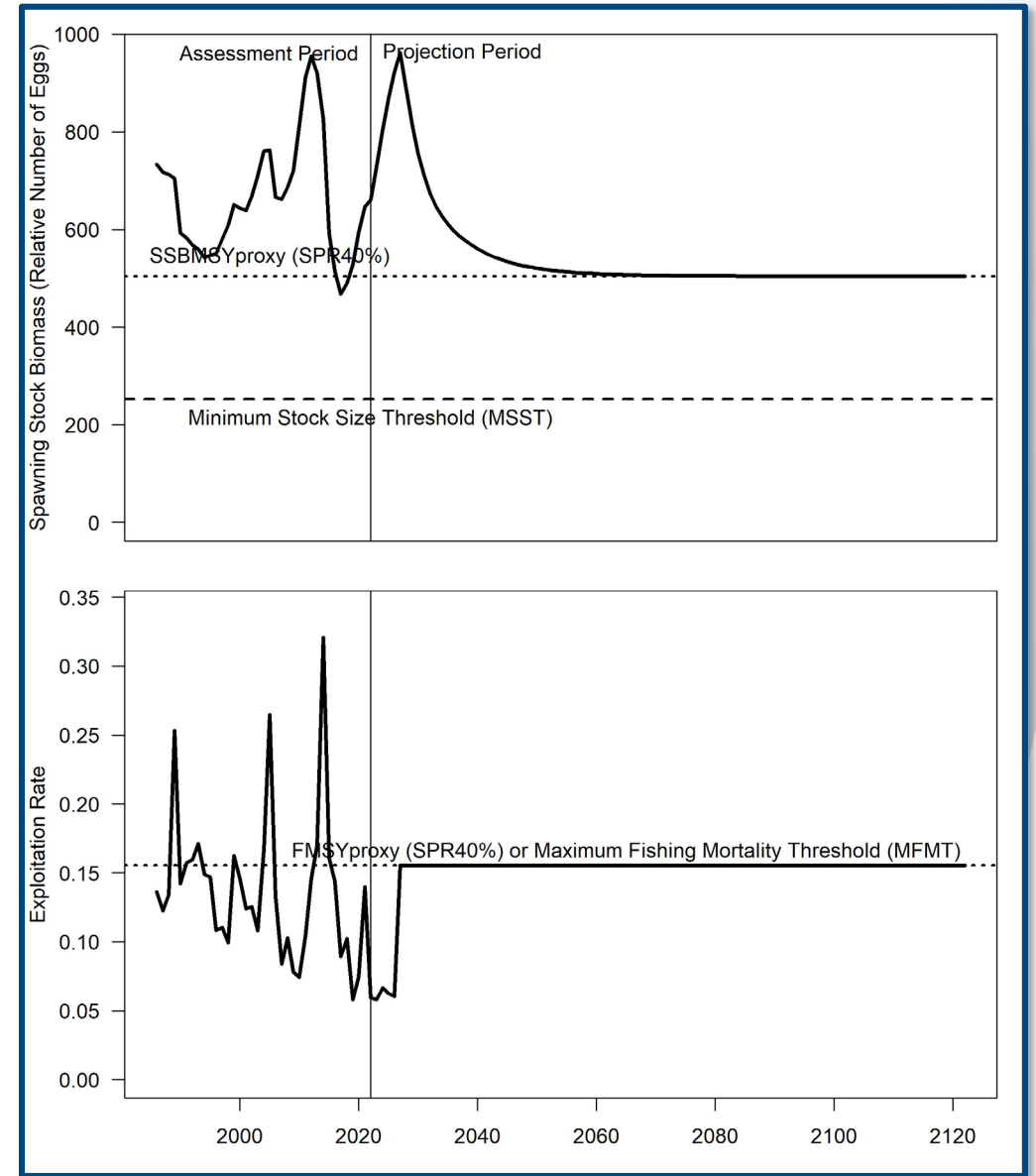
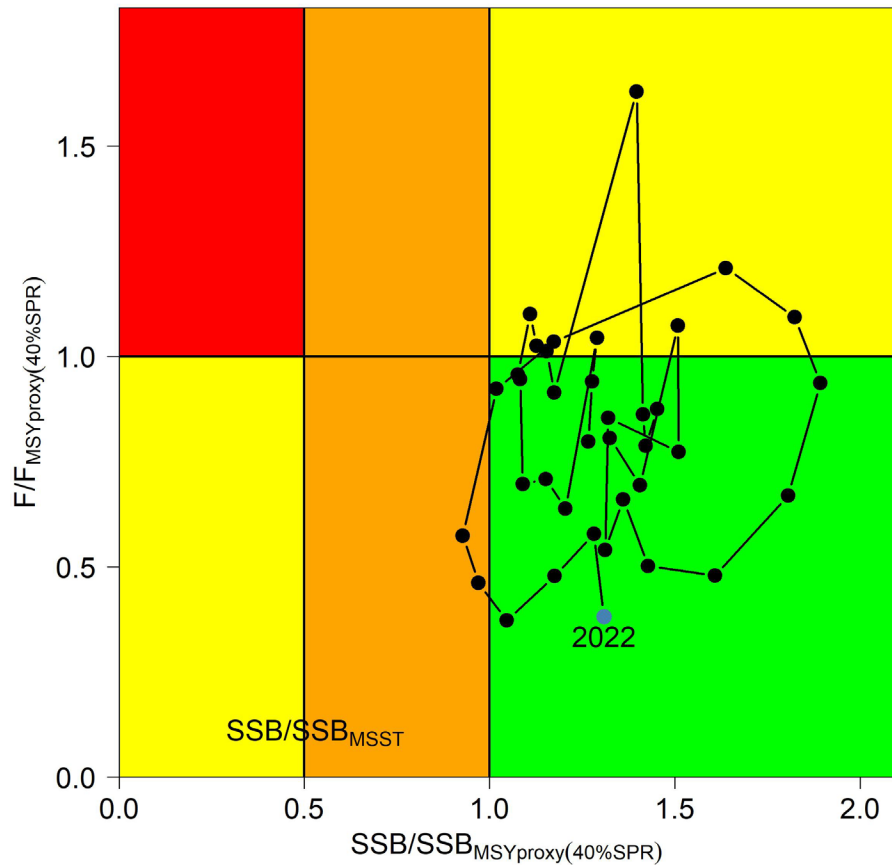


MSRA Benchmarks & Reference Points: 40%SPR

Criteria	Definition	Value
Base M	Target M for fully selected ages in the Lorenzen (2000) scaling	0.186
Steepness	Steepness of the Beverton-Holt stock-recruit relationship	0.661
Unfished Recruitment (R0)	Unfished recruitment (1,000s)	44,927
Generation Time	Fecundity-weighted mean age	9.78
Unfished SSB (SSB0)	Unfished spawning stock biomass (Relative number of eggs)	1,618,300
Mortality Rate Criteria		
$F_{MSYproxy}$	Equilibrium F that achieves SPR40%	0.156
MFMT	$F_{MSYproxy}$	0.156
Fcurrent	Geometric mean of the last 3 years of the assessment (F2020-2022)	0.073
Fcurrent/MFMT	Current stock status based on MFMT	0.473
Biomass Criteria		
$SSB_{MSYproxy}$	Equilibrium SSB at FSPR 40 %	504,435
MSST	0.5 * SSBSPR40%	252,218
$SSB_{current}$	SSB in 2022	660,063
$SSB_{current}/SSB_{FMSYproxy}$	Current stock status based on SSBSPR40% (Equilibrium)	1.31
$SSB_{current}/MSST$	Current stock status based on MSST	2.62
$SSB_{current}/SSB0$	SSB ratio in 2022	0.41

Stock Status: 40% SPR

- Gulf of Mexico Red Grouper is **not overfished** nor undergoing overfishing at 40% SPR



Projection Settings

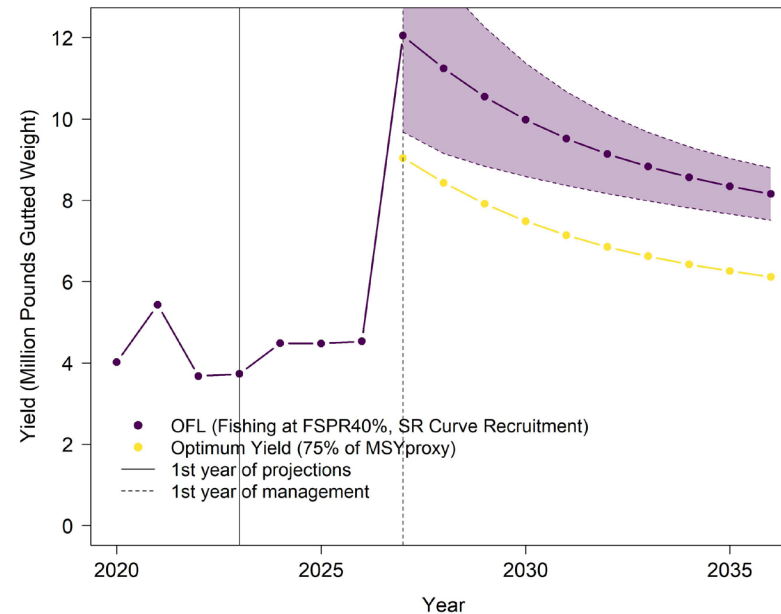
Parameter	Value	Comment
Relative F	-	Not used due to allocations below
Selectivity	Average from 2020-2022	Fleet specific selectivity estimated over terminal three years of model
Retention	Average from 2020-2022	Fleet specific retention estimated over terminal three years of model
Recruitment	Beverton-Holt stock-recruitment relationship	Derived from the model estimated Beverton-Holt stock-recruitment relationship
Interim Landings (2023-2026)	383.68/400.48 metric tons (Commercial Handline); 740.8/770.99 metric tons (Commercial Longline); 185.72/289.27 numbers (Recreational)	Landings provided for 2023; For 2024, 2025 and 2026 used 3-year average of landings (2021-2023)
Allocation Ratio	59.3:40.7	Commercial: Recreational; difference in changing allocation changes yields by ~1% overall

OFL Projections: $F=F_{40\%SPR}$

Year	Recr	F	$F/F_{40\%SPR}$	SSB	$SSB/SSB_{40\%SPR}$	SSB/MSST	SSB ratio	OFL (mp gw)
2027	41306.6	0.156	1	961572	1.906	3.812	0.594	12.054
2028	40610.8	0.156	1	885160	1.755	3.51	0.547	11.243
2029	39878.2	0.156	1	814583	1.615	3.23	0.503	10.55
2030	39187	0.156	1	755661	1.498	2.996	0.467	9.983
2031	38580.1	0.156	1	709113	1.406	2.812	0.438	9.518

- Assuming recruitment from stock-recruit curve throughout projections

Years	Constant Catch
Three (2027-2029)	11.28 mp gw
Five (2027-2031)	10.66 mp gw

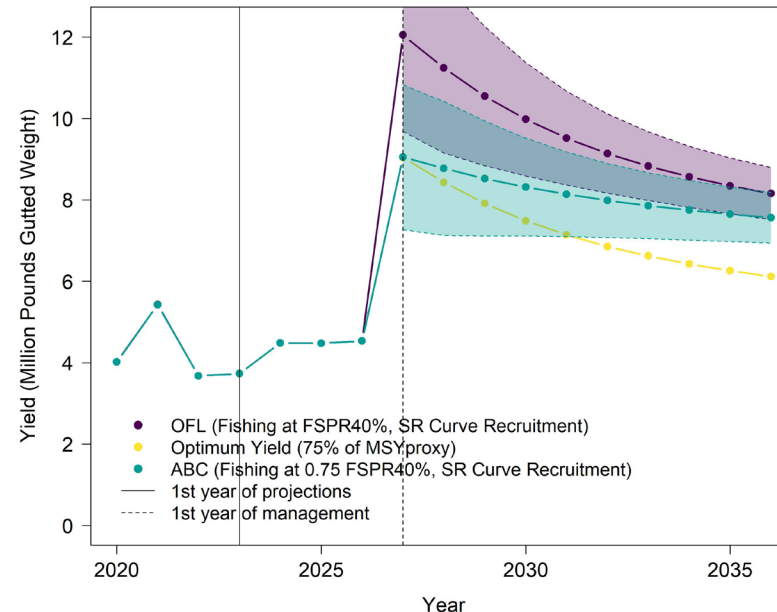


ABC Projections: $F=0.75 * F_{40\%SPR}$

Year	Recr	F	F/ $F_{40\%SPR}$	SSB	SSB/ $SSB_{40\%SPR}$	SSB/MSST	SSB ratio	Yield
2027	41306.6	0.117	0.75	961572	1.906	3.812	0.594	9.049
2028	40999.9	0.117	0.75	926645	1.837	3.674	0.573	8.773
2029	40649.4	0.117	0.75	889150	1.763	3.525	0.549	8.524
2030	40307.1	0.117	0.75	854783	1.695	3.389	0.528	8.316
2031	39999.7	0.117	0.75	825662	1.637	3.274	0.51	8.138

- Assuming recruitment from stock-recruit curve throughout projections

Years	Constant Catch
Three (2027-2029)	8.78 mp gw
Five (2027-2031)	8.56 mp gw



Gulf SSC Recommendations:

The SSC finds the SEDAR 88 stock assessment for Gulf red grouper to be consistent with the best scientific information available, and appropriate for management advice.

The SSC sets the OFL at F40%SPR for Gulf red grouper based on the SEDAR 88 base model projections and a constant catch scenario for the fishing years 2027 – 2029 at 11.28 million pounds gutted weight (mp gw).

The SSC sets the ABC at 75% of F40%SPR for Gulf red grouper based on the SEDAR 88 base model projections and a constant catch scenario for the fishing years 2027 – 2029 at 8.78 mp gw.