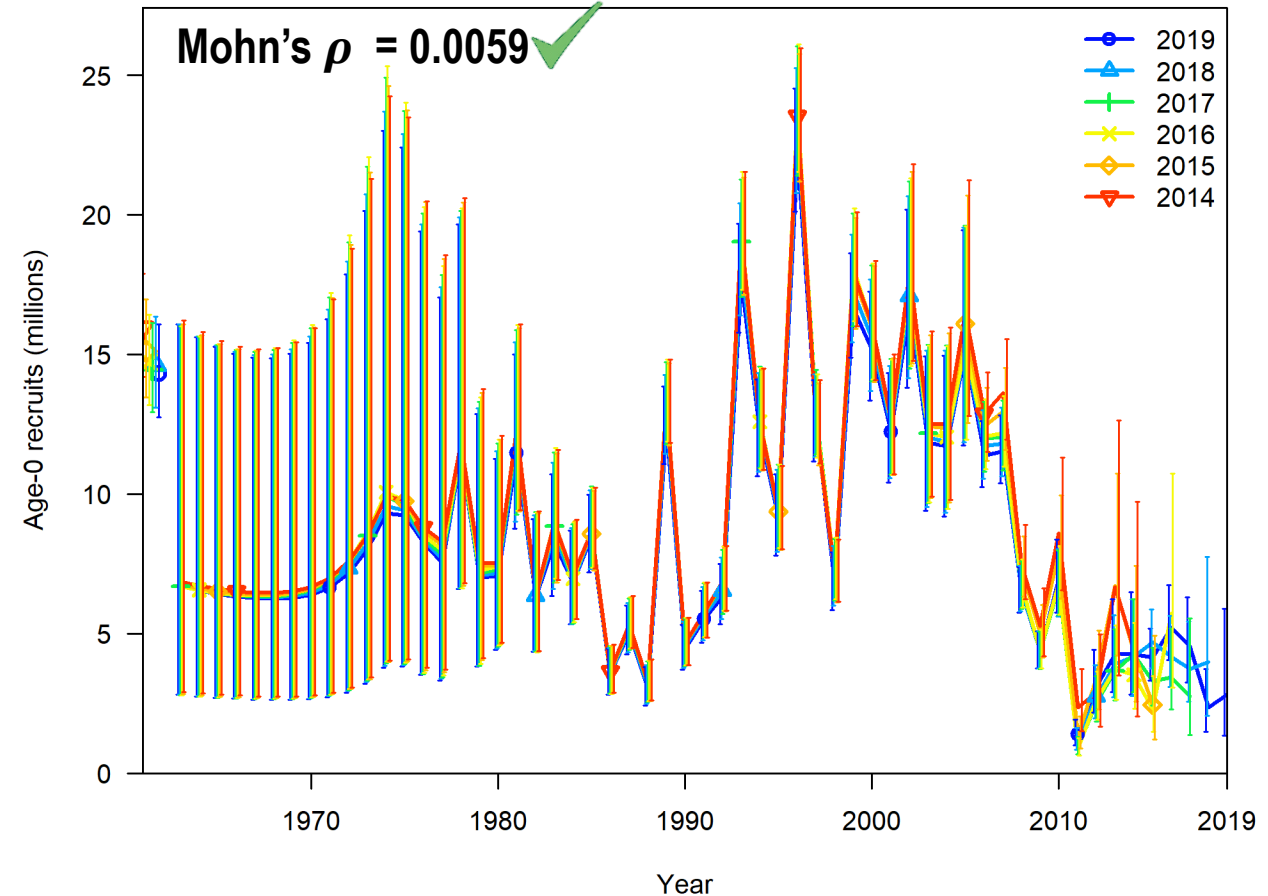
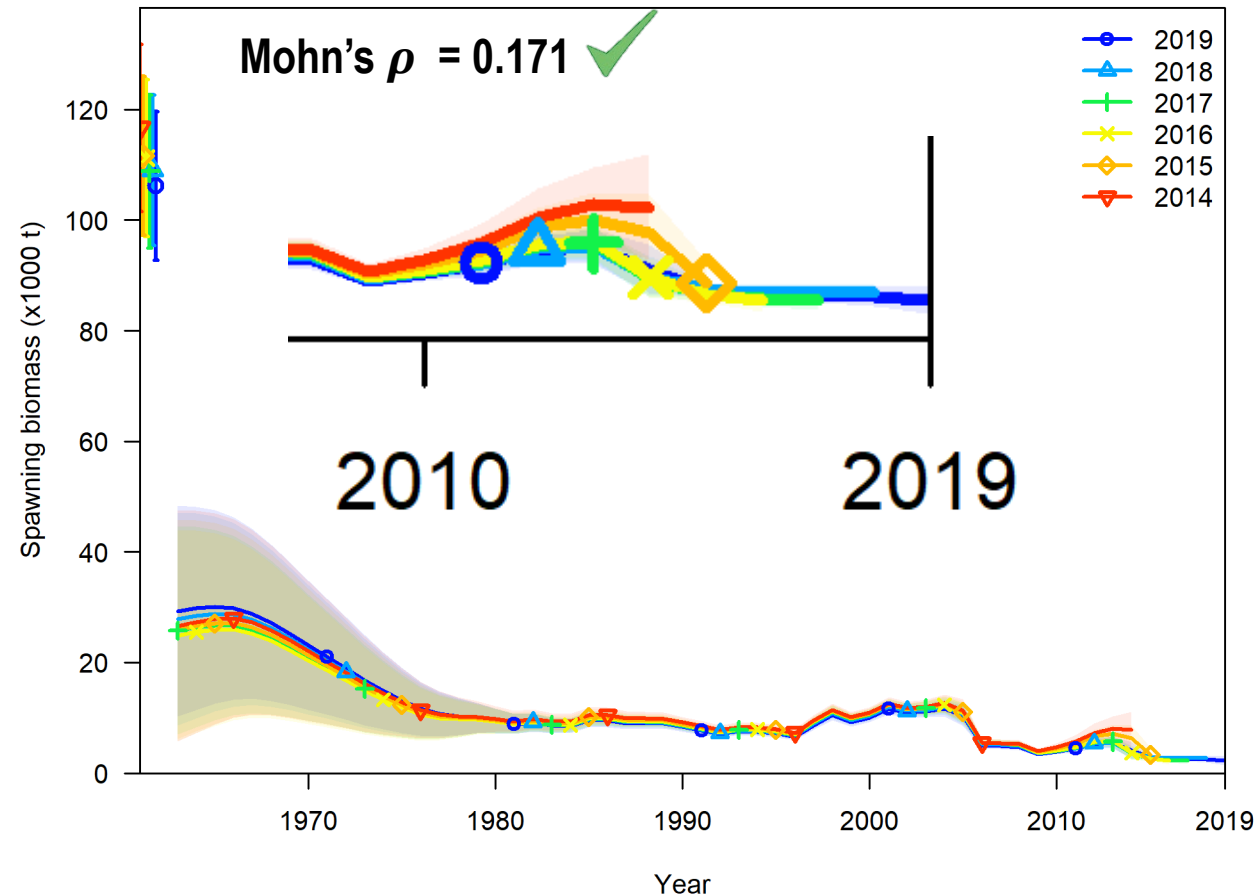


# SSB COMBINED Base Model Diagnostics

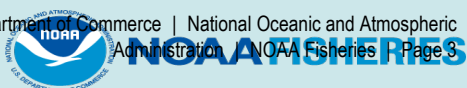
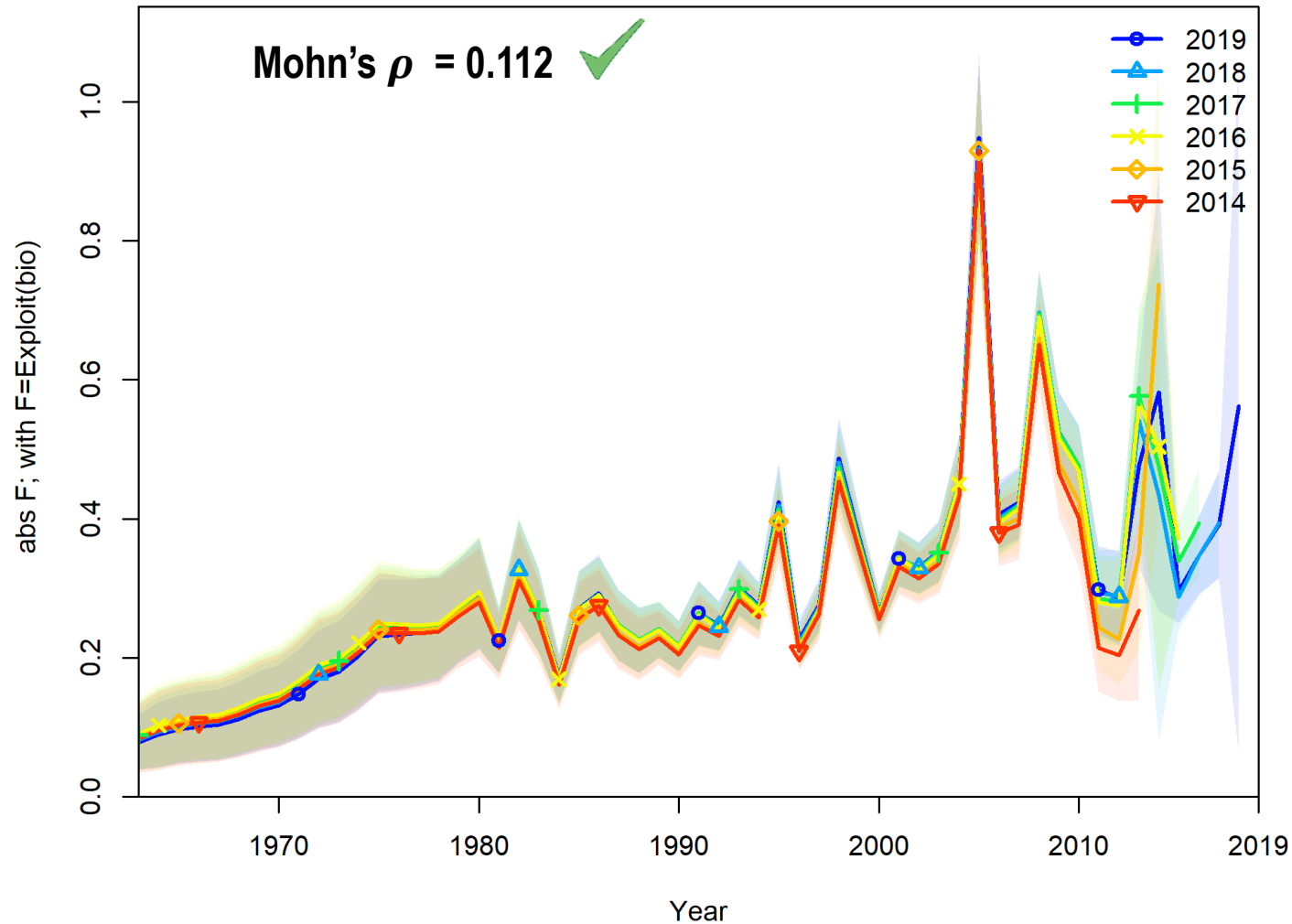
# Retrospective Analysis

Mohn's  $\rho$  between  $-0.15$  and  $0.20$  is considered acceptable (i.e. no retrospective pattern) see *Hurtado-Ferro et al. 2015*



# Retrospective Analysis

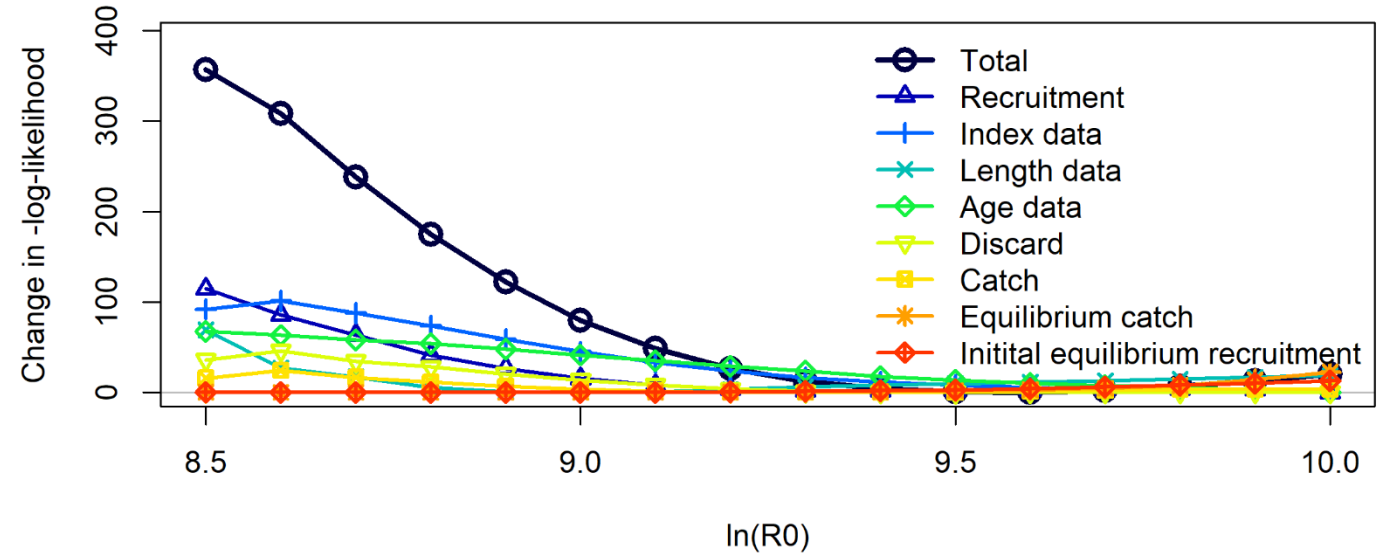
Mohn's  $\rho$  between -0.15 and 0.20 is considered acceptable (i.e. no retrospective pattern) see Hurtado-Ferro et al. 2015



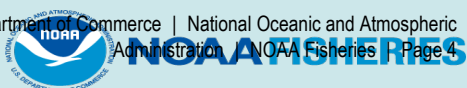
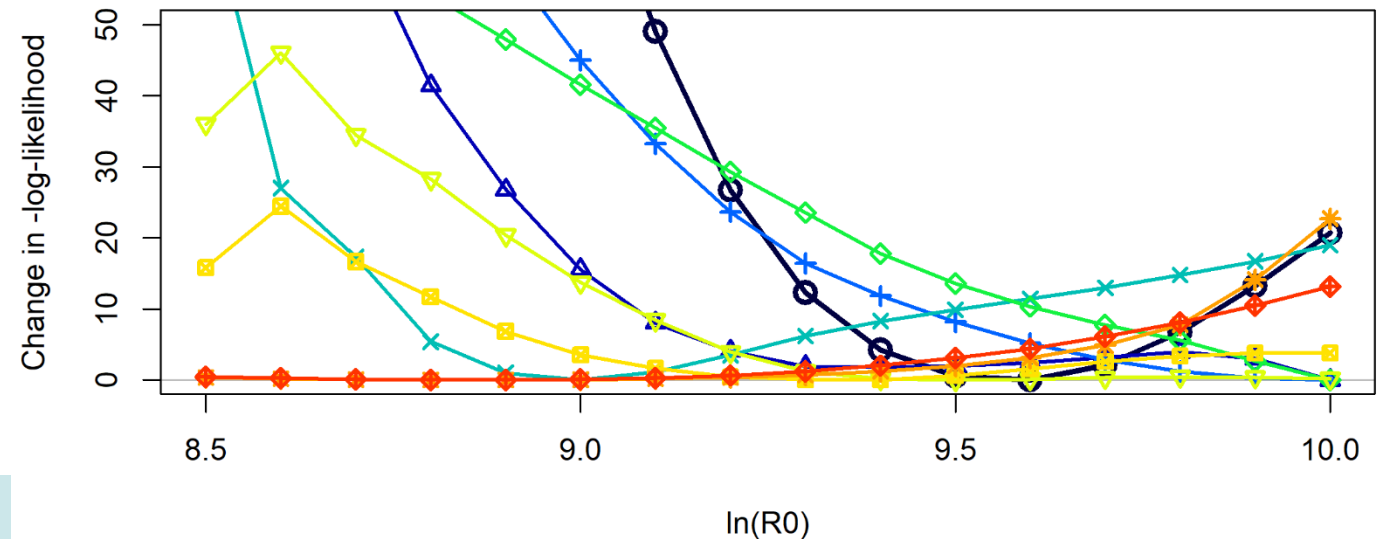
# Likelihood Profile on $\ln(R0)$

- Fixing  $\ln(R0)$  at different values while maximizing the likelihood over the other parameters.
- The MLE for the base model was 9.57.
- Different data components converge to a similar  $\ln(R0)$

Likelihood Profile



Likelihood Profile -- Zoom



# SSB COMBINED Projections



# Projection Settings

Parameter	Value	Comment
Relative F	Average from 2017 - 2019	Average relative fishing mortality (apical F) over terminal three years of model (Red Tide F excluded)
Selectivity	2019	Fleet specific selectivity estimated in the terminal year of the model
Retention	2019	Fleet specific retention estimated in the terminal year of the model
Recruitment	Beverton-Holt stock-recruitment relationship	Derived from the model estimated Beverton-Holt stock-recruitment relationship
Interim Landings (2020-2022)	73.79/126.72/126.72 mt (Comm. Vertical Line) 133.69/97.41/97.41 mt (Comm. Longline) 2.61/2.54/2.54 thousands of fish (Headboat) 37.61/28.66/28.66 thousands of fish (Charter) 305.4/271.68/271.68 thousands of fish (Private)	Landings provided for 2020; For 2021-2022, used 3-year average of landings (2018-2020)
Allocation Ratio	39:61	Commercial:Recreational

# Projection Scenarios – Red Tide

- Ecosystem model estimates overall red tide M (over all ages) for 2021
- We can make assumptions about how long the bloom might persist
- Assuming the red tide will dissipate in mid-November
  - M: Low=0.096, Med=0.320, High=0.724
- For SS, this translates into a red tide that is
  - Low=10% strength of 2005, Med=30% strength of 2005, High=72% strength of 2005

# Projection Scenarios

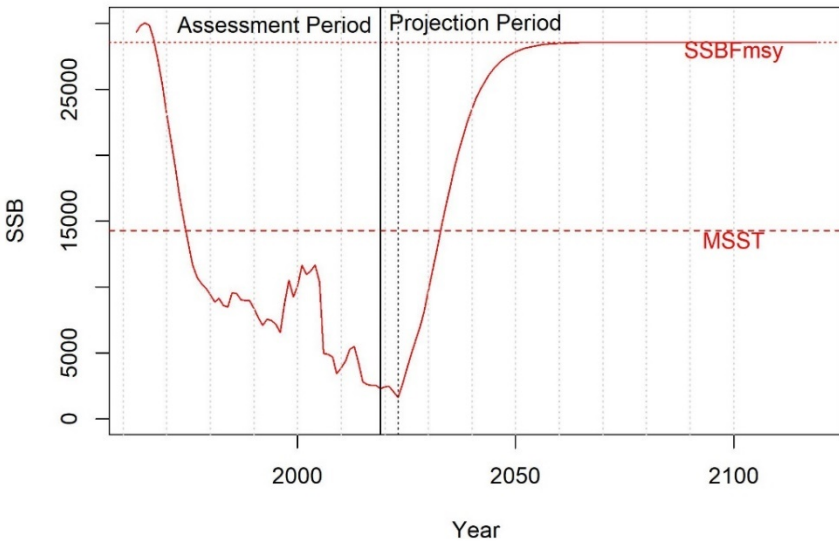
	Fspr30			Fmax		
	LOW	HIGH	MED	LOW	HIGH	MED
Base M	0.159	0.159	0.159	0.159	0.159	0.159
Steepness	0.855	0.855	0.855	0.855	0.855	0.855
R0	14319.2	14319.2	14319.2	14319.2	14319.2	14319.2
Generation Time	7.88	7.88	7.88	7.88	7.88	7.88
SSB0	106178	106178	106178	106178	106178	106178
	Fspr30	Fspr30	Fspr30	Fmax	Fmax	Fmax
Proxy						
Fmsy proxy	0.148	0.148	0.148	0.285	0.285	0.285
MFMT	0.148	0.148	0.148	0.285	0.285	0.285
%SPR equivalent of Fmsy proxy	30	30	30	16	16	16
Fcurrent	0.412	0.412	0.412	0.412	0.412	0.412
Fcurrent/MFMT	2.784	2.784	2.784	1.446	1.446	1.447
SSBmsy proxy	28559.4	28560.1	28559.3	12686.8	12689.1	12689.9
MSST	14279.7	14280.05	14279.65	6343.4	6344.55	6344.95
SSBcurrent	2296.24	2296.24	2296.24	2296.24	2296.24	2296.24
SSBcurrent/SSBFmsy_proxy	0.08	0.08	0.08	0.181	0.181	0.181
SSBcurrent/MSST	0.161	0.161	0.161	0.362	0.362	0.362
First year mgmt	2023	2023	2023	2023	2023	2023
Yr rebuilt at F=0	2033	2035	2034	2029	2031	2030
SSBcurrent/SSB0	0.022	0.022	0.022	0.022	0.022	0.022
SSByrrebuilt/SSB0	0.137	0.124	0.138	0.047	0.038	0.046



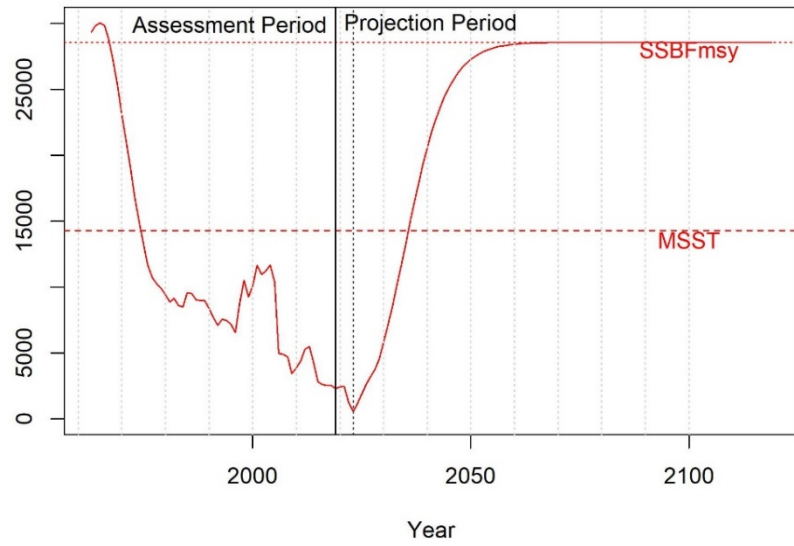


# Fspr30%

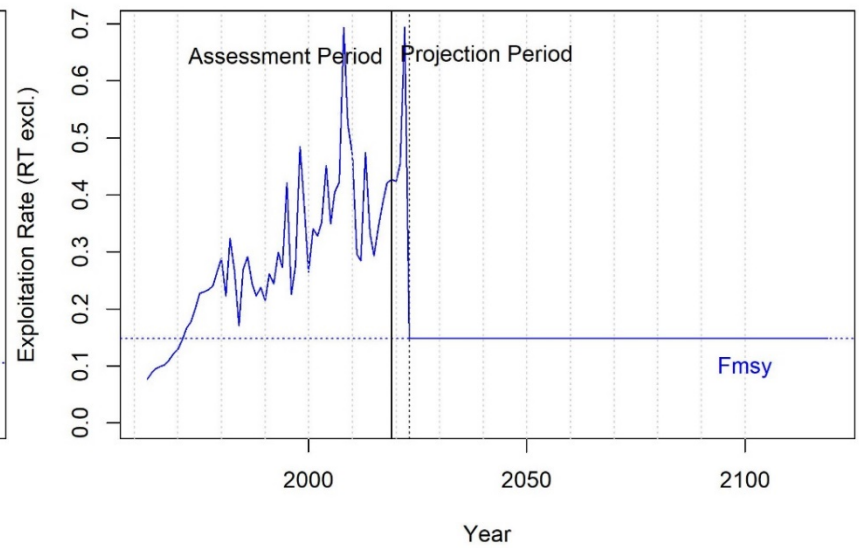
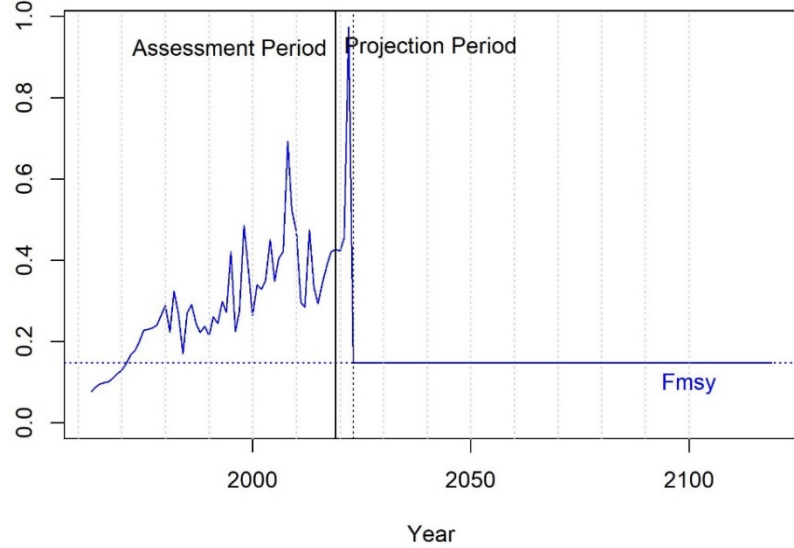
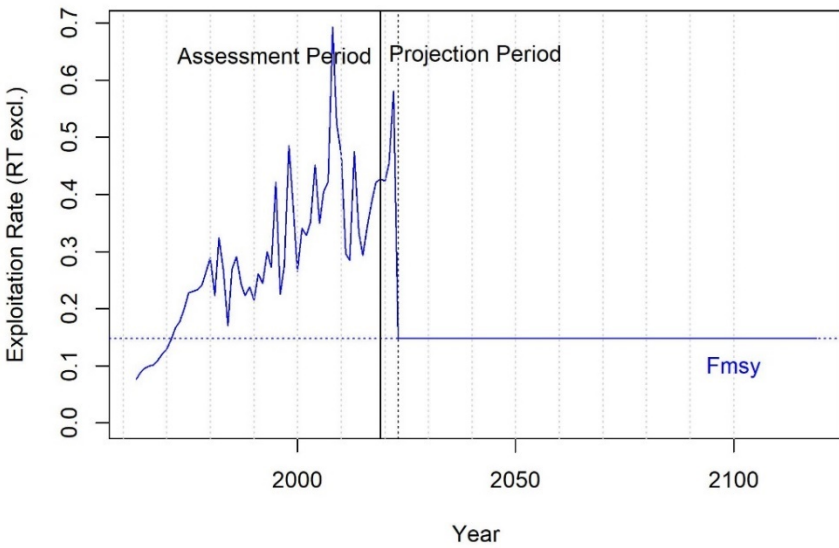
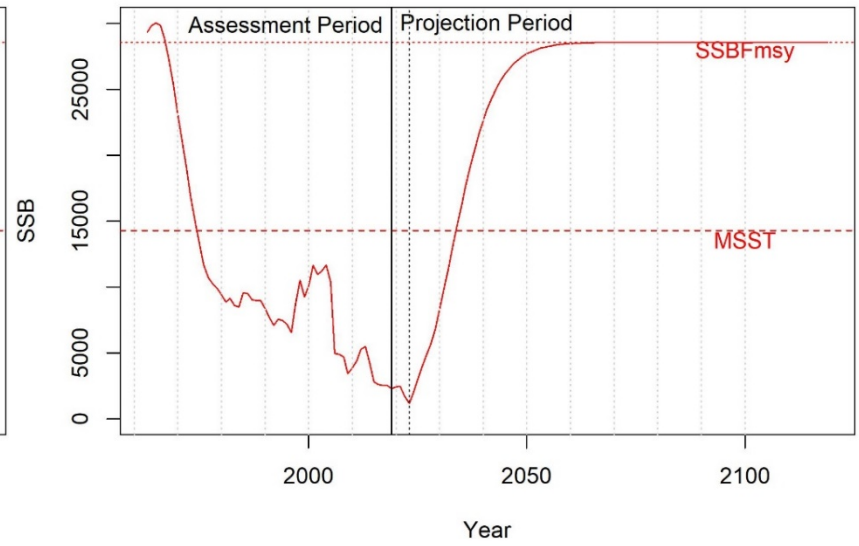
Fmsy\_proxy = Fspr30% ; Lo 2021 Red Tide



Fmsy\_proxy = Fspr30% ; Hi 2021 Red Tide

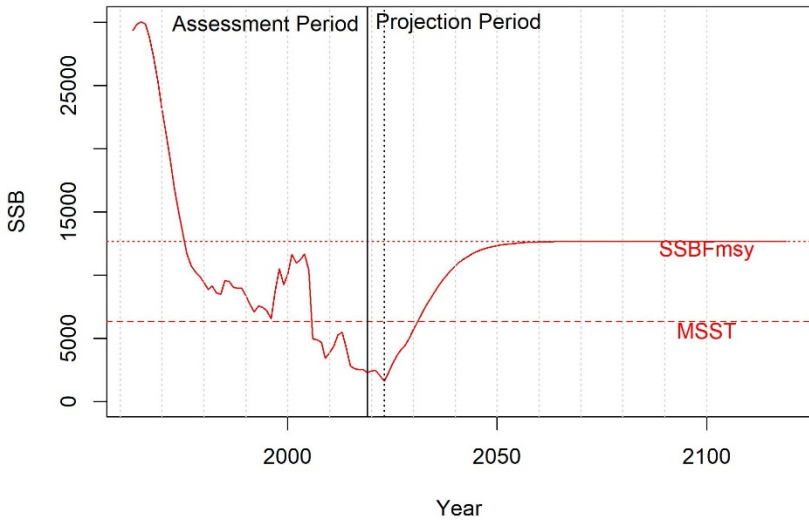


Fmsy\_proxy = Fspr30% ; Med 2021 Red Tide

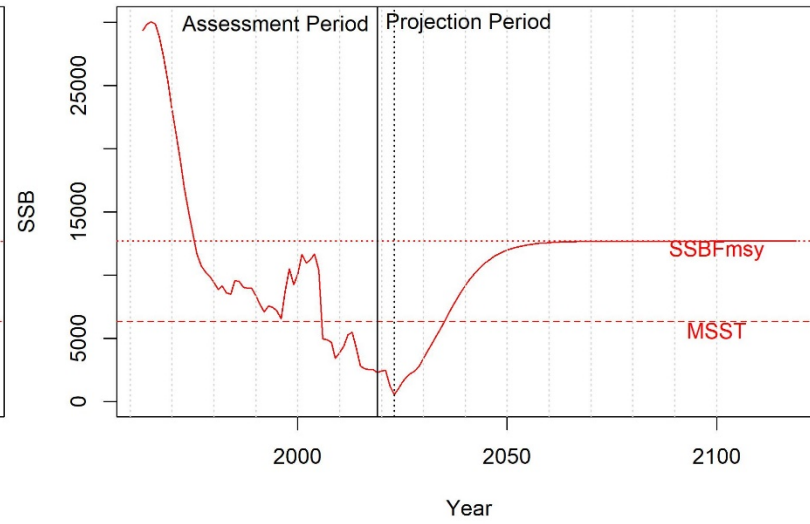


# Fmax

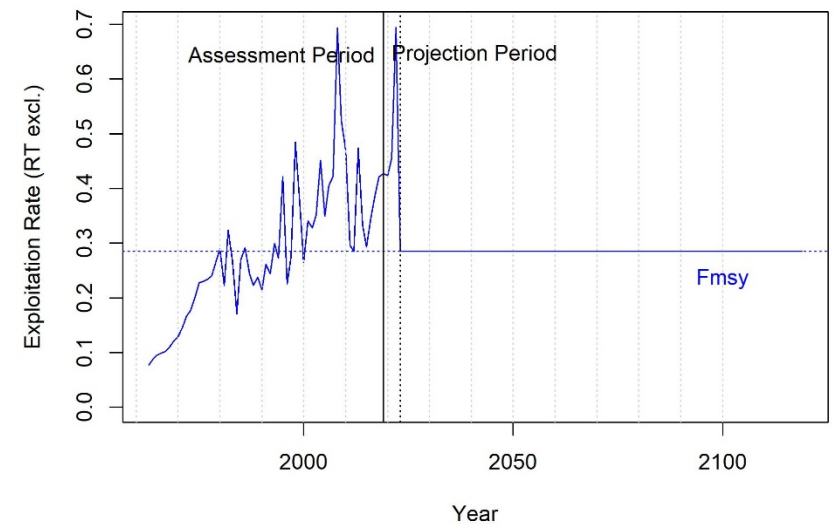
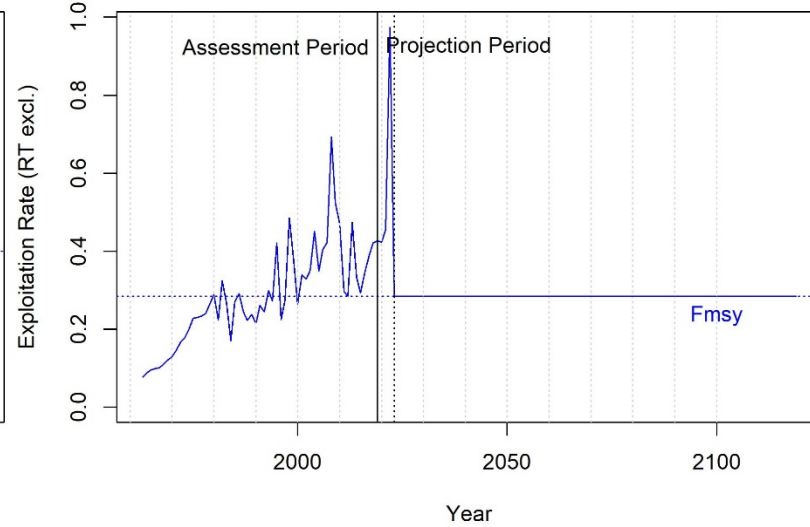
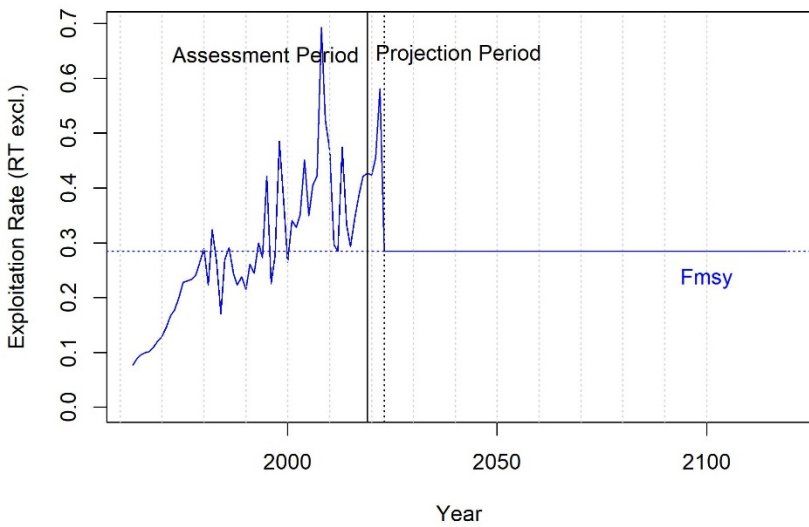
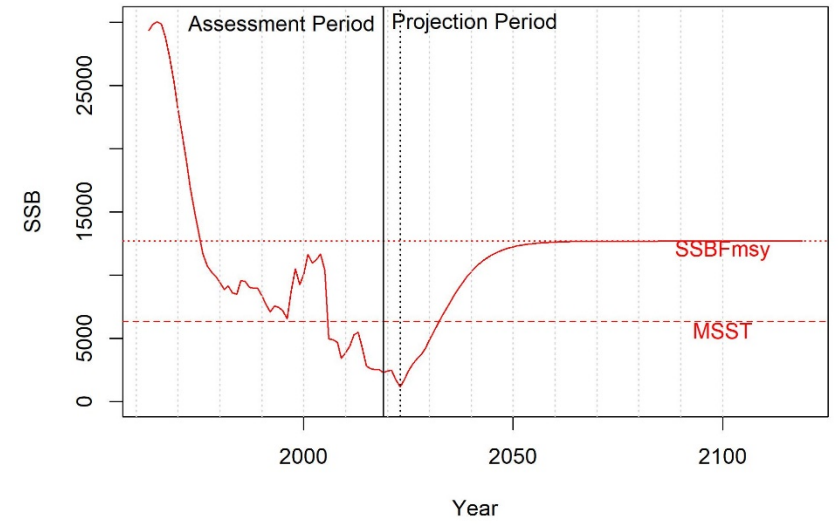
Fmsy\_proxy = Fmax ; Lo 2021 Red Tide



Fmsy\_proxy = Fmax ; Hi 2021 Red Tide



Fmsy\_proxy = Fmax ; Med 2021 Red Tide



# Frebuild

- $T_{min}$  = the amount of time the stock or stock complex is expected to take to rebuild to its MSY biomass level in the absence of any fishing mortality ( $F=0$ ).
- If  $T_{min} \leq 10$  years
  - $T_{min}$
  - Halfway between  $T_{min}$  and 10 years, rounded to the nearest year
  - 10 years
- If  $T_{min} > 10$  years
  - $T_{min}$  + length of time associated with one generation time
  - Amount of time stock expected to take to rebuild to  $B_{msy}$  proxy if fished at 75% MFMT
  - $T_{min} * 2$

# Fspr30\_IoRT

**F=0**

Year	R (1000s)	F	Yield (mp gwt)	SSB (mt)	SSB/ SSBFmsy	SSB/ MSST	F/ MFMT	SSB/ SSB0
2020	5,098	0.424	3.31	2,432	0.09	0.17	2.86	0.02
2021	5,170	0.454	3.10	2,484	0.09	0.17	3.07	0.02
2022	4,580	0.581	3.17	2,075	0.07	0.15	3.92	0.02
<b>2023</b>	3,864	0.000	0.00	1,638	0.06	0.11	0.00	0.02
2024	5,707	0.000	0.00	2,901	0.10	0.20	0.00	0.03
2025	7,464	0.000	0.00	4,685	0.16	0.33	0.00	0.04
2026	8,756	0.000	0.00	6,642	0.23	0.47	0.00	0.06
2027	9,670	0.000	0.00	8,605	0.30	0.60	0.00	0.08
2028	10,437	0.000	0.00	10,864	0.38	0.76	0.00	0.10
2029	11,147	0.000	0.00	13,766	0.48	0.96	0.00	0.13
2030	11,755	0.000	0.00	17,277	0.60	1.21	0.00	0.16
2031	12,243	0.000	0.00	21,238	0.74	1.49	0.00	0.20
2032	12,627	0.000	0.00	25,514	0.89	1.79	0.00	0.24
2033	12,928	0.000	0.00	30,015	1.05	2.10	0.00	0.28

# Fspr30\_hiRT

F=0

Year	R (1000s)	F	Yield (mp gwt)	SSB (mt)	SSB/ SSBFmsy	SSB/ MSST	F/ MFMT	SSB/ SSB0
2020	5,098	0.424	3.31	2,432	0.09	0.17	2.86	0.02
2021	5,170	0.455	3.09	2,484	0.09	0.17	3.07	0.02
2022	3,144	0.974	3.09	1,251	0.04	0.09	6.58	0.01
<b>2023</b>	1,599	0.000	0.00	563	0.02	0.04	0.00	0.01
2024	3,186	0.000	0.00	1,273	0.04	0.09	0.00	0.01
2025	4,964	0.000	0.00	2,336	0.08	0.16	0.00	0.02
2026	6,413	0.000	0.00	3,530	0.12	0.25	0.00	0.03
2027	7,405	0.000	0.00	4,612	0.16	0.32	0.00	0.04
2028	8,279	0.000	0.00	5,831	0.20	0.41	0.00	0.05
2029	9,263	0.000	0.00	7,652	0.27	0.54	0.00	0.07
2030	10,215	0.000	0.00	10,136	0.35	0.71	0.00	0.10
2031	11,018	0.000	0.00	13,160	0.46	0.92	0.00	0.12
2032	11,654	0.000	0.00	16,605	0.58	1.16	0.00	0.16
2033	12,156	0.000	0.00	20,425	0.72	1.43	0.00	0.19
2034	12,553	0.000	0.00	24,591	0.86	1.72	0.00	0.23
2035	12,869	0.000	0.00	29,033	1.02	2.03	0.00	0.27

# Fspr30\_hiRT

## Frebuild Tmin\*2

Year	R (1000s)	F	Yield (mp gwt)	SSB (mt)	SSB/ SSBFmsy	SSB/ MSST	F/ MFMT	SSB/ SSB0
2020	5,098	0.424	3.31	2,432	0.09	0.17	2.86	0.02
2021	5.170	0.455	3.09	2.484	0.09	0.17	3.07	0.02
2022	3.144	0.974	3.09	1.251	0.04	0.09	6.58	0.01
2023	1.599	0.135	0.33	563	0.02	0.04	0.91	0.01
2024	2.928	0.135	0.59	1,145	0.04	0.08	0.91	0.01
2025	4.370	0.135	0.86	1,941	0.07	0.14	0.91	0.02
2026	5.484	0.135	0.99	2,722	0.10	0.19	0.91	0.03
2027	6.175	0.135	1.19	3,307	0.12	0.23	0.91	0.03
2028	6.770	0.135	1.49	3,890	0.14	0.27	0.91	0.04
2029	7.571	0.135	1.90	4,821	0.17	0.34	0.91	0.05
2030	8.440	0.135	2.36	6,091	0.21	0.43	0.91	0.06
2031	9.217	0.135	2.86	7,554	0.26	0.53	0.91	0.07
2032	9.860	0.135	3.38	9,099	0.32	0.64	0.91	0.09
2033	10.392	0.135	3.94	10,712	0.38	0.75	0.91	0.10
2034	10.844	0.135	4.52	12,408	0.43	0.87	0.91	0.12
2035	11.227	0.135	5.10	14,165	0.50	0.99	0.91	0.13
2036	11.546	0.135	5.68	15,932	0.56	1.12	0.91	0.15
2037	11.809	0.135	6.23	17,658	0.62	1.24	0.91	0.17
2038	12.025	0.135	6.75	19,303	0.68	1.35	0.91	0.18
2039	12.201	0.135	7.23	20,842	0.73	1.46	0.91	0.20
2040	12.346	0.135	7.66	22,257	0.78	1.56	0.91	0.21
2041	12.464	0.135	8.06	23,540	0.82	1.65	0.91	0.22
2042	12.561	0.135	8.40	24,686	0.86	1.73	0.91	0.23
2043	12.641	0.135	8.71	25,698	0.90	1.80	0.91	0.24
2044	12.706	0.135	8.97	26,581	0.93	1.86	0.91	0.25
2045	12.760	0.135	9.20	27,345	0.96	1.91	0.91	0.26
2046	12.804	0.135	9.39	27,999	0.98	1.96	0.91	0.26
2047	12.840	0.135	9.56	28,556	1.00	2.00	0.91	0.27
2048	12.869	0.148	10.66	29,026	1.02	2.03	1.00	0.27

# Fspr30\_hiRT

## F fixed at 75%MFMT

Year	R (1000s)	F	Yield (mp gwt)	SSB (mt)	SSB/SSBFmsy	SSB/MSST	F/MFMT	SSB/SSBO
2020	5,098	0.424	3.31	2,432	0.09	0.17	2.86	0.02
2021	5,170	0.455	3.09	2,484	0.09	0.17	3.07	0.02
2022	3,144	0.974	3.09	1,251	0.04	0.09	6.58	0.01
2023	1,599	0.111	0.27	563	0.02	0.04	0.75	0.01
2024	2,973	0.111	0.49	1,167	0.04	0.08	0.75	0.01
2025	4,473	0.111	0.73	2,007	0.07	0.14	0.75	0.02
2026	5,647	0.111	0.85	2,852	0.10	0.20	0.75	0.03
2027	6,392	0.111	1.04	3,509	0.12	0.25	0.75	0.03
2028	7,038	0.111	1.31	4,180	0.15	0.29	0.75	0.04
2029	7,876	0.111	1.68	5,231	0.18	0.37	0.75	0.05
2030	8,767	0.111	2.11	6,662	0.23	0.47	0.75	0.06
2031	9,558	0.111	2.57	8,328	0.29	0.58	0.75	0.08
2032	10,208	0.111	3.07	10,113	0.35	0.71	0.75	0.10
2033	10,743	0.111	3.59	11,995	0.42	0.84	0.75	0.11
2034	11,191	0.111	4.14	13,982	0.49	0.98	0.75	0.13
2035	11,565	0.111	4.70	16,045	0.56	1.12	0.75	0.15
2036	11,874	0.111	5.25	18,125	0.63	1.27	0.75	0.17
2037	12,126	0.111	5.78	20,165	0.71	1.41	0.75	0.19
2038	12,332	0.111	6.28	22,118	0.77	1.55	0.75	0.21
2039	12,500	0.111	6.74	23,954	0.84	1.68	0.75	0.23
2040	12,637	0.111	7.17	25,650	0.90	1.80	0.75	0.24
2041	12,749	0.111	7.55	27,195	0.95	1.90	0.75	0.26
2042	12,841	0.111	7.90	28,583	1.00	2.00	0.75	0.27



# Fspr30\_medRT

F=0

Year	R (1000s)	F	Yield (mp gwt)	SSB (mt)	SSB/ SSBFmsy	SSB/ MSST	F/ MFMT	SSB/ SSB0
2020	5,098	0.424	3.31	2,432	0.09	0.17	2.86	0.02
2021	5,170	0.454	3.10	2,484	0.09	0.17	3.07	0.02
2022	4,033	0.695	3.14	1,736	0.06	0.12	4.69	0.02
<b>2023</b>	3,017	0.000	0.00	1,188	0.04	0.08	0.00	0.01
2024	4,820	0.000	0.00	2,236	0.08	0.16	0.00	0.02
2025	6,626	0.000	0.00	3,741	0.13	0.26	0.00	0.04
2026	8,000	0.000	0.00	5,408	0.19	0.38	0.00	0.05
2027	8,968	0.000	0.00	7,044	0.25	0.49	0.00	0.07
2028	9,797	0.000	0.00	8,931	0.31	0.63	0.00	0.08
2029	10,605	0.000	0.00	11,465	0.40	0.80	0.00	0.11
2030	11,320	0.000	0.00	14,645	0.51	1.03	0.00	0.14
2031	11,900	0.000	0.00	18,322	0.64	1.28	0.00	0.17
2032	12,356	0.000	0.00	22,364	0.78	1.57	0.00	0.21
2033	12,714	0.000	0.00	26,689	0.93	1.87	0.00	0.25
2034	12,997	0.000	0.00	31,230	1.09	2.19	0.00	0.29



# Fspr30\_medRT

## Frebuild Tmin\*2

Year	R (1000s)	F	Yield (mp gwt)	SSB (mt)	SSB/ SSBFmsy	SSB/ MSST	F/ MFMT	SSB/ SSB0
2020	5,098	0.424	3.31	2,432	0.09	0.17	2.86	0.02
2021	5,170	0.454	3.10	2,484	0.09	0.17	3.07	0.02
2022	4,033	0.695	3.14	1,736	0.06	0.12	4.69	0.02
2023	3,017	0.134	0.59	1,188	0.04	0.08	0.91	0.01
2024	4,457	0.134	0.94	1,996	0.07	0.14	0.91	0.02
2025	5,914	0.134	1.28	3,075	0.11	0.22	0.91	0.03
2026	6,993	0.134	1.53	4,130	0.14	0.29	0.91	0.04
2027	7,719	0.134	1.84	5,016	0.18	0.35	0.91	0.05
2028	8,348	0.134	2.24	5,941	0.21	0.42	0.91	0.06
2029	9,046	0.134	2.74	7,199	0.25	0.50	0.91	0.07
2030	9,727	0.134	3.29	8,749	0.31	0.61	0.91	0.08
2031	10,313	0.134	3.85	10,449	0.37	0.73	0.91	0.10
2032	10,793	0.134	4.43	12,196	0.43	0.85	0.91	0.11
2033	11,185	0.134	5.01	13,955	0.49	0.98	0.91	0.13
2034	11,510	0.134	5.58	15,713	0.55	1.10	0.91	0.15
2035	11,779	0.134	6.14	17,443	0.61	1.22	0.91	0.16
2036	12,000	0.134	6.66	19,106	0.67	1.34	0.91	0.18
2037	12,182	0.134	7.15	20,669	0.72	1.45	0.91	0.19
2038	12,331	0.134	7.59	22,111	0.77	1.55	0.91	0.21
2039	12,453	0.134	7.99	23,419	0.82	1.64	0.91	0.22
2040	12,553	0.134	8.34	24,591	0.86	1.72	0.91	0.23
2041	12,635	0.134	8.66	25,626	0.90	1.79	0.91	0.24
2042	12,703	0.134	8.93	26,532	0.93	1.86	0.91	0.25
2043	12,758	0.134	9.16	27,317	0.96	1.91	0.91	0.26
2044	12,803	0.134	9.36	27,990	0.98	1.96	0.91	0.26
2045	12,840	0.134	9.53	28,563	1.00	2.00	0.91	0.27



# Fspr30\_medRT

## F fixed at 75%MFMT

Year	R (1000s)	F	Yield (mp gwt)	SSB (mt)	SSB/ SSBFmsy	SSB/ MSST	F/ MFMT	SSB/ SSB0
2020	5,098	0.424	3.31	2,432	0.09	0.17	2.86	0.02
2021	5,170	0.454	3.10	2,484	0.09	0.17	3.07	0.02
2022	4,033	0.695	3.14	1,736	0.06	0.12	4.69	0.02
2023	3,017	0.111	0.49	1,188	0.04	0.08	0.75	0.01
2024	4,521	0.111	0.79	2,037	0.07	0.14	0.75	0.02
2025	6,038	0.111	1.09	3,184	0.11	0.22	0.75	0.03
2026	7,170	0.111	1.32	4,331	0.15	0.30	0.75	0.04
2027	7,941	0.111	1.60	5,323	0.19	0.37	0.75	0.05
2028	8,609	0.111	1.97	6,378	0.22	0.45	0.75	0.06
2029	9,332	0.111	2.43	7,804	0.27	0.55	0.75	0.07
2030	10,025	0.111	2.94	9,562	0.33	0.67	0.75	0.09
2031	10,617	0.111	3.47	11,509	0.40	0.81	0.75	0.11
2032	11,098	0.111	4.02	13,532	0.47	0.95	0.75	0.13
2033	11,489	0.111	4.57	15,588	0.55	1.09	0.75	0.15
2034	11,809	0.111	5.12	17,657	0.62	1.24	0.75	0.17
2035	12,072	0.111	5.66	19,700	0.69	1.38	0.75	0.19
2036	12,288	0.111	6.17	21,674	0.76	1.52	0.75	0.20
2037	12,464	0.111	6.64	23,540	0.82	1.65	0.75	0.22
2038	12,608	0.111	7.07	25,270	0.88	1.77	0.75	0.24
2039	12,725	0.111	7.47	26,851	0.94	1.88	0.75	0.25
2040	12,822	0.111	7.82	28,276	0.99	1.98	0.75	0.27
2041	12,900	0.111	8.13	29,543	1.03	2.07	0.75	0.28



# Fspr30\_medRT

## Frebuild 10yrs + 1 generation

Year	R (1000s)	F	Yield (mp gwt)	SSB (mt)	SSB/SSBFmsy	SSB/MSST	F/ MFMT	SSB/SSBO
2020	5,098	0.424	3.31	2,432	0.09	0.17	2.86	0.02
2021	5,170	0.454	3.10	2,484	0.09	0.17	3.07	0.02
2022	4,033	0.695	3.14	1,736	0.06	0.12	4.69	0.02
2023	3,017	0.122	0.54	1,188	0.04	0.08	0.83	0.01
2024	4,490	0.122	0.86	2,017	0.07	0.14	0.83	0.02
2025	5,977	0.122	1.19	3,130	0.11	0.22	0.83	0.03
2026	7,084	0.122	1.42	4,232	0.15	0.30	0.83	0.04
2027	7,833	0.122	1.72	5,171	0.18	0.36	0.83	0.05
2028	8,482	0.122	2.11	6,161	0.22	0.43	0.83	0.06
2029	9,193	0.122	2.59	7,502	0.26	0.53	0.83	0.07
2030	9,880	0.122	3.12	9,156	0.32	0.64	0.83	0.09
2031	10,470	0.122	3.67	10,978	0.38	0.77	0.83	0.10
2032	10,951	0.122	4.23	12,861	0.45	0.90	0.83	0.12
2033	11,342	0.122	4.80	14,767	0.52	1.03	0.83	0.14
2034	11,665	0.122	5.37	16,678	0.58	1.17	0.83	0.16
2035	11,931	0.122	5.91	18,561	0.65	1.30	0.83	0.17
2036	12,150	0.122	6.43	20,376	0.71	1.43	0.83	0.19
2037	12,329	0.122	6.91	22,086	0.77	1.55	0.83	0.21
2038	12,475	0.122	7.35	23,667	0.83	1.66	0.83	0.22
2039	12,595	0.122	7.75	25,107	0.88	1.76	0.83	0.24
2040	12,693	0.122	8.11	26,400	0.92	1.85	0.83	0.25
2041	12,773	0.122	8.42	27,547	0.96	1.93	0.83	0.26
2042	12,839	0.122	8.69	28,553	1.00	2.00	0.83	0.27
2043	12,894	0.148	10.80	29,427	1.03	2.06	1.00	0.28



# Fmax\_loRT

## F=0

Year	R (1000s)	F	Yield (mp gwt)	SSB (mt)	SSB/ SSBF <sub>msy</sub>	SSB/ MSST	F/ MFMT	SSB/ SSB0
2020	5,098	0.424	3.31	2,432	0.19	0.38	1.49	0.02
2021	5,170	0.454	3.10	2,484	0.20	0.39	1.59	0.02
2022	4,580	0.581	3.17	2,075	0.16	0.33	2.04	0.02
<b>2023</b>	3,864	0.000	0.00	1,638	0.13	0.26	0.00	0.02
2024	5,707	0.000	0.00	2,901	0.23	0.46	0.00	0.03
2025	7,464	0.000	0.00	4,685	0.37	0.74	0.00	0.04
2026	8,756	0.000	0.00	6,642	0.52	1.05	0.00	0.06
2027	9,670	0.000	0.00	8,605	0.68	1.36	0.00	0.08
2028	10,437	0.000	0.00	10,864	0.86	1.71	0.00	0.10
2029	11,147	0.000	0.00	13,766	1.09	2.17	0.00	0.13

# Fmax\_loRT

## Frebuild 10 years

Year	R (1000s)	F	Yield (mp gwt)	SSB (mt)	SSB/ SSBFmsy	SSB/ MSST	F/ MFMT	SSB/ SSBO
2020	5,098	0.424	3.31	2,432	0.19	0.38	1.49	0.02
2021	5,170	0.454	3.10	2,484	0.20	0.39	1.59	0.02
2022	4,580	0.581	3.17	2,075	0.16	0.33	2.04	0.02
<b>2023</b>	3,864	0.184	1.06	1,638	0.13	0.26	0.65	0.02
2024	5,146	0.184	1.56	2,466	0.19	0.39	0.65	0.02
2025	6,425	0.185	2.02	3,542	0.28	0.56	0.65	0.03
2026	7,340	0.185	2.35	4,532	0.36	0.71	0.65	0.04
2027	7,951	0.185	2.75	5,338	0.42	0.84	0.65	0.05
2028	8,476	0.185	3.24	6,152	0.48	0.97	0.65	0.06
2029	9,048	0.185	3.81	7,203	0.57	1.14	0.65	0.07
2030	9,604	0.185	4.42	8,439	0.67	1.33	0.65	0.08
2031	10,084	0.185	5.02	9,736	0.77	1.53	0.65	0.09
2032	10,480	0.185	5.60	11,014	0.87	1.74	0.65	0.10
2033	10,807	0.185	6.18	12,252	0.97	1.93	0.65	0.12
2034	11,080	0.285	10.36	13,450	1.06	2.12	1.00	0.13

# Fmax\_loRT

Halfway  
between  
Tmin and  
10 yrs

Year	R (1000s)	F	Yield (mp gwt)	SSB (mt)	SSB/ SSBFmsy	SSB/ MSST	F/ MFMT	SSB/ SSB0
2020	5,098	0.424	3.31	2,432	0.19	0.38	1.49	0.02
2021	5,170	0.454	3.10	2,484	0.20	0.39	1.59	0.02
2022	4,580	0.581	3.17	2,075	0.16	0.33	2.04	0.02
<b>2023</b>	3,864	0.130	0.75	1,638	0.13	0.26	0.46	0.02
2024	5,316	0.130	1.14	2,593	0.20	0.41	0.46	0.02
2025	6,740	0.130	1.53	3,858	0.30	0.61	0.46	0.04
2026	7,774	0.130	1.83	5,090	0.40	0.80	0.46	0.05
2027	8,483	0.130	2.19	6,164	0.49	0.97	0.46	0.06
2028	9,093	0.130	2.64	7,293	0.57	1.15	0.46	0.07
2029	9,721	0.130	3.17	8,734	0.69	1.38	0.46	0.08
2030	10,309	0.130	3.74	10,434	0.82	1.64	0.46	0.10
2031	10,807	0.130	4.32	12,254	0.97	1.93	0.46	0.12
2032	11,213	0.285	10.70	14,094	1.11	2.22	1.00	0.13

# Fmax\_hiRT

**F=0**

Year	R (1000s)	F	Yield (mp gwt)	SSB (mt)	SSB/ SSBFmsy	SSB/ MSST	F/ MFMT	SSB/ SSB0
2020	5,098	0.424	3.31	2,432	0.19	0.38	1.49	0.02
2021	5,170	0.455	3.09	2,484	0.20	0.39	1.60	0.02
2022	3,144	0.974	3.09	1,251	0.10	0.20	3.42	0.01
<b>2023</b>	1,599	0.000	0.00	563	0.04	0.09	0.00	0.01
2024	3,186	0.000	0.00	1,273	0.10	0.20	0.00	0.01
2025	4,964	0.000	0.00	2,336	0.18	0.37	0.00	0.02
2026	6,413	0.000	0.00	3,530	0.28	0.56	0.00	0.03
2027	7,405	0.000	0.00	4,612	0.36	0.73	0.00	0.04
2028	8,279	0.000	0.00	5,831	0.46	0.92	0.00	0.05
2029	9,263	0.000	0.00	7,652	0.60	1.21	0.00	0.07
2030	10,215	0.000	0.00	10,136	0.80	1.60	0.00	0.10
2031	11,018	0.000	0.00	13,160	1.04	2.07	0.00	0.12

# Fmax\_hiRT

## Frebuild 10 years

Year	R (1000s)	F	Yield (mp gwt)	SSB (mt)	SSB/ SSBFmsy	SSB/ MSST	F/ MFMT	SSB/ SSB0
2020	5,098	0.424	3.31	2,432	0.19	0.38	1.49	0.02
2021	5,170	0.455	3.09	2,484	0.20	0.39	1.60	0.02
2022	3,144	0.974	3.09	1,251	0.10	0.20	3.42	0.01
<b>2023</b>	1,599	0.106	0.26	563	0.04	0.09	0.37	0.01
2024	2,983	0.106	0.47	1,171	0.09	0.18	0.37	0.01
2025	4,495	0.106	0.70	2,020	0.16	0.32	0.37	0.02
2026	5,681	0.106	0.82	2,880	0.23	0.45	0.37	0.03
2027	6,437	0.106	1.00	3,553	0.28	0.56	0.37	0.03
2028	7,093	0.106	1.27	4,242	0.33	0.67	0.37	0.04
2029	7,939	0.106	1.63	5,321	0.42	0.84	0.37	0.05
2030	8,835	0.106	2.05	6,787	0.53	1.07	0.37	0.06
2031	9,628	0.106	2.50	8,499	0.67	1.34	0.37	0.08
2032	10,279	0.106	2.99	10,338	0.81	1.63	0.37	0.10
2033	10,814	0.106	3.51	12,282	0.97	1.94	0.37	0.12
2034	11,260	0.285	10.82	14,335	1.13	2.26	1.00	0.14



# Fmax\_hiRT

Halfway  
between  
Tmin and  
10 yrs

Year	R (1000s)	F	Yield (mp gwt)	SSB (mt)	SSB/ SSBFmsy	SSB/ MSST	F/ MFMT	SSB/ SSB0
2020	5,098	0.424	3.31	2,432	0.19	0.38	1.49	0.02
2021	5,170	0.455	3.09	2,484	0.20	0.39	1.60	0.02
2022	3,144	0.974	3.09	1,251	0.10	0.20	3.42	0.01
<b>2023</b>	1,599	0.068	0.17	563	0.04	0.09	0.24	0.01
2024	3,056	0.068	0.31	1,207	0.10	0.19	0.24	0.01
2025	4,663	0.068	0.47	2,130	0.17	0.34	0.24	0.02
2026	5,943	0.068	0.56	3,101	0.24	0.49	0.24	0.03
2027	6,785	0.068	0.70	3,905	0.31	0.62	0.24	0.04
2028	7,522	0.068	0.90	4,759	0.38	0.75	0.24	0.04
2029	8,423	0.068	1.17	6,064	0.48	0.96	0.24	0.06
2030	9,348	0.068	1.49	7,839	0.62	1.24	0.24	0.07
2031	10,153	0.068	1.85	9,942	0.78	1.57	0.24	0.09
2032	10,807	0.068	2.23	12,252	0.97	1.93	0.24	0.12
2033	11,336	0.285	11.01	14,734	1.16	2.32	1.00	0.14

# Fmax\_medRT

**F=0**

Year	R (1000s)	F	Yield (mp gwt)	SSB (mt)	SSB/ SSBFmsy	SSB/ MSST	F/ MFMT	SSB/ SSB0
2020	5,098	0.424	3.31	2,432	0.19	0.38	1.49	0.02
2021	5,170	0.454	3.10	2,484	0.20	0.39	1.60	0.02
2022	4,033	0.695	3.14	1,736	0.14	0.27	2.44	0.02
<b>2023</b>	3,017	0.000	0.00	1,188	0.09	0.19	0.00	0.01
2024	4,820	0.000	0.00	2,236	0.18	0.35	0.00	0.02
2025	6,626	0.000	0.00	3,741	0.29	0.59	0.00	0.04
2026	8,000	0.000	0.00	5,408	0.43	0.85	0.00	0.05
2027	8,968	0.000	0.00	7,044	0.56	1.11	0.00	0.07
2028	9,797	0.000	0.00	8,931	0.70	1.41	0.00	0.08
2029	10,605	0.000	0.00	11,465	0.90	1.81	0.00	0.11
2030	11,320	0.000	0.00	14,645	1.15	2.31	0.00	0.14

# Fmax\_medRT

## Frebuild 10 years

Year	R (1000s)	F	Yield (mp gwt)	SSB (mt)	SSB/ SSBF <sub>msy</sub>	SSB/ MSST	F/ MFMT	SSB/ SSB <sub>0</sub>
2020	5,098	0.424	3.31	2,432	0.19	0.38	1.49	0.02
2021	5,170	0.454	3.10	2,484	0.20	0.39	1.60	0.02
2022	4,033	0.695	3.14	1,736	0.14	0.27	2.44	0.02
<b>2023</b>	3,017	0.161	0.71	1,188	0.09	0.19	0.56	0.01
2024	4,384	0.161	1.10	1,950	0.15	0.31	0.56	0.02
2025	5,770	0.161	1.49	2,954	0.23	0.47	0.56	0.03
2026	6,789	0.161	1.75	3,909	0.31	0.62	0.56	0.04
2027	7,462	0.161	2.07	4,683	0.37	0.74	0.56	0.04
2028	8,045	0.161	2.50	5,474	0.43	0.86	0.56	0.05
2029	8,711	0.161	3.03	6,561	0.52	1.03	0.56	0.06
2030	9,374	0.161	3.60	7,899	0.62	1.24	0.56	0.07
2031	9,951	0.161	4.19	9,351	0.74	1.47	0.56	0.09
2032	10,425	0.161	4.78	10,824	0.85	1.71	0.56	0.10
2033	10,816	0.161	5.37	12,291	0.97	1.94	0.56	0.12
2034	11,143	0.285	10.52	13,750	1.08	2.17	1.00	0.13

# Fmax\_medRT

**Halfway  
between  
Tmin and  
10 yrs**

Year	R (1000s)	F	Yield (mp gwt)	SSB (mt)	SSB/ SSBFmsy	SSB/ MSST	F/ MFMT	SSB/ SSB0
2020	5,098	0.424	3.31	2,432	0.19	0.38	1.49	0.02
2021	5,170	0.454	3.10	2,484	0.20	0.39	1.60	0.02
2022	4,033	0.695	3.14	1,736	0.14	0.27	2.44	0.02
<b>2023</b>	3,017	0.132	0.58	1,188	0.09	0.19	0.46	0.01
2024	4,463	0.132	0.92	2,000	0.16	0.32	0.46	0.02
2025	5,925	0.132	1.27	3,085	0.24	0.49	0.46	0.03
2026	7,009	0.132	1.51	4,147	0.33	0.65	0.46	0.04
2027	7,739	0.132	1.82	5,042	0.40	0.79	0.46	0.05
2028	8,371	0.132	2.22	5,978	0.47	0.94	0.46	0.06
2029	9,071	0.132	2.72	7,250	0.57	1.14	0.46	0.07
2030	9,753	0.132	3.26	8,817	0.69	1.39	0.46	0.08
2031	10,340	0.132	3.82	10,538	0.83	1.66	0.46	0.10
2032	10,820	0.132	4.40	12,308	0.97	1.94	0.46	0.12
2033	11,212	0.285	10.70	14,091	1.11	2.22	1.00	0.13