Summary of Four 2022 Groundfish Management Track Assessments and Groundfish PDT Report

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& Paul Nitschke, NEFSC

SSC Meeting
November 9, 2022

New England Fishery Management Council

Discussion Order

1. SNE/MA Yellowtail Flounder
2. CC/GOM Yellowtail Flounder*
3. George Bank Haddock
4. White Hake

** Level 1 stock*

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Overall Review Panel Concern for Analytical Assessments

- “Reduction in Port sampling for individual lengths and age structures represents a significant threat to the stock assessment enterprise. NOAA should decide whether it can return Port sampling to levels comparable with those achieved prior to 2019. If they cannot, they should increase catch sampling by observers (either ASM or NEFOP) to balance the loss of these data.”
- Change to area-swept adjusted survey indices.
- Missing spring and fall 2020 surveys due COVID-19 restrictions.

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Projection Uncertainty

There is evidence, that in the case of multispecies stocks, that the projections tend to be overly optimistic when they extend beyond a short term period (i.e., 1-3 years), although recent work suggests some improvements. This means, generally, that the projections tend to over-estimate future stock sizes and under-estimate future fishing mortality.

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Council's Groundfish ABC Control Rules

"These ABC control rules will be used in the absence of better information that may allow a more explicit determination of scientific uncertainty for a stock or stocks. If such information is available - that is, if scientific uncertainty can be characterized in a more accurate fashion -- it can be used by the SSC to determine ABCs, these ABC control rules can be modified in a future Council action (an amendment, framework, or specification package):

1. *ABC should be determined as the catch associated with 75% of FMSY.*
2. *If fishing at 75% of FMSY does not achieve the mandated rebuilding requirements for overfished stocks, ABC should be determined as the catch associated with the fishing mortality that meets rebuilding requirements (Frebuild).*
3. *For stocks that cannot rebuild to BMSY in the specified rebuilding period, even with no fishing, the ABC should be based on incidental bycatch, including a reduction in bycatch rate (i.e., the proportion of the stock caught as bycatch).*
4. *Interim ABCs should be determined for stocks with unknown status according to case-by- case recommendations from the SSC."*

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Overview

- Introduction summary table and PDT memo (does not include all sources of uncertainty or all reviewer comments).
- Status table (short report 2nd table)
- Biomass (mt) and F or exploitation plots (short report).
- PDT catch performance plots and tables for individual stocks.
- OFL and ABC tables at 75%F_{MSY} or $F_{Rebuild}$
- Additional fishery information – in-season commercial groundfish utilization, recreational fishery performance, and economic information

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Individual Stock Details: Catch Plots and Tables (Catch History, OFLs, ABCs, Projections)

- CY 2005- CY 2021 total catch
- Historical FY OFLs & ABCs (2010-2022)
- PDT CY 2022 catch assumption
- F_{MSY} and 75%F_{MSY} or Frebuild projected for 2023-2025
- Assessment overfishing history:

  "Yes" , "No", "unknown" ability to calculate whether overfishing was occurring in terminal year of assessment

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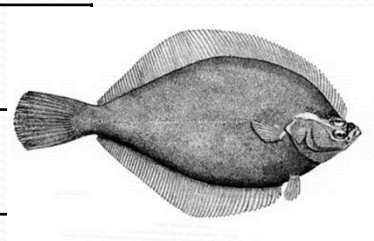
Southern New England/Mid-Atlantic Yellowtail Flounder

MODEL	ASAP (Level 2) Chris Legault
STOCK STATUS	Overfished & Overfishing is not occurring
REBUILDING	2029 (70%F_{MSY} Frebuild)
RETROSPECTIVE ADJUSTMENT	Yes
UNCERTAINTIES	Missing 2020 surveys, Major retrospective pattern, Recent very low recruitment, Modeling is near detection, Fishery catch-at-age treated as missing 2020-2021, Fishery weight-at-age estimated from average of 2015-2019, If the cold pool index continues to warm then recruitment and yield could continue to decline.
REVIEWER COMMENTS	Concern with the limited sampling for WAA, Concern with the out year catch advice from the projection due to the paper fish assumption.



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Southern New England/Mid-Atlantic Yellowtail Flounder

CHANGES	The larval index was treated differently, now use SSB weights-at-age, tuned to the spawning time of the stock instead of the survey time, and used a fixed selectivity pattern equal to the maturity ogive, the number of fishery selectivity blocks was reduced from 6 to 2 after consideration of a range of alternatives. These changes had little impact on the model. Many sensitivity runs were conducted which do not change the conclusion of this assessment.

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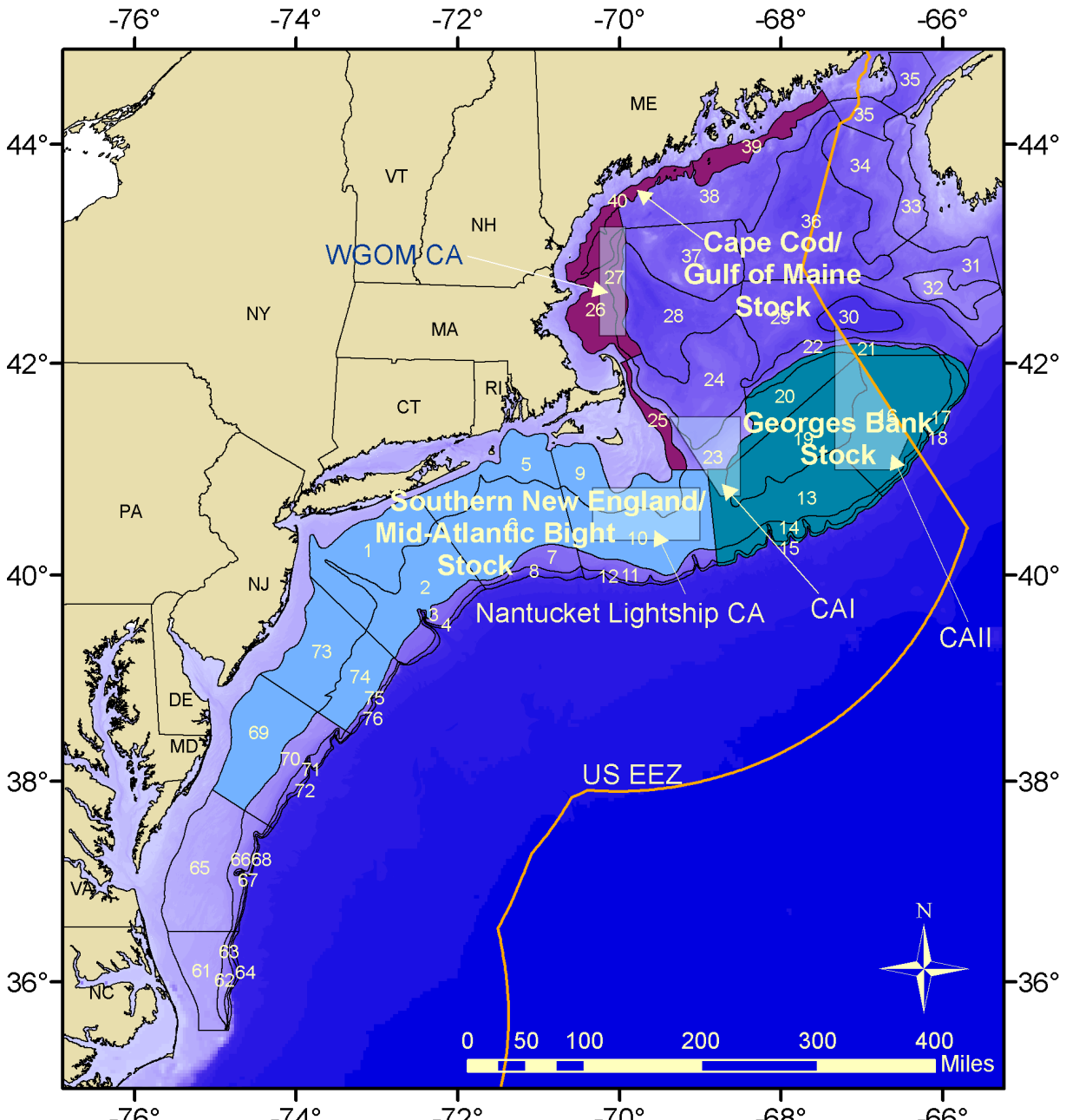

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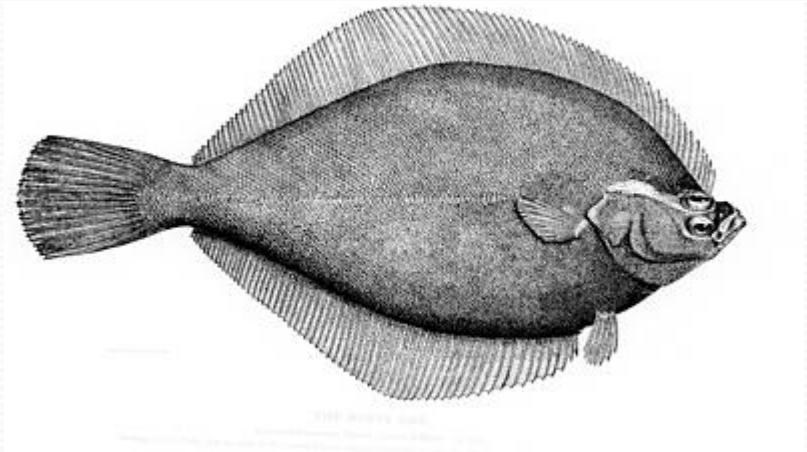
Southern New England/Mid-Atlantic Yellowtail Flounder

	2019	2022
F_{MSY} *proxy*	0.355	0.349
SSB_{MSY} (mt)	1,756	1,715 (908 - 2,739)
MSY (mt)	495	461 (245 - 739)
Median recruitment (age 1) (000s)	6,562	6,004
Overfishing	No	No
Overfished	Yes	Yes



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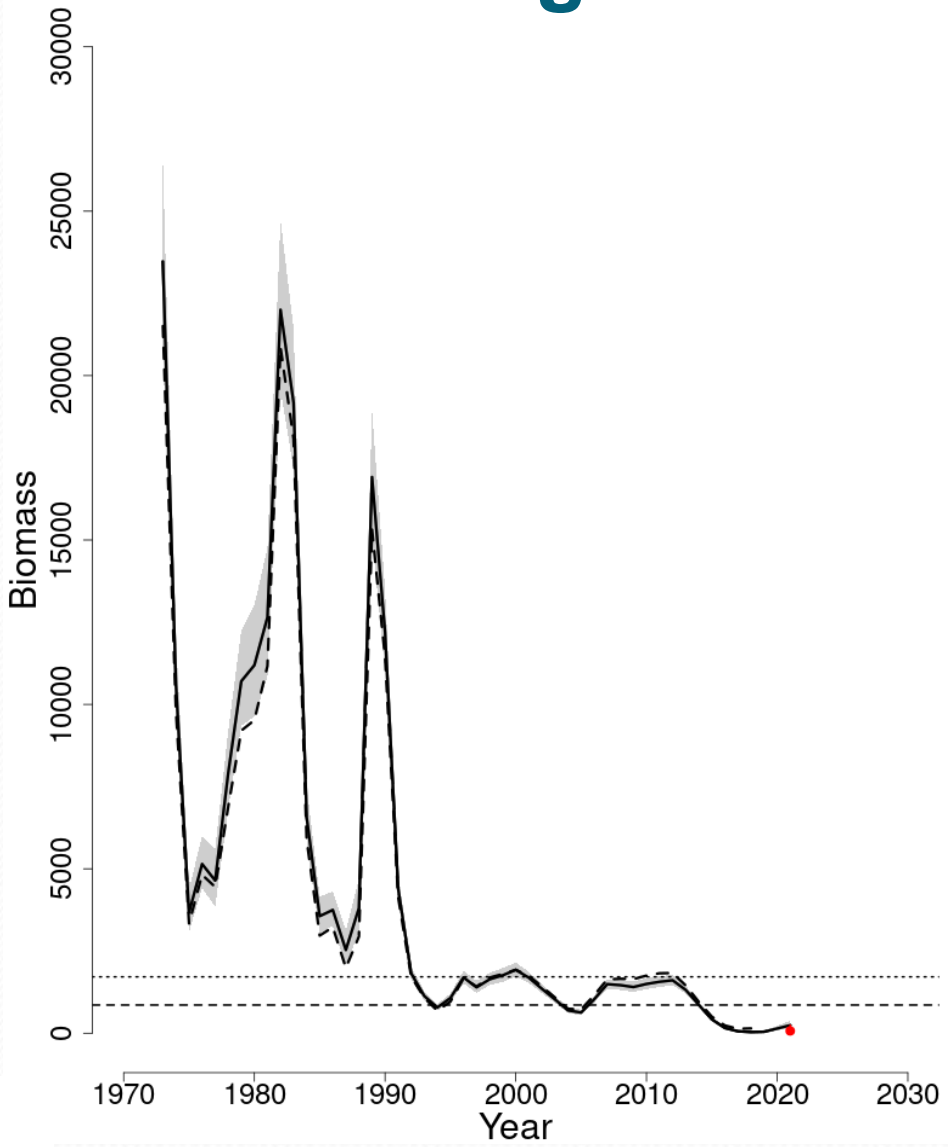
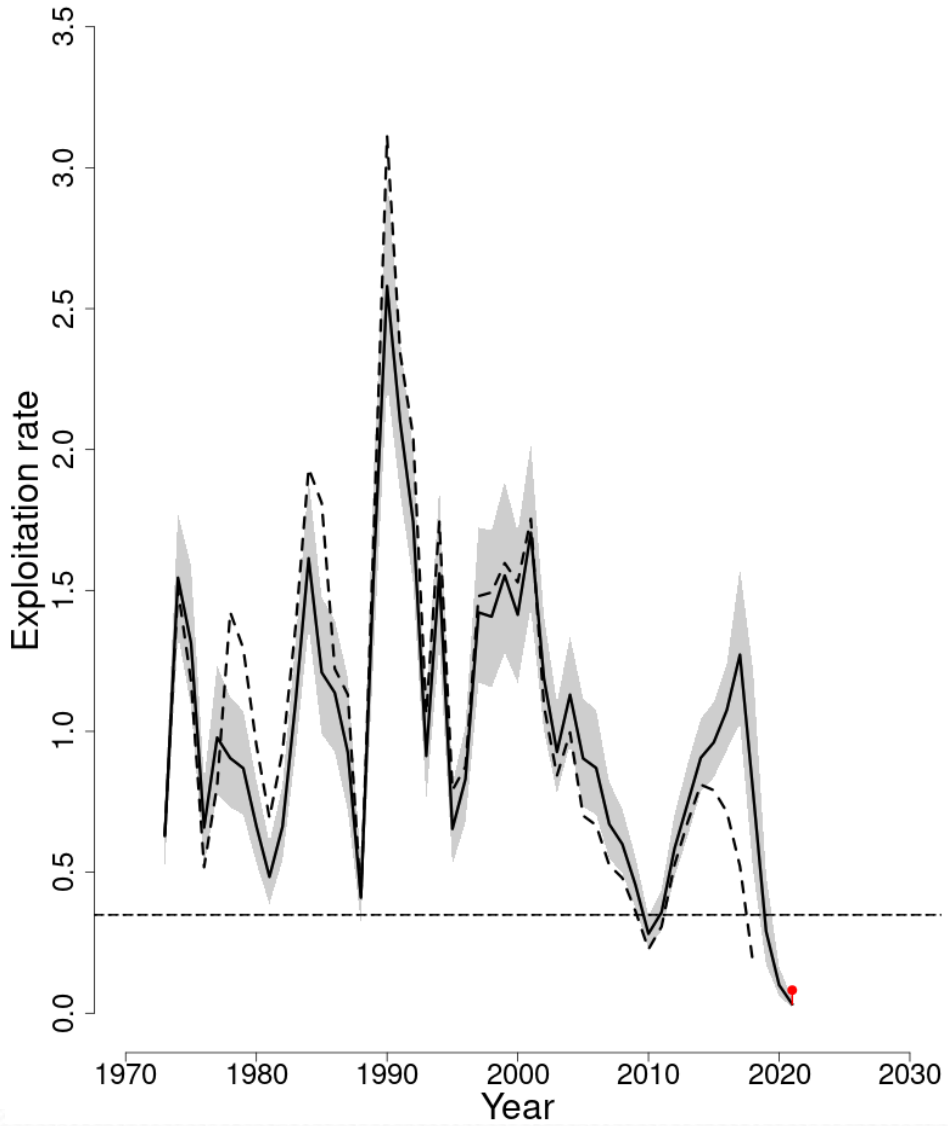
Southern New England/Mid-Atlantic Yellowtail Flounder





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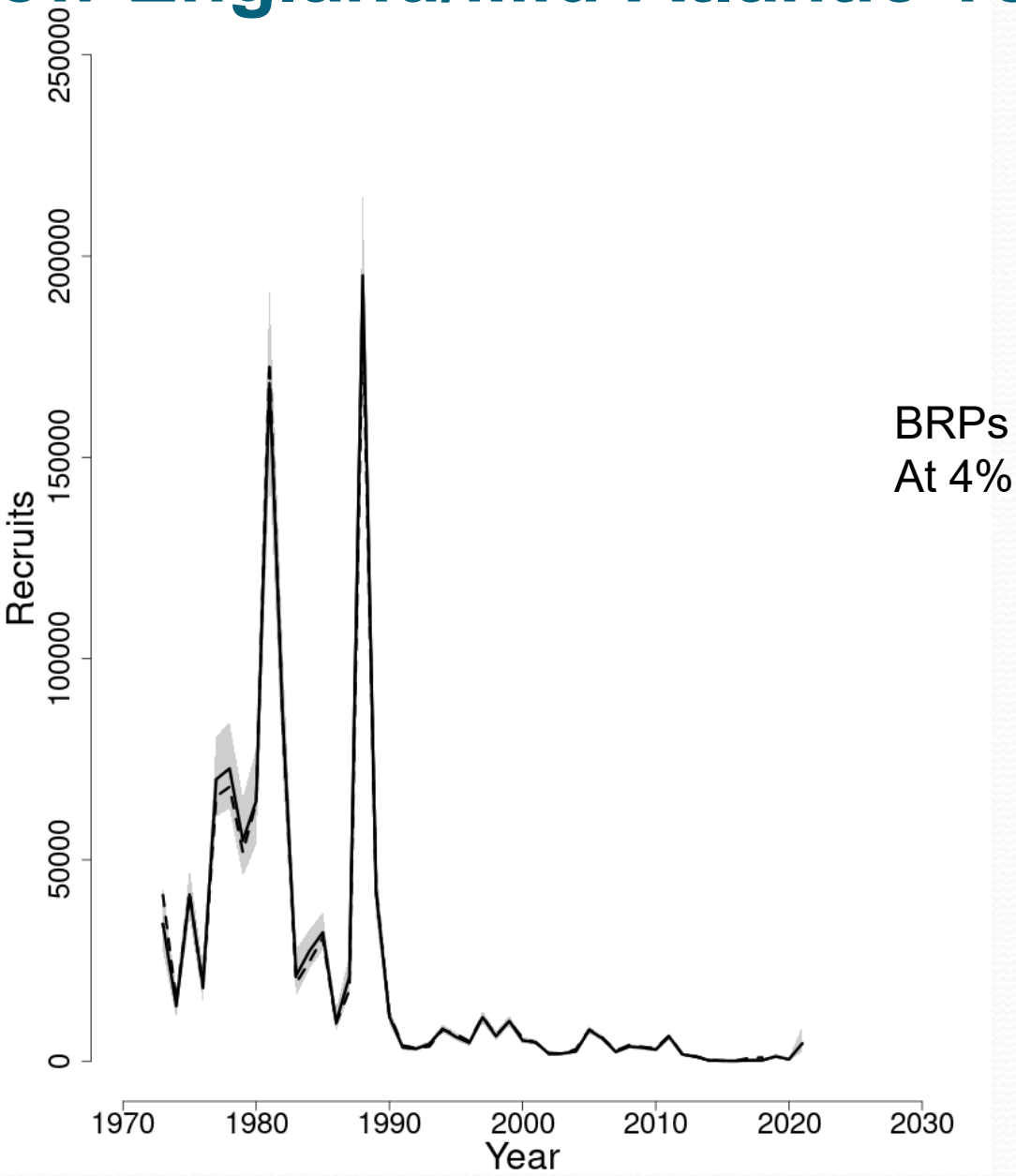
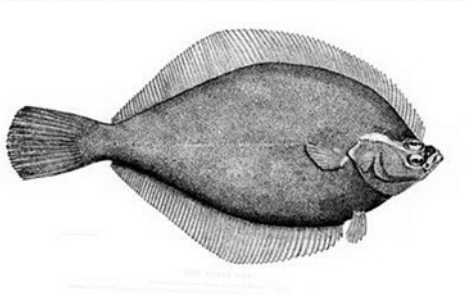
Southern New England/Mid-Atlantic Yellowtail Flounder





BRPs based on 1990-2018 year classes
At 4% of the low SSB_{MSY} target

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Southern New England/Mid-Atlantic Yellowtail Flounder

Surveys

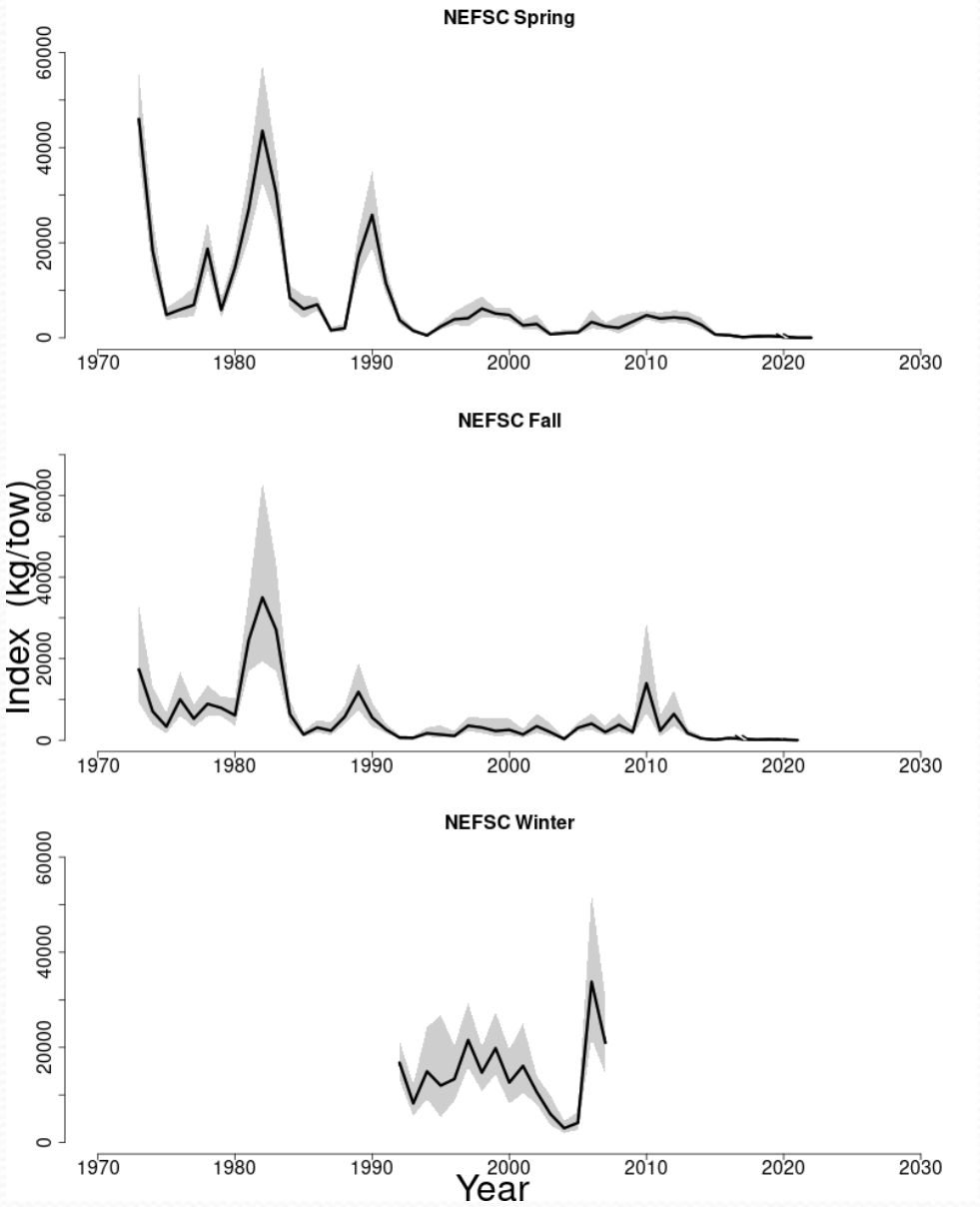
Strong signal, but little cohort information

NEFSC Spring 2021 caught 2 fish

NEFSC Fall 2021 caught 3 fish

Larval survey 2021 caught 2 larvae

NEFSC Spring 2022 caught 3 fish (not in ASAP)



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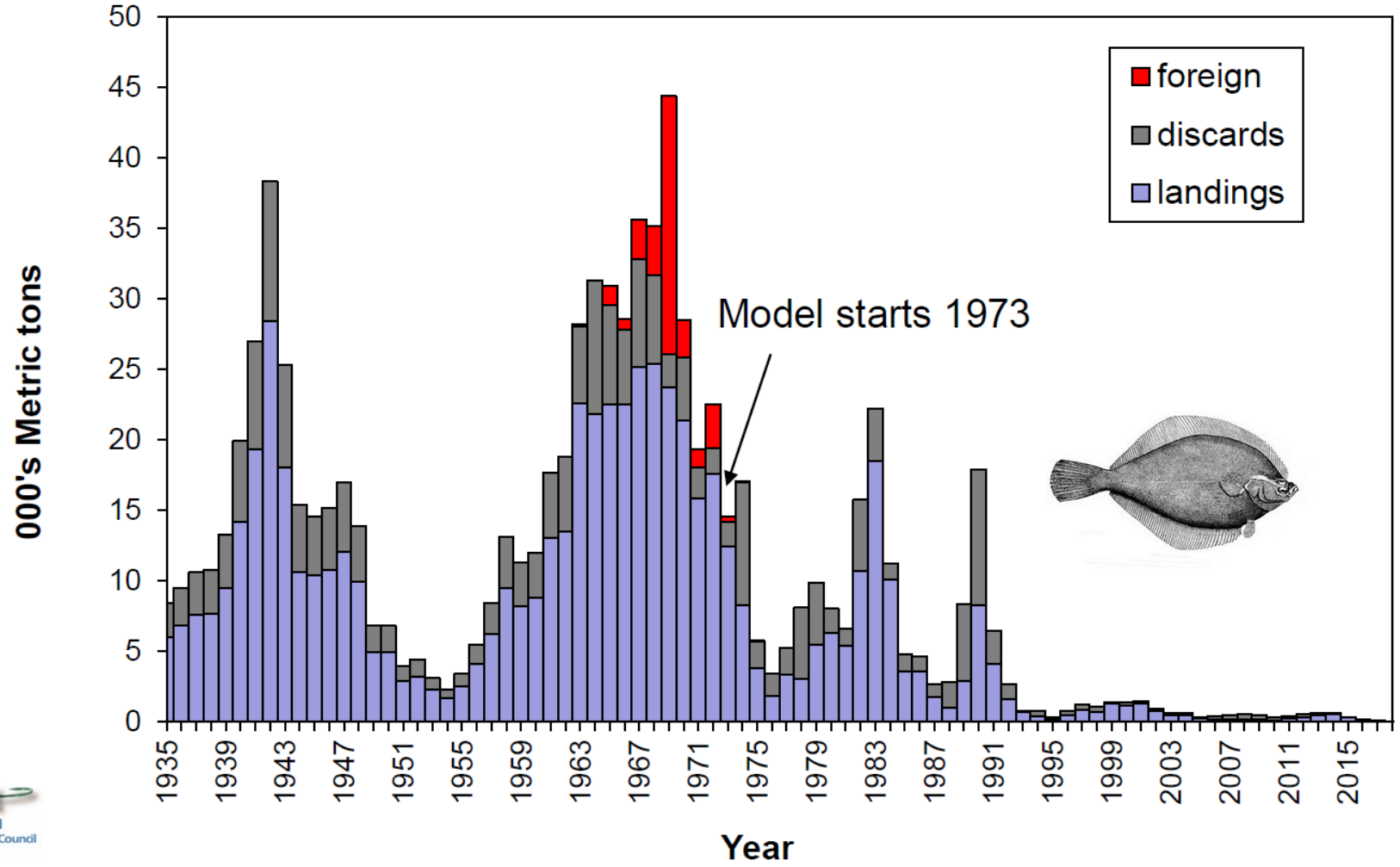
Historical Catch



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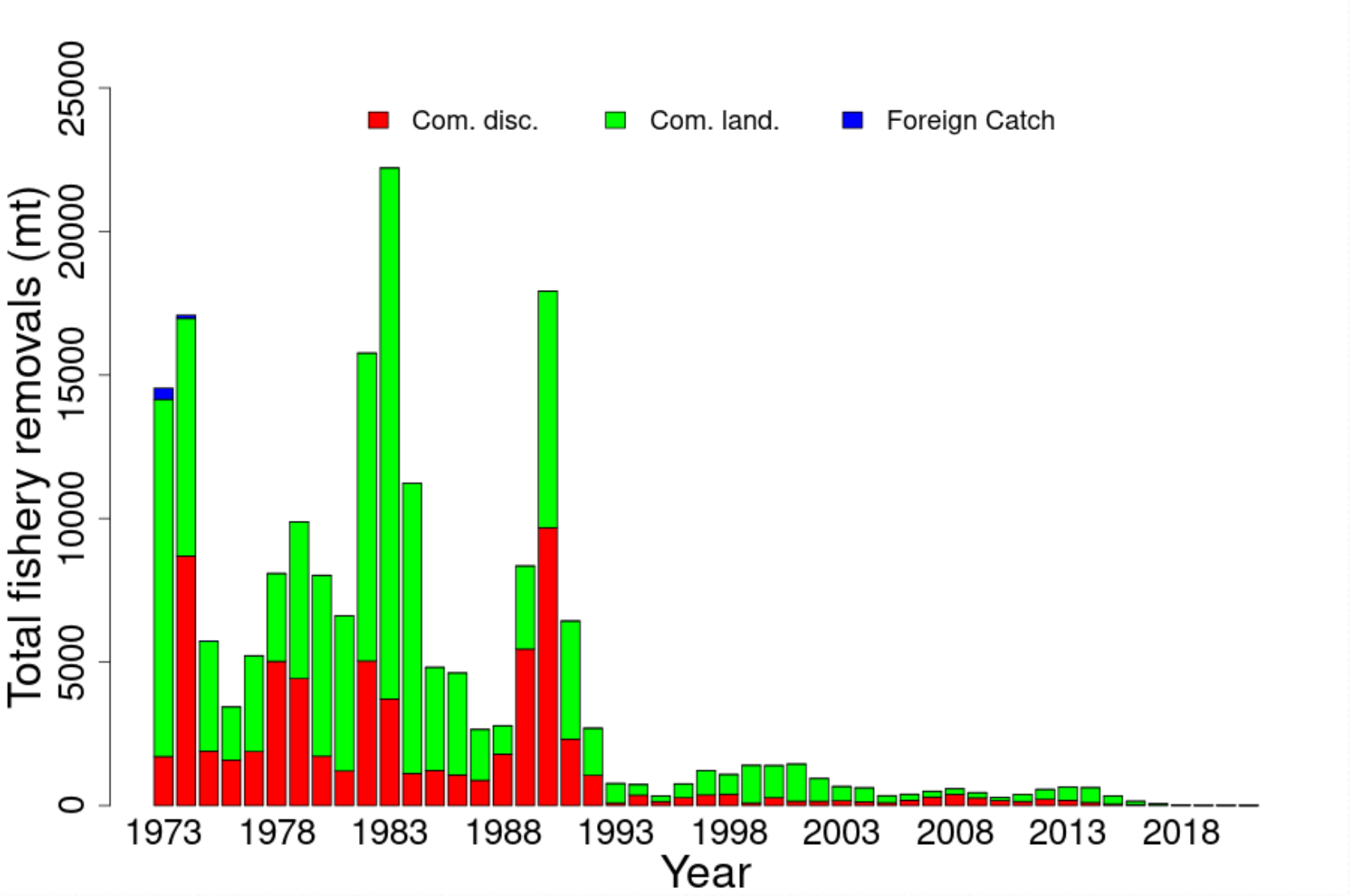
Southern New England/Mid-Atlantic Yellowtail Flounder



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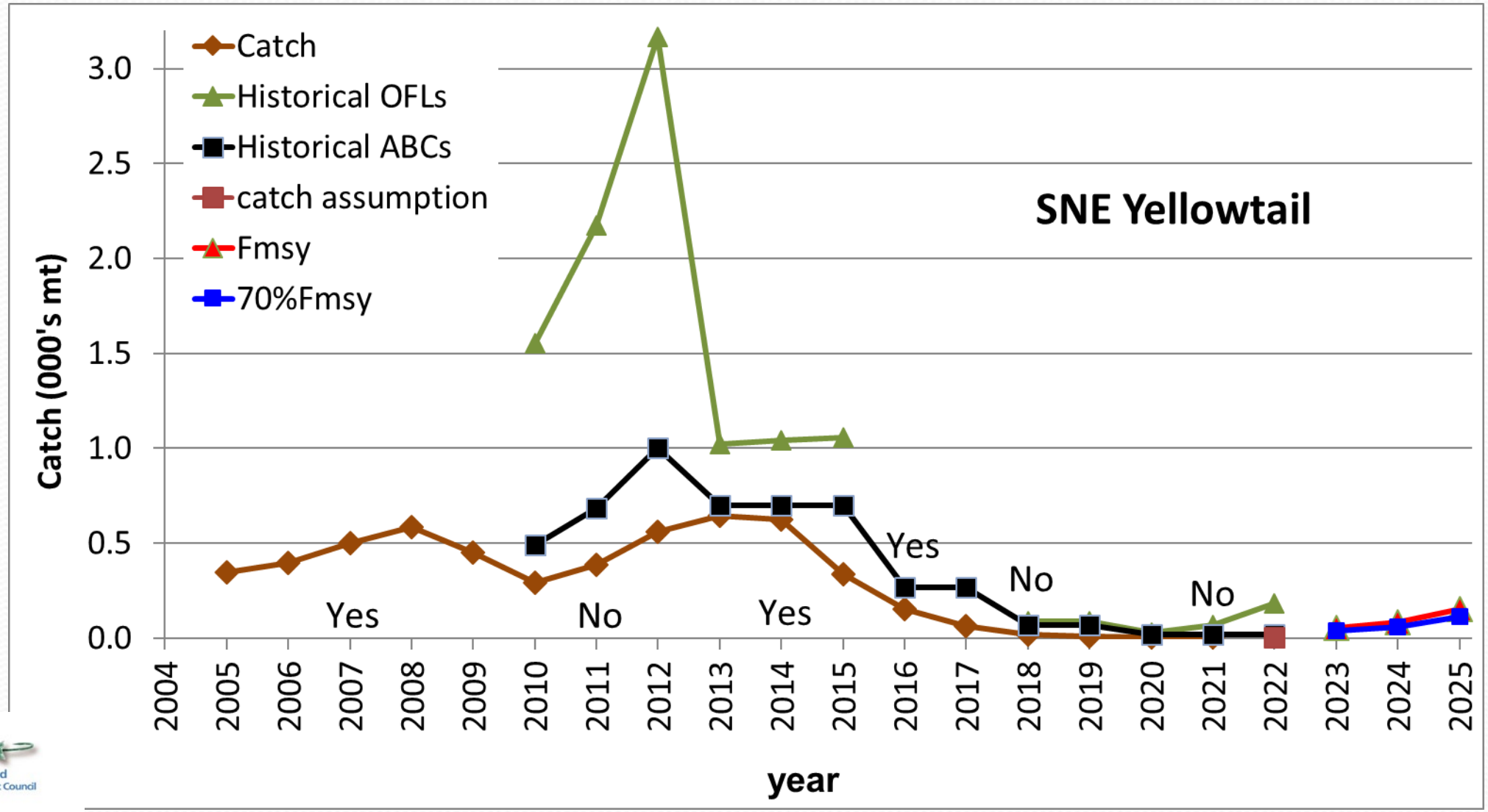

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Southern New England/Mid-Atlantic Yellowtail Flounder

Year	Catch	Historical OFLs	Historical ABCs	Catch Assumption	F_{MSY}	$70\%F_{MSY}$
2010	291	1,553	493			
2011	388	2,174	687			
2012	563	3,166	1,003			
2013	646	1,021	700			
2014	625	1,042	700			
2015	337	1,056	700			
2016	152	undefined	267			
2017	64	undefined	267			
2018	19	90	68			
2019	8	90	68			
2020	7	31	22			
2021	5	71	22			
2022		184	22	4		
2023					55	40
2024					84	64
2025					152	116

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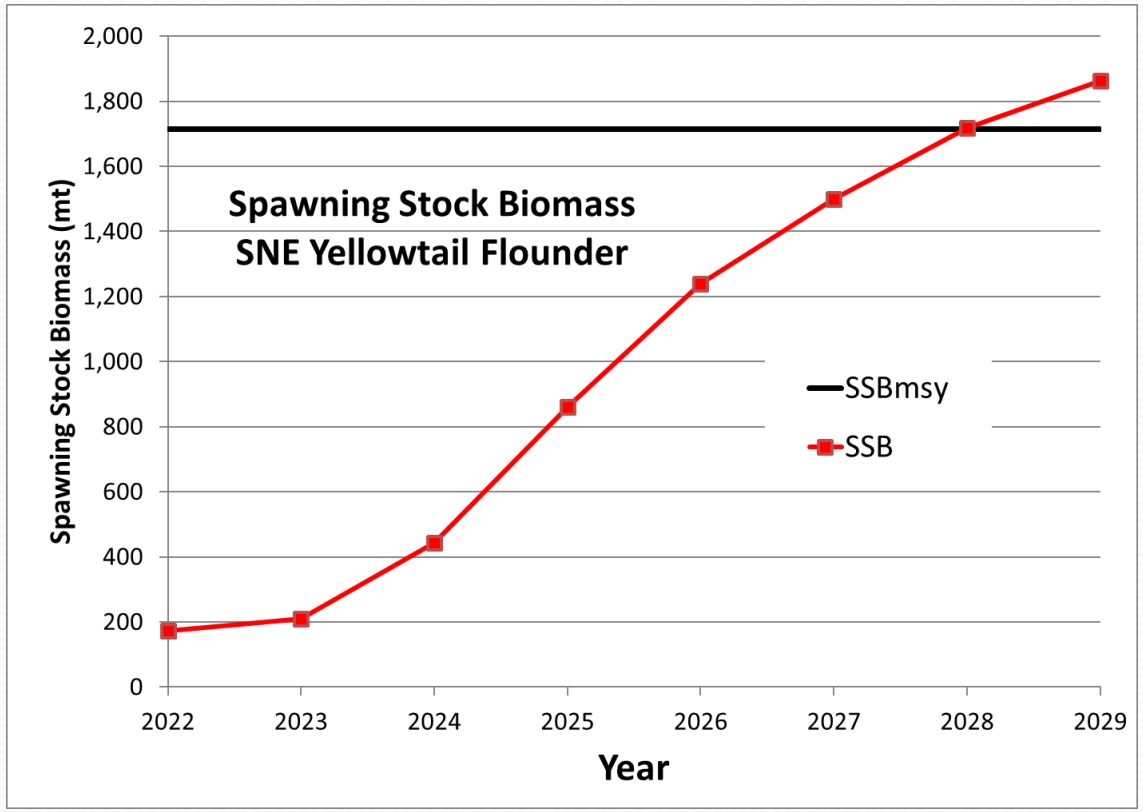
Southern New England/Mid-Atlantic Yellowtail Flounder

Projection at 70%Fmsy
Rebuilds by 2028, Rebuilding end date is 2029

Year	SSB	Probabilty SSB > SSBmsy
2022	174	0.00
2023	210	0.00
2024	444	0.00
2025	861	0.05
2026	1,238	0.22
2027	1,499	0.36
2028	1,718	0.50
2029	1,862	0.59



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Southern New England/Mid-Atlantic Yellowtail Flounder

Total Stock Biomass

Age	2022	2023	2024	2025
1	13,419	265,234	264,731	265,542
2	84,421	18,155	357,771	357,092
3	22,763	115,389	23,938	471,736
4	76,342	23,089	104,378	21,654
5	10,992	66,489	16,286	73,624
6+	9,382	18,529	66,159	55,377
total	217,318	506,886	833,263	1,245,025

Proportions (Total Stock Biomass)

Age	2022	2023	2024	2025
1	0.06	0.52	0.32	0.21
2	0.39	0.04	0.43	0.29
3	0.10	0.23	0.03	0.38
4	0.35	0.05	0.13	0.02
5	0.05	0.13	0.02	0.06
6+	0.04	0.04	0.08	0.04

Exploitable Biomass

Age	2022	2023	2024	2025
1	187	3,687	3,680	3,691
2	14,402	3,097	61,036	60,920
3	12,583	63,787	13,233	260,776
4	76,342	23,089	104,378	21,654
5	10,992	66,489	16,286	73,624
6+	9,382	18,529	66,159	55,377
total	123,887	178,678	264,771	476,041

Proportions (Exploitable Biomass)

Age	2022	2023	2024	2025
1	0.00	0.02	0.01	0.01
2	0.12	0.02	0.23	0.13
3	0.10	0.36	0.05	0.55
4	0.62	0.13	0.39	0.05
5	0.09	0.37	0.06	0.15
6+	0.08	0.10	0.25	0.12

Proportion Paper Fish

2019	2020	2021	2022
0.00	0.02	0.24	0.68

Southern New England/Mid-Atlantic Yellowtail Flounder

70%Fmsy Projection

year	OFL	ABC	F	SSB
2023	55	40	0.24	210
2024	89	64	0.24	443
2025	161	116	0.24	863

First Year 70%Fmsy Constant Projection

year	OFL	ABC	F	SSB
2023	55	40	0.24	210
2024	89	40	0.15	454
2025	345	40	0.08	917

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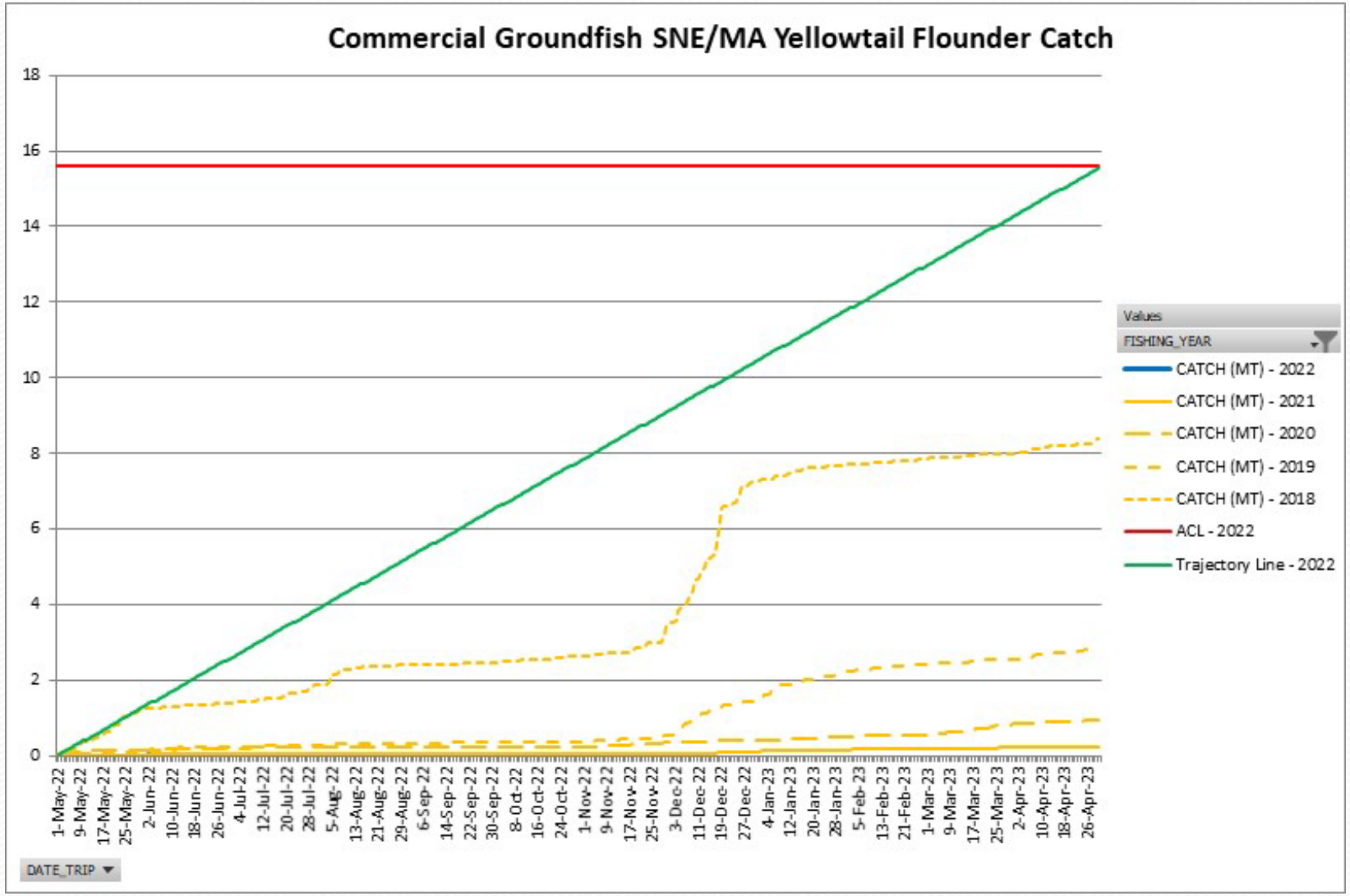
In-Season Utilization – Commercial Groundfish



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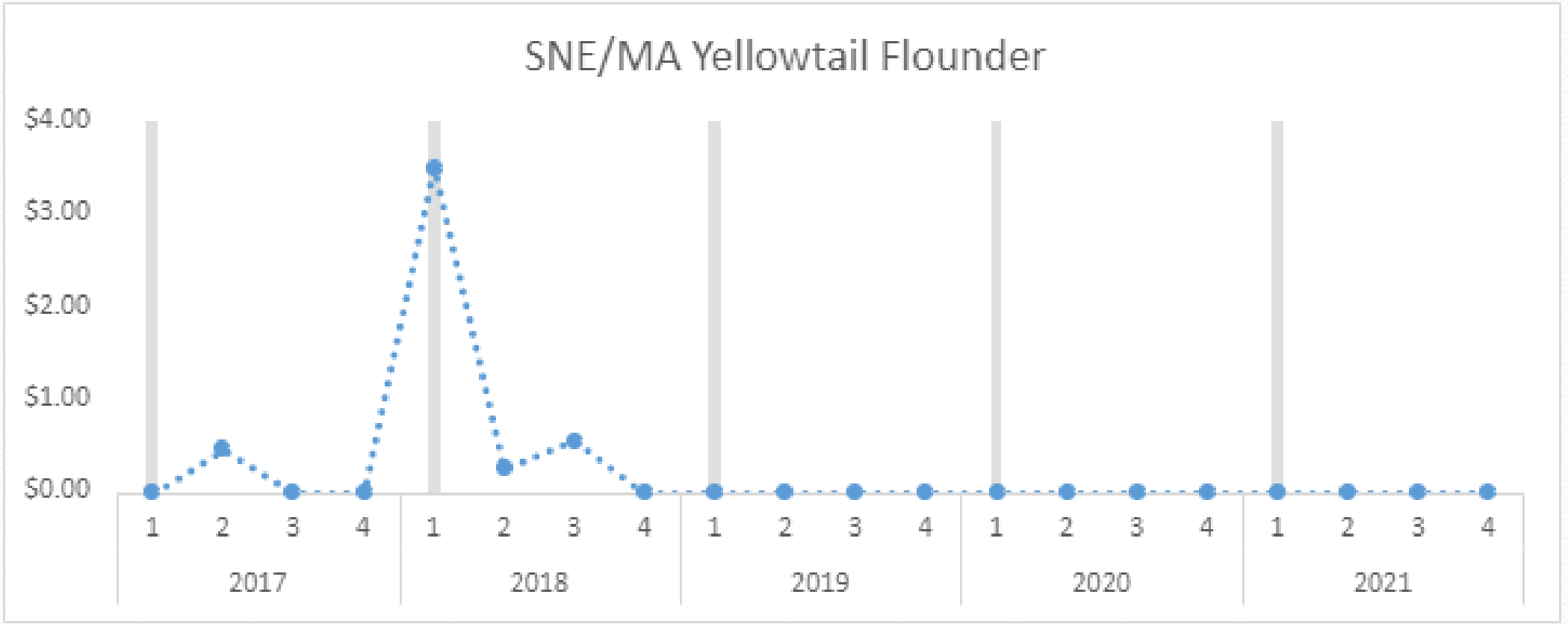
Economic Information – ACE Lease Prices - Sectors



Note: ACE lease prices were estimated for fishing years 2017-2021 using a hedonic price model. Input data into the model is comprised of inter-sector ACE leases over the FY2017-2021 period.

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Economic Information – Quota Change Model - Sectors

	FY	Sector sub-ACL	Catch (mt)		*Utilization (%)*		Gross Rev ($mil, 2021)	
			Realized	Predicted	*Realized*	*Predicted*	Realized	Predicted
SNE/MA Yellowtail Flounder	2012	607	426	148	*0.70*	*0.20*	1.7	0.1
	2013	488	282	455	*0.58*	*0.88*	1.3	1.6
	2014	462	313	450	*0.68*	*1.00*	1.3	1.7
	2015	460	174	457	*0.38*	*1.00*	0.8	1.6
	2016	169	45	138	*0.26*	*0.95*	0.3	0.4
	2017	176	11	120	*0.06*	*0.77*	0.1	0.3
	2018	35	7	34	*0.20*	*1.00*	0.0	0.1
	2019	36	3	16	*0.07*	*0.61*	0.0	0.1
	2020	13	1	12	*0.07*	*1.00*	0.0	0.0
	2021	12	0.2	3	*0.02*	*0.25*	0.0	0.0

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Sea Scallop Fishery Sub-ACL

- Presently, the sub-ACL is determined at 90% of the Scallop PDT's projected catch for the fishery, which was set at 2 mt for FY2020-FY2022.
- In FY2021, the scallop fishery caught 58.2% of its sub-ACL (1.2 mt out of 2 mt).
- The preliminary in-season GARFO catch report indicates only 4.3% of the sub-ACL has been caught in FY2022.
- AMs can be triggered under certain conditions, and these AMs would require gear modifications in a subsequent year following an overage.

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For the SSC Today

Recommend OFLs and ABCs for Fishing Years 2023, 2024, and 2025 for SNE/MA Yellowtail Flounder.

70%Fmsy Projection

Fishing Year	Possible OFL (mt)	Possible ABC (mt)
2023	55	40
2024	89	64
2025	161	116

First Year 70%Fmsy Constant Projection

Fishing Year	Possible OFL (mt)	Possible ABC (mt)
2023	55	40
2024	89	40
2025	345	40

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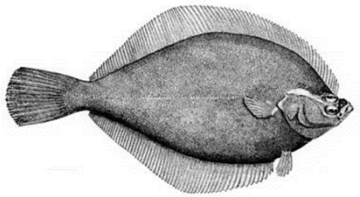
Cape Cod/Gulf of Maine Yellowtail Flounder



MODEL	VPA (Level 1) Larry Alade
STOCK STATUS	not Overfished & Overfishing is not occurring
REBUILDING	Rebuilt according to 2022 MT, SSB at 100% of SSBmsy
RETROSPECTIVE ADJUSTMENT	Yes
UNCERTAINTIES	Retrospective pattern got worse, missing 2020 fall surveys (NEFSC, MADMF) & 2020 spring surveys (NEFSC, MADMF, MENH), survey residuals patterns, age-length keys from NEFSC surveys used to age MENH surveys.
Changes	MADMF ALK was used to age the MDMF surveys.

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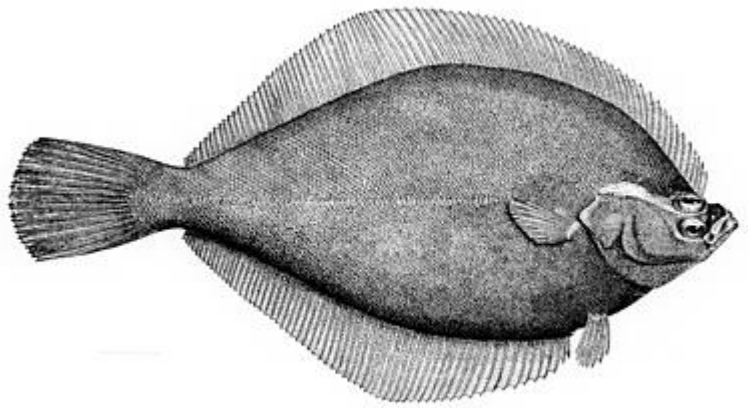
Cape Cod/Gulf of Maine Yellowtail Flounder

	2019	2022
F_{MSY} *proxy*	0.3204	0.3201
SSB_{MSY} (mt)	3,439	3,068 (2,108 - 4,751)
MSY (mt)	1,138	1,008 (696 - 1,554)
Median recruits (age 1) (000s)	5,781	6,417
Overfishing	No	No
Overfished	No	No



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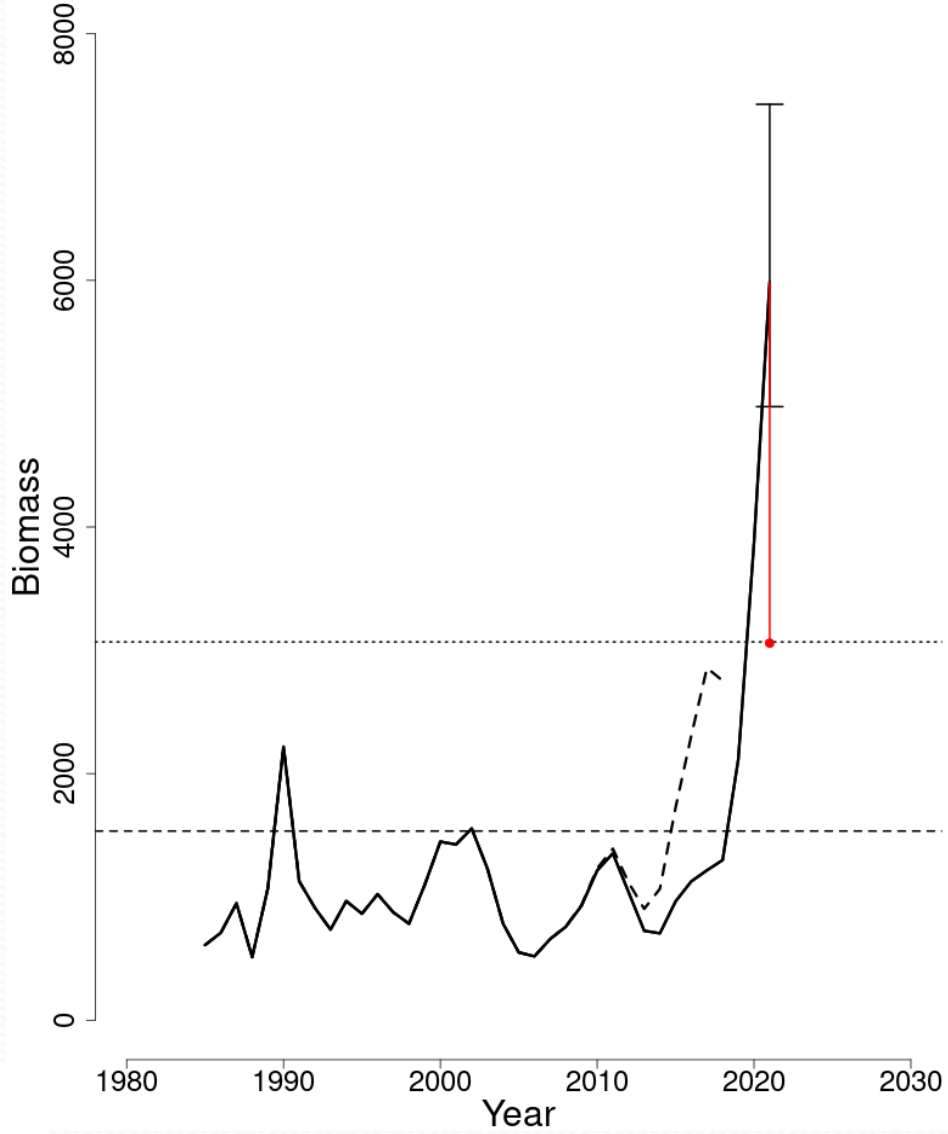
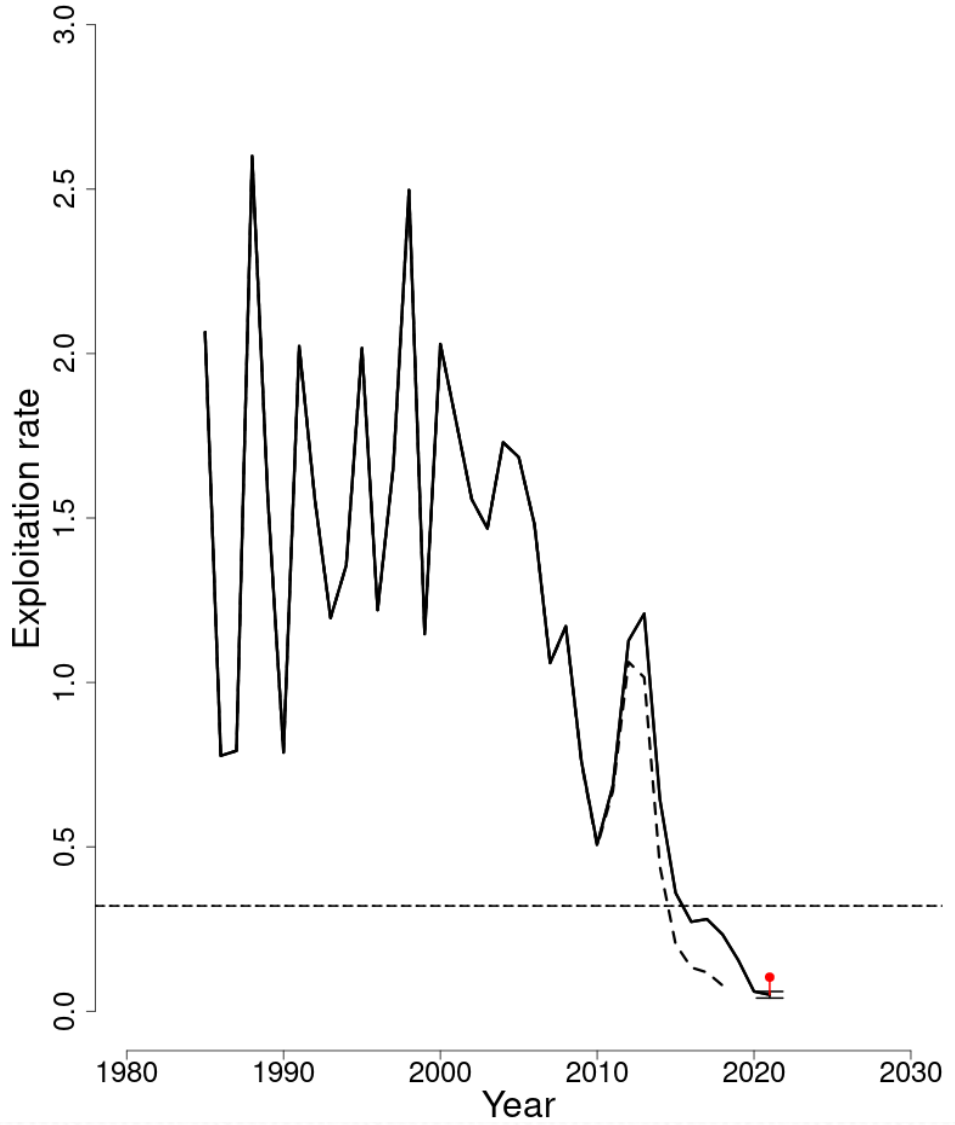
Cape Cod/Gulf of Maine Yellowtail Flounder





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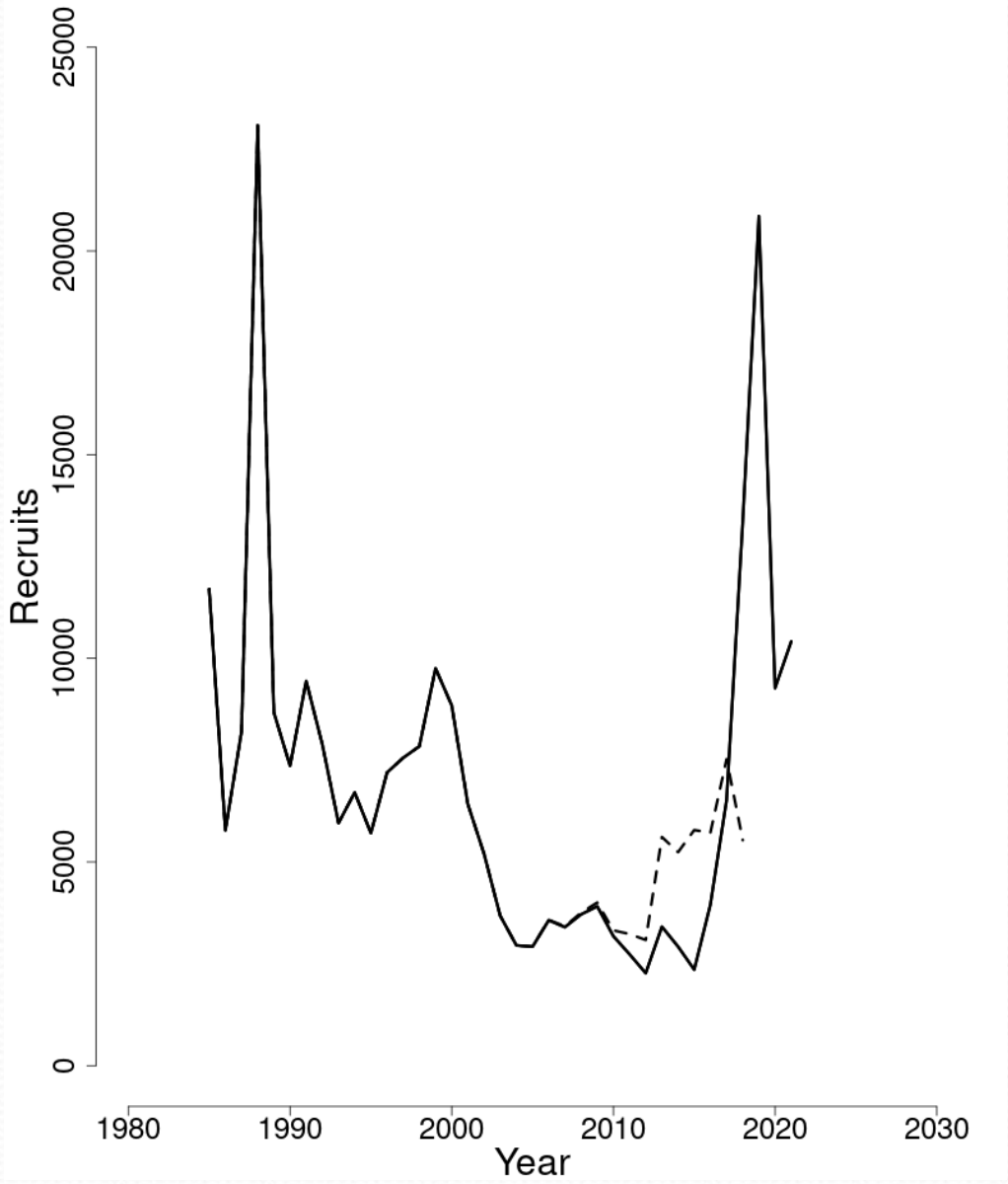
Cape Cod/Gulf of Maine Yellowtail Flounder



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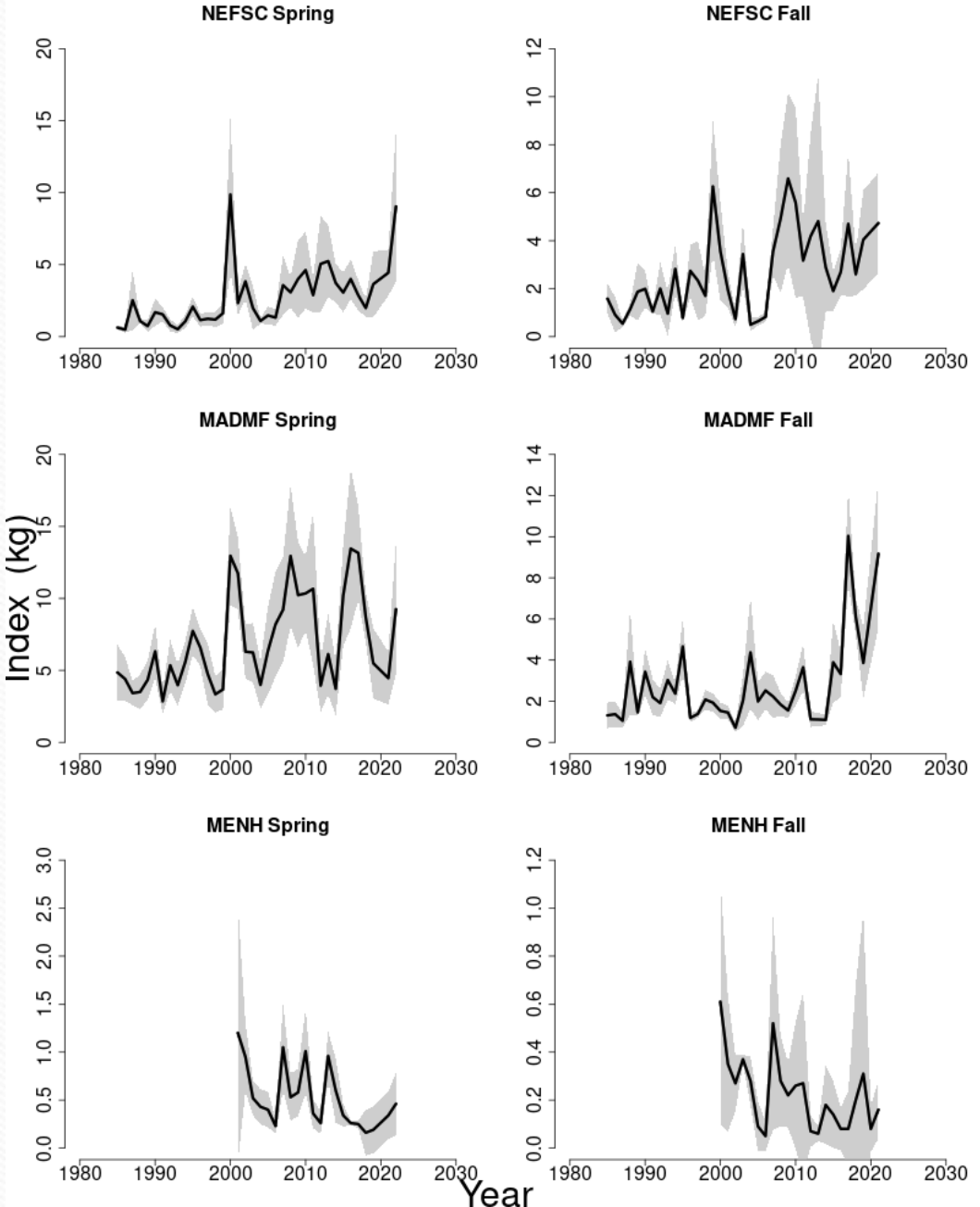
Cape Cod/Gulf of Maine Yellowtail Flounder



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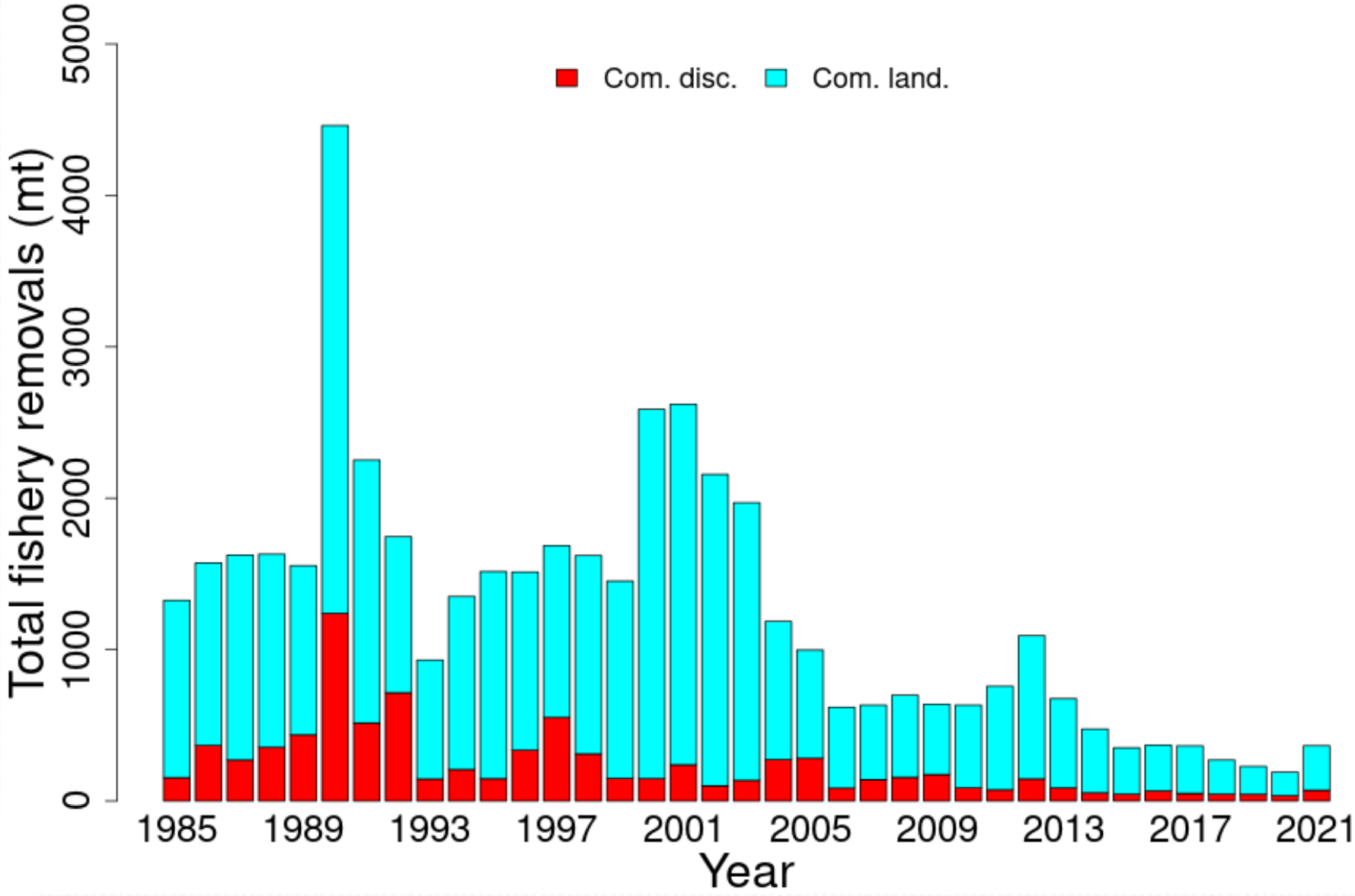
Cape Cod/Gulf of Maine Yellowtail Flounder



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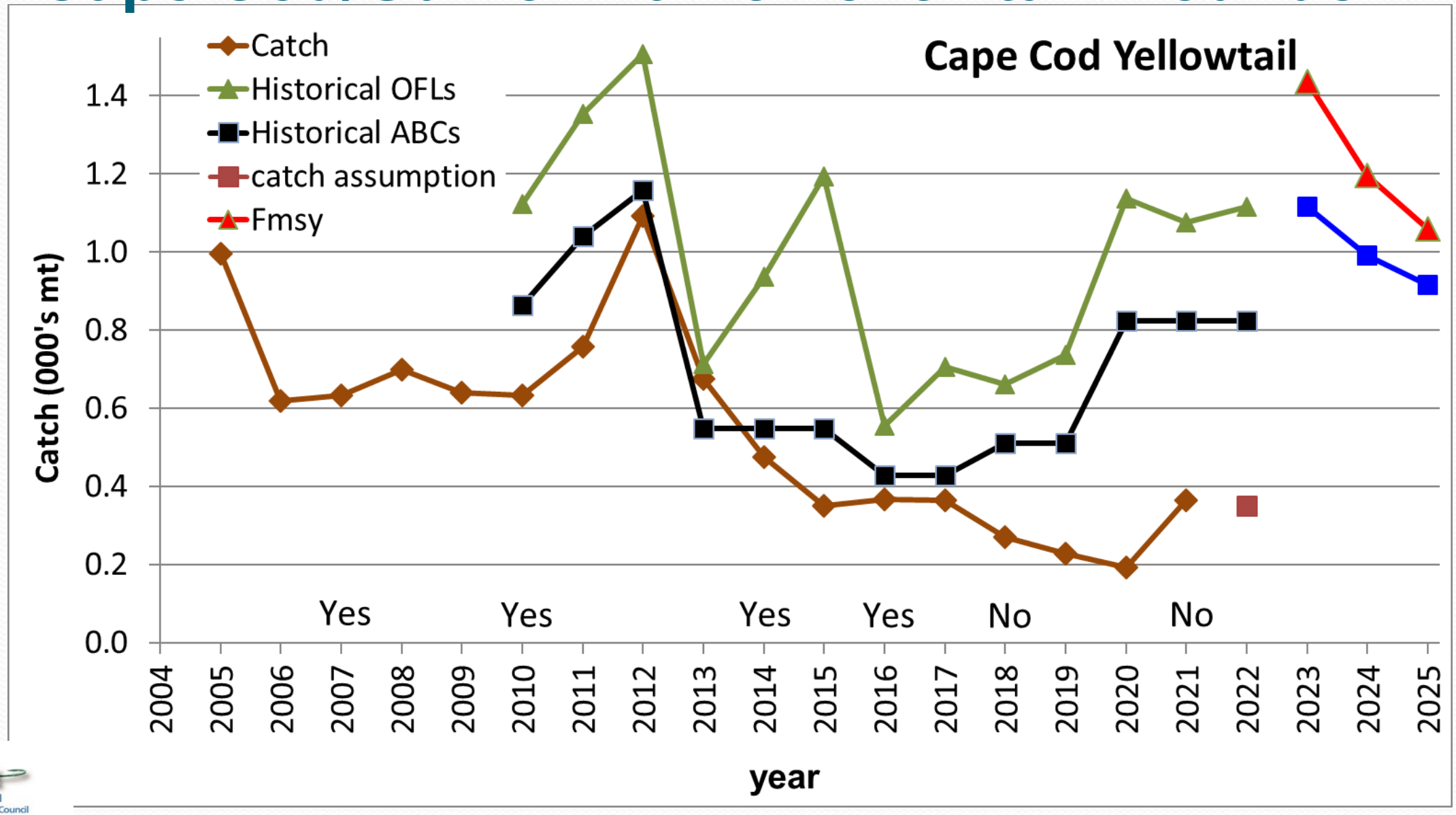
Cape Cod/Gulf of Maine Yellowtail Flounder



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Cape Cod/Gulf of Maine Yellowtail Flounder

Year	Catch	Historical OFLs	Historical ABCs	Catch Assumption	F_{MSY}	$75\%F_{MSY}$
2010	633	1,124	863			
2011	758	1,355	1,041			
2012	1,092	1,508	1,159			
2013	676	713	548			
2014	475	936	548			
2015	351	1,194	548			
2016	368	555	427			
2017	365	707	427			
2018	271	662	511			
2019	228	736	511			
2020	192	1,136	823			
2021	365	1,076	823			
2022		1,116	823	350		
2023					1,436	1,115
2024					1,197	992
2025					1,059	915

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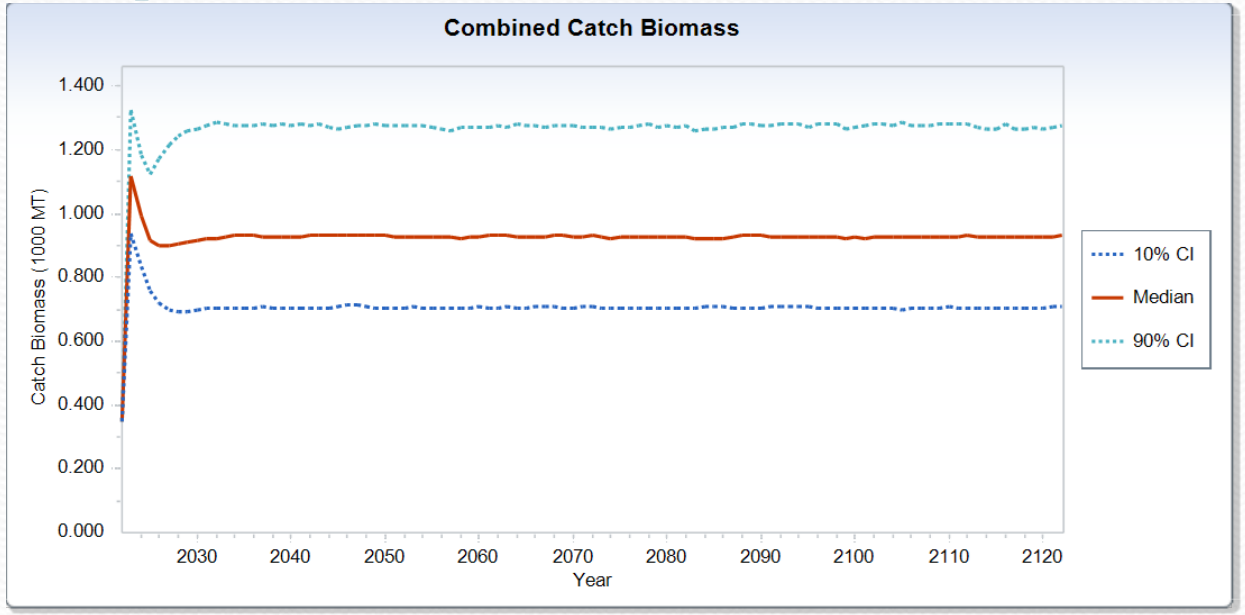
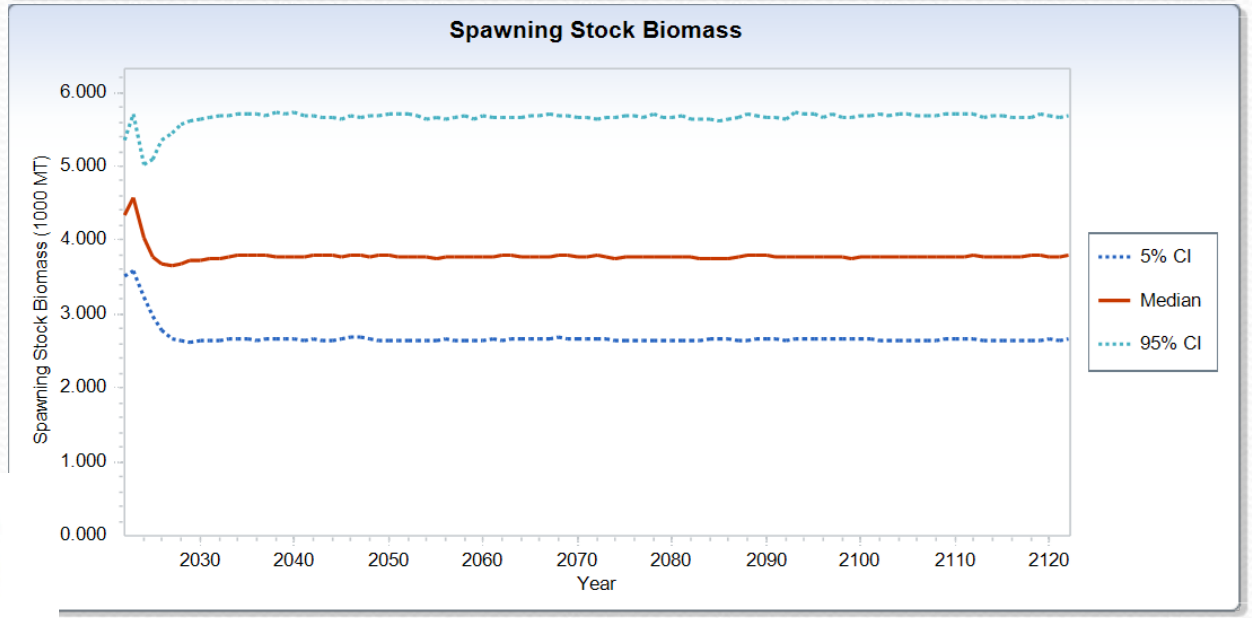
Cape Cod/Gulf of Maine Yellowtail Flounder





Long term catch
at 75%Fmsy = 928 mt

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Cape Cod/Gulf of Maine Yellowtail Flounder

75%F_{MSY} Projection

year	OFL	ABC	F	SSB
2023	1,436	1,115	0.24	4,575
2024	1,279	992	0.24	4,045
2025	1,184	915	0.24	3,766

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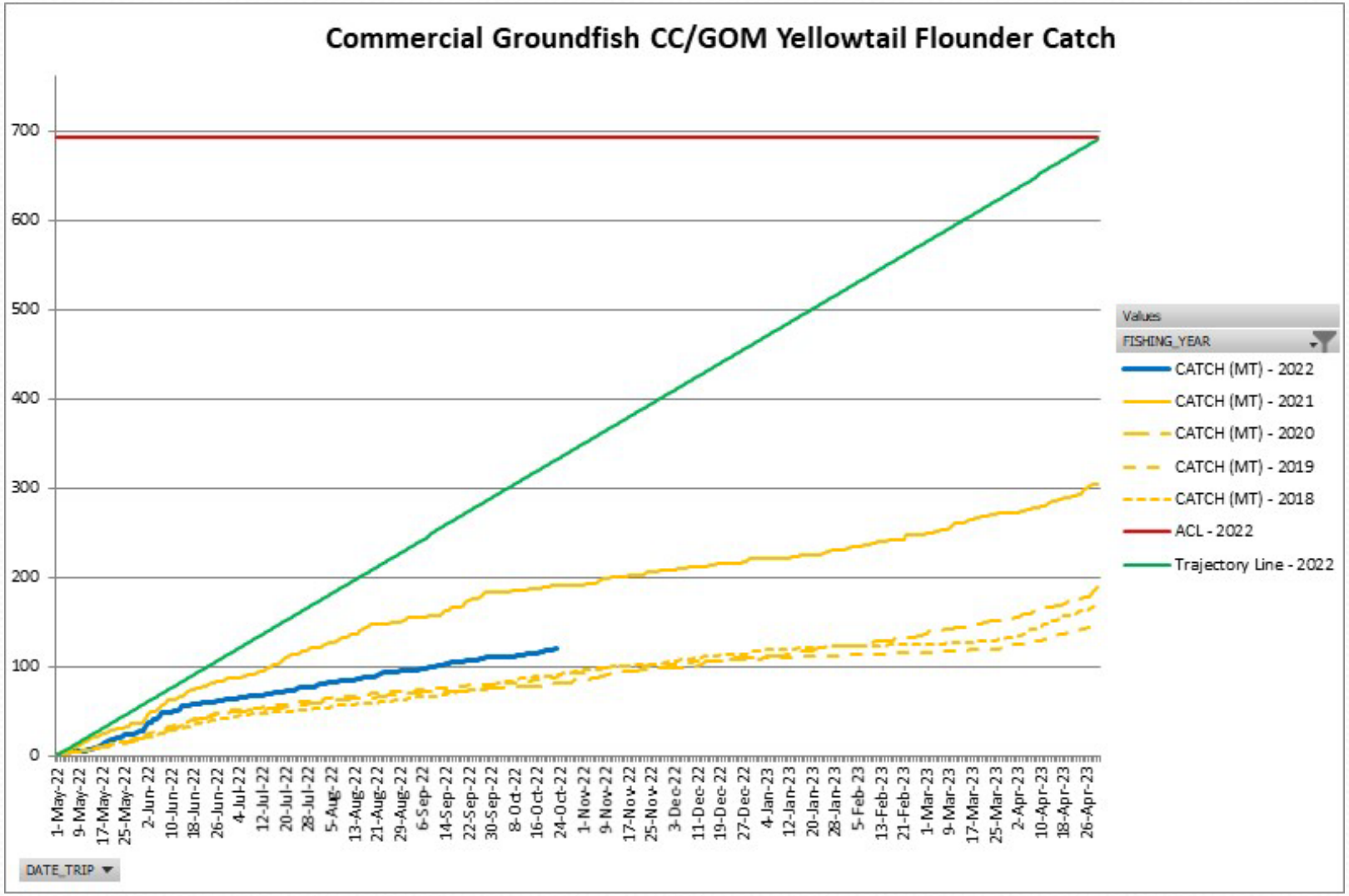
In-Season Utilization – Commercial Groundfish



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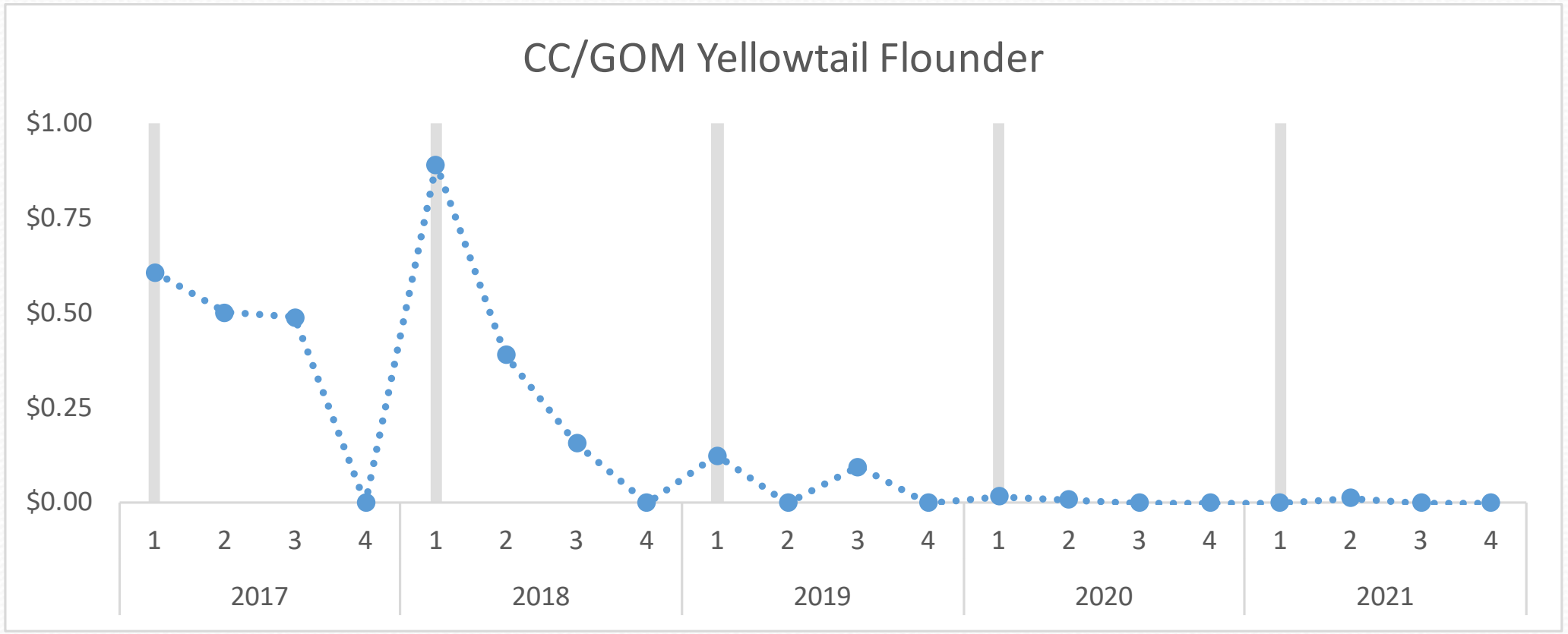
Economic Information – ACE Lease Prices - Sectors



Note: ACE lease prices were estimated for fishing years 2017-2021 using a hedonic price model. Input data into the model is comprised of inter-sector ACE leases over the FY2017-2021 period.

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Economic Information – Quota Chane Model - Sectors

	FY	Sector sub-ACL	Catch (mt)		*Utilization (%)*		Gross Rev ($mil, 2021)	
			Realized	Predicted	*Realized*	*Predicted*	Realized	Predicted
CC/GOM Yellowtail Flounder	2012	1021	954	391	*0.94*	*0.33*	3.1	0.6
	2013	466	377	423	*0.81*	*0.74*	1.3	1.4
	2014	463	249	338	*0.54*	*0.72*	0.7	1.1
	2015	437	372	204	*0.85*	*0.46*	1.2	0.7
	2016	327	249	177	*0.76*	*0.54*	1.0	0.6
	2017	326	196	237	*0.60*	*0.73*	0.7	0.9
	2018	381	165	380	*0.43*	*1.00*	0.4	1.4
	2019	377	141	282	*0.37*	*0.74*	0.3	0.8
	2020	656	182	178	*0.28*	*0.27*	0.3	0.4
	2021	651	284	124	*0.44*	*0.19*	0.5	0.3

New England Fishery Management Council

For the SSC Today

Recommend OFLs and ABCs for Fishing Years 2023, 2024, and 2025 for CC/GOM Yellowtail Flounder.

$75\%F_{MSY}$ Projection

Fishing Year	Possible OFL (mt)	Possible ABC (mt)
2023	1,436	1,115
2024	1,279	992
2025	1,184	915

$70\%F_{MSY}$ Projection

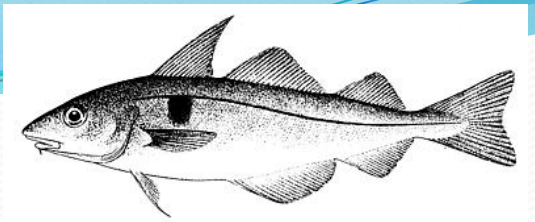
FY	Possible ABC (mt)
2023	1,048
2024	943
2025	878

$60\%F_{MSY}$ Projection

FY	Possible ABC (mt)
2023	911
2024	841
2025	799

New England Fishery Management Council

Georges Bank Haddock

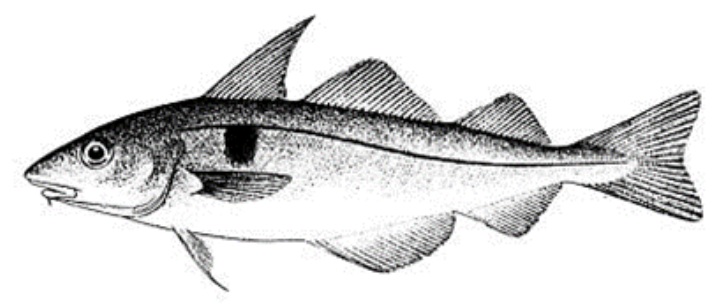


MODEL	WHAM (Level 2) Liz Brooks
STOCK STATUS	Not Overfished & Overfishing is not occurring
REBUILDING	Rebuilt
RETROSPECTIVE ADJUSTMENT	No
UNCERTAINTIES	Uncertainty in dynamics in the plus group, the magnitude of the 2020 and 2021 year classes, and future assumptions about weights and selectivity at age. The strong 2013 yc's contribution to catch in the projections is 35% in 2022, and diminishes to 17% in 2025. Negative annual deviations have been estimated in the plus group in recent years, and it is uncertain if this will persist in projections. Catches in 2023-2025 are reliant on the 2020 year class, which constitutes 33% - 41% of the 2023-2025 catch.

New England
Fishery Management Council

Georges Bank Haddock

REVIEWER COMMENTS	The Panel **recommended** that the Gaussian Markov Random Field (GMRF) approach be used for Weights at age, in part because of its quick response to changes and because a model-based approach was more robust than a two-year average.



New England
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Georges Bank Haddock

Model: WHAM (Woods Hole Assessment Model)

(GB haddock decisions in red

- Can incorporate process error
  - **Transitions in NAA (including recruitment)**
    - **Selectivity**
      - Natural mortality (M)
      - catchability (q)
- Process error random effects with correlation struc
  - iid
  - AR1 (year or age/parameter)
  - **2DAR1 (year+age or year+parameter)**
- Age composition likelihoods
  - Multinomial, Dirichlet-multinomial, Dirichlet, mu
    normal

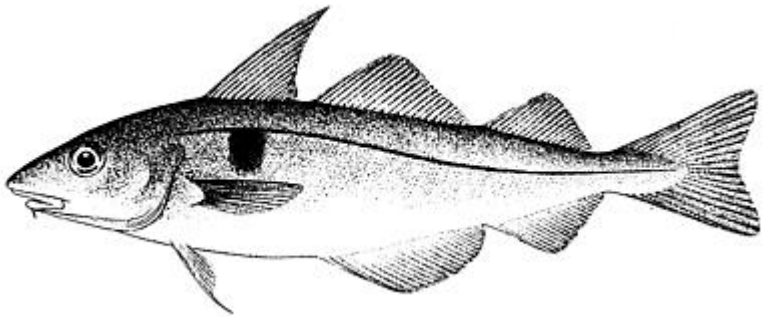
tures

ultiple versions of **logistic-**

New England Fishery Management Council

Georges Bank Haddock

	2019	2022
F_{MSY} *proxy*	0.33	0.25
SSB_{MSY} (mt)	138,924	120,580 (94,687 - 153,555)
MSY (mt)	24,400	25,494 (19,979 32,533)
Median recruits (age 1) (000s)	59,143	25,607 (835 - 785516)
Overfishing	No	No
Overfished	No	No



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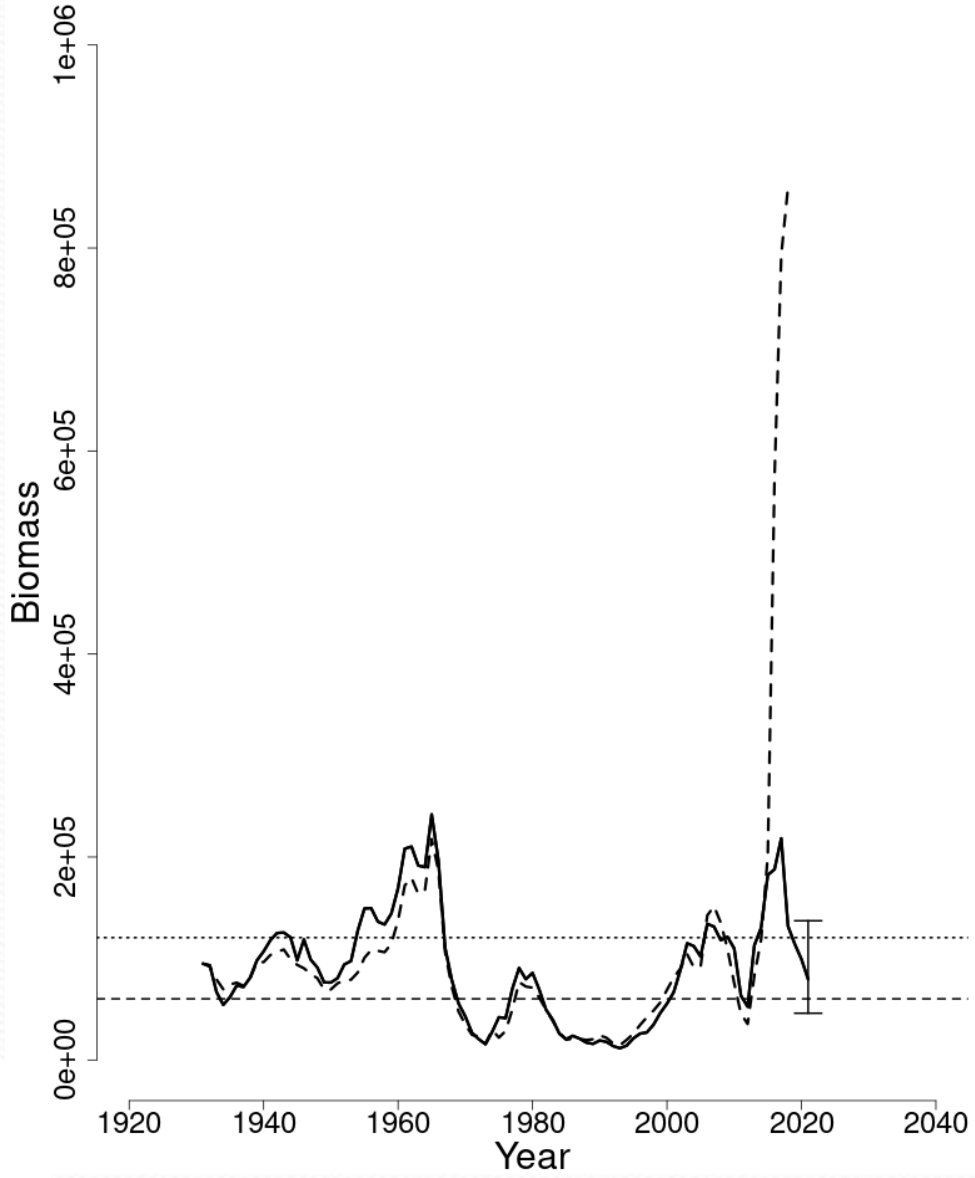
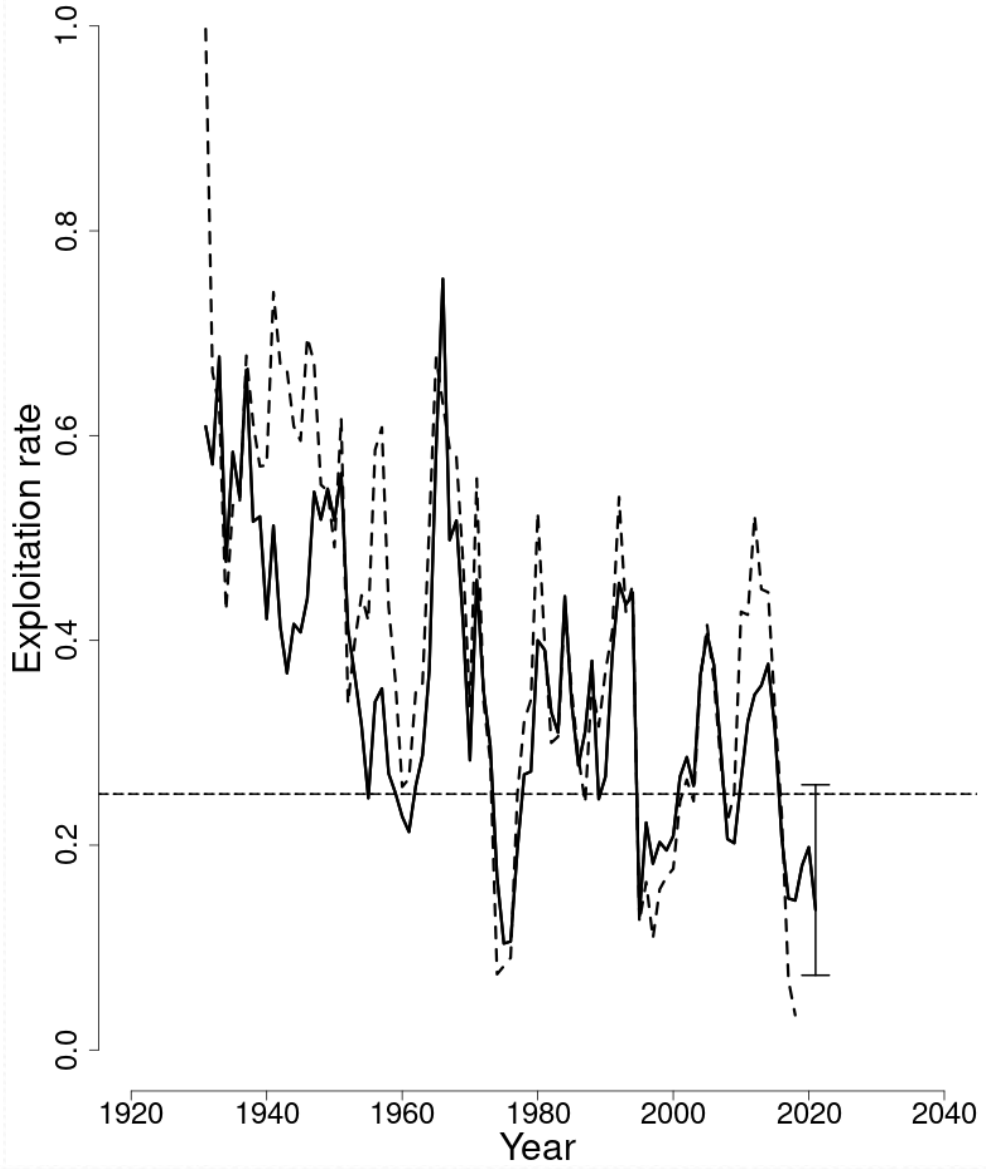
Georges Bank Haddock





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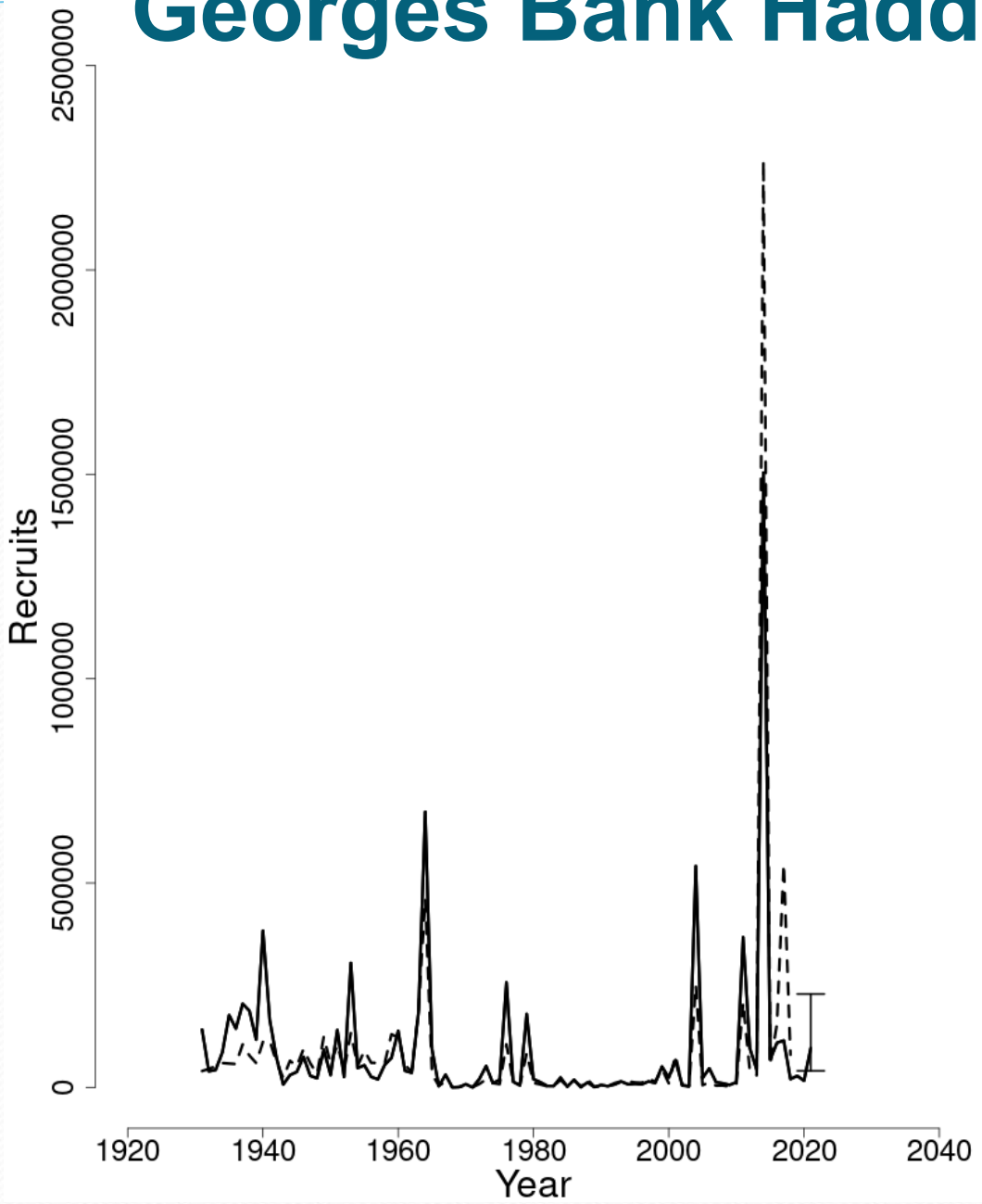
Georges Bank Haddock



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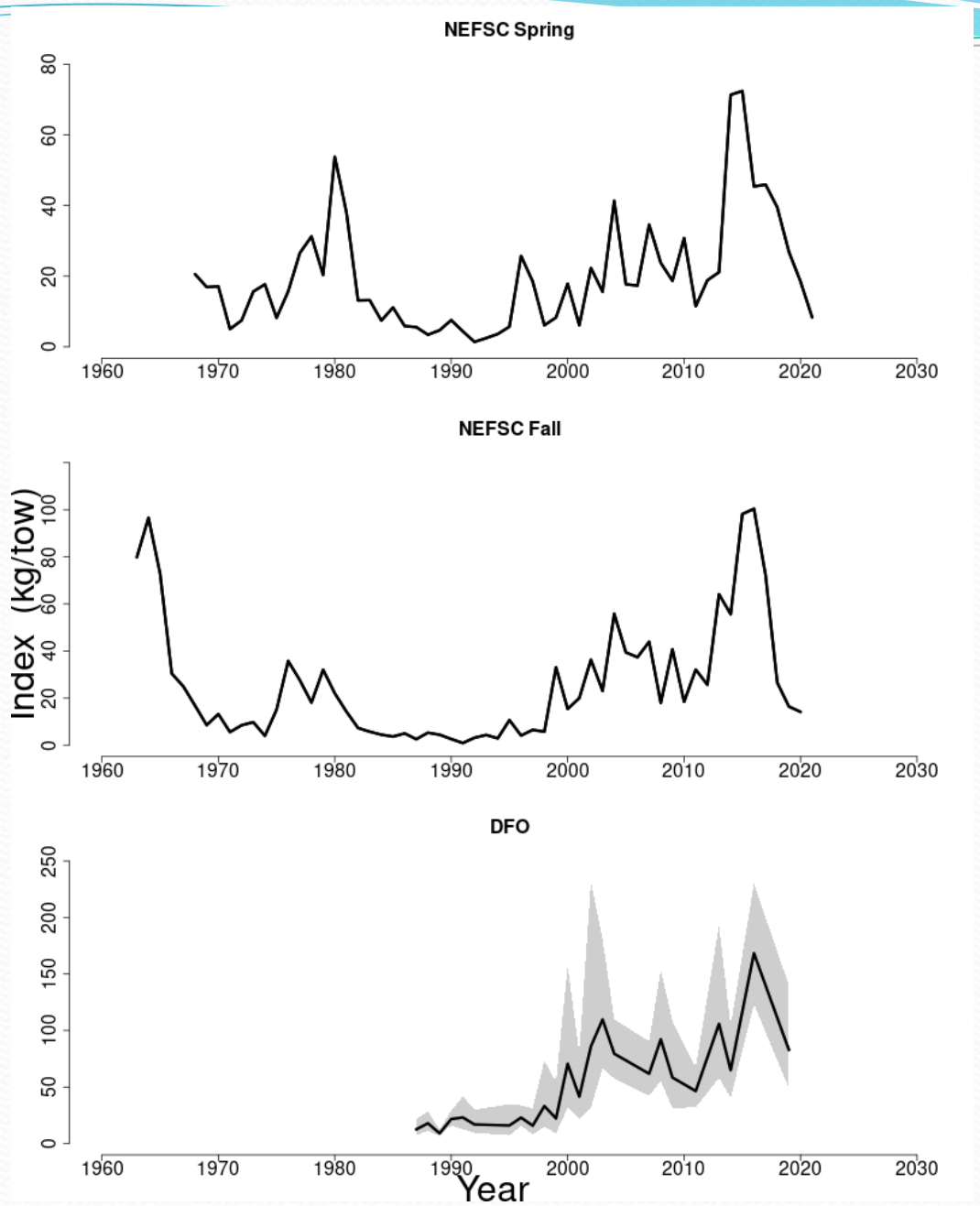
Georges Bank Haddock



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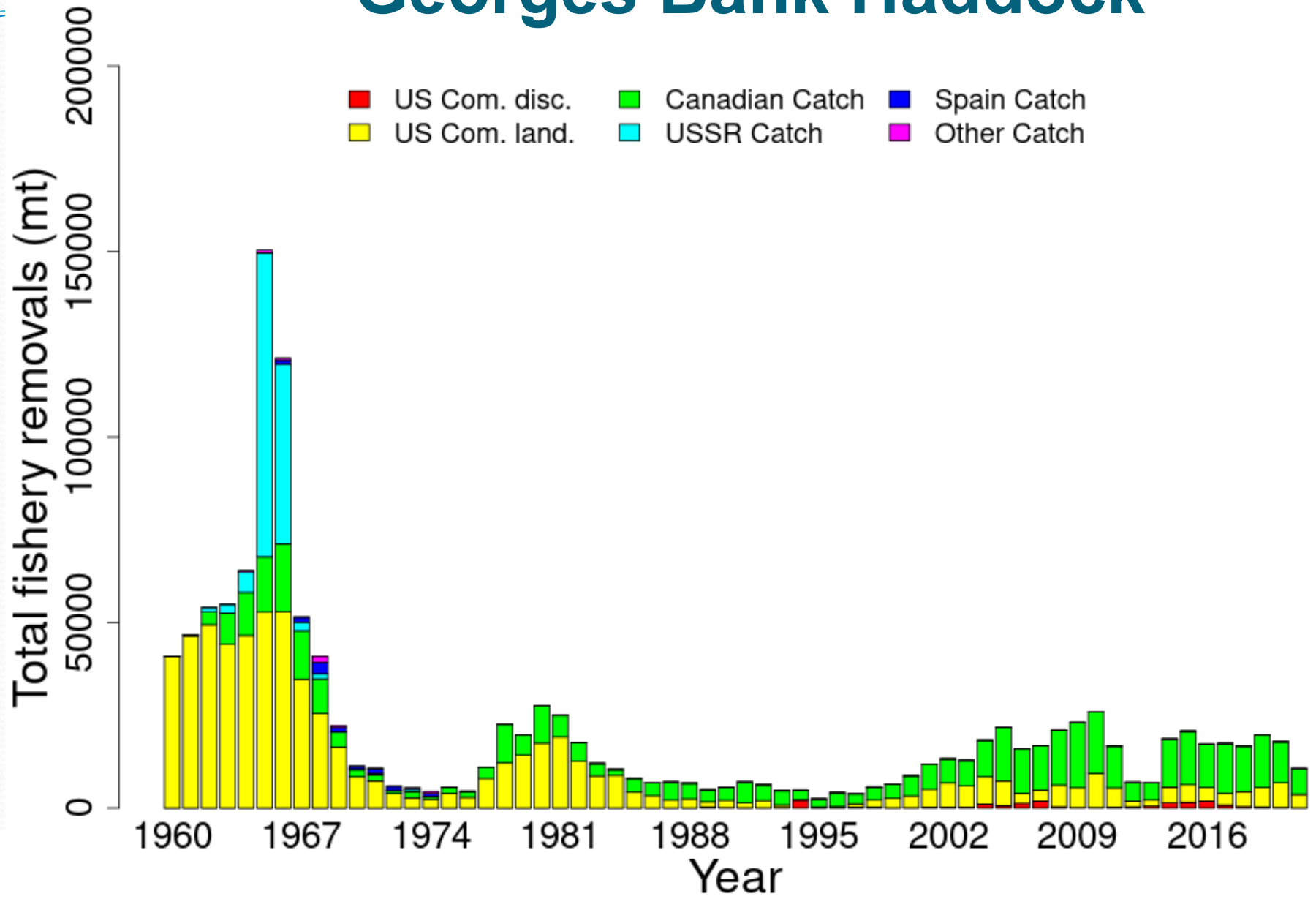
Georges Bank Haddock



New England
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Georges Bank Haddock

F_{MSY} 40%proxy

	100% F40 2yr avg waa			100% F40 gmrf pred waa		
Year	Catch	95%lo	95%hi	Catch	95%lo	95%hi
2022	9,914	9,914	9,914	9,914	9,914	9,914
2023	16,433	6,516	41,444	18,482	7,332	46,591
2024	14,461	4,805	43,521	17,287	5,680	52,616
2025	11,928	3,283	43,341	14,555	3,926	53,958

	100% F40 2yr avg waa			100% F40 gmrf pred waa		
Year	SSB	95%lo	95%hi	SSB	95%lo	95%hi
2022	73,821	1,381	990,070	79,457	39,624	159,332
2023	72,340	937	858,592	90,073	35,695	227,286
2024	60,687	860	806,570	81,027	25,060	261,981
2025	49,131	842	791,401	69,916	17,543	278,641

$75\%F_{MSY}$ 40%proxy

	75% F40 2yr avg waa			75% F40 gmrf pred waa		
Year	Catch	95%lo	95%hi	Catch	95%lo	95%hi
2022	9,914	9,914	9,914	9,914	9,914	9,914
2023	12,648	5,013	31,913	14,221	5,640	35,860
2024	11,682	3,907	34,933	13,958	4,617	42,193
2025	10,068	2,826	35,865	12,282	3,380	44,636

	75% F40 2yr avg waa			75% F40 gmrf pred waa		
Year	SSB	95%lo	95%hi	SSB	95%lo	95%hi
2022	73,821	36,179	150,629	79,457	39,624	159,332
2023	73,315	29,605	181,559	91,249	36,196	230,036
2024	64,426	21,003	197,625	85,886	26,908	274,130
2025	54,369	14,872	198,762	77,237	19,936	299,231

The Overfished threshold is 60,290 mt, and the stock is not projected to drop below this value in 2025.

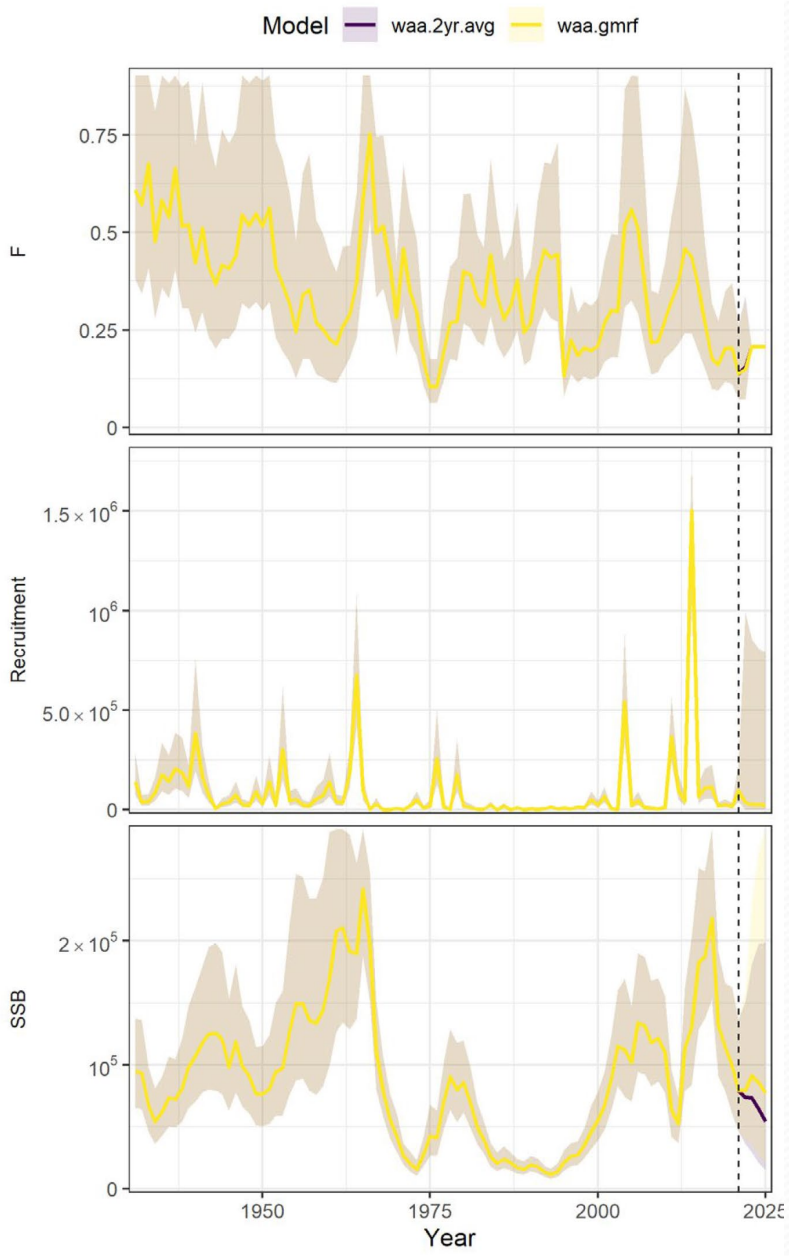
New England Fishery Management Council

MT Projections at 75%F40, 2yr avg vs GMRF WAA

- WAA predicted from GMRF continue to increase → higher catch and SSB forecasted

	75% F40 2yr avg waa			75% F40 gmrf pred waa		
Year	Catch	95%lo	95%hi	Catch	95%lo	95%hi
2022	9914	9914	9914	9914	9914	9914
2023	12648	5013	31913	14221	5640	35860
2024	11682	3907	34933	13958	4617	42193
2025	10068	2826	35865	12282	3380	44636

	75% F40 2yr avg waa			75% F40 gmrf pred waa		
Year	SSB	95%lo	95%hi	SSB	95%lo	95%hi
2022	73821	36179	150629	79457	39624	159332
2023	73315	29605	181559	91249	36196	230036
2024	64426	21003	197625	85886	26908	274130
2025	54369	14872	198762	77237	19936	299231



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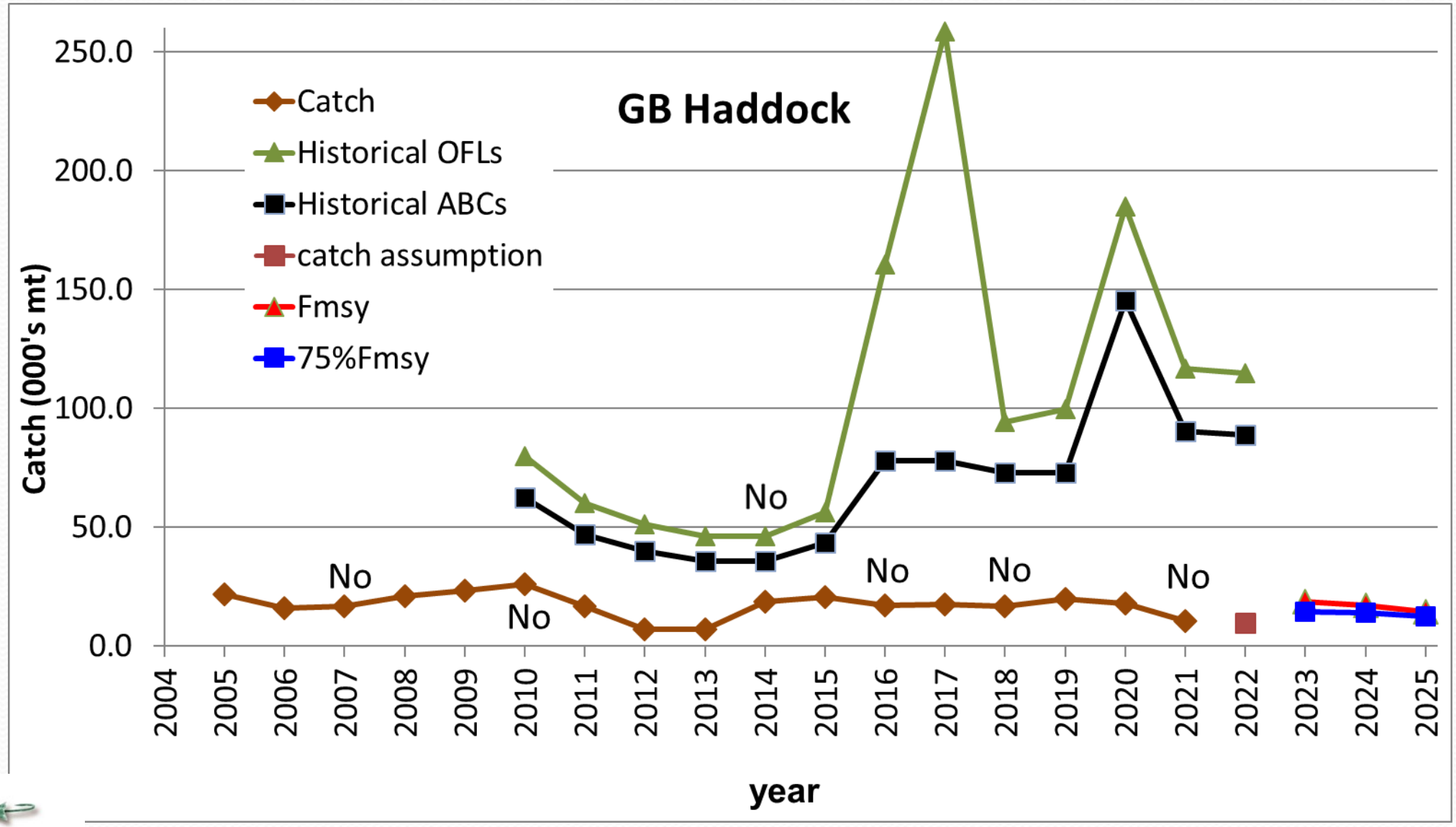
Georges Bank Haddock



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Georges Bank Haddock

Year	Catch	Historical OFLs	Historical ABCs	Catch Assumption	F_{MSY}	$75\%F_{MSY}$
2010	25,903	80,007	62,515			
2011	16,670	59,948	46,784			
2012	6,935	51,150	39,846			
2013	6,828	46,185	35,783			
2014	18,601	46,268	35,699			
2015	20,687	56,293	43,606			
2016	17,274	160,385	77,898			
2017	17,387	258,691	77,898			
2018	16,647	94,274	73,114			
2019	19,719	99,757	73,114			
2020	17,878	184,822	145,367			
2021	10,691	116,883	90,337			
2022		114,925	88,856	9,914		
2023					18,482	14,221
2024					17,287	13,958
2025					14,555	12,282

New England Fishery Management Council

Georges Bank Haddock

75%F_{MSY} Projection

year	OFL	ABC	SSB
2023	18,482	14,221	91,249
2024	17,768	13,958	85,886
2025	15,096	12,282	77,237

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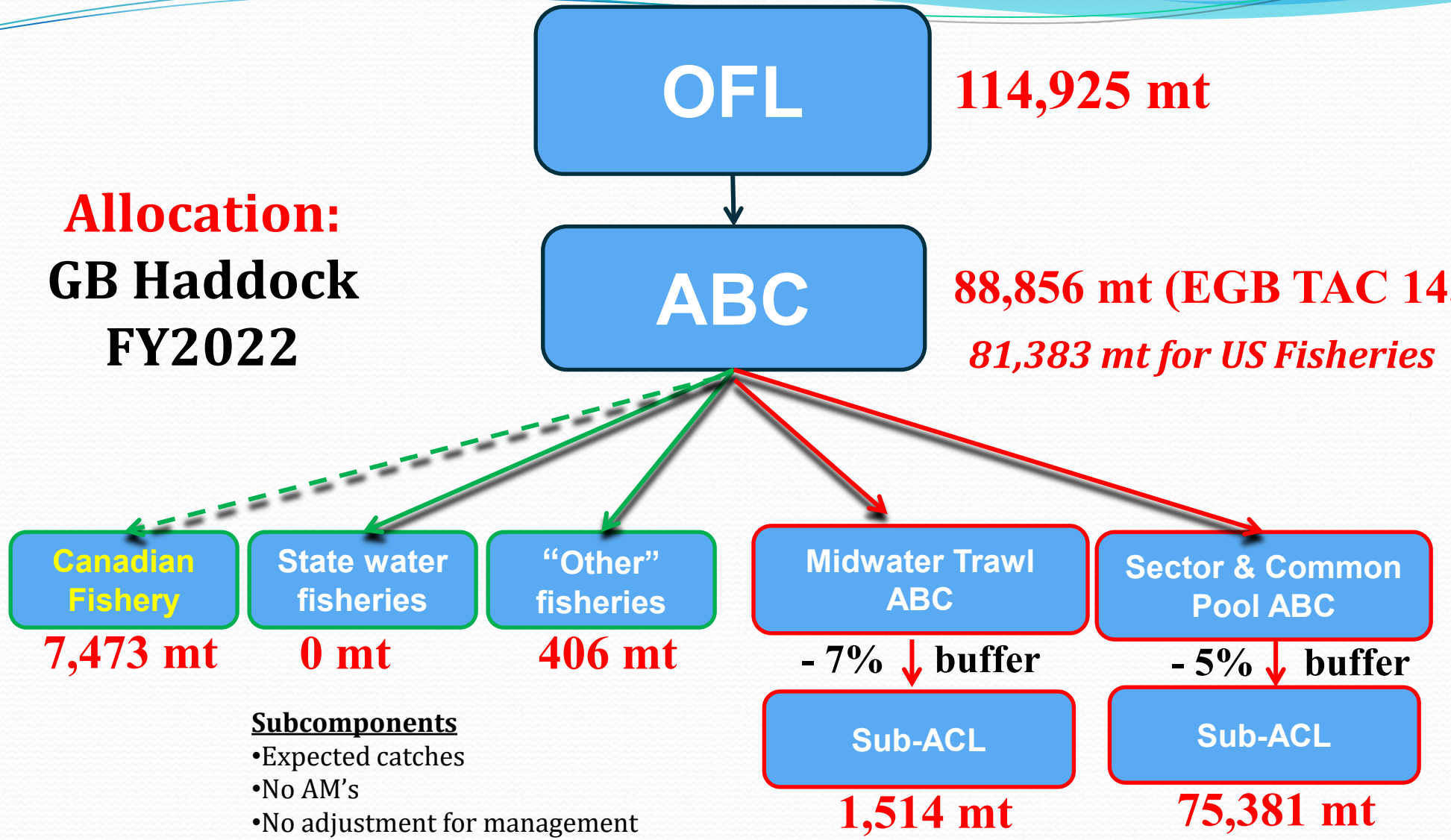
Allocation:
GB Haddock
FY2022

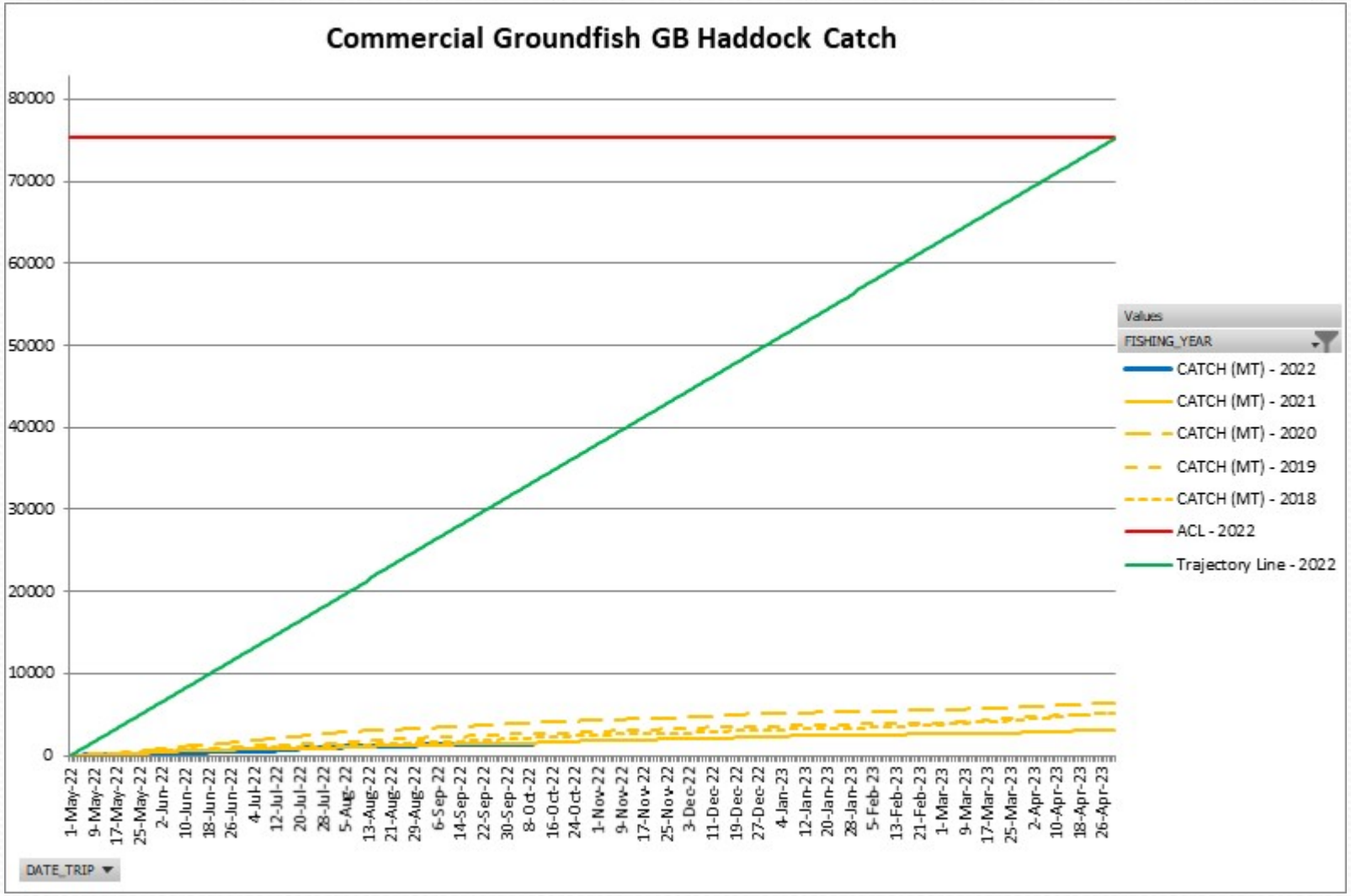


Subcomponents
- Expected catches
- No AM's
- No adjustment for management uncertainty

Sub-ACLs
- Subject to AM's
- Management uncertainty adjustment

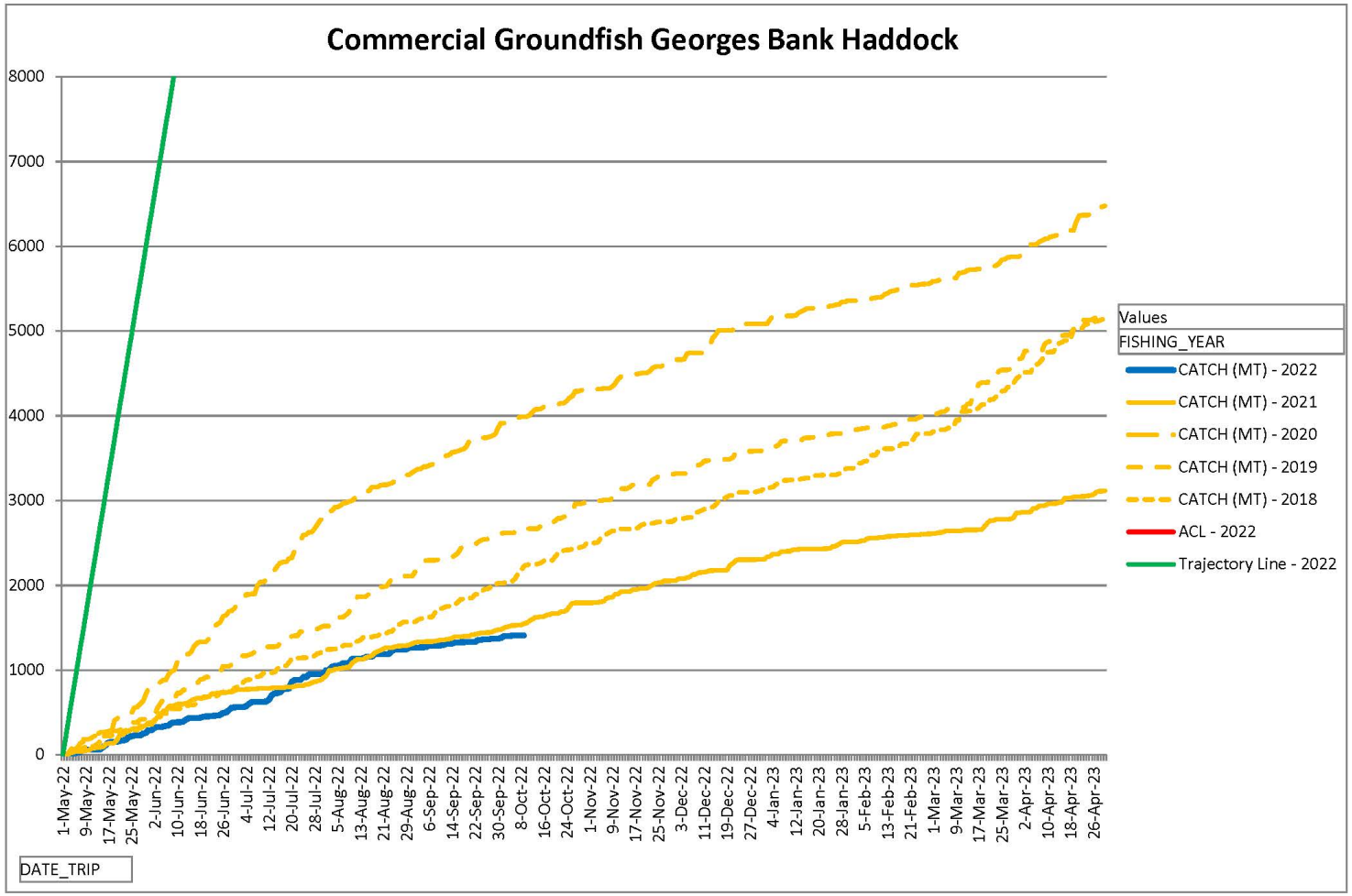
New England Fishery Management Council

In-Season Utilization - Commercial Groundfish



New England
Fishery Management Council

In-Season Utilization - Commercial Groundfish



New England Fishery Management Council

Economic Information - Quota Change Model - Sectors

	FY	Sector sub-ACL	Catch (mt)		*Utilization (%)*		Gross Rev ($mil, 2021)	
			Realized	Predicted	*Realized*	*Predicted*	Realized	Predicted
GB Haddock East	2012	6,861	366	N/A	*0.05*	*N/A*	1.4	N/A
	2013	3,742	579	566	*0.16*	*0.14*	1.5	2.2
	2014	9,454	1,536	365	*0.16*	*0.04*	3.9	1.4
	2015	15,045	1,058	1,107	*0.07*	*0.20*	2.3	3.1
	2016	15,063	549	1,574	*0.04*	*0.09*	1.2	3.7
	2017	29,288	407	1,016	*0.01*	*0.03*	0.7	2.2
	2018	15,488	623	618	*0.04*	*0.04*	1.1	1.4
	2019	14,762	716	464	*0.05*	*0.03*	1.3	0.7
	2020	15,861	563	692	*0.04*	*0.04*	1.1	1.2
	2021	6,267	443	481	*0.07*	*0.08*	1.2	0.9

New England Fishery Management Council

Economic Information - Quota Change Model - Sectors

	FY	Sector sub-ACL	Catch (mt)		*Utilization (%)*		Gross Rev ($mil, 2021)	
			Realized	Predicted	*Realized*	*Predicted*	Realized	Predicted
GB Haddock West	2012	19,251	626	N/A	*0.03*	*N/A*	3.3	N/A
	2013	24,908	2,167	1,185	*0.09*	*0.05*	6.7	5.0
	2014	18,666	3,523	793	*0.19*	*0.04*	9.8	3.2
	2015	16,206	3,293	4,495	*0.20*	*0.28*	8.8	12.9
	2016	34,156	3,006	4,511	*0.09*	*0.13*	8.2	10.7
	2017	22,968	3,208	4,787	*0.14*	*0.21*	6.8	10.9
	2018	28,857	4,135	3,628	*0.14*	*0.13*	8.3	7.8
	2019	38,003	4,368	4,160	*0.11*	*0.11*	9.7	7.5
	2020	103,849	5,783	4,426	*0.06*	*0.04*	13.1	7.9
	2021	74096	3,116	4425	*0.04*	*0.06*	7.6	9.0

New England Fishery Management Council

For the SSC today

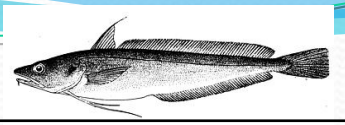
Recommend OFLs and ABCs for Fishing Years 2023, 2024, and 2025 for Georges Bank haddock.

$75\%F_{MSY}$ Projection

Fishing Year	Possible OFL (mt)	Possible ABC (mt)
2023	18,482	14,221
2024	17,768	13,958
2025	15,096	12,282

New England Fishery Management Council

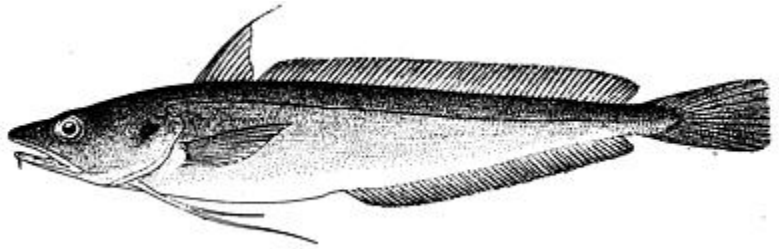
White Hake

MODEL	ASAP (Level 3) Kathy Sosebee 
STOCK STATUS	Not Overfished & Overfishing is not occurring
REBUILDING	2031 70%F_{msy} Frebuild
RETROSPECTIVE ADJUSTMENT	Yes
UNCERTAINTIES	Species mis-identification, recent addition of an extra-large market category causing possible bias in the age composition, no commercial catch at age data prior to 1989, commercial catch at age is aged primary with the survey ages, catchability of older age classes in surveys is low, pooled age length key used 1963-1981 survey, 2003 fall survey and 2020 commercial, Retrospective pattern, missing 2020 surveys.
ASSESSMENT/ REVIEWER COMMENTS	Panel recommended to include the shrimp survey but not the BLLS. Panel **recommends** that the pooled age length key be used rather than simply leaving the missing 2020 blank in the reference point calculations but not for WAA estimates in the short-term projections.

New England Fishery Management Council

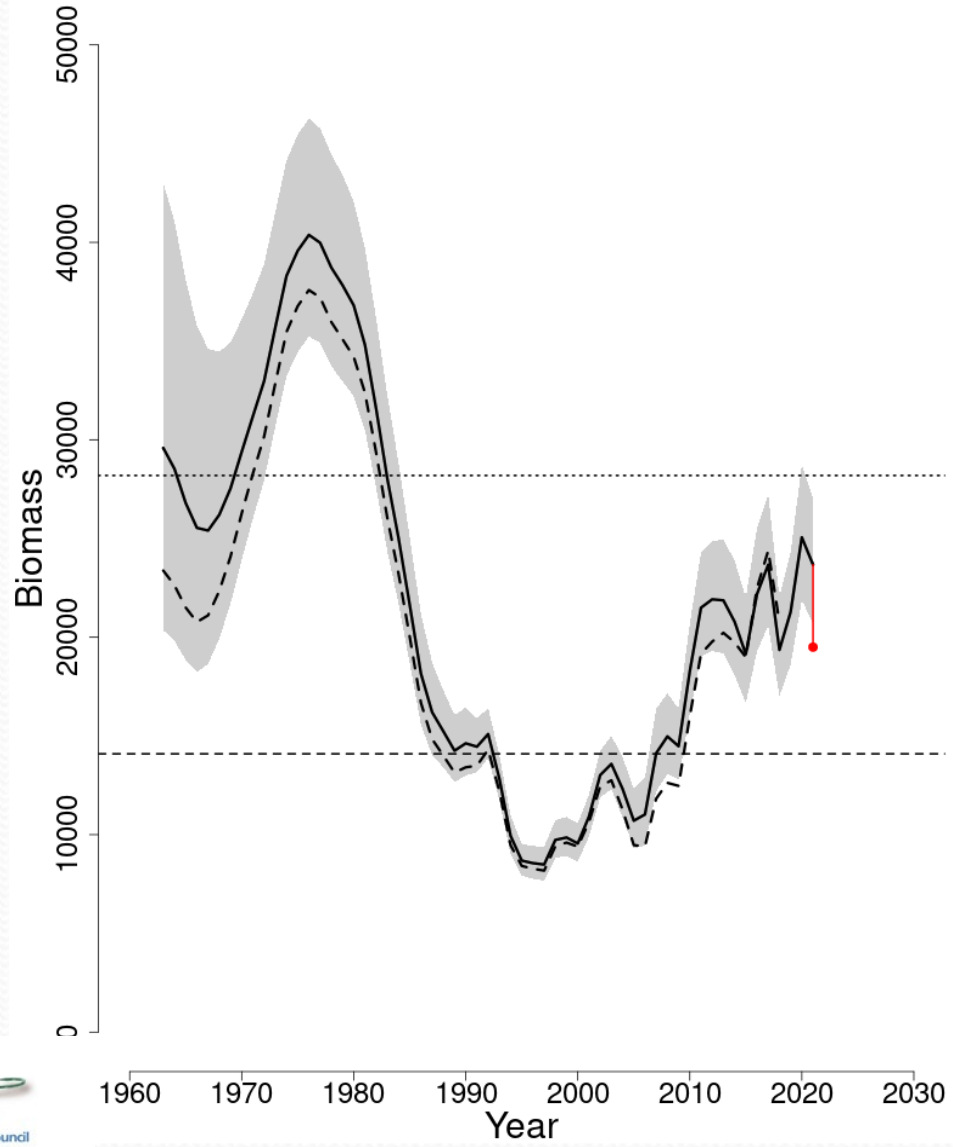
White Hake

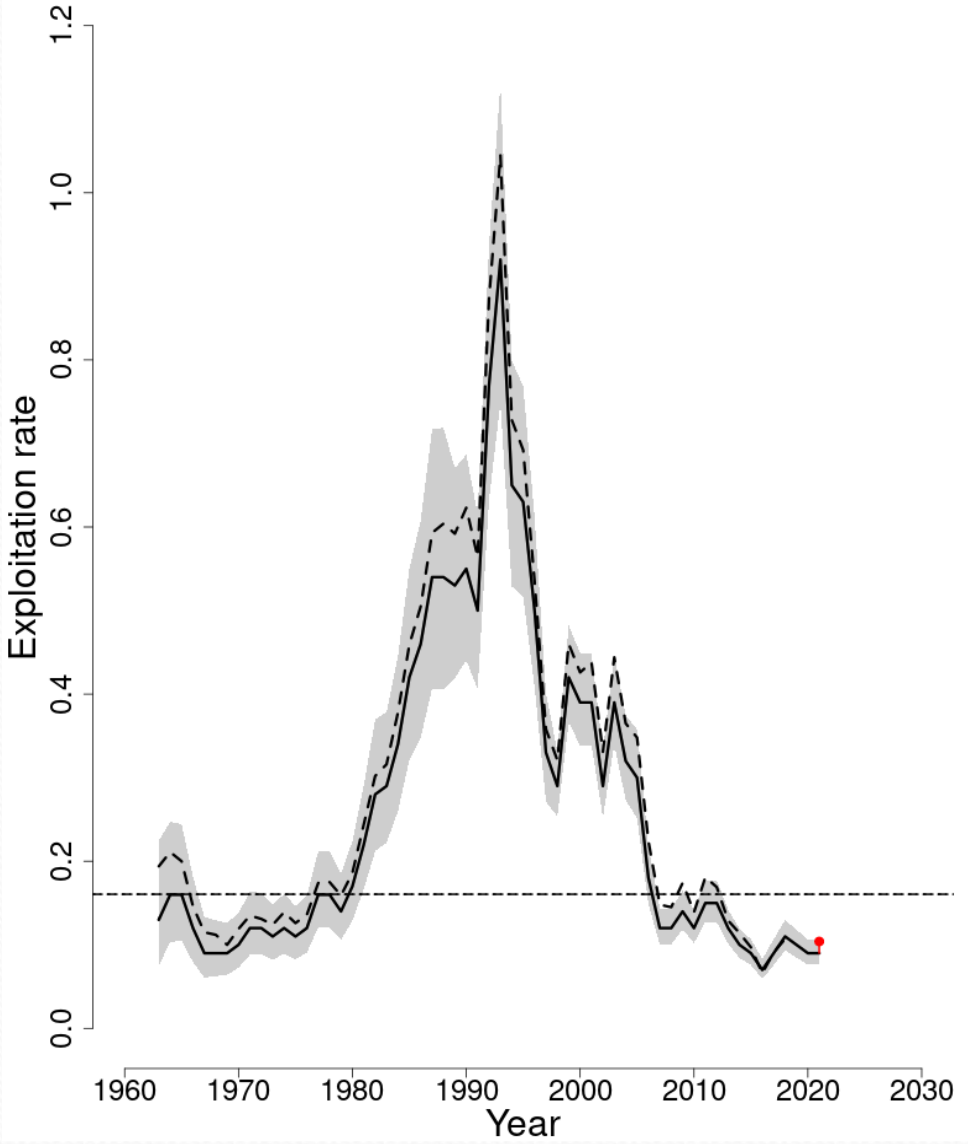
	2019	2022
F_{MSY} *proxy*	0.1677	0.1605
SSB_{MSY} (mt)	31,828	28,191 (22,616 - 35,424)
MSY (mt)	4,601	4,186 (3,345 - 5,279)
Median recruits (age 1) (000s)	4,471	4,232
Overfishing	No	No
Overfished	Yes	No



New England Fishery Management Council

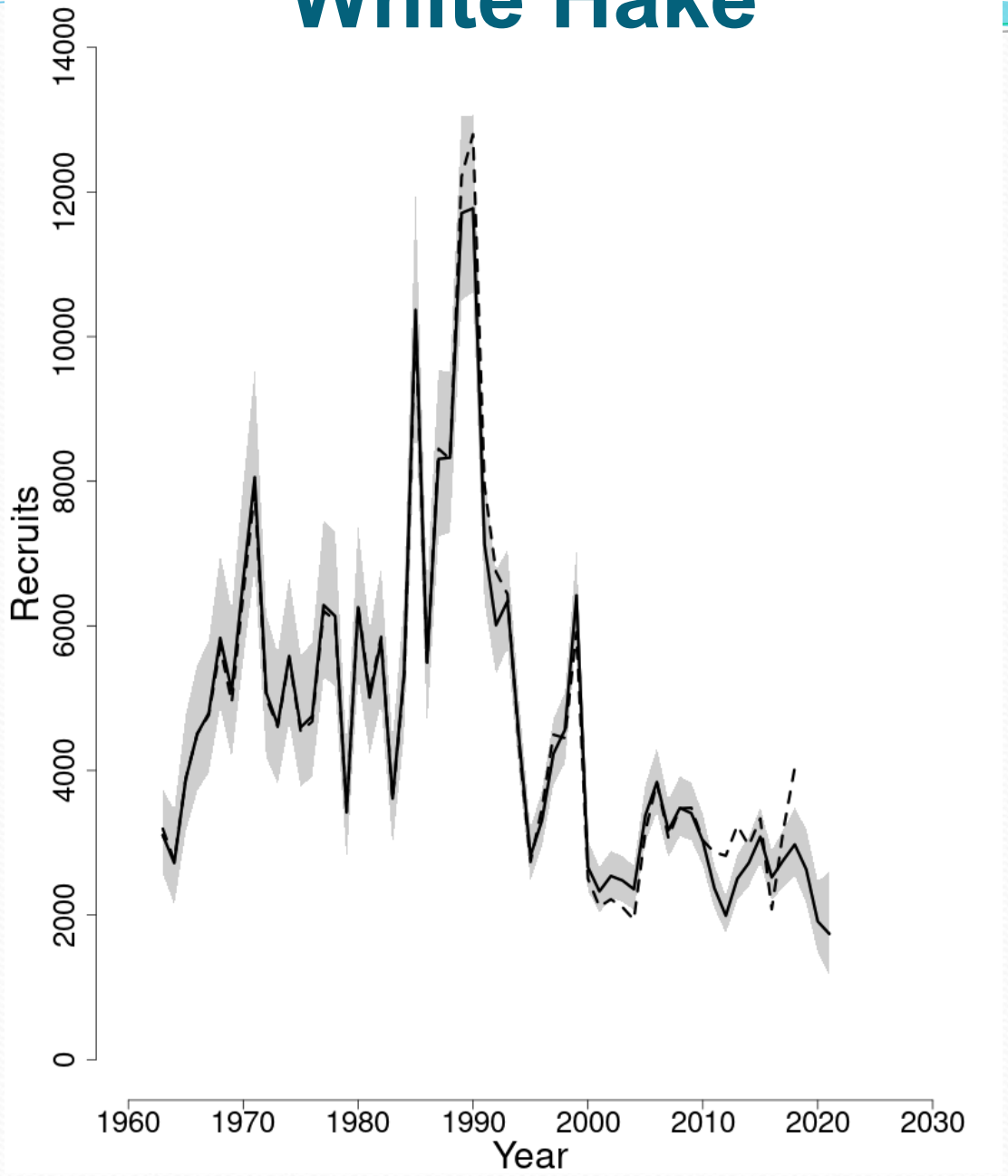
White Hake





New England
Fishery Management Council

White Hake



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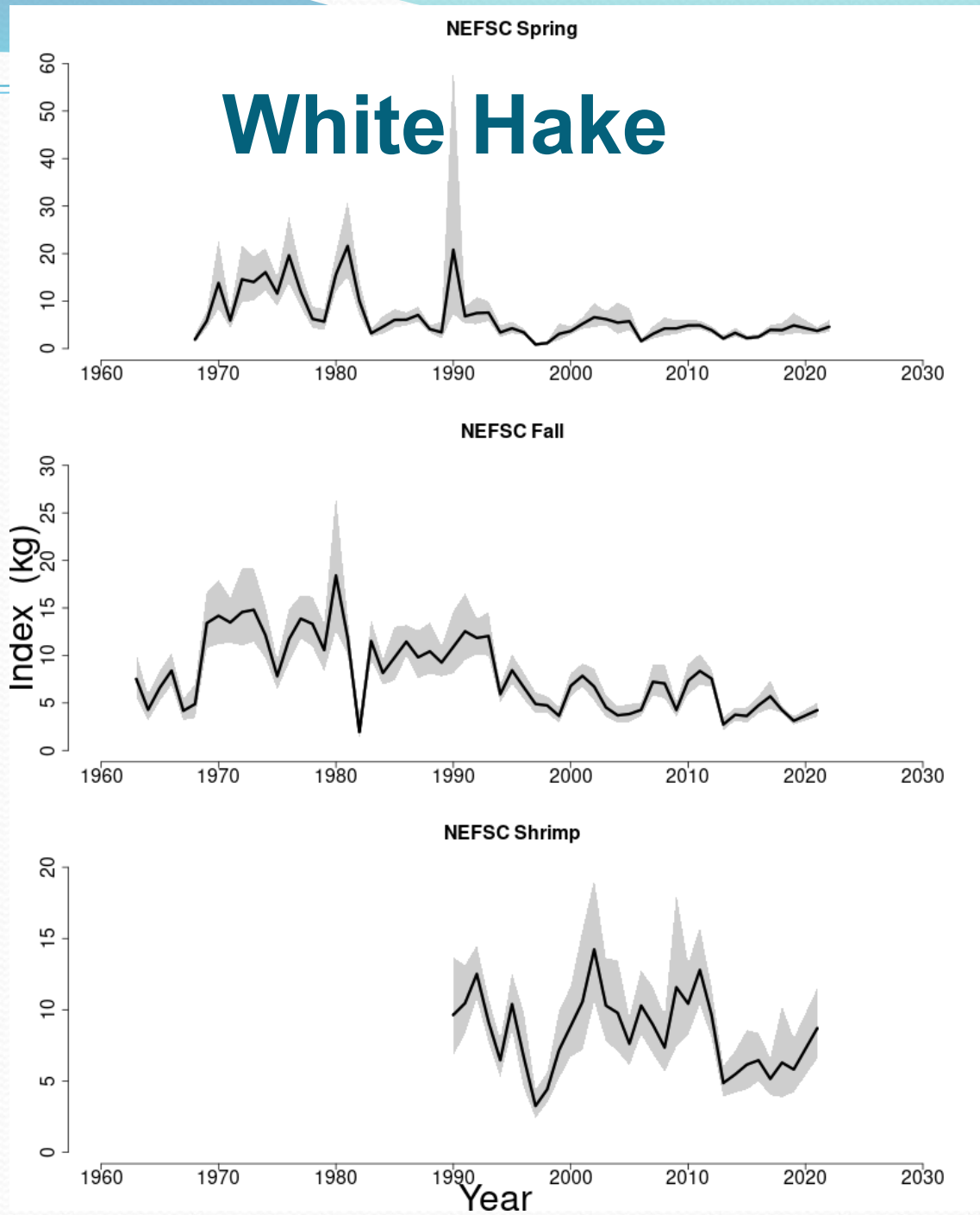
White Hake



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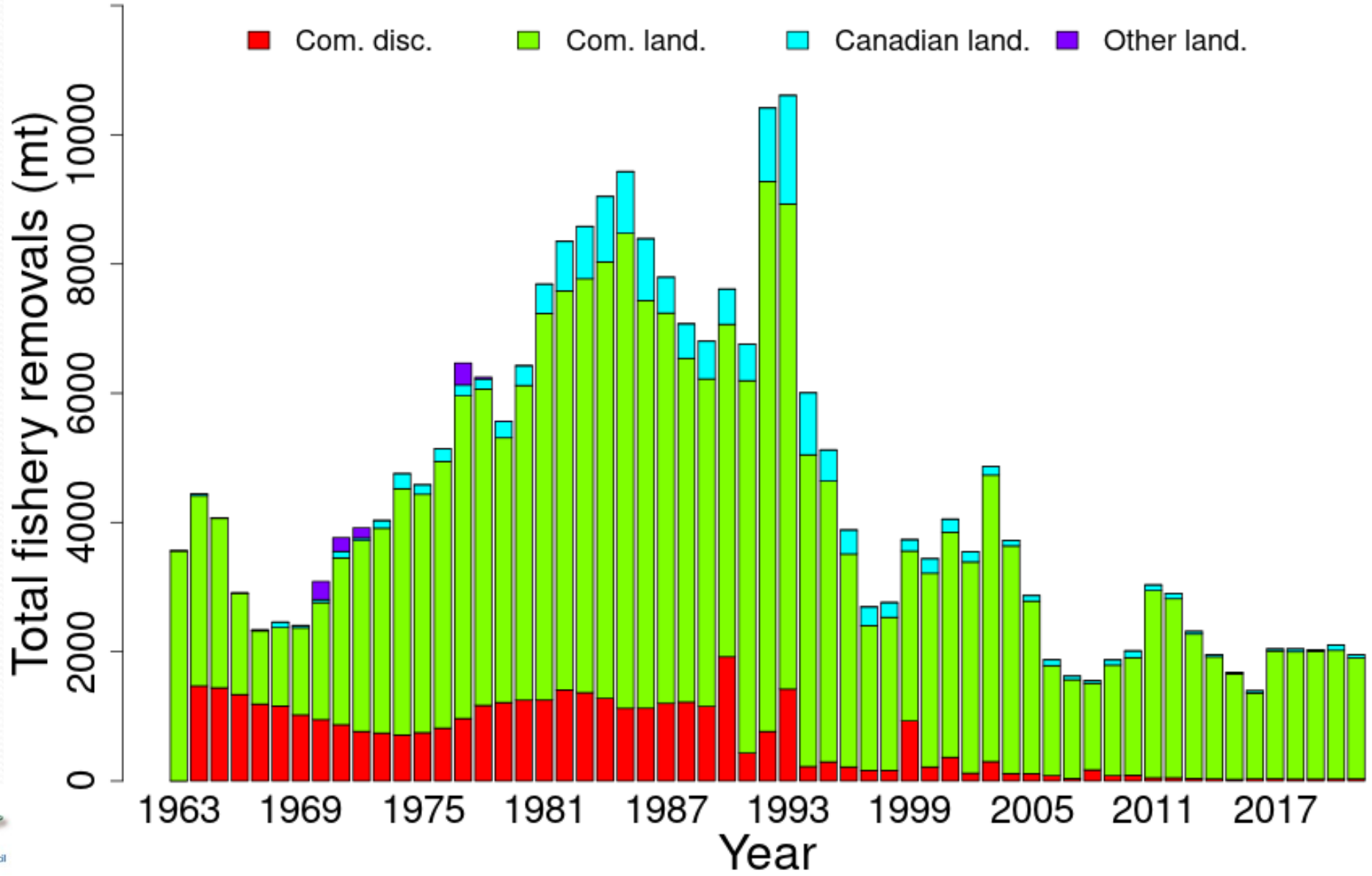
White Hake



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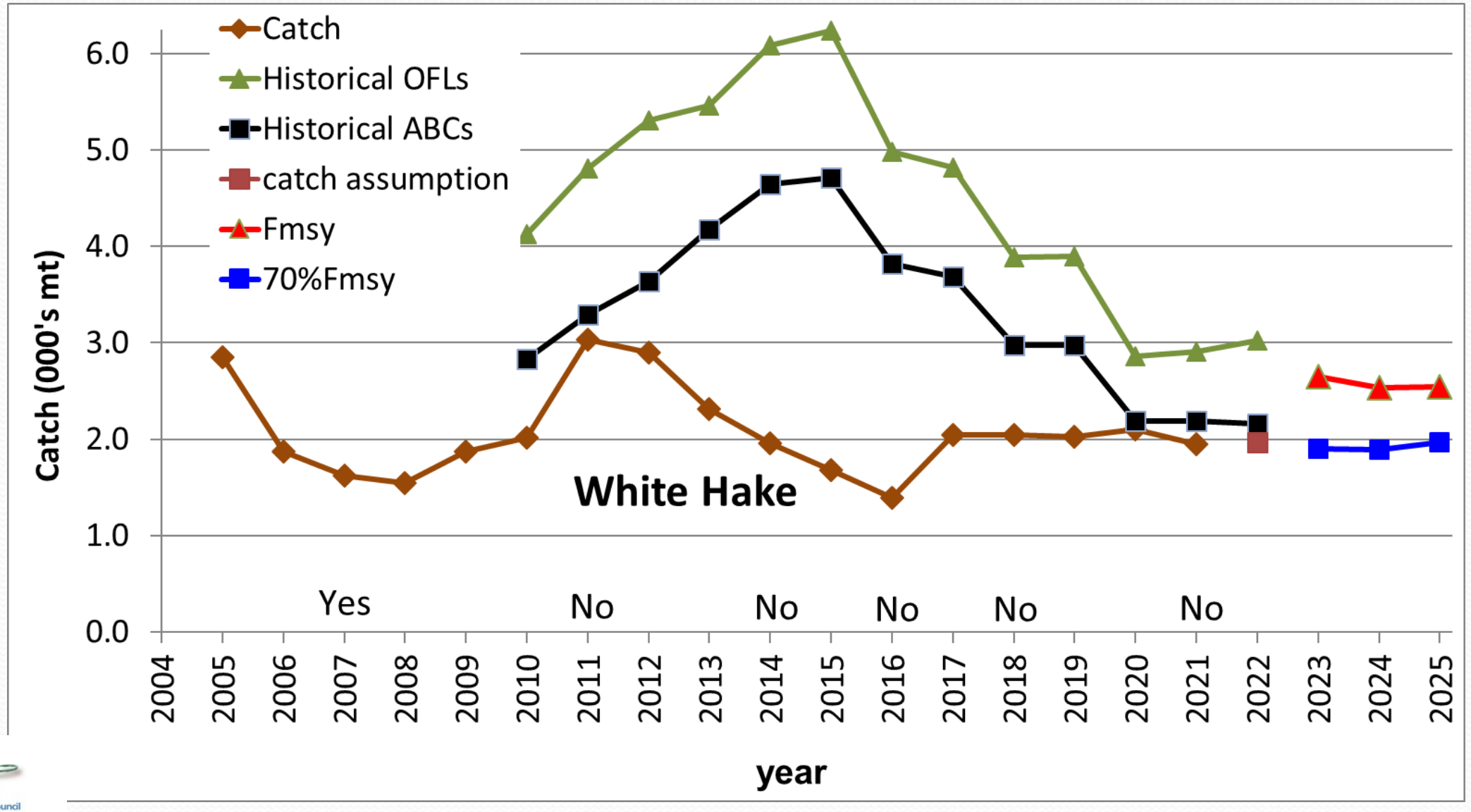


New England Fishery Management Council

White Hake

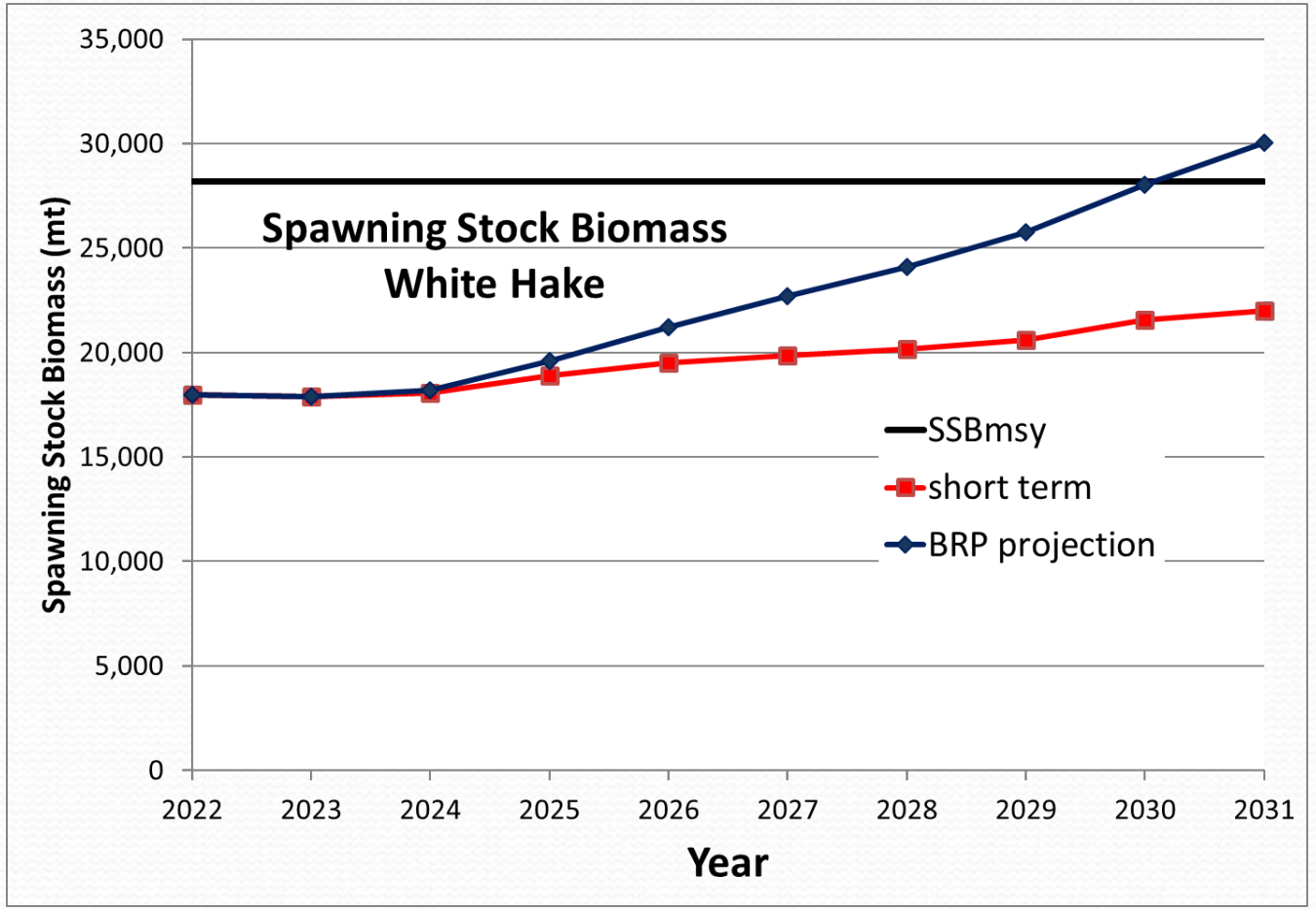
Year	Catch	Historical OFLs	Historical ABCs	Catch Assumption	F_{MSY}	$70\%F_{MSY}$
2010	2,012	4,130	2,832			
2011	3,034	4,805	3,295			
2012	2,903	5,306	3,638			
2013	2,316	5,462	4,177			
2014	1,955	6,082	4,642			
2015	1,680	6,237	4,713			
2016	1,396	4,985	3,816			
2017	2,043	4,816	3,686			
2018	2,044	3,885	2,971			
2019	2,029	3,898	2,971			
2020	2,104	2,857	2,186			
2021	1,951	2,906	2,186			
2022		3,022	2,155	1,964		
2023					2,650	1,897
2024					2,535	1,892
2025					2,547	1,968

New England Fishery Management Council

White Hake

Projection at 70%Fmsy
Rebuilds by 2031 with BRP projection, Rebuilding end date is 2031
Short term projection is based on recruitment from 1995 -2019

Year	short term projection SSB	BRP projection SSB	BRP projection Probabilty SSB > SSBmsy
2022	17,978	17,978	0.00
2023	17,880	17,893	0.00
2024	18,066	18,200	0.00
2025	18,888	19,574	0.00
2026	19,498	21,226	0.00
2027	19,859	22,682	0.03
2028	20,153	24,096	0.11
2029	20,609	25,755	0.25
2030	21,556	28,046	0.48
2031	21,992	30,039	0.67



New England Fishery Management Council

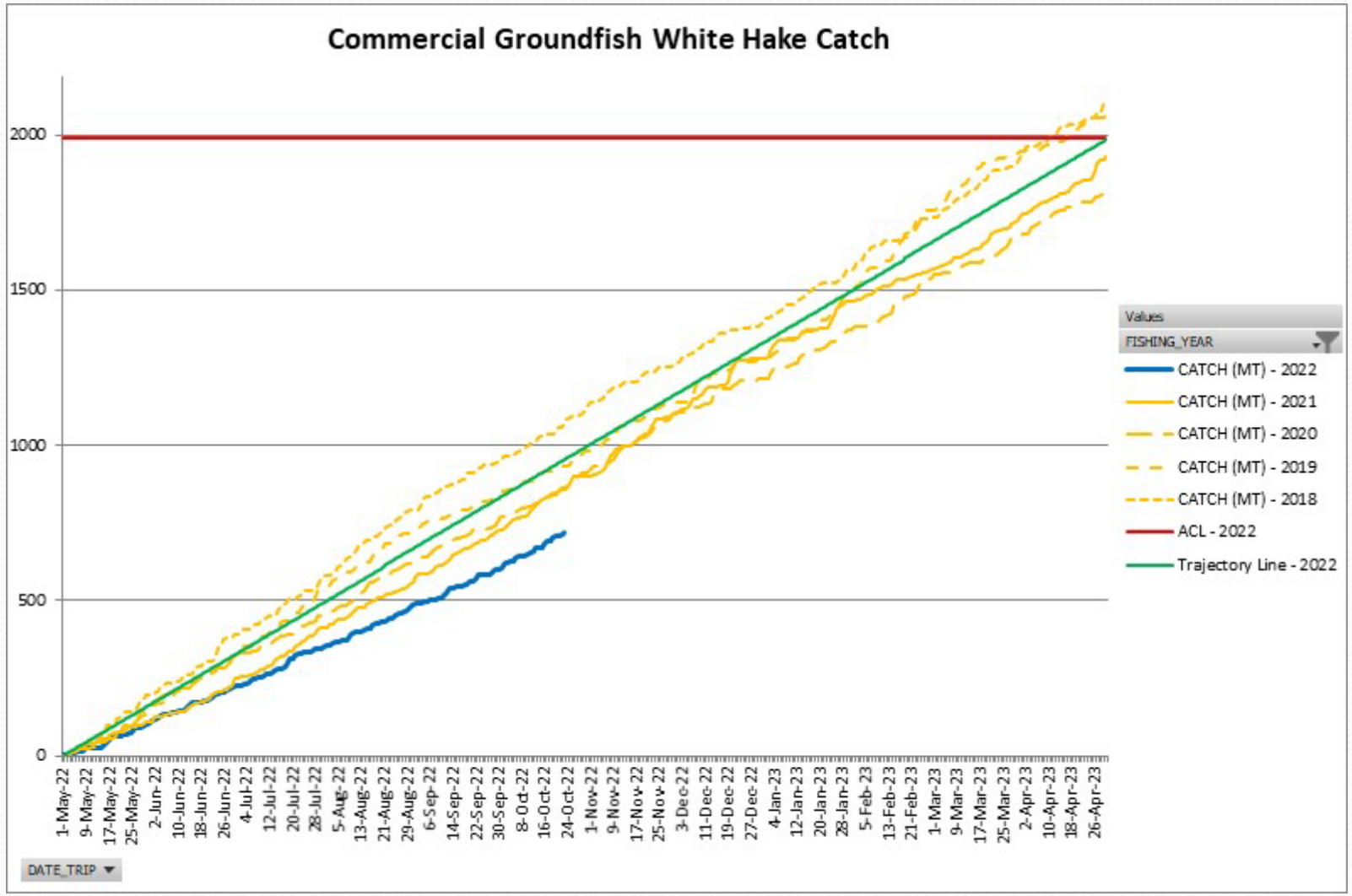
White Hake

70%F_{MSY} Projection

year	OFL	ABC	F	SSB
2023	2,650	1,897	0.11	17,881
2024	2,645	1,892	0.11	18,059
2025	2,753	1,968	0.11	18,891

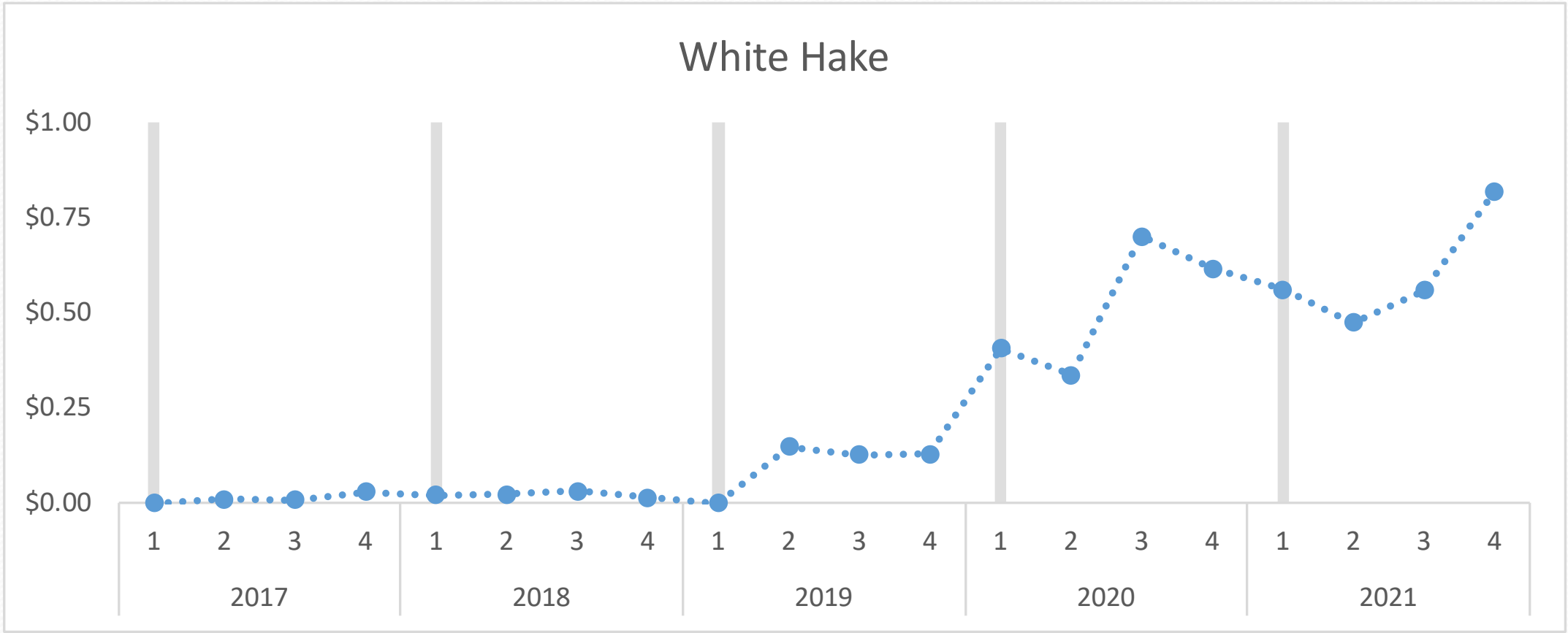
New England Fishery Management Council

In-Season Utilization – Commercial Groundfish



New England
Fishery Management Council

Economic Information – ACE Lease Prices - Sectors



Note: ACE lease prices were estimated for fishing years 2017-2021 using a hedonic price model. Input data into the model is comprised of inter-sector ACE leases over the FY2017-2021 period.

New England Fishery Management Council

Economic Information – Quota Chane Model - Sectors

	FY	Sector sub-ACL	Catch (mt)		*Utilization (%)*		Gross Rev ($mil, 2021)	
			Realized	Predicted	*Realized*	*Predicted*	Realized	Predicted
White Hake	2012	3,257	2,414	1,980	*0.74*	*0.43*	8.2	5.1
	2013	4,142	2,025	2,570	*0.49*	*0.70*	6.7	7.2
	2014	4,308	1,721	1,932	*0.40*	*0.45*	6.4	6.5
	2015	4,313	1,581	1,689	*0.37*	*0.39*	5.5	5.7
	2016	3,434	1,432	1,780	*0.42*	*0.52*	4.9	6.3
	2017	3,333	2,014	2,071	*0.60*	*0.62*	4.9	7.2
	2018	2,713	2,083	1,907	*0.77*	*0.7*	4.7	6.2
	2019	2,715	2,044	2,691	*0.75*	*0.99*	4.4	6.2
	2020	2,004	1,790	1,839	*0.89*	*0.92*	4.6	4.2
	2021	1,994	1,930	1,995	*0.97*	*1.00*	5.8	4.0

New England Fishery Management Council

For the SSC Today

Recommend OFLs and ABCs for Fishing Years 2023, 2024, and 2025 for White Hake.

$70\%F_{MSY}$ Projection

Fishing Year	Possible OFL (mt)	Possible ABC (mt)
2023	2,650	1,897
2024	2,645	1,892
2025	2,753	1,968

New England Fishery Management Council