

## 9.7 BFT-W-Western bluefin

### BFT-W-2. Fishery indicators

The total catch for the West Atlantic peaked at 18,608 t in 1964, mostly due to the Japanese longline fishery for large fish off Brazil (that started in 1962) and the U.S. purse seine fishery for juvenile fish (**BFT-Table 1, BFT-W-Figure 1**). Catches dropped sharply thereafter to slightly above 3,000 t in 1969 with declines in longline catches off Brazil in 1967 and in purse seines (**BFT-Figure 1**). Catches increased to over 5,000 t in the 1970s due to the expansion of the Japanese longline fleet into the Northwest Atlantic and Gulf of Mexico and an increase in purse seine effort targeting larger fish for the sashimi market. Catches declined abruptly in 1982 from close to 6,000 t in the late 1970s and early 1980s with the imposition of a catch limit. The total catch for the West Atlantic, including discards, fluctuated without trend after 1982, reaching 3,319 t in 2002 (the highest since 1981, with all three major fishing nations indicating higher catches). Total catch in the West Atlantic subsequently declined steadily to 1,638 t in 2007 and then fluctuated without pronounced trend. The catch in 2020, 2021 and 2022 was 2,269 t, 2,310 t and 2,700 t, respectively (as of 18 September 2023) (**BFT-W-Figure 1**).

The Committee notes that ongoing work conducted as part of the MSE process evaluated the sensitivity to assumed stock of origin of the large historical catches from the off Brazil and found that management procedure (MP) performance was insensitive to the stock of origin of these catches.

The Committee notes that the Total Allowable Catch (TAC) in the West has not been caught for the last 10 years. Based on information received, the Committee considers that this is not due to low stock abundance but rather to market and operational conditions.

For continuity of information, the Committee presents the indices used in the 2021 western bluefin stock assessment ([Anon., 2021d](#)) and their updated time series, however the primary source of information on recent indicators comes from the update of the five indices used for the current MP. The current MP uses five indices in each management area (**BFT-Figure 2**). The indices are individually weighted by the inverse of their variance in the MP and are used to develop an overall index that is used to determine the TAC according to specifications outlined in [Rec. 22-09](#). Annually, the Committee evaluates the updated indices for determination of exceptional circumstances (ECs). The Committee evaluated the indicators for determination of ECs according to the proposed protocols and results are provided in section 19.17.

The most recent 2021 western bluefin stock assessment ([Anon., 2021d](#)) used 10 catch per unit effort (CPUE) and two survey indices up to and including the year 2020 (**BFT-W-Figure 2**). As noted previously, several indices exhibit trends that may be indicative of environmentally driven changes in availability and three of these indices (Can-GSL, US RR>177 and Canada Acoustic index) were not recommended for use in MPs. As in 2017 and 2020, the Stock Synthesis assessment reconciled the conflicting trends in some Canadian and United States indices under a hypothesis of environmentally mediated availability of fish to the two regions. The Canada Acoustic index experienced a very low value for 2018 and subsequently also for 2019; it appears that the index is in a state of transition, possibly due to environmentally driven changes in the spatial distribution of the fish or of their prey. The 2021 western bluefin stock assessment split the index and, as two years of data would be uninformative for the models, the years 2018 and 2019 were removed until such time as the differences between the time periods can be reconciled.

### BFT-W-3. State of the stock

Until such time as a new assessment occurs, the Committee retains the stock status determination from the most recent assessments. In 2021, Stock Synthesis with alternative spawning-at-age scenarios equally weighted across model scenarios was used to determine stock status but not specifically to provide TAC advice. Current  $F$  (average of 2018-2020) relative to the  $F_{0.1}$  reference point was 0.53 (0.49-0.58, 80% CI), indicating that overfishing was not occurring. The Committee retains the time series of estimated biomass, recruitment and fishing mortality between the two models run in the 2021 western bluefin stock assessment (SS and VPA (**BFT-W-Figure 3**)). As in the 2020 assessment, two spawning fraction scenarios (a young age at spawning, consistent with the eastern stock and older age of spawning with 100% spawning contribution at age 13) were considered in the assessment methods. Rather than presenting two series of spawning stock biomass (SSB) based on these two spawning fraction scenarios, total biomass is presented as this does not depend on which of these scenarios is selected.

The Committee has added a figure that shows the trajectory of  $F/F_{0.1}$  for the most recent three Stock Synthesis and VPA assessments (2017, 2020, 2021), illustrating that trend in stock status relative to  $F_{0.1}$  are quite similar across model platforms and across assessment years (**BFT-W-Figure 4**). The similarity in stock status relative to overfishing across models and model runs illustrates the utility of using the stock assessments to provide overfishing status, despite many well-documented uncertainties.

#### ***BFT-W-4. Outlook***

In 1998, the Commission initiated a 20-year rebuilding plan designed to achieve  $SSB_{MSY}$  with at least 50% probability. As indicated above, the Committee did not use biomass-based reference points in previous stock assessments. The Committee is not evaluating if the stock is rebuilt because it has been unable to resolve the long-term recruitment potential.

The adopted MP accounts for many of the long-standing uncertainties regarding stock mixing, biomass-based reference points and recruitment that created uncertainty for the outlook for the stock. Furthermore, the Committee is no longer providing projections, TAC advice or Kobe 2 strategy matrices derived from the stock assessments using an  $F_{0.1}$  strategy, as the MP provides TAC advice that was simulation tested to achieve MSY-based management objectives.

As noted above, stock assessments will continue to be valuable in providing status checks, to determine whether the MP is achieving the goal of maintaining stock status as well as to estimate recent recruitment. For continuity, the Committee provides the previous time series of  $F/F_{0.1}$  showing the fishing status over time relative to the year-specific estimate of  $F_{0.1}$  (**BFT-W-Figure 4**) and will update this figure with the next scheduled stock assessment.

#### ***BFT-W-5. Effect of current regulations***

The 2021 and 2022 TAC recommendations were unlikely to have led to overfishing relative to  $F_{0.1}$ . The three-year TACs from the adopted MP are, by design, intended to ensure a high probability of maintaining stock status above  $B_{MSY}$  and avoiding overfishing.

#### ***BFT-W-6. Management recommendations***

The Commission adopted a TAC of 2,350 t in 2021 ([Rec. 20-06](#)), and a moderate increase to 2,726 t in 2022 ([Rec. 21-07](#)) and, with the adoption of the management procedure in 2022 ([Rec. 22-09](#)), TAC of 2,726 t for 2023, 2024, and 2025 ([Rec. 22-10](#)).

According to the proposed EC provisions reviewed in 2023 and outlined in item 19.18 of this report, no EC exist that would warrant deviating from the TAC advice under the MP.

**Summary table**

The estimated mean of the SS models (two maturity specifications) for recent fishing mortality rate for each model was calculated as the geometric mean of F over 2018 to 2020 relative to the F reference point, F<sub>0.1</sub> (a proxy for F<sub>MSY</sub>). The values in parenthesis represent the approximate 80% confidence intervals from the hessian-based standard errors or multivariate lognormal approximation approach.

<b>WEST ATLANTIC BLUEFIN TUNA SUMMARY</b>	
Current catch including discards (2022)	2,700 t*
F <sub>CURRENT (2018-2020)</sub>	0.063 (0.059-0.067) <sup>2</sup>
F <sub>0.1</sub>	0.118 (0.113-0.123) <sup>3</sup>
F <sub>CURRENT (2018-2020)</sub> /F <sub>0.1</sub>	0.53 (0.49-0.58) <sup>2</sup>
Estimated probability of overfishing (F <sub>CURRENT (2018-2020)</sub> )/F <sub>0.1</sub> )	<1%
Stock status (2020) <sup>1</sup>	Overfishing: No
Management Measures:	<b>Rec. 22-10:</b> TAC of 2,726 t in 2023, 2024 and 2025, including dead discards.

\* As of 18 September 2023.

<sup>1</sup> Biomass reference points to determine stock status were not estimated in the 2021 BFT-W stock assessment due to uncertainty in recruitment potential.

<sup>2</sup> Mean and approximate 80% confidence interval from the multivariate lognormal approximation approach from the assessment.

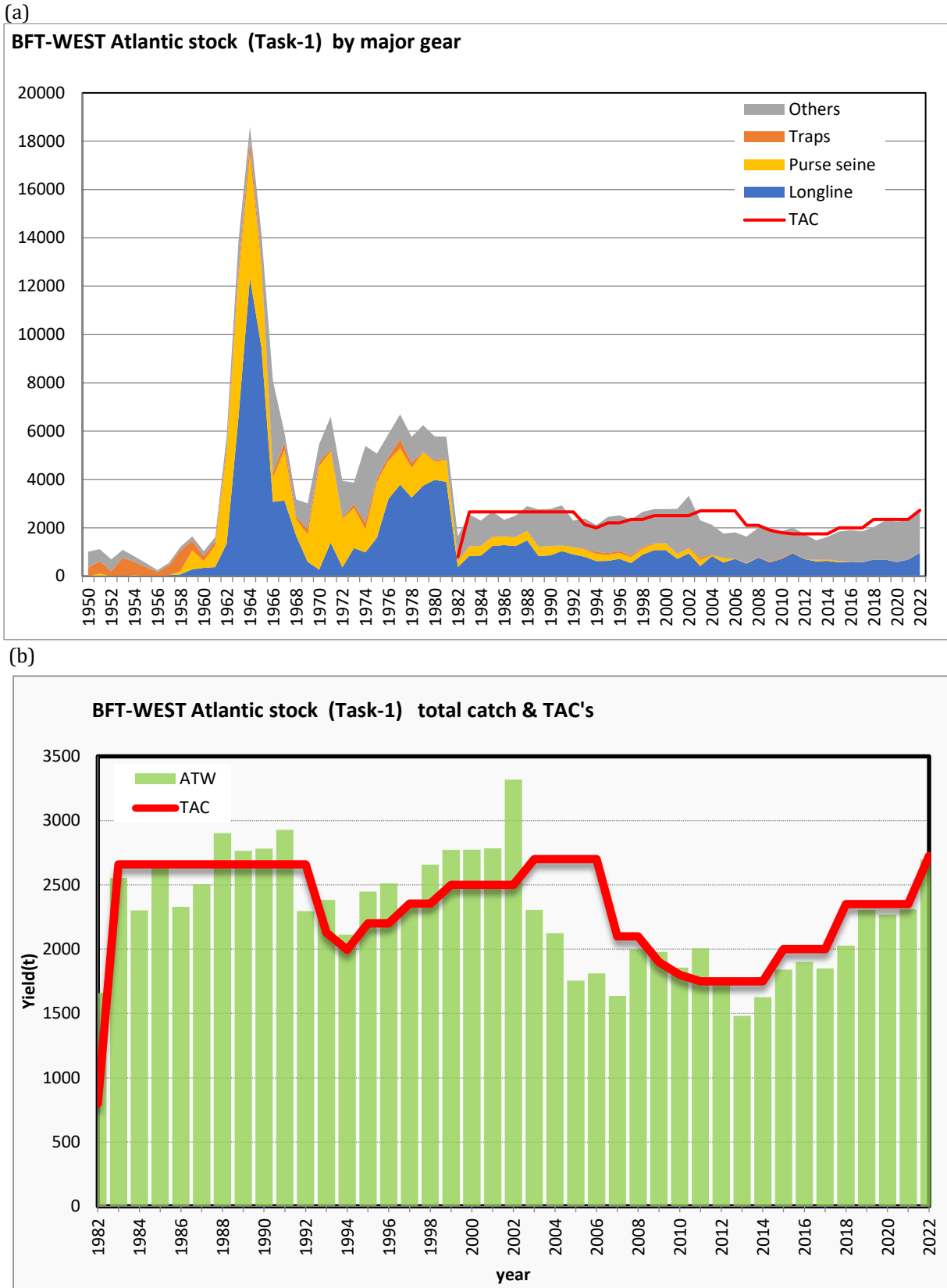
<sup>3</sup> Mean and approximate 80% confidence interval from the hessian-based standard errors.

EXECUTIVE SUMMARY BFT-W

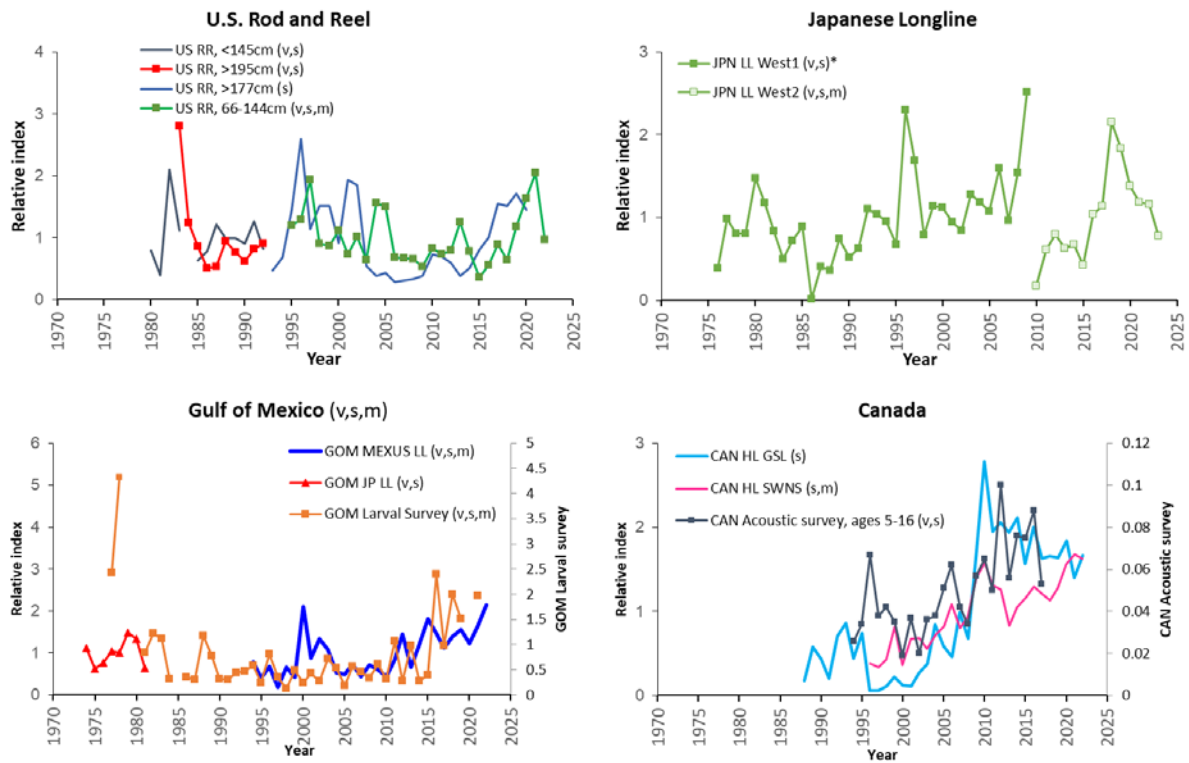
BFT-Table 1. Estimated catches (t) of Northern bluefin tuna (*Thunnus thynnus*) by area, gear and flag.

			1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
TOTAL			36642	48881	49751	54009	53545	52657	52772	52784	53319	52305	52125	51756	51812	62638	26460	21798	13195	11781	12688	14725	14887	18055	21313	25515	29809	33440	37308	37404	37802			
BFT-E			34258	46769	47303	51497	51211	50000	50000	50000	50000	50000	50000	50000	50000	61000	24460	19818	11338	9774	10934	13243	13261	16214	19412	23665	27782	31134	35038	35095	35102			
	ATE		9317	7054	9780	12098	16379	11630	10247	10061	10086	10347	7394	7402	9023	7529	8441	8243	6684	4379	3984	3834	4163	3918	4841	5968	7216	8157	9044	10874	10308	10477		
	MED		24941	39715	37523	39399	34831	38370	39753	39939	39914	39653	42606	42598	40977	42471	52559	16217	13133	6959	5790	7100	9080	9343	11372	13444	16450	19624	22090	24164	24786	24625		
BFT-W	ATW		2384	2113	2448	2512	2334	2657	2772	2775	2784	3319	2305	2125	1756	1811	1638	2000	1980	1857	2007	1754	1482	1627	1842	1901	1850	2027	2306	2269	2310	2700		
Landings	ATE	Bait boat	3884	2284	3093	5369	7215	3139	1554	2032	2426	2635	1409	1902	2282	1263	2436	2393	1260	725	636	283	243	95	172	1085	1195	692	845	936	1031	1026		
		Longline	2802	2311	4522	4212	4057	3789	3570	3736	3303	2896	2748	2064	2700	2033	1705	2491	1951	1194	1125	1139	1167	1194	1467	1829	2208	2730	3128	3313	3249	3294		
		Other surf.	976	590	555	273	60	387	404	509	558	631	521	290	424	831	502	181	297	124	35	49	141	210	193	261	295	340	320	381	359	368		
		Purse seine	24	213	458	323	828	700	726	661	153	887	490	1078	1197	408	0	2	1	0	0	2	0	0	0	0	42	49	11	56	190	147	106	
		Sport (HL+RR)	0	25	0	0	237	28	33	126	61	63	109	89	11	99	11	12	11	44	51	53	46	43	104	35	101	118	92	156	267	245		
		Traps	1631	1630	1152	1921	3982	3586	3960	2996	3585	3235	2116	1978	2408	2895	3788	3166	3164	2292	2137	2311	2564	2376	2905	2716	3362	4258	4994	5889	5255	5434		
	MED	Bait boat	48	0	206	5	4	11	4	38	28	1	9	17	5	0	0	0	38	1	0	2	2	9	25	0	50	56	72	103	81	88		
		Longline	2470	6993	8469	9856	7313	4117	3338	3424	4144	3234	3484	3036	3427	3408	3269	2376	1344	1242	962	587	605	588	776	1523	1184	1518	1485	1889	1657	1785		
		Other surf.	371	776	545	417	282	284	228	728	354	340	198	197	175	81	85	0	0	1	1	1	20	29	3	37	1	34	51	32	65	58		
		Purse seine	20065	27948	23799	26021	24279	31792	33798	33237	33043	34044	37291	37869	36639	38363	48994	13540	11448	4986	4293	6172	7982	8184	9993	11340	14493	17128	19515	20872	21987	21591		
		Sport (HL+RR)	1238	2307	3562	2149	2340	1092	1533	1773	1167	1520	1404	1325	619	494	117	149	160	448	356	202	240	289	373	308	439	582	611	865	740	717		
		Traps	749	1691	942	951	613	1074	852	739	1177	515	221	154	112	125	93	152	144	281	165	125	222	232	192	227	272	300	353	399	252	384		
	ATW	Longline	712	539	491	545	382	764	915	858	610	729	186	644	425	565	420	606	366	529	743	478	470	498	553	562	559	664	675	576	653	913		
		Other surf.	406	307	384	429	293	342	279	283	201	107	139	97	89	85	63	78	121	107	147	117	121	119	138	93	123	77	168	134	175	209		
		Purse seine	295	301	249	245	250	249	248	275	196	208	265	32	178	4	28	0	11	0	0	2	29	38	34	0	0	0	0	0	0	0		
		Sport (HL+RR)	854	804	1114	1032	1181	1108	1125	1121	1650	2036	1399	1139	924	1005	123	1134	1251	1009	888	917	692	810	1085	1204	1144	1263	1450	1543	1444	1521		
			Traps	29	79	72	90	59	68	44	16	16	28	84	32	8	3	4	23	23	39	26	17	11	20	6	10	13	3	4	4	4	0	
	Discards	ATE	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	7	9	8	1	4
			Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0
		MED	Purse seine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	12	9	11	2	9	10	6	4	5	4	2
ATW			Longline	88	83	138	167	155	123	160	222	105	211	232	181	131	149	100	159	207	174	202	224	145	139	19	29	10	17	7	8	31	54	
Other surf.			0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	1	2	2	4	3	3	
ATW	Purse seine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	4	5	0	0	0	0	0	0	0		
	Sport (HL+RR)	0	0	0	0	14	3	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Landings	ATE	CP	Cape Verde	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			China PR	0	0	0	0	0	85	103	80	68	39	19	41	24	42	72	119	42	38	36	36	38	37	45	54	64	79	89	101	101	72	
			EU-Denmark	37	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	6
EU-España			4962	3137	3819	6186	9519	4565	4429	3493	3633	4089	2172	2801	3102	2339	3680	3536	2409	1550	1483	1329	1553	1282	1655	1986	2509	2489	2729	3289	2953	3301		
EU-France			1099	336	725	563	269	613	588	542	629	755	648	561	818	1218	629	253	366	228	135	148	223	212	254	343	350	461	462	557	559	540		
EU-Germany	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
EU-Ireland	0	0	0	0	14	21	52	22	8	15	3	1	1	2	1	1	1	2	4	10	13	19	14	32	16	17	6	16	16	20	0			
EU-Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0		
EU-Poland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
EU-Portugal	91	363	169	199	712	323	411	441	404	186	61	27	82	104	29	36	53	58	180	223	235	243	263	327	429	450	475	592	614	583	0			
EU-Sweden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Great Britain	0	0	1	0	1	1	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	0	0	0	0	2	5	0		
Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	7	0	0	0	0	0		
Guinée Rep	0	330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Iceland	0	0	0	0	0	2	27	0	0	1	0	0	0	0	0	0	0	0	0	2	5	4	30	37	6	0	0	0	1	1	0	0		
Japan	2484	2075	3971	3341	2905	3195	2690	2895	2425	2536	2695	2015	2598	1896	1612	2351	1904	1155	1089	1093	1129	1134	1386	1578	1905	2262	2514	2773	2779	2867	0			
Korea Rep	0	4	205	92	203	0	6	1	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	161	181	208	232	247	242	252	0		
Maroc	415	720	678	1035	2068	2341	1591	2228	2497	2565	1795	1953	2389	1923	2418	1947	1909	1348	1055	990	960	959	1176	1433	1703	2164	2476	3089	2884	2704	0			
Norway	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	44	51	12	49	194	152	123	0		
Panama	0	1	19	550	255	0	13																											

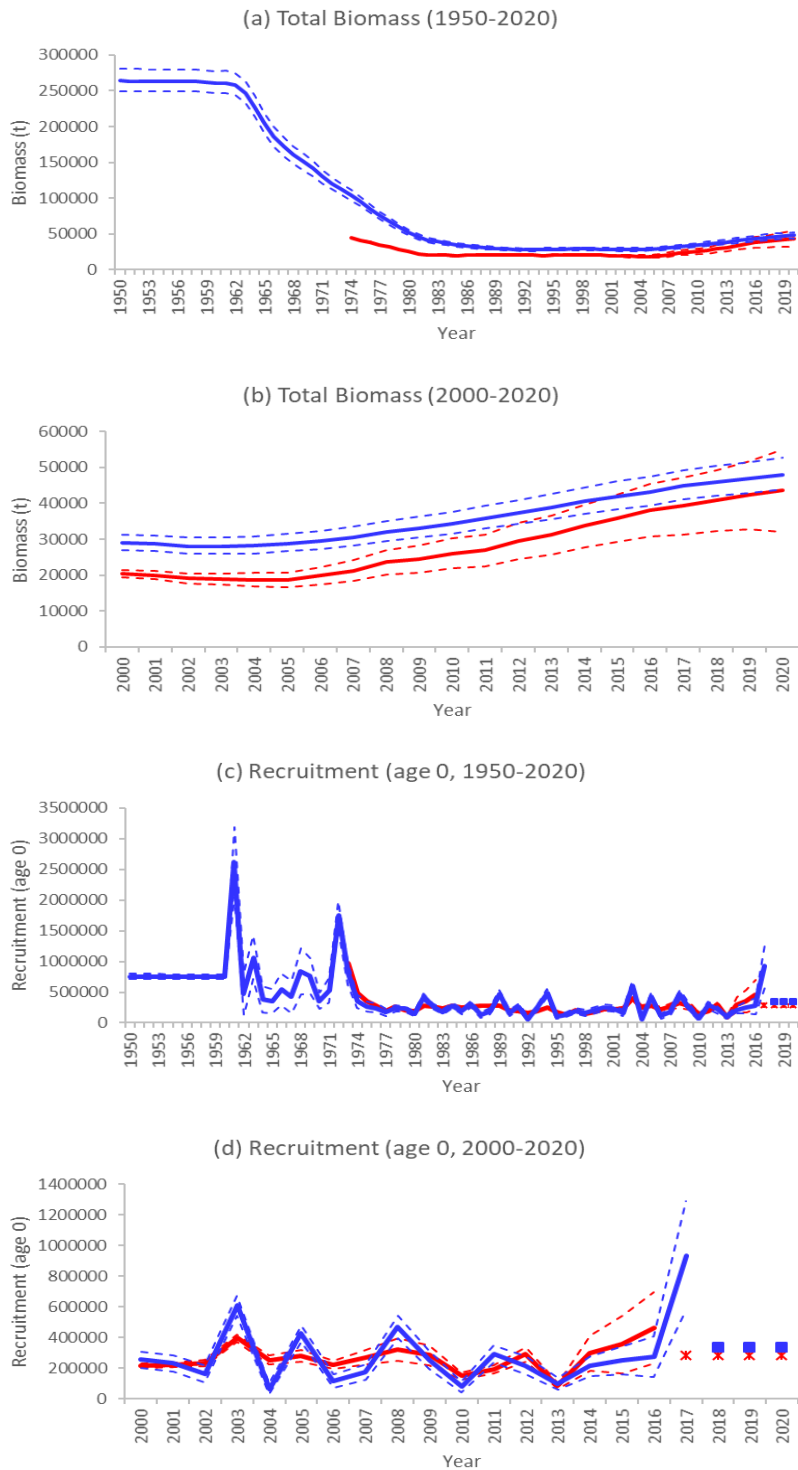




**BFT-W-Figure 1.** Historical catches of western bluefin tuna: (a) by gear type and (b) TACs agreed by the Commission (which are shown for comparison).

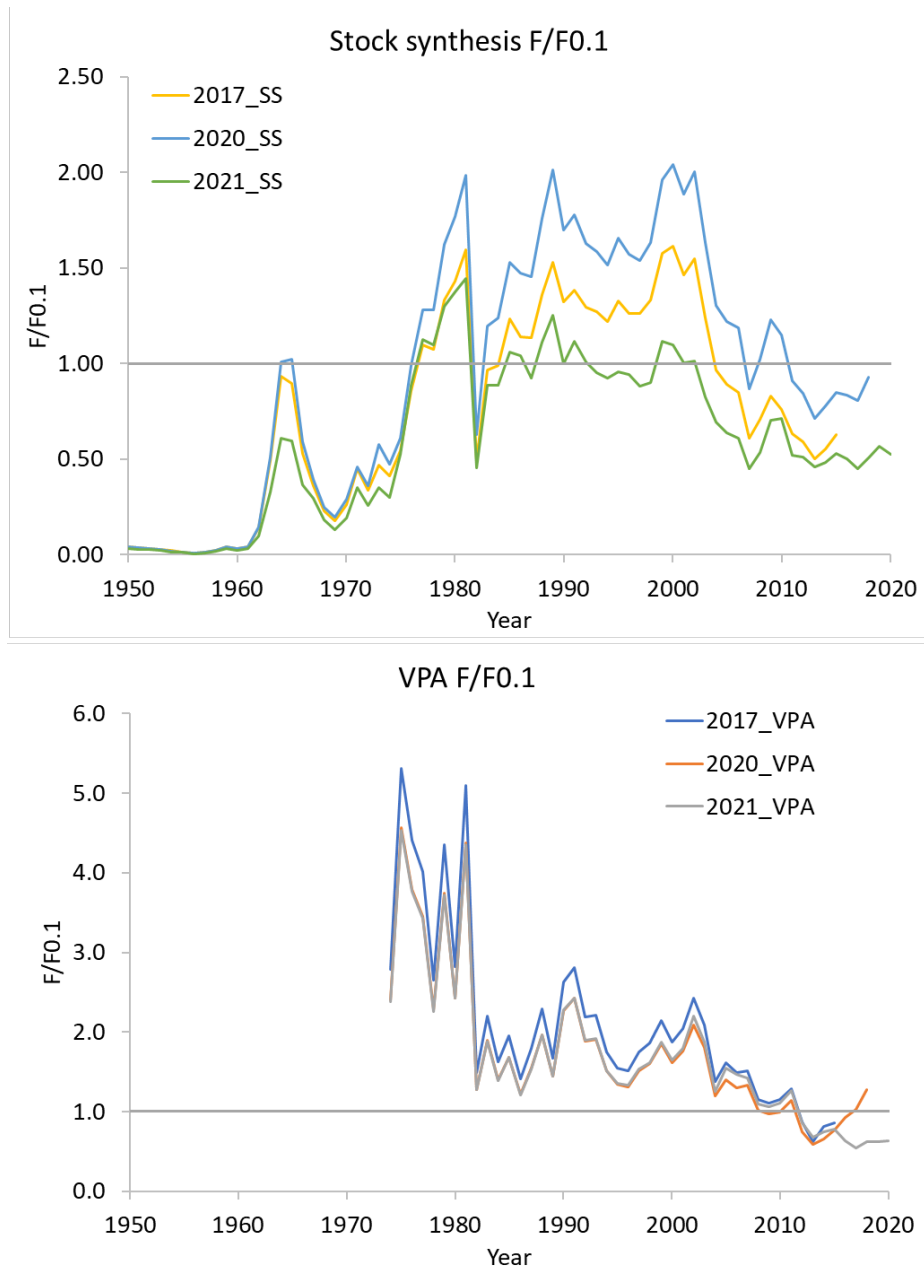


**BFT-W-Figure 2.** Indices of relative abundance for western bluefin tuna. Indices denoted with an “s” were used in Stock Synthesis, indices with a “v” were used in VPA and indices with a ‘m’ are used in the management procedure. (\*) The 1986 low data point of the Japanese longline in the West Atlantic was removed in the Stock Synthesis models.



**BFT-W-Figure 3.** Estimates of (a) total stock biomass for 1950-2020 and (b) for 2000-2020, and (c) recruitment (age 0) for 1950-2020 and (d) for 2000-2020 for the base VPA (red) and Stock Synthesis (blue) models from the 2021 assessment. The 80% confidence intervals are indicated with dashed lines. Recruitment estimates for the recent years (2017-2020 for VPA; 2018-2020 for Stock Synthesis) have been replaced by the average recruitment in the recent 6 years (2012-2017).





**BFT-W-Figure 4.** a. Fishing mortality relative to the  $F_{0.1}$  reference point as estimated by Stock Synthesis (a) and VPA (b) for the 2017, 2020 and 2021 assessments.