Western and Central Pacific Fisheries Commission

SCIENTIFIC COMMITTEE
TWENTIETH REGULAR SESSION

Manila, Philippines
14 – 21 August 2024

ANNUAL REPORT TO THE COMMISSION
PART 1: INFORMATION ON FISHERIES, RESEARCH AND STATISTICS

WCPFC-SC20-AR/CCM-27 (Rev.01)
26 July 2024

UNITED STATES OF AMERICA

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UNITED STATES OF AMERICA

2024 Annual Report to the Western and Central Pacific Fisheries Commission

PART I. INFORMATION ON FISHERIES, RESEARCH, AND STATISTICS

United States of America

National Oceanic and Atmospheric Administration National Marine Fisheries Service

Data Included Through December 2023

Scientific data was provided to the Commission in accordance with the decision relating to the provision of scientific data to the Commission by 30 April 2023	**YES**
If no, please indicate the reason(s) and intended actions:	

Summary

In the Western and Central Pacific Fisheries Commission (WCPFC) statistical area, the United States (U.S.) and its territories have large-scale fisheries for highly migratory species (HMS) in the Pacific Ocean that include purse seine fisheries targeting skipjack tuna (*Katsuwonus pelamis*) and yellowfin tuna (*Thunnus albacares*); longline fisheries targeting bigeye tuna (*Thunnus obesus*), swordfish (*Xiphias gladius*), or albacore (*Thunnus alalunga*); and a troll fishery targeting albacore. Small-scale fisheries include troll fisheries targeting skipjack and yellowfin tuna and other pelagic species, handline fisheries targeting yellowfin and bigeye tuna, as well as other miscellaneous-gear fisheries. In these large- and small-scale fisheries, a variety of other pelagic species are captured incidentally or targeted, in the case of small-scale troll fisheries, including other tunas and billfishes, mahimahi (*Coryphaena hippurus*), wahoo (*Acanthocybium solandri*), moonfish (*Lampris* spp.), escolar (*Lepidocybium flavobrunneum*), and pomfrets (Bramidae).

The large-scale fisheries operate in the high seas and within the U.S. exclusive economic zone (EEZ) and in the EEZs of other nations where authorized. The small-scale fisheries operate in nearshore waters off Hawaii and the U.S. territories of American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands (CNMI).

This report presents estimates of annual catches of tuna, billfish, and other highly migratory

species (HMS), and vessel participation from 2019–2023 for fisheries of the U.S. and its territories operating in the WCPFC Statistical Area. Statistics for 2023 are provisional. Statistics for 2022 have been updated from those reported provisionally in the submission for 2018–2022.

For the U.S. and its territorial fishing fleets, the species composition of total HMS catch in the WCPFC statistical area is dominated by the catch by the purse seine fishery, which comprises 85% (73,948 t in 2023) of the total fisheries catch. The large majority (78%) of the purse seine catch is skipjack with 57,745 t in 2023 with 11% (8,373 t) of the catch composed of yellowfin tuna and 11% (7,826 t) of bigeye tuna (Table 1a-e). Although the largest U.S. fisheries catch in the WCPFC statistical area in 2023 is from the purse seine fishery, this catch is less than half of the total annual catches for 2019 and 2020 (165,971 t in 2019 and 137,406 t in 2020; Table 1a-e).

The U.S. and its territorial longline fleets have the second largest catch of HMS species in the WCPFC statistical area with 13% (11,359 t) of total catch in 2023. The majority (89%) of this catch was from the Hawaii deep-set and shallow-set fisheries that operate in the NPO with 11% of the catch in 2023 from the American Samoa longline fishery that operates in the South Pacific Ocean (SPO). The 2023 annual longline catch (11,359 t) for all retained species was similar to the annual average (11,552 t) for the 5-year period (Table 1f).

In 2023, the total U.S. and territories longline fisheries catch composition was dominated by species targeted in the Hawaii deep-set (bigeye tuna), Hawaii shallow-set (swordfish), and American Samoa (albacore) longline fisheries with 46% (5,164 t) bigeye tuna; 7% (766 t) swordfish; 8% (1,132 t) albacore; and by the secondary catch of yellowfin tuna with 24% (2,746 t) of total catch (Table 1a-e; Table 1f). The 2023 bigeye tuna catch was below, swordfish above, albacore similar, and yellowfin tuna catch above the 5-year catch averages (bigeye tuna = 5,653 t; swordfish = 593 t; albacore = 1,024 t; and yellowfin tuna = 2,222 t).

The small-scale tropical troll and handline fisheries have the largest number of U.S.-flagged vessels (1,802 vessels) operating in the WCPFC statistical area with 1,802 vessels in 2023; however, this fishery contributed less than 2% of the total HMS catch. The troll and handline fisheries consists of fishers targeting HMS in Hawaii and the territories and includes people that fish recreationally, for subsistence, or commercially, selling all or a portion of their catch. In contrast, the large-scale purse seine fleet that provides the majority of U.S. HMS catch had only 13 vessels operating in 2023, which is less than half of the number of vessels that operated in 2019. In 2023, the longline fishery operated 155 vessels to bring in the second largest amount of HMS catch and the SPO albacore troll fishery operated 10 vessels.

The National Marine Fisheries Service (NOAA) continued research on Pacific tunas and associated species at its Southwest and Pacific Islands Fisheries Science Centers, often in collaboration with scientists from other organizations. Stock assessment research on tuna and tuna-like species was conducted primarily through collaboration with participating scientists of

the International Scientific Committee (ISC) for Tuna and Tuna-Like Species in the NPO and international Regional Fisheries Management Organizations. Research studies were also conducted that will help improve stock assessments, including an analysis by Hoyle et al. (2024) on good practices for standardizing catch per unit effort and a reproductive study by Humphreys and Brodziak (2024) on the striped marlin in the central North Pacific Ocean. Fishery monitoring and socio-economic research was conducted on tunas, billfishes, and bycatch species, and NOAA reports summarized monitoring data collected for longline, purse seine, and small-boat fisheries. In addition, a NOAA data report (Stahl et. al. 2024) outlined which data fields historically collected by at-sea observers in the Hawaii longline fisheries are collecTable by electronic monitoring or other sources (e.g. VMS or logbooks).

In addition, NOAA successfully completed biological and oceanographic studies on tunas and billfishes. Highlighted research includes studies that examine the micronekton (Domokos et al. 2023) and scattering layers (Arostegui et al. 2023) that create structure and aggregate predators in the open ocean; effects of warming oceans on food webs (Gomes et al. 2024; Reum et al. 2024; Welch et al. 2023), and foraging studies on swordfish (Preti et al. 2023) and albacore (Gleiber et al. 2023). In addition, Frawley et al. (2023) examined factors that drive longline fisheries interactions with North Pacific albacore.

Tabular Annual Fisheries Information

The purse seine fishery remains the largest U.S. fishery in terms of total catch. It accounted for about 85% of the total catch of HMS by the U.S. and its territories in the WCPFC statistical area in 2023. The U.S. longline fishery accounts for 13% of total catch with the tropical troll, handline, and albacore troll fisheries accounting for the remaining 2% of total catch. Fisheries of the U.S. and its territories had an estimated catch of 87,161 t of tunas, billfishes and other HMS in 2023 (Table 1a), which is below the 5-year average for 2019–2023 (111,093 t) and likely driven by declines in skipjack tuna catch by the purse seine fishery with less vessel participation in the last three years (Table 1a-e, Table 2a). The 2023 catch consisted primarily of tuna with 67% skipjack tuna, 15% bigeye tuna, 13% yellowfin tuna, and 2% albacore with the remaining 3% of total catch composed of billfish, sharks, and other pelagic fish. The 2023 total bigeye tuna catch was above the 5-year average, while the catches of skipjack and yellowfin tuna were below the 5-year averages (Table 1a-e). Further discussion of the tabular fisheries information is provided in the following section Flag State Reporting.

Table 1a. Estimated weight (metric tons) of catch by U.S. or its territories (American Samoa, Guam, and CNMI) by species and fishing gear in the WCPFC statistical area for 2023. Totals may not match sums of values due to rounding. A zero represents no catch or <0.5 t catch and a "-" indicates a species is not reported for a particular fishery.

Species and FAO Code	Purse Seine	Longline	Albacore Troll	Tropical Troll	Handline	Total
Albacore (ALB), North Pacific	0	264	-	0	5	269
Albacore (ALB), South Pacific	0	868	328	0	-	1196
Bigeye tuna (BET)	7826	5164	-	5	132	13126
Pacific bluefin tuna (PBF)	0	1	-	0	-	1
Skipjack tuna (SKJ)	57745	103	-	367	8	58223
Yellowfin tuna (YFT)	8373	2746	-	312	249	11680
Other tuna (TUN KAW FRI)	0	0	-	2	1	3
TOTAL TUNAS	73943	9146	328	686	395	84498
Black marlin (BLM)	0	1	-	1	-	3
Blue marlin (BUM)	3	353	-	94	3	452
Sailfish (SFA)	0	10	-	2	-	12
Spearfish (SSP)	0	172	-	6	0	178
Striped marlin (MLS), North Pacific	0	182	-	6	0	188
Striped marlin (MLS), South Pacific	0	2	-	0	-	2
Other marlins (BIL)	0	4	-	0	-	4
Swordfish (SWO), North Pacific	0	763	-	0	1	764
Swordfish (SWO), South Pacific	0	3	-	0	-	3
TOTAL BILLFISHES	3	1490	-	109	4	1606
Blue shark (BSH)	0	0	-	0	-	0
Mako shark (MAK)	0	0	-	0	-	0
Thresher sharks (THR)	0	1	-	0	-	1
Other sharks (SKH OCS FAL SPN TIG CCL)	0	0	-	0	-	0
TOTAL SHARKS	0	2	-	0	-	2
Mahimahi (DOL)	1	184	-	197	13	394
Moonfish (LAP)	0	90	-	0	-	90
Oilfish (GEP)	0	44	-	0	-	44
Pomfrets (BRZ)	0	127	-	0	1	128
Wahoo (WAH)	1	276	-	109	4	390
Other fish (PEL PLS MOP TRX GBA ALX GES RRU DOT)	1	1	-	8	0	10
TOTAL OTHER	3	721	-	313	18	1055
TOTAL	73948	11359	328	1109	417	87161

Table 1b. Estimated weight (metric tons) of catch by U.S. or its territories (American Samoa, Guam, and CNMI) by species and fishing gear in the WCPFC statistical area for 2022. Totals may not match sums of values due to rounding. A zero represents no catch or <0.5 t catch and a "-" indicates a species is not reported for a particular fishery.

Species and FAO Code	Purse Seine	Longline	Albacore Troll	Tropical Troll	Handline	Total
Albacore (ALB), North Pacific	0	129	-	1	5	135
Albacore (ALB), South Pacific	0	1139	1400	0	-	2539
Bigeye tuna (BET)	8457	5357	-	13	239	14065
Pacific bluefin tuna (PBF)	0	1	-	0	-	1
Skipjack tuna (SKJ)	42823	140	-	355	5	43322
Yellowfin tuna (YFT)	4449	2309	-	370	425	7554
Other tuna (TUN KAW FRI)	0	0	-	2	1	3
TOTAL TUNAS	55729	9075	1400	740	675	67619
Black marlin (BLM)	0	0	-	1	-	2
Blue marlin (BUM)	3	456	-	117	3	579
Sailfish (SFA)	0	9	-	3	-	12
Spearfish (SSP)	0	120	-	4	0	125
Striped marlin (MLS), North Pacific	0	255	-	9	-	264
Striped marlin (MLS), South Pacific	0	2	-	0	-	2
Other marlins (BIL)	0	0	-	0	-	0
Swordfish (SWO), North Pacific	0	760	-	0	1	762
Swordfish (SWO), South Pacific	0	3	-	0	-	3
TOTAL BILLFISHES	3	1606	-	135	4	1748
Blue shark (BSH)	0	0	-	0	-	0
Mako shark (MAK)	0	1	-	0	-	1
Thresher sharks (THR)	0	2	-	0	-	2
Other sharks (SKH OCS FAL SPN TIG CCL)	0	0	-	0	-	0
TOTAL SHARKS	0	3	-	0	-	3
Mahimahi (DOL)	1	149	-	232	9	392
Moonfish (LAP)	0	92	-	0	-	92
Oilfish (GEP)	0	64	-	0	0	64
Pomfrets (BRZ)	0	155	-	1	2	158
Wahoo (WAH)	2	231	-	85	2	321
Other fish (PEL PLS MOP TRX GBA ALX GES RRU DOT)	2	2	-	8	0	12
TOTAL OTHER	5	693	-	326	14	1038
TOTAL	55738	11376	1400	1201	693	70408

Table 1c. Estimated weight (metric tons) of catch by U.S. or its territories (American Samoa, Guam, and CNMI) by species and fishing gear in the WCPFC statistical area for 2021. Totals may not match sums of values due to rounding. A zero represents no catch or <0.5 t catch and a "-" indicates a species is not reported for a particular fishery.

Species and FAO Code	Purse Seine	Longline	Albacore Troll	Tropical Troll	Handline	Total
Albacore (ALB), North Pacific	0	135	-	1	5	141
Albacore (ALB), South Pacific	0	832	654	0	-	1486
Bigeye tuna (BET)	6145	5683	-	13	123	11964
Pacific bluefin tuna (PBF)	0	1	-	0	-	1
Skipjack tuna (SKJ)	39507	198	-	516	4	40225
Yellowfin tuna (YFT)	4820	2509	-	387	277	7992
Other tuna (TUN KAW FRI)	0	0	-	3	1	4
TOTAL TUNAS	50472	9358	654	920	409	61813
Black marlin (BLM)	1	0	-	1	-	2
Blue marlin (BUM)	2	397	-	128	3	530
Sailfish (SFA)	0	11	-	1	-	12
Spearfish (SSP)	0	121	-	5	-	126
Striped marlin (MLS), North Pacific	0	226	-	8	-	234
Striped marlin (MLS), South Pacific	0	3	-	0	-	3
Other marlins (BIL)	0	1	-	0	-	1
Swordfish (SWO), North Pacific	0	567	-	0	1	569
Swordfish (SWO), South Pacific	0	3	-	0	-	3
TOTAL BILLFISHES	3	1329	-	143	4	1480
Blue shark (BSH)	0	0	-	0	-	0
Mako shark (MAK)	0	1	-	0	-	1
Thresher sharks (THR)	0	1	-	0	-	1
Other sharks (SKH OCS FAL SPN TIG CCL)	0	0	-	0	-	0
TOTAL SHARKS	0	2	-	0	-	2
Mahimahi (DOL)	2	128	-	194	7	330
Moonfish (LAP)	0	136	-	0	-	136
Oilfish (GEP)	0	58	-	1	0	60
Pomfrets (BRZ)	0	150	-	1	2	153
Wahoo (WAH)	2	371	-	134	4	511
Other fish (PEL PLS MOP TRX GBA ALX GES RRU DOT)	1	3	-	11	0	15
TOTAL OTHER	5	846	-	341	13	1205
TOTAL	50479	11535	654	1404	427	64500

Table 1d. Estimated weight (metric tons) of catch by U.S. or its territories (American Samoa, Guam, and CNMI) by species and fishing gear in the WCPFC statistical area for 2020. Totals may not match sums of values due to rounding. A zero represents no catch or <0.5 t catch and a "-" indicates a species is not reported for a particular fishery.

Species and FAO Code	Purse Seine	Longline	Albacore Troll	Tropical Troll	Handline	Total
Albacore (ALB), North Pacific	0	57	18	0	3	78
Albacore (ALB), South Pacific	0	543	1901	0	-	2444
Bigeye tuna (BET)	9487	6059	-	19	145	15709
Pacific bluefin tuna (PBF)	0	1	-	0	-	1
Skipjack tuna (SKJ)	116886	203	-	348	5	117442
Yellowfin tuna (YFT)	11015	1581	-	333	243	13172
Other tuna (TUN KAW FRI)	0	0	-	1	1	2
TOTAL TUNAS	137388	8443	1919	702	397	148849
Black marlin (BLM)	1	0	-	1	-	3
Blue marlin (BUM)	9	513	-	111	3	636
Sailfish (SFA)	0	7	-	1	-	7
Spearfish (SSP)	0	105	-	3	-	108
Striped marlin (MLS), North Pacific	0	288	-	10	-	298
Striped marlin (MLS), South Pacific	1	2	-	0	-	2
Other marlins (BIL)	0	1	-	0	-	1
Swordfish (SWO), North Pacific	0	306	-	0	2	307
Swordfish (SWO), South Pacific	0	3	-	0	-	3
TOTAL BILLFISHES	11	1223	-	125	5	1364
Blue shark (BSH)	0	0	-	0	-	0
Mako shark (MAK)	0	2	-	0	-	2
Thresher sharks (THR)	0	1	-	0	-	1
Other sharks (SKH OCS FAL SPN TIG CCL)	0	0	-	0	-	0
TOTAL SHARKS	0	3	-	0	-	3
Mahimahi (DOL)	3	92	-	197	6	298
Moonfish (LAP)	0	238	-	0	-	238
Oilfish (GEP)	0	63	-	2	-	65
Pomfrets (BRZ)	0	181	-	0	1	182
Wahoo (WAH)	2	292	-	69	3	367
Other fish (PEL PLS MOP TRX GBA ALX GES RRU DOT)	1	2	-	12	1	15
TOTAL OTHER	7	867	-	280	11	1165
TOTAL	137406	10536	1919	1107	413	151381

Table 1e. Estimated weight (metric tons) of catch by U.S. or its territories (American Samoa, Guam, and CNMI) by species and fishing gear in the WCPFC statistical area for 2019. Totals may not match sums of values due to rounding. A zero represents no catch or <0.5 t catch and a "-" indicates a species is not reported for a particular fishery.

Species and FAO Code	Purse Seine	Longline	Albacore Troll	Tropical Troll	Handline	Total
Albacore (ALB), North Pacific	0	101	-	1	10	111
Albacore (ALB), South Pacific	0	1050	872	0	-	1923
Bigeye tuna (BET)	3014	6003	-	35	226	9278
Pacific bluefin tuna (PBF)	0	2	-	0	-	2
Skipjack tuna (SKJ)	144839	295	-	482	9	145625
Yellowfin tuna (YFT)	18102	1965	-	456	249	20771
Other tuna (TUN KAW FRI)	0	0	-	3	1	4
TOTAL TUNAS	165955	9415	872	977	495	177715
Black marlin (BLM)	3	0	-	2	-	6
Blue marlin (BUM)	3	860	-	176	5	1045
Sailfish (SFA)	0	16	-	1	-	17
Spearfish (SSP)	0	173	-	7	-	179
Striped marlin (MLS), North Pacific	0	458	-	13	-	472
Striped marlin (MLS), South Pacific	0	2	-	0	-	2
Other marlins (BIL)	0	0	-	0	-	0
Swordfish (SWO), North Pacific	0	555	-	0	3	558
Swordfish (SWO), South Pacific	0	4	-	0	-	4
TOTAL BILLFISHES	7	2068	-	200	8	2282
Blue shark (BSH)	0	0	-	0	-	0
Mako shark (MAK)	0	35	-	0	-	35
Thresher sharks (THR)	0	5	-	0	-	5
Other sharks (SKH OCS FAL SPN TIG CCL)	0	0	-	0	-	0
TOTAL SHARKS	0	40	-	0	-	40
Mahimahi (DOL)	3	145	-	344	8	500
Moonfish (LAP)	0	428	-	0	-	428
Oilfish (GEP)	0	103	-	0	-	103
Pomfrets (BRZ)	0	275	-	0	8	283
Wahoo (WAH)	5	479	-	158	7	649
Other fish (PEL PLS MOP TRX GBA ALX GES RRU DOT)	1	2	-	9	0	13
TOTAL OTHER	9	1433	-	511	24	1977
TOTAL	165971	12955	872	1688	527	182014

Table 1f. Longline retained catch (metric tons) by species and species group for U.S. and territories of CNMI and American Samoa (AS) (no catch for Guam during this period) operating in WCPFC statistical area in North Pacific Ocean (NPO) and South Pacific Ocean (SPO) in 2019–2023. Totals may not match sums of values due to rounding. A zero represents no catch or <0.5 t catch and a "-" indicates a species is not reported for a particular fishery.

	U.S. (NPO)					CNMI (NPO)					AS (NPO)					AS (SPO)					Total				
	2023	2022	2021	2020	2019	2023	2022	2021	2020	2019	2023	2022	2021	2020	2019	2023	2022	2021	2020	2019	2023	2022	2021	2020	2019
VESSELS	145	142	137	135	138	135	120	131	119	128	19	133	24	122	127	10	11	12	11	18	155	153	150	146	156
Albacore, NPO	238	108	105	48	88	0	0	0	0	0	25	22	30	8	12	0	0	0	0	0	264	129	135	57	101
Albacore, SPO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	868	1139	832	543	1050	868	1139	832	543	1050
Bigeye tuna	3553	3237	3748	3546	3459	1205	552	1500	926	999	369	1546	405	1563	1514	37	22	30	23	31	5164	5357	5683	6059	6003
Pacific bluefin tuna	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2
Skipjack tuna	52	84	130	124	198	0	0	0	0	0	5	10	15	16	28	46	45	53	64	69	103	140	198	203	295
Yellowfin tuna	2329	1971	2021	1199	1556	0	0	0	0	0	209	184	274	160	220	209	155	213	222	189	2746	2309	2509	1581	1965
Other tuna	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
TOTAL TUNAS	6174	5401	6005	4918	5302	1205	552	1500	926	999	609	1762	725	1747	1774	1159	1360	1128	852	1339	9146	9075	9358	8443	9415
Black marlin	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Blue marlin	289	350	332	440	747	0	0	0	0	0	25	52	31	44	83	39	53	34	28	29	353	456	397	513	860
Sailfish	8	8	9	5	12	0	0	0	0	0	1	1	1	1	2	1	1	1	1	2	10	9	11	7	16
Spearfish	160	112	110	94	154	0	0	0	0	0	11	8	10	11	16	1	1	1	0	2	172	120	121	105	173
Striped Marlin, NPO	169	230	196	241	397	0	0	0	0	0	13	25	30	47	62	0	0	0	0	0	182	255	226	288	458
Striped Marlin, SPO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	3	2	2	2	2	3	2	2
Other marlins	4	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	1	1	0
Swordfish, NPO	748	735	528	266	510	0	0	0	0	0	15	26	39	40	44	0	0	0	0	0	763	760	567	306	555
Swordfish, SPO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	4	3	3	3	3	4
TOTAL BILLFISH	1379	1435	1177	1047	1821	0	0	0	0	0	65	111	111	143	208	46	60	42	33	39	1490	1606	1329	1223	2068
Blue shark	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
Mako shark	0	1	1	2	32	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	1	1	2	35
Thresher	1	2	1	1	4	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	1	2	1	1	5
Sharks nei	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
Oceanic whitetip	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
Silky shark	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
Hammerhead	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
Tiger shark	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
Blacktip shark	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
TOTAL SHARKS	2	3	1	3	36	0	0	0	0	0	0	0	1	0	3	0	0	0	0	1	2	3	2	3	40
Mahimahi	164	130	109	75	123	0	0	0	0	0	19	14	18	11	20	1	6	1	5	2	184	149	128	92	145
Moonfish	77	80	109	198	368	0	0	0	0	0	12	12	26	40	59	0	1	1	1	1	90	92	136	238	428
Oilfish	39	57	52	55	89	0	0	0	0	0	5	7	6	8	15	0	0	0	0	0	44	64	58	63	103
Pomfret	118	138	132	157	246	0	0	0	0	0	9	17	18	23	29	0	0	0	0	0	127	155	150	181	275
Wahoo	239	194	314	239	401	0	0	0	0	0	25	25	41	35	60	12	12	16	18	18	276	231	371	292	479
Other fish	1	1	2	1	1	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	1	2	3	2	2
TOTAL OTHER	638	600	718	726	1228	0	0	0	0	0	69	74	109	118	184	14	19	19	23	21	721	693	846	867	1433
TOTAL	8192	7439	7901	6694	8387	1205	552	1500	926	999	743	1947	945	2008	2169	1219	1439	1189	909	1400	11359	11376	11535	10536	12955

Table 1g. Estimated catch of tropical troll fishery (metric tons) for Hawaii, Guam, CNMI, and American Samoa vessels by species and species group operating in WCPFC statistical area in 2019–2023. A zero represents no catch or <0.5 t catch and a "-" indicates a species is not reported for a particular fishery.

	Hawaii					Guam					CNMI					American Samoa					Total Tropical Troll				
	2023	2022	2021	2020	2019	2023	2022	2021	2020	2019	2023	2022	2021	2020	2019	2023	2022	2021	2020	2019	2023	2022	2021	2020	2019
VESSELS	1151	1170	1187	1126	1294	466	449	546	459	465	77	95	85	76	51	9	9	5	8	5	1703	1723	1823	1669	1815
Albacore, NPO	0	1	1	0	1	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	0	1	1	0	1
Albacore, SPO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0
Bigeye tuna	5	13	13	18	35	0	0	0	0	0	-	-	-	-	-	0	0	0	0	0	5	13	13	19	35
Pacific bluefin tuna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0
Skipjack tuna	108	101	69	78	106	223	192	302	159	215	35	60	139	108	157	2	2	6	3	5	367	355	516	348	482
Yellowfin tuna	259	348	332	294	410	44	15	42	26	29	9	6	12	11	17	0	0	2	2	1	312	370	387	333	456
Other tunas	1	1	1	1	3	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	2	2	3	1	3
TOTAL TUNAS	373	463	415	392	555	267	208	344	186	244	45	67	153	119	173	2	2	8	5	6	686	740	920	702	977
Black marlin	1	1	1	1	2	0	0	0	0	0	-	-	-	-	-	0	0	0	0	0	1	1	1	1	2
Blue marlin	87	113	112	88	152	6	4	14	23	23	0	0	1	0	2	0	0	0	0	0	94	117	128	111	176
Sailfish	1	1	1	1	1	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	3	1	1	1
Spearfish	6	4	5	3	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	4	5	3	7
Striped marlin, NPO	6	9	8	10	13	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	6	9	8	10	13
Striped marlin, SPO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0
Other billfish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0
Swordfish, NPO	-	0	0	-	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0
Swordfish, SPO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0
TOTAL BILLFISHES	101	129	128	102	175	7	4	14	23	23	0	2	1	0	2	0	0	0	0	0	109	135	144	125	200
Blue shark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0
Mako shark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0
Thresher sharks	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0
Other sharks	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL SHARKS	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mahimahi	167	162	166	138	249	24	43	14	44	62	5	26	14	14	33	0	0	0	0	0	197	232	194	197	344
Moonfish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0
Oilfish	-	-	-	-	-	0	0	1	2	0	-	-	-	-	-	0	0	0	0	0	0	0	1	2	0
Pomfrets	-	-	-	-	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Wahoo	82	50	121	47	146	21	26	10	21	11	6	9	2	1	1	0	0	0	0	0	109	85	134	69	158
Other pelagics	0	0	0	0	0	6	5	5	8	5	1	3	6	4	3	0	0	0	0	0	8	8	11	12	9
TOTAL OTHER	250	213	287	186	396	51	74	31	74	78	13	39	22	19	37	0	0	1	1	1	313	326	341	280	511
GEAR TOTAL	724	805	830	680	1126	326	287	389	283	345	57	108	176	138	212	2	2	8	5	7	1109	1201	1404	1107	1688

Table 1h. Estimated catch of swordfish, and number of U.S. vessels fishing for swordfish, south of 20° S in the WCPFC statistical area in 2019–2023 to fulfill the reporting requirements of WCPFC CMM 2009-03.

	U.S. Vessels South of 20° S	
Year	Catch (t)	Number of vessels fishing for swordfish
2023	0	0
2022	0	0
2021	0	0
2020	0	0
2019	0	0

Table 2a. Number of U.S. and territorial vessels operating in WCPFC statistical area by gear type from 2019–2023.

	2023	2022	2021	2020	2019
Purse seine	**13**	**13**	**21**	**23**	**31**
Longline (North Pacific-based) [1]	145	142	137	135	138
Longline (American Samoa-based)	10	11	12	11	18
Total U.S. longline [2]	**155**	**153**	**150**	**146**	**156**
Albacore troll (North Pacific)	0	0	0	3	0
Albacore troll (South Pacific)	10	18	21	18	9
Total albacore troll[3]	**10**	**18**	**21**	**21**	**9**
Tropical troll	1703	1723	1823	1669	1815
Handline	375	435	389	398	445
Total tropical troll and handline[4]	**1802**	**1833**	**1921**	**1796**	**1933**
TOTAL	**1980**	**2017**	**2113**	**1983**	**2129**

[1] Includes Hawaii- and California-based vessels that fished west of 150 W.
[2] Longline vessels that made trips based out of Hawaii or California and American Samoa are only counted once in total U.S. longline.
[3] Albacore troll vessels that fished on both sides of the equator are only counted once in total albacore troll
[4] Vessels that used both tropical troll and handline gear are only counted once in total tropical troll and handline.

Table 2b. Estimated number vessels for the U.S. and its territories operating in the WCPFC statistical area by gear type and gross registered tonnage (GRT), 2019–2023.

Gear and year	Gross registered tonnage				
Purse seine				**1001–1500**	**1500+**
2019				14	17
2020				7	13
2021				6	9
2022				5	9
2023				4	9
Longline	**0–50**	**51–200**			
2019	10	146			
2020	6	140			
2021	4	146			
2022	3	150			
2023	4	151			
Albacore pole and line	**0–50**	**51–150**			
2019	1	1			
2020	1	1			
2021		1			
2022		1			
2023		1			
Albacore troll		**51–150**	**150+**		
2019		6	3		
2020		9	9		
2021		12	9		
2022		9	10		
2023		5	6		

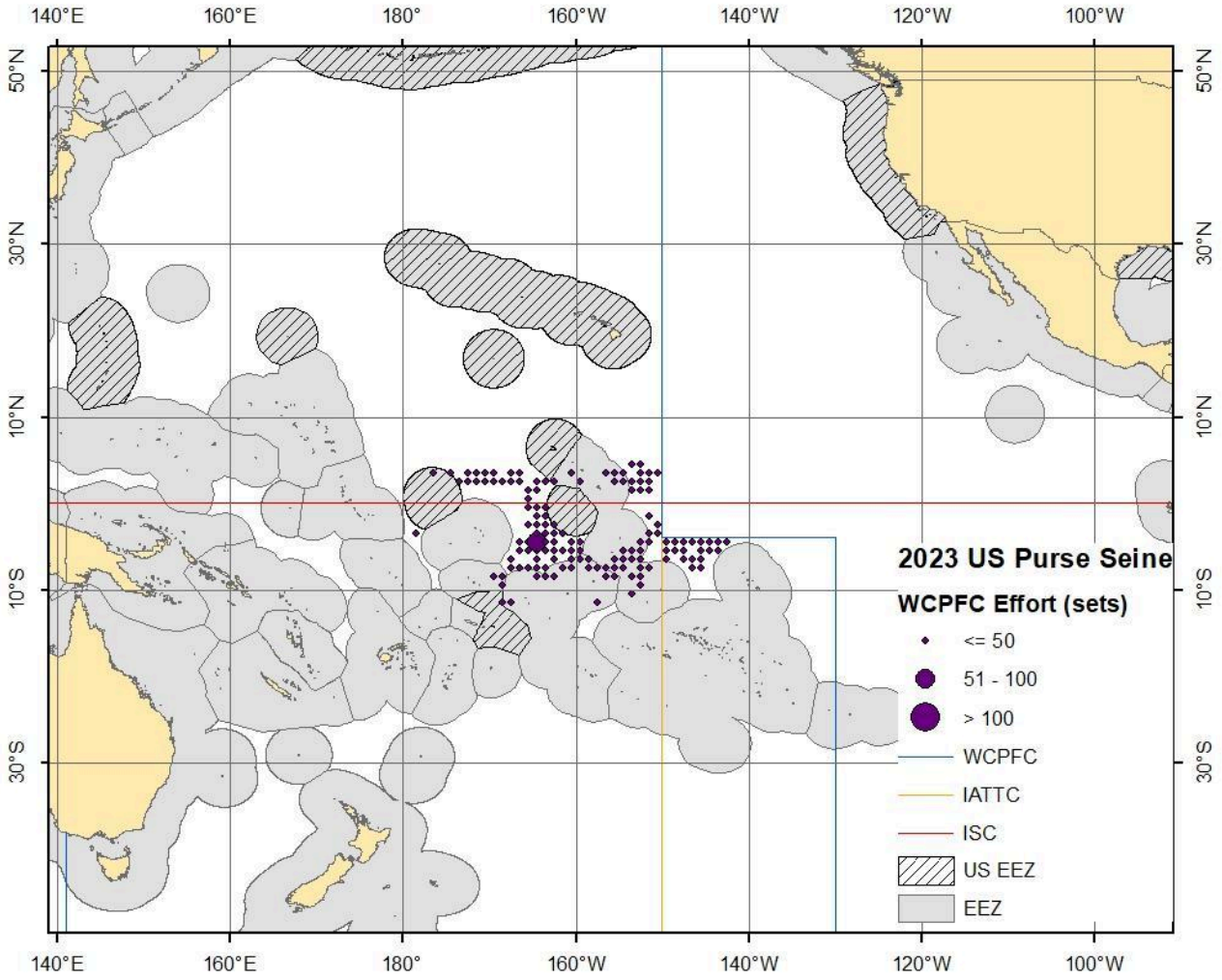

Figure 1. Spatial distribution of fishing effort (number of sets) reported in logbooks by U.S.-flagged purse seine vessels fishing in the Pacific Ocean in 2023. Effort in some areas is not shown to preserve data confidentiality.

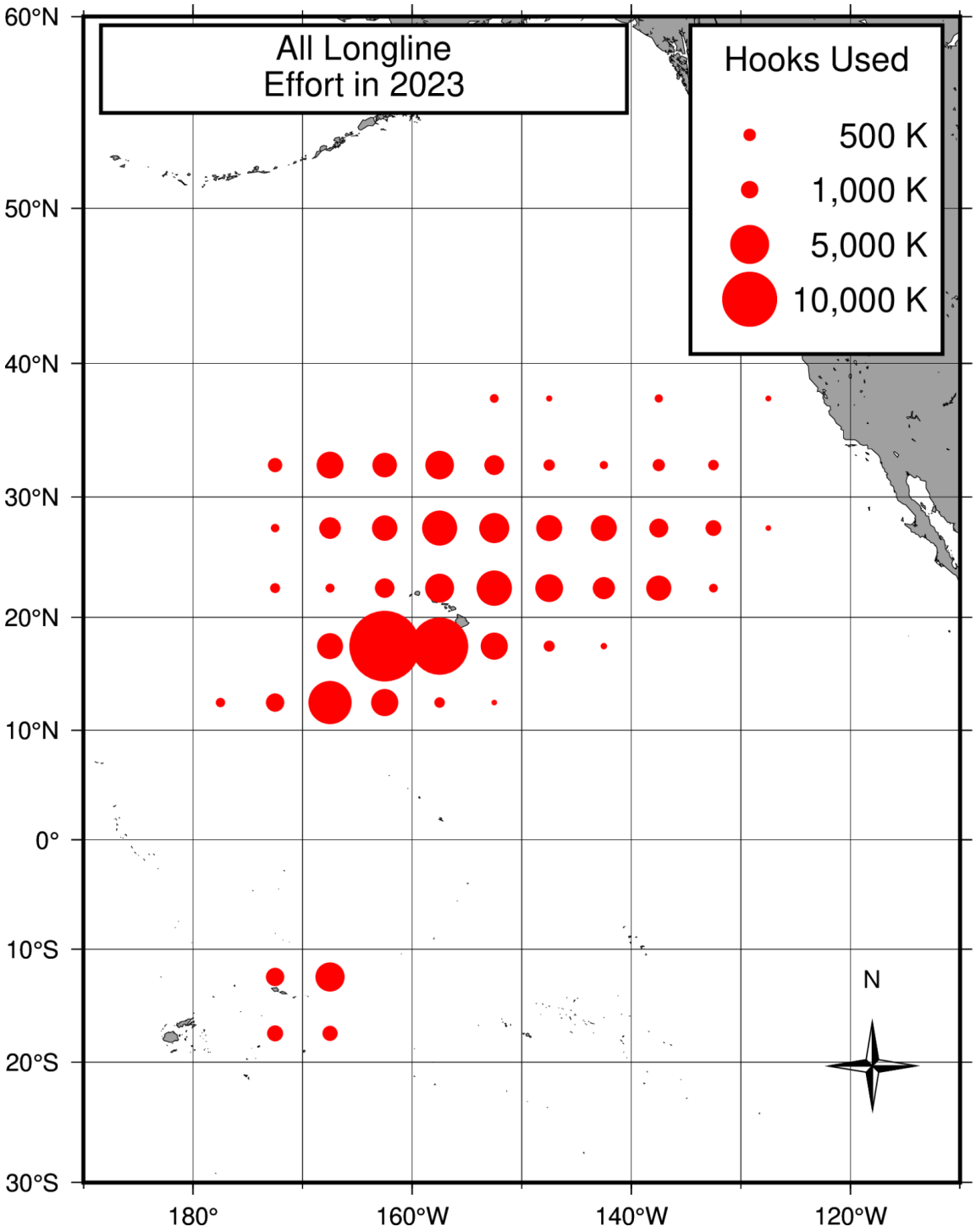

Figure 2a. Spatial distribution of fishing effort (number of hooks; K=1,000 hooks) reported by U.S.-flagged longline vessels fishing in the Pacific Ocean in 2023. Effort in some areas is not shown to preserve data confidentiality.

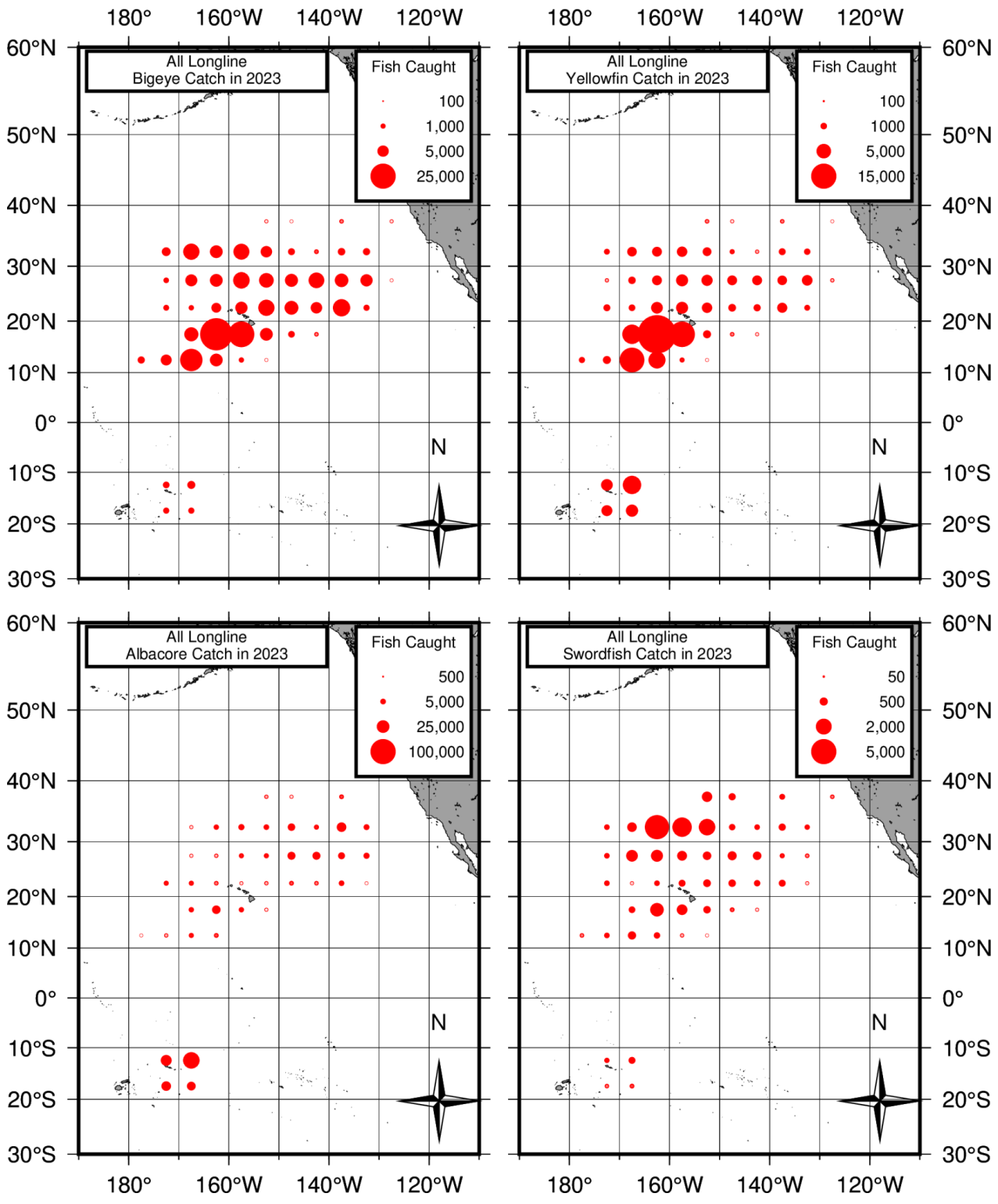

Figure 2b. Spatial distribution of retained and released catch (in number of fish) by U.S.-flagged longline vessels in 2023. Catches in some areas are not shown to preserve data confidentiality.

Flag State Reporting of National Fisheries

U.S. Purse Seine Fishery

The U.S. purse seine catch of tunas in the WCPFC statistical area was 73,948 t in 2023, which is higher than 2021 (50,479 t) and 2022 (55,738 t), but less than half of the total annual catches for 2019 and 2020 (165,971 t in 2019 and 137,406 t in 2020; Table 1a-e). The 2023 catch was primarily composed of skipjack tuna (78%), with smaller catches of yellowfin (11%) and bigeye tuna (11%). The skipjack catch has fluctuated over the past five years ranging from 39,507 in 2021 to 144,839 in 2019 (Table 1a-1e) with variable participation in the U.S. fleet with only 13 vessels operating in 2022 and 2023 compared to 31 vessels in 2019 (Table 2a). In 2023, the fishery operated in a slightly larger area than in 2022 with fishing effort around the equator, mainly between 10° N and 10° S latitude, and between 180° E and 140° W longitude with some fishing in the area that where there is overlap in the WCPFC and IATTC management boundaries (Figure 1).

U.S. Longline Fisheries

The U.S. longline fishery consists of mostly vessels that are based in Hawaii with a few vessels based out of California and a handful of vessels based out of American Samoa. In 2023 there were a total of 155 longline vessels that fished west of 150° W (Table 2a) with 4 vessels less than or equal to 50 gross registered tonnage **(**GRT) and 151 vessels greater than 50 GRT (Table 2b). In 2023, 145 longline vessels made fishing trips based out of the NPO, mainly Hawaii, which is the largest number of vessels operating in the last five years. Effort remains low for the number of vessels based out of American Samoa with only 10 vessels operating in 2023 (Table 2a).

Retained catches are assigned to the longline fisheries of the U.S., American Samoa, Guam or the CNMI based on the 1) port of landing, 2) location of catch, 3) the types of permit(s) registered to the vessel, and 4) if caught during a time period and from a vessel that was included in an arrangement[1] that allowed the bigeye tuna catch to be assigned to a longline fishery from the U.S. territories of American Samoa, Guam, or CNMI. A few longline vessels operated with both Hawaii and American Samoa permits during 2019–2023. If longline catches from these vessels were outside of the U.S. EEZ in the NPO, the catches were attributed to American Samoa (even if landed in Hawaii) in accordance with federal fisheries regulations (50 *CFR* 300.224).

[1] Agreements allowing bigeye tuna catch from the Hawaii-permitted longline vessels that fished in the high seas or the Hawaii EEZ to be attributed to U.S territories of American Samoa, Guam, or CNM: 1) Consolidated and Further Continuing Appropriations Act, Sec. 113(a), 2012, Pub. L. 112-55, 125 Stat. 552 et seq., 2) of the Pelagics Fishery Ecosystem Plan, Amendment 7)

If longline catches are from vessels operating under an agreement attributing bigeye catch to a U.S. territory (American Samoa, Guam, or CNMI), then bigeye tuna catch during the time period of the agreement is included in catches for that territory in the NPO within the WCPFC statistical area while other species caught during the same time period are attributed to the Hawaii longline fishery and included in the U.S. NPO catches (Table 1f). Since 2019, there were agreements with CNMI for all years and for American Samoa for 2019, 2020, and 2022.

The U.S. longline fishery in the NPO within the WCPFC statistical area operated between 10° N to 40° N latitude and from 125° W to 180° W in 2023 (Figure 2a). The American Samoa-based longline fishery operated mostly from 10° S to 20° S latitude and 165° W to 175° W longitude in 2023 (Figure 2a). The U.S. longline fishery in the NPO targeted bigeye tuna and swordfish with catches also composed of yellowfin tuna (28% of retained catch in 2023) and other pelagic species (≤ 4% of retained catch for any particular species in 2023). The geographic distribution of bigeye tuna, yellowfin tuna, and swordfish catches in the NPO within the WCPFC statistical area were similar; however, the areas with the highest concentrations of swordfish catch were further north compared to the areas with the highest concentrations of bigeye and yellowfin tuna catches. The American Samoa longline fishery in the South Pacific Ocean (SPO) targeted albacore, but also caught a noteworthy proportion of yellowfin tuna (17% of retained catch in 2023), which can be seen in the distribution of yellowfin tuna and albacore tuna catch in the SPO (Figure 2b). The total annual longline catch for the U.S. and its territories of all retained species from 2019 to 2023 ranged from a low of 10,536 t in 2020 to a high of 12,955 t in 2019 with the 2023 catch (11,359 t) similar to the annual average (11,552 t) for the 5-year period (Table 1f). Approximately 1 t of Pacific bluefin tuna catches were reported in logbooks in 2023 for U.S. longline fisheries (Table 1f); however, it is possible that some of the reported bluefin tuna are other tuna species that were misidentified.

Most of the U.S. longline fishery in the NPO targets tuna using deep-set longline gear; while the U.S. longline fishery that targets swordfish uses shallow-set gear. Swordfish landings in the NPO within the WCPFC statistical area have varied from 2019 to 2023, ranging from 306 t in 2020 to 763 t in 2023. No swordfish were caught and no longline vessels targeted swordfish south of 20°S in the WCPFC Statistical Area from 2019–2023 (Table 1h).

The U.S. longline shallow-set fishery was closed in recent years in 2018 and 2019, when it exceeded the fleet-wide annual interaction limit on loggerhead sea turtles (34 loggerhead sea turtles in 2018 and 17 loggerhead sea turtles in 2019). However, the annual interaction limits for loggerhead sea turtles have been removed from management regulations since 2020. Annual interaction limits are still in place for leatherback sea turtles (16 sea turtles) with trip limits for loggerhead sea turtles (two leatherback and five loggerhead sea turtles).

U.S. Albacore Troll and Pole and Line Fisheries

In recent years, participation in the U.S. troll fisheries for albacore in the WCPFC Statistical Area, has ranged from 9 to 21 vessels annually from 2019 to 2023. Ten vessels participated in the South Pacific albacore troll fishery in 2023, which is below the average of 15 vessels from 2019 to 2023 (Table 2a). The catch in this fishery is composed almost exclusively of albacore with 328 t of albacore caught in 2023, which is well below the 5-year average of 1,031 t from 2019 to 2023. The South Pacific albacore troll fishery operates mostly between 30° S and 45° S latitude and 145° W and 175° W longitude. During the last 5-years, participation in the North Pacific albacore troll fishery in the WCPFC statistical area only occurred in 2020 with 3 vessels. In addition, one or two albacore pole and line vessels operated in the WCPFC statistical area of the NPO annually from 2019 to 2023 (Table 2b).

Other Fisheries of the U.S. and Territories

In the WCPFC statistical area, the U.S. and its territories have small-scale tropical troll and handline fisheries that operate mostly nearshore with 1,802 vessels operating in 2023. Although the number of vessels participating in small-scale fisheries is large, the catch only comprises about 2% of the total HMS catch in the WCPFC statistical area for the U.S. and its territories. The total catch by tropical troll and handline fisheries was 1,109 t in 2023 with the catch composed primarily of yellowfin and skipjack tunas, mahimahi, wahoo, and blue marlin (Table 1g). Hawaii-based fishers account for the majority (68%) of the tropical troll vessels (1,151 vessels in 2023) and all of the handline vessels (35 vessels in 2023). The catch statistics for Hawaii troll and handline fisheries are derived from fisher catch reports, which are required for all fishing trips for fishers that are commercially permitted (including charter fishers) no matter if fish are being sold on a trip. However, if Hawaii troll or handline fishing trips are performed solely for subsistence, personal use, or recreational purposes and a fisher is not commercially permitted, then no catch reports are required. In 2023, 27% of the tropical troll fishing vessels operated out of Guam with only 5% from CNMI and <1% from American Samoa. There has been a decline in fishing effort by locals in American Samoa with fishers buying HMS from the cannery or from the docks by foreign fishers landing in American Samoa. Fishing trips in the territories may include trips that are for commercial, recreational, or subsistence purposes with trips often including fish that are both sold and retained for personal use. Commercial fishing trips may also include charter fishing trips where fish are not sold but instead profit is derived from paid clients. Territorial fisheries catches are monitored by creel surveys (i.e. fisheries catch and effort data collected shoreside by technicians through fisher interviews).

Socioeconomic Factors and Trends in the Fisheries

Socio-economic Surveys and Analyses

NMFS staff and colleagues conducted surveys and analyses to better understand the socioeconomic considerations of U.S. pelagic fisheries in the WCPFC statistical area.

Relevant Publications

Ayers A, Leong K, Hospital J, Tam C, Morioka C. 2023. 2022 American Samoa Fisher Observations Data Summary and Analysis. Pacific Islands Fisheries Science Center, PIFSC Data Report, DR-23-14, 14 p. https://doi.org/10.25923/vwj1-3z88

Chan HL. 2023. Economic Contributions of U.S. Commercial Fisheries in American Samoa. U.S. Dept. of Commerce, NOAA Technical Memorandum NOAA-TM-NMFS-PIFSC-151, 35 p. https://doi.org/10.25923/x904-a830

Chan, HL. 2023. Economic and social characteristics of the Hawaii small boat fishery 2021. U.S. Dept. of Commerce, NOAA Technical Memorandum NOAA-TM-NMFS-PIFSC-138, 177 p. https://doi.org/10.25923/2s7e-7m45

Dombrow C, Hospital J. 2023. Economic and Social Characteristics of the American Samoa Small Boat Fishery 2021. Pacific Islands Fisheries Science Center, PIFSC Administrative Report, H-23-05, 92 p. https://doi.org/10.25923/hqca-xs29

Fisheries Research and Monitoring Division Pacific Islands Fisheries Science Center. 2023. Economic value of longline catch in the PRIA. Pacific Islands Fisheries Science Center, PIFSC Data Report, DR-23-17, 2p. https://doi.org/10.25923/qjcc-mn28

Disposition of Catch

Purse seine catch is stored onboard as a frozen whole product. Most of the purse seine catch has historically been off-loaded to canneries in Pago Pago, American Samoa. However, recently, more vessels have shipped their catches from the ports of other Pacific Island countries to canneries in Southeast Asia and Latin America. Cannery products from American Samoa are typically destined for U.S. canned tuna markets. Catches of non-tuna species are consumed onboard the vessel or discarded at sea.

Hawaii- and California-based longline vessels fishing in the North Pacific store their catch on ice and deliver their product to the market as a fresh product. Large tunas, marlins, and mahimahi are gilled and gutted before being stored on the vessel, swordfish are headed and gutted, and other species caught are stored whole. These products are primarily sold fresh locally in Hawaii to restaurants and retail markets, or air freighted to U.S. mainland destinations with a very small proportion of high quality bigeye tuna exported to Japan. The American Samoa-based longline albacore catch is gilled and gutted and delivered as a frozen product to the cannery in Pago Pago, American Samoa. Other associated catch is either marketed fresh (for vessels making day trips)

or frozen (for vessels making extended trips).

In 2023, all catch from the U.S. South Pacific albacore troll fishery was transported to New Zealand. In past years, the majority of catch was transported to New Zealand or Canada; however, in 2023 U.S. vessels fishing for albacore in the WCPFC statistical area redirected catch to New Zealand with the termination of U.S.-Canada Albacore Treaty. In addition, in 2023 no U.S. South Pacific albacore troll vessels landed catch on the west coast of the U.S. as had been done in previous years. Albacore catch is frozen for transportation.

Most small-scale pelagic fisheries store their catch in ice; large tunas are gilled and gutted while other species are kept whole. The small-scale tropical troll fisheries chill their products with ice and sell it fresh, mainly to local markets.

Onshore Developments

No major developments have occurred in processing plants or support facilities for the U.S. fisheries.

Future Prospects of the Fisheries

Fuel costs and supplies associated with fishing operations have increased dramatically in the last year and may affect participation and trip distance from ports for all U.S. large-scale and small-scale fisheries. In addition, U.S. fleets face competition from less regulated foreign fleets that may have lower operational costs.

The U.S. longline fishery in the NPO is expected to continue targeting bigeye tuna and swordfish, as well as catch other associated pelagic species in future years and deliver them fresh to both local and mainland markets. As of 2024, an increase in the annual catch limit of bigeye tuna from 3,554 to 6,554 t in the WCPFC statistical area (CMM 2023-01) will reduce constraints in potential growth of the Hawaii deep-set fishery. However the Hawaii longline fishery will no longer be able to obtain additional quota from the U.S. territories as was done in previous years through an agreement[2]. However, the Hawaii longline fleet will still be able to assign bigeye tuna catch in the NPO to American Samoa if they were caught by fishers with both Hawaii and American Samoa permits.

Although the Hawaii deep-set fishery may not be as limited by their bigeye quota in the future, it is uncertain whether the fishery will grow or even decline. In 2023, the fishery had higher yields but did not have higher revenues as the fishery faced severe economic impacts with high costs to

[2] Agreements allowing bigeye tuna catch from the Hawaii-permitted longline vessels that fished in the high seas or the Hawaii EEZ to be attributed to U.S territories of American Samoa, Guam, or CNM: 1) Consolidated and Further Continuing Appropriations Act, Sec. 113(a), 2012, Pub. L. 112-55, 125 Stat. 552 et seq., 2) of the Pelagics Fishery Ecosystem Plan, Amendment 7)

operate and low prices for fish with competition from foreign imports according to a press release on June 7, 2024 Western Pacific Regional Management Council.

Bigeye tuna catch in the eastern Pacific Ocean (EPO) was well below the catch limit (750t for vessels greater than 24 m) established by the Inter-American Tropical Tuna Commission (IATTC) with only 25 longline vessels greater than 24 m operating in the EPO. However, more effort is not expected by the U.S. longline deep-set fishery in the EPO due to increasing fuel costs.

It is possible that the Hawaii longline deep-set fishery may be limited in its geographic distribution if there is an area closure for the management of false killer whale (*Pseudorca crassidens*) populations. If a closure occurs, then the deep-set fishery may have to travel further and incur additional fuel costs to reach fishing grounds. As of February 23, 2024 an area closure would occur within the U.S. EEZ in an management area defined as the Southern Exclusion Zone[3] if a"trigger" of three false killer whales is incidentally caught by the Hawaii deep-set fishery within the U.S. Exclusive Economic Zone and the whales are given a determination of mortality or serious injury (https://www.federalregister.gov/documents/2024/02/23/2024-03664/pacific-island-pelagic-fisheries-false-killer-whale-take-reduction-plan-new-trigger-value-for). This "trigger" is published in accordance with the Marine Mammal Protection Act (MMPA) of 1972 and the False Killer Whale Take Reduction Plan and is defined in § 229.37(e)(2) as the larger of either of the values: (i) 2 observed M/SI of false killer whales within the EEZ around Hawaii, or (ii) the smallest number of observed false killer whale M/SI that, when extrapolated based on the percentage observer coverage in the deep-set longline fishery for that year, exceeds the Hawaii pelagic false killer whale stock's potential biological removal (PBR). In 2024, the observer coverage was reduced from 20% to 13.5% due to increased program costs and decreased available funding, and the PBR was estimated at 16 false killer whales. Thus the "trigger" was calculated at three false killer whales. Additional changes are expected in the management of false killer whale populations around Hawaii in the near future. In March 2023, NMFS introduced a new False Killer Whale Management Area that included areas inside and outside the EEZ around Hawaii with a PBR calculated to be 33 pelagic false killer whales. However, the False Killer Whale Management Area and associated PBR are not yet available for current management use.

It is expected that effort will remain high in the Hawaii shallow-set longline fishery that targets swordfish with market demand, despite rising operational costs. Effort in the shallow-set fishery increased in 2022 and remained high in 2023 compared to the lower effort observed in 2016 and 2017–2021. The shallow-set fishery overlaps spatially and temporally with seasonal abundance

[3] The Southern Exclusion Zone false killer whale management area is defined by boundaries on the east at 154°30′ W longitude, on the west at 165° W longitude, north by the boundaries of the Main Hawaiian Islands Longline Fishing Prohibited Area and Papahānaumokuākea Marine National Monument, and on the south by the EEZ boundary an area within the main Hawaiian Islands EEZ.

of sea turtles and thus has management regulations to ensure the conservation of sea turtles. However, it is not expected that interactions with sea turtles will result in any fishery closures unless effort increases greatly. Current management regulations do not include an annual interaction limit on loggerhead sea turtles, the species of sea turtle most commonly interacted with in the Hawaii shallow-set fishery. Instead, current regulations include annual limits on leatherback sea turtles (16 sea turtles) and trip interaction limits on loggerhead and leatherback sea turtles (two leatherback and five loggerhead sea turtles). Recent closures (2018 and 2019) occurred in this fishery when annual limits were still in place for loggerhead sea turtles (34 loggerhead sea turtles in 2018; 17 loggerhead sea turtles in 2019).

Fishing effort in the American Samoa longline and small-boat troll fisheries in the South Pacific is expected to remain low. The American Samoa longline fishery is expected to continue targeting albacore and deliver their catch frozen to the cannery in Pago Pago, American Samoa. However, effort by this longline fleet is expected to remain low with similar effort as in 2023 when only 10 vessels that fished. This fleet has had recent operational challenges with limited available crew in this remote location and high operational costs. In addition, growth of this fishery may be prevented as the fishing area close to American Samoa is limited to its EEZ as waters outside are surrounded by the EEZs of other countries. A substantial distance must be traveled to reach international waters; consequently, requiring large amounts of fuel. Longliners are also faced with competition from foreign vessels. Low effort is also expected for the American Samoa small-boat troll fishery that has had on average only seven vessels fishing from 2019 to 2023. Typically, locals buy fish from the cannery or from the docks at low prices from foreign fishing vessels, which reduces the demand for local fishers. However, there will be some new opportunities for local fishing in 2024 with the arrival of three super ‘alia vessels that can be leased to locals. These vessels can be used for longlining or bottom fishing and are 38 ft in length, smaller than typical longliners. In addition, locals that would like to lease vessels will be able to receive training.

Participation and catch from the Hawaii small-scale troll and handline fisheries and the Guam and CNMI troll fisheries is expected to be fairly stable although these fisheries are challenged by uncertainty in the economy and fish market prices along with increasing fuel and supply costs. The main Hawaiian Island troll and handline fisheries are expected to continue to make single-day trips targeting tunas, billfish, and other pelagic fish, and deliver their catch fresh to local markets.

The future prospects of the albacore fishing fleets in the WCPFC statistical area will depend on a balanced approach that considers environmental sustainability, effective regulation, market dynamics, and technological progress. Maintaining healthy albacore populations and ensuring the economic viability of the fleets will require ongoing collaboration and adaptive management strategies.

Status of Fisheries Data Collection Systems

Logsheet Data Collection and Verification

U.S. pelagic fisheries are monitored using fishery-dependent data collected from various sources: logbooks and fish catch reports submitted by fishers, at-sea observers, port samplers, market sales reports from fish dealers, and creel surveys (i.e. offshore fisheries catch and effort data collected shoreside by technicians through fisher interviews). The coverage rates for different data collection methods vary considerably.

The primary monitoring system for retained catches for the major U.S. fisheries (purse seine, longline, and albacore troll) in the WCPFC statistical area is federally mandated logbooks that provide catches (in numbers of fish or weight), fishing effort, fishing location, and some details on fishing gear and operations. U.S. purse seine logbook and landings data have been submitted, as a requirement of the South Pacific Tuna Treaty, since 1988 with coverage rates at 100%. Logbooks have been required to be submitted to NOAA fisheries by all Hawaii and American Samoa longline vessels since 1990 with logbook coverage generally at 100%. The Hawaii, California, and American Samoa-based longline fisheries are monitored using primarily electronic logbooks with some paper logs. Electronic reporting was first tested in the region in 2019 with full implementation mandated in 2021 for the Hawaii longline fleet. The use of electronic reporting throughout the U.S. and American Samoa longline fisheries assists in better real-time estimates of bigeye tuna catch. Currently the U.S. is also developing an electronic logbook to support data collection and monitoring for the albacore troll fisheries.

In Hawaii, fish sales records from the Hawaii Division of Aquatic Resources (DAR) Commercial Marine Dealer Report database supplement logbook data with sales records covering virtually 100% of the Hawaii-based longline landings. The Western Pacific Fisheries Information Network (WPacFIN) integrates Hawaii longline logbook catch data of numbers of fish caught by trip with the fish weight and sales data from the dealers' purchase reports. As a result, data on the weight and value of most catches on a trip level can be linked. This integration of data provides average fish weight data by gear type, time period, and species that are used to estimate total catch weights for the Hawaii fisheries.

Small-scale pelagic fisheries in Hawaii (i.e. tropical troll and handline) are monitored using the Hawaii DAR Commercial Fishermen's Catch Report data and Commercial Marine Dealer Report data. The tropical troll pelagic fisheries that are boat-based in American Samoa, Guam, and CNMI are monitored by creel surveys as part of WPacFIN.

Relevant Publications

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Observer Programs

Purse seine

U.S. purse seine vessels operating in the WCPFC statistical area under the Treaty on Fisheries between the Governments of Certain Pacific Island States and the U.S. of America (Treaty) were monitored by observers provided by the Pacific Islands Forum Fisheries Agency (FFA) through 2022. Beginning in 2023 U.S. purse seine vessels were monitored by observers provided by the Parties to the Nauru Agreement (PNA). Monitoring includes both the collection of scientific data, as well as information on operator compliance with various Treaty-related and Pacific island country-mandated requirements (these data are not described in this report). NOAA Fisheries has a field station in Pago Pago, American Samoa, that facilitates the placement of PNA-deployed observers on U.S. purse seine vessels.

Since January 1, 2010, the observer coverage rate in the U.S. purse seine fishery in the

Convention Area has been 100%. However, the mandatory observer requirement was suspended during the COVID-19 pandemic and was reinstated January 1, 2023. Data previously collected by FFA-deployed and currently by PNA-deployed observers are provided directly to the WCPFC.

Longline

Under the Fishery Ecosystem Plan for Pacific Pelagic Fisheries of the Western Pacific Region established under the Magnuson-Stevens Fishery Conservation and Management Act, observers monitor the U.S. and American Samoa longline fisheries under the NOAA Pacific Islands Regional Observer Program (PIROP). In 2023, there was 100% observer coverage for Hawaii-permitted shallow-set trips, 17% coverage for Hawaii-permitted deep-set trips, and 9% coverage for American Samoa-based longline trips. Observers were placed on 21% (277 of 1,303 trips) of deep-set and shallow-set trips based out of Hawaii or California that occurred in the high seas outside the U.S. EEZ in the WCPFC area that departed in 2023 (Table 3). No American Samoa-based longline fishing trips occurred in the high seas outside the U.S. EEZ in the WCPFC area in 2023.

The main focus of the longline observer program is to collect scientific data on interactions with protected species. The observer program also collects catch composition and biological data on retained and discarded catch and information on fishing operations. Biological data includes measurements of a systematic subsample of 33% of all fish brought on deck, including bycatch species. Prior to 2006, observers attempted to measure 100% of tunas, billfishes and sharks brought on deck, but not other species. Researchers use observer-collected protected species data to estimate the total number of interactions with those species.

Table 3. Observer coverage in 2023 for U.S. longline fisheries in the WCPFC statistical area excluding the U.S. EEZ. Includes the total estimated effort in number of hooks, days fished, and number of trips, and the amount of this effort observed in numbers and percent of total effort.

Fishery	Number of Hooks			Days Fished			Number of Trips		
	Total	Observed	%	Total	Observed	%	Total	Observed	%
Hawaii and California	43,330,152	8,658,728	20	14,947	3,483	23	1,303	277	21
American Samoa	0	0	0	0	0	0	0	0	0

Since 2017 there has been research and development in the Pacific Islands Region to investigate electronic monitoring (EM) as a tool to collect data in the Hawaii longline fisheries to supplement the at-sea observer program. This research has shown that using EM reviewers can detect 98% of retained fish and 89% all catch (Carnes et al. 2019) compared to at-sea observers. In addition, reviewers were able to detect protected species using EM (Stahl and Carnes 2020) and collect information needed to assess their likely post-release condition (Stahl et al. 2023). In addition a report has been produced that outlines which data fields are collectable by EM that have been traditionally collected by observers (Stahl et al. 2024).

Currently there is a recommendation made at the 196th meeting by the Western Pacific Fishery Management Council to develop a pre-implementation program through the Electronic Technologies Steering Committee (ETSC) that prioritizes EM in Hawaii Longline Fisheries, with a hybridized approach between the shallow-set and deep-set sectors with a primary objective of protected species monitoring and estimation and a secondary objective for discard accounting.

Relevant Publications

Briefing document for the 196th Council Meeting. 2023. Goals and Objectives for the Pre-Implementation of Electronic Monitoring in Pacific Islands Pelagic Longline Fisheries. Prepared by members of the Electronic Technologies Steering Committee and Pelagic Plan Team.

Carnes, MJ, JP Stahl, and KA Bigelow. 2019. Evaluation of Electronic Monitoring Pre-implementation in the Hawaii-based Longline Fisheries. NOAA Technical Memorandum. NMFS-PIFSC -90, 38 p. https://doi.org/10.25923/82gg-jq77

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Stahl, J. and M. Carnes. 2020. Detection Accuracy in the Hawai‘i Longline Electronic Monitoring Program with Comparisons between Three Video Review Speeds. PIFSC Data Report DR-20-012. https://doi.org/10.25923/n1gq-m468.

Stahl, J. P., Tucker, J. B., Hawn, L. A., and Bradford, A. L. 2023. The role of electronic monitoring in assessing post-release mortality of protected species in pelagic longline fisheries. U.S. Dept. of Commerce, NOAA Technical Memorandum NOAA-TM-NMFS-PIFSC-147. https://doi.org/10.25923/zxfv-5b50

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Fishery Interactions with Protected Species

Information is provided on fishery interactions with non-fish species by the Hawaii-based (Table 4a, 4c–4d) and American Samoa (Table 4b–4c) longline fisheries during 2019–2023. This includes interactions with marine mammals and sea turtles in the Hawaii (Table 4a) and American Samoa longline fisheries (Table 4b). CMM 2011-03 requires CCMs to report instances in which cetaceans have been encircled by purse seine nets. In 2023, there were no reports of U.S. purse seine vessels encircling cetaceans.

CMM 2018-03 requires CCMs to report on seabirds including 1) the proportion of observed effort with specific mitigation measures used; and 2) observed and reported species-specific bycatch rates and numbers or statistically rigorous estimates of species-specific seabird interaction rates and total numbers. The number of observed seabird captures and fishing effort for the Hawaii and American Samoa longline fisheries (combined) are provided (Table 4c) and the species-specific seabird catch is shown for the Hawaii longline fisheries (Table 4d). The American Samoa longline fishery had only three shearwater (Procellariidae) and two frigate bird (Fregatidae) interactions from 2019 to 2023. In addition, mandated mitigation measures required for seabirds for the Hawaii longline fisheries are included for 2012–2023 (Table 4e). Note no mitigation measures are required for longline fishing based out of American Samoa. A change in mitigation measure requirements for the Hawaii longline fishery began on April 1, 2024, with tori lines becoming mandatory for the Hawaii deep-set fishery when setting north of 23° N with requirements removed for management of offal discharge and blue dyed bait. Requirements for weighted branchlines and employing a line shooter remain for the Hawaii deep-set fishery when setting north of 23° N. Pelagic longline seabird mitigation measures can be found in the Code of Federal Regulations (Title 50, Chapter VI, Part 665, Subpart F, 665.815; https://www.ecfr.gov/current/title-50/part-665/subpart-F#p-665.815)

Relevant Publications

Bradford, A. L. 2023. Injury determinations for marine mammals observed interacting with Hawaii longline fisheries during 2020. Pacific Islands Fisheries Science Center, PIFSC Data Report, DR-23-02. https://doi.org/10.25923/sx2z-st94

Cooper, B and McCracken, M. 2024. Estimation of Bycatch with Bony Fish, Sharks, and Rays in the 2023 Hawai‘i Permitted Shallow-set Longline Fishery. https://doi.org/10.25923/m7p4-q849

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McCracken, M and Cooper, B. 2023. Assessment of Incidental Interactions with False Killer Whales inside the Hawai‘i Pelagic False Killer Whale Management Area in the Hawai‘i Longline Deep- and Shallow-set Fisheries from 2017 through 2021. https://doi.org/10.25923/7j4f-yj03

McCracken, M. 2023. Estimation of Bycatch with Seabirds, Sea Turtles, Bony Fish, Sharks, and Rays in the 2022 Permitted American Sāmoa Longline Fishery. Pacific Islands Fisheries Science Center, PIFSC Data Report, DR-23-06. https://doi.org/10.25923/mrva-ab86

McCracken, M. 2023. Estimation of Bycatch with Bony Fish, Sharks, and Rays in the 2022 Hawai‘i Permitted Deep-Set Longline Fishery. Pacific Islands Fisheries Science Center, PIFSC Data Report, DR-23-07. https://doi.org/10.25923/mfmp-fq29

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Table 4a. Total estimated fishery interactions[1] (not necessarily resulting in mortality or serious injury) of marine mammals and sea turtles in shallow- and deep-set Hawaii-based longline fisheries for 2019–2023 with observed counts only for marine mammals in 2022 and 2023. Sea turtle interactions are for WCPFC statistical area only except for 2020, which includes the complete distribution of the Hawaii fisheries, as there were complications with estimating interactions for WCPFC statistical area only related to observer coverage during the COVID-19 pandemic. Sea turtle estimates are not yet available for 2023. Marine mammal interactions are for the complete distribution of the Hawaii fisheries with areas outside of the WCPFC reporting area.

Marine Mammals	2023	2022	2021	2020	2019
Striped dolphin (*Stenella coeruleoalba*)	0	0	0	0	0
Spotted dolphin (*Stenella attenuata*)	2	0	0	0	0
Bottlenose dolphin (*Tursiops truncatus*)	1	1	10	10	0
Risso's dolphin (*Grampus griseus*)	3	3	0	16	7
Rough-toothed dolphin (*Steno bradenensis*)	2	0	14	29	4
False killer whale (*Pseudorca crassidens*)	6	7	43	23	75
Shortfinned pilot whale (*Globicephala*	0	0	5	0	0
Unspecified false killer or shortfinned pilot whale	0	0	0	0	6
Unspecified member of beaked whales (*Ziphiidae*)	1	1	1	6	7
Unidentified Kogia Whale	0	0	0	4	0
Unidentified Cetacean (*Cetacea*)	5	2	24	23	10
Guadalupe fur seal (*Arctocephalus townsendi*)	0	2	0	7	0
Unidentified Pinniped *(Pinnipedia*)	0	1	0	0	0
Unspecified eared seal (*Otariidae*)	0	0	0	2	1
Unidentified earless seal	0	0	0	0	1
Total Marine Mammals	**19**	**17**	**97**	**120**	111

Sea Turtles	2023	2022	2021	2020	2019
Loggerhead turtle (*Caretta caretta*)	48	21	18	15	16
Leatherback turtle (*Dermochelys coriacea*)	26	32	11	1	14
Olive Ridley turtle (*Lepidochelys olivacea*)	70	50	48	0	134
Green turtle (*Chelonia mydas*)	10	6	18	0	12
Unidentified hardshell turtle (Cheloniidae)	8	0	1	0	0
Total Sea Turtles	**162**	**130**	**99**	**158**	**186**

[1] Estimates are made by raising the number of observed interactions by a factor determined according to the design of the Pacific Island Regional Observer Program. Sources: Pacific Islands Regional Office observer program reports and Pacific Islands Fisheries Science Center Internal Reports.

Table 4b. Estimated total numbers of fishery interactions[1] (not necessarily resulting in mortality or serious injury) with marine mammals and sea turtles in the American Samoa longline fishery from 2019–2023 with observed counts only for marine mammals in 2022 and 2023.

Marine Mammals	2023	2022	2021	2020	2019
Striped dolphin (S*tenella coeruleoalba*)	0	0	0	0	5
False killer whale (*Pseudorca crassidens*)	0	0	3	5	0
Shortfinned pilot whale (*Globicephala*	0	0	0	0.4	0
Rough-toothed dolphin (*Steno bradenensis*)	0	0	2	3	0
Total Marine Mammals	**0**	**0**	**5**	**8.4**	**5**

Sea Turtles	2023	2022	2021	2020	2019
Leatherback turtle (*Dermochelys coriacea*)	0	2	6	7	7
Olive Ridley turtle (*Lepidochelys olivacea*)	0	8	7	6	20
Green turtle (*Chelonia mydas*)	23	4	10	11	26
Hawksbill *(Eretmochelys imbricata*)	0	0	2	2	0
Total Sea Turtles	**23**	**14**	**25**	**26**	**53**

[1] Estimates are made by raising the number of observed interactions by a factor determined according to the design of the Pacific Island Regional Observer Program. Sources: Pacific Islands Regional Office observer program reports and Pacific Islands Fisheries Science Center Internal Reports.

Table 4c. The rate (captures per 1,000 observed hooks) and number of observed seabird captures and fishing effort for the Hawaii and American Samoa longline fisheries (combined) in the WCPFC statistical area from 2019–2023. Note some effort data are suppressed due to confidentiality. Data are reported separately for 23° N and 23° N–25° S with no fishery effort for latitudinal bands 25° N–30° S or south of 30° S.

Effort and Observed Seabird Captures North of 23° N						
	Fishing Effort				Observed Seabird Captures	
Year	Number of Vessels	Number of Hooks Set	Observed Hooks	% Hooks Observed	Number	Rate
2019	137	19,731,707	3,475,642	17.6	166	0.05
2020	131	18,056,628	3,585,424	19.9	114	0.03
2021	130	17,123,363	3,526,786	20.6	156	0.04
2022	130	14,025,163	2,987,623	21.3	184	0.06
2023	135	16,669,704	3,640,170	21.8	70	0.02

Effort and Observed Seabird Captures 23° N–25° S						
	Fishing Effort				Observed Seabird Captures	
Year	Number of Vessels	Number of Hooks Set	Observed Hooks	% Hooks Observed	Number	Rate
2019	154	35,023,268	6,678,447	19.1	29	0.00
2020	142	32,210,661	3,654,003	11.3	41	0.01
2021	149	41,462,791	6,195,194	14.9	25	0.00
2022	149	42,988,392	7,428,194	17.3	8	0.00
2023	153	42,301,875	6,617,151	15.6	8	0.00

Table 4d. Total number of observed seabird captures by species in Hawaii–based longline fishery from 2019–2023 for north of 23°N and for 23°N to 25°S. Observed capture numbers for 2023 are preliminary. Interactions include the complete distribution of the shallow- and deep-set fisheries with areas outside of the WCPFC reporting area. No observed captures occurred south of 25°S.

Species	2023		2022		2021		2020		2019	
	>23° N	23°N –25°S	>23° N	23°N –25°S	>23° N	23°N –25°S	>23° N	23°N –25°S	>23° N	23°N –25°S
Blackfooted albatross (*Phoebastria nigripes*)	49	9	111	5	109	23	70	31	137	28
Laysan albatross (*Phoebastria diomedia*)	27	1	90	2	46	2	77	8	57	3
Red-footed booby (*Sula sula*)	0	1	0	0	0	0	0	0	0	0
Brown booby (*Sula leucogaster*)	0	0	0	1	1	0	0	1	0	1
Masked booby (*Sula dactylatra*)	0	1	0	0	0	0	0	0	0	0
Sooty shearwater (*Ardenna grisea*)	1	0	0	0	1	0	0	1	0	0
Unidentified shearwater (*Procellariidae*)	0	0	0	0	3	0	0	0	0	0
Northern fulmar (*Fulmarus glacialis*)	0	0	0	0	0	0	1	0	0	0
Totals	77	12	201	9	160	25	148	41	194	32

Table 4e. Seabird mitigation measures required in Hawaii-based longline fisheries in 2023 by type of set (deep- or shallow-set), location of set, and method of setting (side-setting or stern-setting). Mitigation measures include: NS = night setting, WB = weighted branch lines, SS = side setting, BC = bird curtain, BDB = blue dyed bait, DSLS = deep setting line shooter, and MOD = management of offal discharge).

Set Type	Location Set	Method of Setting	Combination of Mitigation Measures
Shallow-set	All locations	Side-setting	SS + WB +BC
Shallow-set	All locations	Stern-setting	MOD + BDB + WB + NS
Deep-set	North of 23° N	Side-setting	SS + WB +BC
Deep-set	North of 23° N	Stern-setting	MOD + BDB + WB + DSLS
Deep-set	South of 23° N	Side setting or stern-setting	No mitigation measures

Port Sampling

Weight data are collected from U.S. longline, purse seine, and albacore troll landings, but no other biological data are collected at port for these fisheries. For the small-boat troll fisheries in Guam, American Samoa, and CNMI, port samplers perform shoreside fisher interviews for catch and effort data and also take length measurements. No biological data is collected at port for the small-boat troll or handline fisheries in Hawaii.

Unloading / Transshipment

In 2023, four U.S. purse-seine vessels transhipped 5,001 t of highly migratory species catch, 741 t bigeye; 3,035 t skipjack; and 1,125 t yellowfin tuna, along with 100 t of other HMS species, in the WCPFC statistical area and unloaded this catch in foreign ports. A total of 3,493 t of this catch was caught inside the WCPFC statistical area with 1,508 t caught outside the WCPFC statistical area.

Table 5a. The total quantities, by weight, of highly migratory fish stocks that were transhipped by U.S. purse seine vessels with reporting according to CMM 2009-06.

a) offloaded and received;	b) transhipped in port, transhipped at sea in areas of national jurisdiction, and transhipped beyond areas of national jurisdiction	c) transhipped inside the Convention Area and transshipped outside the Convention Area;	d) caught inside the Convention Area and caught outside the Convention Area;	e) Species	f) Product Form	g) Fishing gear
offloaded	741			BET	Frozen	Purse seine
	3,035			SKJ	Frozen	Purse seine
	1,125			YFT	Frozen	Purse seine
received						

Table 5b. The number of transshipments involving highly migratory fish stocks by fishing vessels with reporting according to CMM 2009-06.

a) offloaded and received	b) transhipped in port, transhipped at sea in areas of national jurisdiction, and transhipped beyond areas of national jurisdiction	c) transhipped inside the Convention Area and transhipped outside the Convention Area	d) caught inside the Convention Area and caught outside the Convention Area	e) fishing gear
offloaded	4			Purse seine
received				

Research Activities

Highlights:.

A Shallow Scattering Layer Structures the Energy Seascape of an Open Ocean Predator
Arostegui et al. (2023) uses data from archival tags deployed on albacore tuna (*Thunnus alalunga*), to assess how the bioenergetics of scattering layer forays vary across North Pacific biomes in order to better understand how predators achieve energy balance in the unproductive open ocean. The tag-measured depth and relative light levels allowed reconstruction of the subsurface light attenuation environment experienced by the predators, including increased attenuation putatively caused by chlorophyll maxima in the euphotic zone and scattering layers below. With a bioenergetics model of total metabolic rate as a function of vertical swimming speed and in situ water temperature, researchers estimated the energetic cost of deep diving to scattering layers across oligotrophic to mesotrophic and subtropical to temperate waters. In concert, these analyses helped assess how the specific scattering layer that a thermally limited predator targets may transition across oceanographic regimes with differing energy seascapes. This study shows that the mean metabolic cost rate of daytime deep foraging dives to scattering layers decreases as much as 26% from coastal to pelagic biomes. The more favorable energetics offshore are enabled by the addition of a shallow scattering layer that, if not present, would otherwise necessitate costlier dives to deeper layers. The unprecedented importance of this shallow scattering layer challenges assumptions that the globally ubiquitous primary deep scattering layer constitutes the only mesopelagic resource regularly targeted by apex predators.

Spatiotemporal variability of micronekton at two central North Pacific Fronts
Domokos et al. (2023) investigated the spatiotemporal variability of micronekton, forage for top predators, at the North Pacific Subtropical Frontal Zone (STFZ) where economically important fish and protected species seasonally aggregate. Oceanographic data were collected in situ to determine any effects of Subtropical Front and Transition Zone Chlorophyll Front on micronekton. An increase in micronekton biomass and change in composition was observed at the Subtropical Front while no significant effect in composition or biomass was linked to the Transition Zone Chlorophyll Front. Contrary to expectation, significantly higher relative micronekton biomass was associated with higher temperatures, the mechanisms of which still need to be determined.

Dynamic Human, Oceanographic, and Ecological Factors Mediate Transboundary Fishery Overlap Across the Pacific High Seas
Frawley et al. (2023) uses vessel tracking data, archival tags, observer records, and machine learning to examine inter- and intra-annual variability in fisheries overlap (2013–2020) of five pelagic longline fishing fleets with North Pacific albacore tuna (*Thunnus alalunga*, Scombridae) to better understand the oceanographic, ecological and socioeconomic factors mediating fishery overlap and interactions, and how these factors vary across expansive, open ocean habitats. Despite advances in fisheries monitoring and biologging technology, few attempts have been made to conduct integrated ecological analyses at basin scales relevant to pelagic fisheries and the highly migratory species they target. Although progressive declines in catch and biomass

have been observed over the past several decades, the North Pacific albacore Pacific tuna stocks targeted by pelagic longlines are not currently listed as overfished or experiencing overfishing. This study finds that fishery overlap varies significantly across time and space as mediated by (1) differences in habitat preferences between juvenile and adult albacore; (2) variation of oceanographic features known to aggregate pelagic biomass; and (3) the different spatial niches targeted by shallow-set and deep-set longline fishing gear. These findings may have significant implications for stock assessment in this and other transboundary fishery systems, particularly the reliance on fishery-dependent data to index abundance. Additional consideration of how overlap, catchability, and size selectivity parameters vary over time and space may be required to ensure the development of robust, equitable, and climate-resilient harvest control rules.

Marine Heatwaves Disrupt Ecosystem Structure and Function via Altered Food Webs and Energy Flux.

Gomes et al. (2024) investigated the effects of marine heatwaves on ecosystem and function through models developed with data on 361 taxa from six long-term surveys and diet information. While the ecosystem-level contribution (prey) and demand (predators) of most functional groups changed following the heatwaves, gelatinous taxa experienced the largest transformations with the arrival of northward-expanding pyrosomes. Altered trophic relationships and energy flux are demonstrated to have profound consequences for ecosystem structure and function and raise concerns for populations of threatened and harvested species.

Catch per unit effort modeling for stock assessment: A summary of good practices

Hoyle et al. (2024) provides advice on good practices for standardizing catch-per-unit-effort (CPUE) as stock assessment outcomes and management decisions can substantially change based on how CPUE is standardized. CPUE indices of relative abundance are especially important for fisheries where fishery-independent surveys are unavailable. Understanding the population and the fishery allows analysts to make the most appropriate decisions for standardizing CPUE. Advice is provided in 16 areas, focusing on decision points: fishery definitions, exploring and preparing data, misreporting, data aggregation, density and catchability covariates, environmental variables, combining CPUE and survey data, analysis tools, spatial considerations, setting up and predicting from the model, uncertainty estimation, error distributions, model diagnostics, model selection, multispecies targeting, and using CPUE in stock assessments.

Reproductive Dynamics of Striped Marlin (*Kajikia audax*) in the Central North Pacific

Humphreys and Brodziak (2024) performed histological analysis of striped marlin gonads collected from the Hawaii longline fishery to develop new maturity estimates and determine the spawning season for striped marlin in the central North Pacific Ocean. Length distributions and sex ratios were determined to be seasonally dynamic around Hawaii, differing from other Pacific regions with females spawning between May and July and males capable of spawning year-round. Length-at-maturity estimates were lower than other Pacific regions with length (eye-fork length) at 50% maturity estimates for females of 152 cm and for males of 109 cm. These data will improve determinations of stock resilience and productivity in international assessments.

Temperature-Dependence Assumptions Drive Projected Responses of Diverse Size-Based Food Webs to Warming

Reum et al. (2024) evaluated potential effects of warming temperatures on size-dependent processes, food intake, metabolism, and non-predation mortality in fishes using size-structured food web models that link physiological processes to population and community dynamics in different marine ecosystems. Higher food intake in warmed conditions increased total fish biomass, catches, and mean body weight; however, these effects were offset by the negative effects of warming on metabolism and mortality, which combined resulted in lower total biomasses and catches for most food webs. These effects were enhanced when warming increased metabolic rates more than food intake, and the outcomes were also sensitive to size dependency of temperature responses. Importantly, these general patterns were not uniform across all food webs—individual functional groups and fish species within food webs responded to warming in different ways depending on their position in the food web and its structure. Hence, caution is warranted when generalizing food web or species outcomes to warming because they are mediated by community interactions. Uncertainty related to temperature dependence and ecological interactions will impact food web projections and should be represented in climate change projections.

Impacts of Marine Heatwaves on Top Predator Distributions are Variable but Predictable

Welch et al. (2023) seeks to determine the effects of marine heatwaves on marine species, aiming to enhance proactive management strategies for coping with extreme and diverse weather events. Marine heatwaves cause widespread environmental, biological, and socio-economic impacts, placing them at the forefront of 21st-century management challenges. However, heatwaves vary in intensity and evolution, and a paucity of information on how this variability impacts marine species limits our ability to proactively manage for these extreme events. The effects of four recent heatwaves (2014, 2015, 2019, 2020) in the Northeastern Pacific were modeled on the spatial distributions of 14 top predators, spanning several major guilds: sharks, tunas, seabirds, mammals, and turtles of ecological, cultural, and commercial importance. Predicted responses were highly variable across species and heatwaves, ranging from near total loss of habitat to a two-fold increase. Heatwaves rapidly altered political bio-geographies, with up to 10% of predicted habitat across all species shifting jurisdictions during individual heatwaves. The variability in predicted responses across species and heatwaves portends the need for novel management solutions that can rapidly respond to extreme climate events. As proof-of-concept, Welch et al. (2023) developed an operational dynamic ocean management tool that predicts predator distributions and responses to extreme conditions in near real-time. These early warning systems would allow for proactive—as opposed to reactive—responses to new human-wildlife conflicts, changing marine resource availability, and emergent refugia caused by MHWs, allowing managers to plan ahead for a fundamentally dynamic world.

Relevant Publications

Arostegui, MC, Muhling, B Culhane, E Dewar, H Koch, SS and Braun, CD. 2023. A Shallow Scattering Layer Structures the Energy Seascape of an Open Ocean Predator. SCI ADV 9, eadi8200. https://doi.org/10.1126/sciadv.adi8200

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