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PART 1: INFORMATION ON FISHERIES, RESEARCH, AND STATISTICS

WCPFC-SC8-AR/CCM-26

UNITED STATES OF AMERICA

2012 Annual Report to the Western and Central Pacific Fisheries Commission

United States of America

PART I. INFORMATION ON FISHERIES, RESEARCH, AND STATISTICS [1] (For 2011)

National Oceanic and Atmospheric Administration
National Marine Fisheries Service

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 2012	**YES**
If no, please indicate the reason(s) and intended actions:	

1. Summary

Large-scale fisheries of the United States and its Participating Territories for highly migratory species (HMS) in the Pacific Ocean include purse seine fisheries for skipjack tuna (*Katsuwonus pelamis*) and yellowfin tuna (*Thunnus albacares*); longline fisheries for bigeye tuna (*Thunnus obesus*), swordfish (*Xiphias gladius*), albacore (*Thunnus alalunga*), and associated pelagic fish species; and a troll fishery for albacore. Small-scale fisheries include troll fisheries for a wide variety of tropical tunas and associated pelagic species, handline fisheries for yellowfin and bigeye tuna, a pole-and-line fishery for skipjack tuna, and miscellaneous-gear fisheries. Associated pelagic species include other tunas and billfishes, mahimahi (*Coryphaena hippurus*), wahoo (*Acanthocybium solandri*), moonfish (*Lampris* spp.), oilfish (*Ruvettus pretiosus*), and pomfrets (Bramidae). The large-scale fisheries operate on the high seas, within the U.S. exclusive economic zone (EEZ), and within the EEZs of other nations. The small-scale fisheries operate in nearshore waters off Hawaii and the U.S. Territories of American Samoa and Guam, and the Commonwealth of the Northern Mariana Islands (CNMI).

Overall trends in total landings by U.S. and U.S. associated-Participating Territory fisheries in the Western and Central Pacific Fisheries Commission (WCPFC) Statistical Area in 2011 are dominated by the catch of the purse seine fishery. Preliminary 2011 purse seine estimates total 176,654 t of skipjack, 23,212 t of yellowfin, and 3,373 t of bigeye tuna. U.S. purse seine landings in 2010 have been revised downwards to 245,907 t from last year's preliminary estimate. Longline landings increased slightly in 2011 after declining since 2007. Bigeye tuna landings by longliners increased for the second year up to 4,742 t in 2011 while albacore

[1] PIFSC Data Report DR-12-00x
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declined to 3,103 t in 2011. Excluding landings by the U.S. Participating Territories (i.e., American Samoa), longline landings of bigeye tuna declined to 3,566 t in 2011 from 5,381 t in 2007 (Table 1f). These bigeye tuna landings by the U.S. longline fishery in the North Pacific Ocean were below the limit of 3,763 t established in U.S. fishery regulations (50 CFR Part 300, December 12, 2009) pursuant to the provisions of WCPFC Conservation and Management Measure (CMM) 2008-01 for bigeye and yellowfin tuna during 2009 through 2011. Longline landings of swordfish in the NPO decreased to 856 t in 2011, down from their peak of 1,428 t in 2007. Small-scale (tropical) troll and handline vessels operating in nearshore waters represented the largest number of U.S. flagged vessels but contributed only a small fraction of the landings. The longline fleet was the next largest fleet, numbering 152 in 2011, while there were 37 purse seine vessels

The National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NOAA Fisheries Service) conducted a wide range of research on Pacific tuna and associated species at its Southwest and Pacific Islands Fisheries Science Centers and in collaboration with scientists from other organizations. NOAA Fisheries conducts fishery monitoring and socio-cultural research on tunas, billfishes, and animals caught as bycatch in those fisheries. In 2011, standardized shark CPUE time series in the Hawaii-based longline fishery were produced from observer data. Socio-economic studies addressed market impacts of the longline fishery regulations, retail pricing in the Hawaii seafood market, and cost-earnings analyses for Hawaii longline and small boat fisheries. Stock assessment research was conducted almost entirely in collaboration with members of the WCPFC, the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC), and other Regional Fisheries Management Organizations (RFMOs). The stock assessment work is not described in this report (Brodziak and Ishimura, 2011; Lee et al., 2011, 2012; Piner et al., 2011).

NOAA Fisheries biological and oceanographic research on tunas, billfishes, and sharks addressed fish movements, habitat preferences, post-release survival, feeding habits, abundance, sexual maturity, and age and growth. Research on North Pacific albacore focused on otolith analysis for age and growth, and archival tagging for migration and stock structure. Tagging projects also continued for swordfish and pelagic sharks,. Bycatch mitigation studies in the longline and gillnet fisheries focused on sea turtles and pelagic sharks,.

2. Tabular Annual Fisheries Information

This report presents estimates of annual catches of tuna, billfish, and other highly migratory species (HMS), and vessel participation during 2007-2011 for fisheries of the United States and its Participating Territories operating in the western and central Pacific Ocean (WCPO). All statistics for 2011 are provisional. For the purposes of this report, the WCPO is defined as the Western and Central Pacific Fisheries Commission (WCPFC) Statistical Area.

The purse seine fishery remains the largest U.S. fishery in terms of total catch. It accounts for about 93% of the total catch of HMS by the U.S. and its Participating Territories in the WCPO. The longline, albacore troll, tropical troll, and handline fisheries account for about 5.7%, 0.2%, 0.8%, and 0.4% of the total catch, respectively.

Fisheries of the U.S. and its Participating Territories for tunas, billfishes and other pelagic species produced an estimated 218,861 t in 2011 (Table 1a), down from 261,055t in 2010 (Table 1b). The catch consisted primarily of skipjack tuna (81%), yellowfin tuna (12%), bigeye tuna (4%), and albacore (2%). Catches of albacore, bigeye, skipjack, and yellowfin tuna decreased in 2011 as compared to 2010, due to decreased purse seine catches.

For the most part, U.S. estimates of catch by weight are estimates of retained catches due to lack of data on weights of discarded fish. With the exception of purse seine and some small-scale fisheries, weight estimates do not include at-sea discards or subsistence or recreational catches. In the future, the longline weight estimates may include at-sea discards.

Further discussion of the tabular fisheries information is provided in following section on flag state reporting.

Table 1a. Estimated weight (in metric tons) of landings by vessels of the United States and its Participating Territories (American Samoa, Guam, and Commonwealth of the Northern Mariana Islands) by species and fishing gear in the WCPFC Statistical Area, for 2011 (preliminary). Totals may not match sums of values due to rounding to the nearest metric ton (<0.5 t = 0).

Species and FAO code	Purse seine	Longline	Albacore troll	Tropical troll	Handline	Pole & line	TOTAL
Albacore (ALB), North Pacific	0	589	68	4	84		745
Albacore (ALB), South Pacific	0	2,514	321	0	0		2,835
Bigeye tuna (BET)	3,373	4,742		110	297		8,522
Pacific bluefin tuna (PBF)	0	2		0	0		2
Skipjack tuna (SKJ)	176,654	280		439	9		177,382
Yellowfin tuna (YFT)	23,212	1,174		490	353		25,229
Other tuna (TUN KAW FRI)	91	0		18	5		114
TOTAL TUNAS	203,330	9,301	389	1,061	748	-	214,829
Black marlin (BLM)		1		0	0		1
Blue marlin (BUM)		367		193	2		562
Sailfish (SFA)		15		2	0		17
Spearfish (SSP)		205		0	0		205
Striped marlin (MLS), North Pacific		325		16	0		341
Striped marlin (MLS), South Pacific		3		0	0		3
Other marlins (BIL)		1		13	0		14
Swordfish (SWO), North Pacific		856		0	5		861
Swordfish (SWO), South Pacific		12		0	0		12
TOTAL BILLFISHES	0	1,786	0	224	7	-	2,017
Blue shark (BSH)		14		0	0		14
Mako shark (MAK)		50		0	1		51
Thresher sharks (THR)		18		0	0		18
Other sharks (SKH OCS FAL SPN TIG CCL)		3		1	0		4
TOTAL SHARKS	0	86	0	1	1	-	88
Mahimahi (DOL)		347		360	16		723
Moonfish (LAP)		386		0	0		386
Oilfish (GEP)		224		0	0		224
Pomfrets (BRZ)		145		0	16		161
Wahoo (WAH)		235		161	4		400
Other fish (PEL PLS MOP TRX GBA ALX GES RRU DOT)		20		13	0		33
TOTAL OTHER	0	1,358	0	534	36	-	1,928
TOTAL	**203,330**	**12,530**	**389**	**1,820**	**792**	**0**	**218,861**

Table 1b. Estimated weight (in metric tons) of landings by vessels of the United States and its Participating Territories (American Samoa, Guam, and Commonwealth of the Northern Mariana Islands) by species and fishing gear in the WCPFC Statistical Area, for 2010 (updated). Totals may not match sums of values due to rounding to the nearest metric ton (<0.5 t = 0).

Species and FAO code	**Purse seine**	**Longline**	**Albacore troll**	**Tropical troll**	**Handline**	**Pole & line**	**TOTAL**
Albacore (ALB), North Pacific	0	356		2	53		411
Albacore (ALB), South Pacific	52	3,943	307	0	0		4,302
Bigeye tuna (BET)	4,878	4,064		118	340		9,400
Pacific bluefin tuna (PBF)	0	3		0	0		3
Skipjack tuna (SKJ)	207,074	235		398	7		207,714
Yellowfin tuna (YFT)	32,494	935		428	265		34,122
Other tuna (TUN KAW FRI)	280	0		26	4		310
TOTAL TUNAS	244,778	9,537	307	972	669	0	256,263
Black marlin (BLM)	21	1		0	0		22
Blue marlin (BUM)	28	293		144	2		467
Sailfish (SFA)	2	11		2	0		15
Spearfish (SSP)	0	86		0	0		86
Striped marlin (MLS), North Pacific	0	130		5	0		135
Striped marlin (MLS), South Pacific	14	2		0	0		16
Other marlins (BIL)	82	1		12	0		
Swordfish (SWO), North Pacific	0	1,024		0	3		1,028
Swordfish (SWO), South Pacific	0	11		0	0		11
TOTAL BILLFISHES	147	1,559	0	163	5	0	1,874
Blue shark (BSH)	0	7		0	0		7
Mako shark (MAK)	0	65		0	1		66
Thresher sharks (THR)	0	16		0	1		17
Other sharks (SKH OCS FAL SPN TIG CCL)	0	3		0	0		3
TOTAL SHARKS	0	92	0	0	2	0	94
Mahimahi (DOL)	29	251		451	25		756
Moonfish (LAP)	0	379		0	0		379
Oilfish (GEP)	0	176		0	0		176
Pomfrets (BRZ)	0	180		0	22		202
Wahoo (WAH)	25	238		232	5		500
Other fish (PEL PLS MOP TRX GBA ALX GES RRU DOT)	784	10		16	1		811
TOTAL OTHER	838	1,234	0	699	53	0	2,824
TOTAL	**245,763**	**12,422**	**307**	**1,834**	**729**	**0**	**261,055**

Table 1c. Estimated weight (in metric tons) of landings by vessels of the United States and its Participating Territories (American Samoa, Guam, and Commonwealth of the Northern Mariana Islands) by species and fishing gear in the WCPFC Statistical Area, for 2009. Totals may not match sums of values due to rounding to the nearest metric ton (<0.5 t = 0).

Species and FAO code	**Purse seine**	**Longline**	**Albacore troll**	**Tropical troll**	**Handline**	**Pole & line**	**TOTAL**
Albacore (ALB), North Pacific	0	171		3	97		271
Albacore (ALB), South Pacific	0	3,915	237 [1]	0	0		3,915
Bigeye tuna (BET)	6,561	4,029		59	136		10,786
Pacific bluefin tuna (PBF)	0	2		0	0		2
Skipjack tuna (SKJ)	253,783	266		399	11	214	254,673
Yellowfin tuna (YFT)	21,245	820		471	317	17	22,869
Other tuna (TUN KAW FRI)	1,260	0		12	3	1	1,275
TOTAL TUNAS	282,848	9,203	237	945	564	231	293,791
Black marlin (BLM)	0	1		0	0		1
Blue marlin (BUM)	0	389		180	1		570
Sailfish (SFA)	0	12		0	0		12
Spearfish (SSP)	0	103		0	0		103
Striped marlin (MLS), North Pacific	0	240		10	0		250
Striped marlin (MLS), South Pacific	0	4		0	0		4
Other marlins (BIL)	0	0		8	0		8
Swordfish (SWO), North Pacific	0	1,290		0	5		1,295
Swordfish (SWO), South Pacific	0	12		0	0		12
TOTAL BILLFISHES	0	2,051	0	198	6	0	2,255
Blue shark (BSH)	0	9		0	0		9
Mako shark (MAK)	0	104		0	0		104
Thresher sharks (THR)	0	29		0	0		29
Other sharks (SKH OCS FAL SPN TIG CCL)	0	6		0	0		6
TOTAL SHARKS	0	148	0	0	0	0	148
Mahimahi (DOL)	0	276		408	18	1	703
Moonfish (LAP)	0	512		0	0	0	512
Oilfish (GEP)	0	203		0	0	0	203
Pomfrets (BRZ)	0	218		0	16	0	234
Wahoo (WAH)	0	257		264	5	0	526
Other fish (PEL PLS MOP TRX GBA ALX GES RRU DOT)	371	8		13	3	0	395
TOTAL OTHER	371	1,474	0	684	42	1	2,572
TOTAL	**283,219**	**12,875**	**237**	**1,827**	**612**	**232**	**299,003**

Table 1d. Estimated weight in metric tons (t) of landings by vessels of the United States and its Participating Territories by species and fishing gear in the WCPFC Statistical Area, for 2008. Totals may not match sums of values due to rounding to the nearest metric ton (<0.5 t = 0).

Species and FAO code	Purse seine	Longline	Albacore troll	Tropical troll	Handline	Pole & line	TOTAL
Albacore (ALB), North Pacific	0	298	1	1	28	0	328
Albacore (ALB), South Pacific	0	3,550	150	0	0	0	3,700
Bigeye tuna (BET)	4,220	4,781	0	74	148	0	9,223
Pacific bluefin tuna (PBF)	0	1	0	0	0	0	1
Skipjack tuna (SKJ)	159,741	282	0	375	9	293	160,699
Yellowfin tuna (YFT)	45,363	1,169	0	453	227	23	47,235
Other tuna (TUN KAW FRI)	51	0	0	7	1	4	63
TOTAL TUNAS	209,375	10,081	151	910	413	320	221,250
Black marlin (BLM)	0	0	0	0	0	0	0
Blue marlin (BUM)	0	367	0	180	1	0	549
Sailfish (SFA)	0	11	0	1	0	0	12
Spearfish (SSP)	0	211	0	0	0	0	211
Striped marlin (MLS), North Pacific	0	411	0	14	0	0	425
Striped marlin (MLS), South Pacific	0	1	0	0	0	0	1
Other marlins (BIL)	0	2	0	13	0	0	15
Swordfish (SWO), North Pacific	0	1,301	0	0	6	0	1,307
Swordfish (SWO), South Pacific	0	7	0	0	0	0	7
TOTAL BILLFISHES	0	2,310	0	208	7	0	2,526
Blue shark (BSH)	0	7	0	0	0	0	7
Mako shark (MAK)	0	109	0	0	0	0	109
Thresher sharks (THR)	0	39	0	0	0	0	39
Other sharks (SKH OCS FAL SPN TIG CCL)	0	4	0	0	0	0	4
TOTAL SHARKS	0	160	0	0	0	0	160
Mahimahi (DOL)	0	335	0	309	18	1	663
Moonfish (LAP)	0	415	0	0	0	0	415
Oilfish (GEP)	0	178	0	0	0	0	178
Pomfrets (BRZ)	0	224	0	1	16	0	241
Wahoo (WAH)	0	326	0	273	5	0	604
Other fish (PEL PLS MOP TRX GBA ALX GES RRU DOT)	0	14	0	8	0	0	22
TOTAL OTHER	0	1,493	0	591	39	1	2,123
TOTAL	**209,375**	**14,043**	**151**	**1,709**	**459**	**321**	**226,058**

Table 1e. Estimated weight in metric tons (t) of landings by vessels of the United States and its Participating Territories by species and fishing gear in the WCPFC Statistical Area, for 2007. Totals may not match sums of values due to rounding to the nearest metric ton (<0.5 t = 0).

Species and FAO code	Purse seine	Longline	Albacore troll	Tropical troll	Handline	Pole & line	TOTAL
Albacore (ALB), North Pacific	0	243	36	3	94	0	376
Albacore (ALB), South Pacific	0	5,183	198	0	0	0	5,381
Bigeye tuna (BET)	2,985	5,599	0	63	324	0	8,970
Pacific bluefin tuna (PBF)	0	2	0	0	0	0	2
Skipjack tuna (SKJ)	75,210	253	0	272	7	272	76,014
Yellowfin tuna (YFT)	10,541	1,473	0	505	254	23	12,796
Other tuna (TUN KAW FRI)	0	0	0	8	1	1	11
TOTAL TUNAS	88,736	12,753	234	851	680	296	103,551
Black marlin (BLM)	0	1	0	0	0	0	1
Blue marlin (BUM)	0	293	0	127	1	0	422
Sailfish (SFA)	0	11	0	0	0	0	11
Spearfish (SSP)	0	142	0	0	0	0	142
Striped marlin (MLS), North Pacific	0	267	0	13	0	0	280
Striped marlin (MLS), South Pacific	0	1	0	0	0	0	1
Other marlins (BIL)	0	1	0	12	0	0	14
Swordfish (SWO), North Pacific	0	1,428	0	1	5	0	1,434
Swordfish (SWO), South Pacific	0	13	0	0	0	0	13
TOTAL BILLFISHES	0	2,156	0	153	6	0	2,315
Blue shark (BSH)	0	7	0	0	0	0	7
Mako shark (MAK)	0	120	0	0	0	0	120
Thresher sharks (THR)	0	42	0	0	0	0	42
Other sharks (SKH OCS FAL SPN TIG CCL)	0	7	0	0	0	0	7
TOTAL SHARKS	0	176	0	0	0	0	176
Mahimahi (DOL)	0	390	0	433	12	0	835
Moonfish (LAP)	0	454	0	0	0	0	454
Oilfish (GEP)	0	180	0	0	0	0	180
Pomfrets (BRZ)	0	235	0	2	8	0	244
Wahoo (WAH)	0	366	0	228	3	0	598
Other fish (PEL PLS MOP TRX GBA ALX GES RRU DOT)	0	10	0	14	0	0	24
TOTAL OTHER	0	1,635	0	677	23	0	2,335
TOTAL	**88,736**	**16,720**	**234**	**1,682**	**710**	**296**	**108,378**

Table 1f. Longline landings in metric tons (t) by species and species group, for U.S. and American Samoa vessels operating in the WCPFC Statistical Area in 2011. Totals may not match sums of values due to rounding to the nearest metric ton (<0.5 t = 0).

	U.S. in North Pacific Ocean					American Samoa in North Pacific Ocean			American Samoa in South Pacific Ocean					Total				
	2011	2010	2009	2008	2007	2011	2010	2009	2011	2010	2009	2008	2007	2011	2010	2009	2008	2007
Vessels	128	123	127	129	129	115	11	10	24	26	26	28	29	152	146	151	155	156
Species																		
Albacore, North Pacific	498	324	178	298	243	90	32	2	0	0	0	0	0	589	356	179	298	243
Albacore, South Pacific	0	0	0	0	0	0	0	0	2,514	3,943	3,883	3,550	5,183	2,514	3,943	3,883	3,550	5,183
Bigeye tuna	3,566	3,577	3,741	4,649	5,381	965	310	89	211	178	160	132	218	4,742	4,064	3,990	4,781	5,599
Pacific bluefin tuna	0	0	1	0	0	0	0	0	2	3	1	1	2	2	3	2	1	2
Skipjack tuna	158	114	117	117	91	26	12	4	96	110	151	165	162	280	235	271	282	253
Yellowfin tuna	737	462	429	836	833	119	28	12	318	445	386	333	640	1,174	935	826	1,169	1,473
Other tuna	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL TUNA	4,959	4,477	4,464	5,900	6,549	1,200	381	107	3,141	4,679	4,581	4,180	6,205	9,301	9,537	9,152	10,081	12,753
Black marlin	1	0	0	0	1	0	0	0	1	0	0	0	0	1	1	0	0	1
Blue marlin	291	238	334	333	255	37	10	4	40	45	37	34	38	367	293	374	367	293
Sailfish	10	9	10	10	10	1	0	0	4	2	2	1	1	15	11	11	11	11
Spearfish	169	79	97	210	141	31	5	1	5	2	3	1	1	205	86	100	211	142
Striped marlin, North Pacific	262	124	234	411	267	63	6	3	0	0	0	0	0	325	130	237	411	267
Striped marlin, South Pacific	0	0	0	0	0	0	0	0	3	2	4	1	1	3	2	4	1	1
Other marlins	1	1	0	2	1	0	0	0	0	0	0	0	0	1	1	0	2	1
Swordfish, North Pacific	838	1,013	1,242	1,301	1,428	18	11	3	0	0	0	0	0	856	1,024	1,244	1,301	1,428
Swordfish, South Pacific	0	0	0	0	0	0	0	0	12	11	9	7	13	12	11	9	7	13
TOTAL BILLFISH	1,570	1,464	1,916	2,267	2,103	151	33	10	64	62	54	43	54	1,786	1,559	1,980	2,310	2,156

Table 1f. (Continued.)

	U.S. in North Pacific Ocean					American Samoa in North Pacific Ocean			American Samoa in South Pacific Ocean					Total				
	2011	**2010**	**2009**	**2008**	**2007**	**2011**	**2010**	**2009**	**2011**	**2010**	**2009**	**2008**	**2007**	**2011**	**2010**	**2009**	**2008**	**2007**
Blue shark	9	6	9	7	6	3	0	0	2	1	1	1	1	14	7	9	7	7
Mako shark	43	63	102	109	119	7	2	0	0	0	0	0	0	50	65	102	109	120
Thresher	15	16	28	39	42	3	0	0	0	0	0	0	0	18	16	28	39	42
Other sharks	2	3	6	4	7	0	0	0	1	1	0	0	1	3	3	6	4	7
TOTAL SHARKS	69	87	144	159	174	13	3	0	4	2	1	1	2	86	92	146	160	176
Mahimahi	290	229	265	323	376	47	13	4	11	9	16	12	14	347	251	285	335	390
Moonfish	309	356	485	412	451	75	21	9	3	2	3	2	3	386	379	497	415	454
Oilfish	175	164	194	178	180	49	12	4	1	0	2	0	0	224	176	200	178	180
Pomfret	115	169	202	224	234	30	10	7	0	0	1	0	0	145	180	210	224	235
Wahoo	124	100	116	194	169	17	5	2	93	133	139	133	197	235	238	258	326	366
Other fish	20	10	8	14	10	0	0	0	0	0	1	0	0	20	10	8	14	10
TOTAL OTHER	1,033	1,028	1,269	1,345	1,420	217	61	26	108	145	162	148	215	1,358	1,234	1,458	1,493	1,635
GEAR TOTAL	**7,631**	**7,056**	**7,794**	**9,671**	**10,246**	**1,582**	**478**	**144**	**3,317**	**4,887**	**4,798**	**4,372**	**6,475**	**12,530**	**12,422**	**12,736**	**14,043**	**16,720**

Table 1g. Tropical troll landings in metric tons (t) for Hawaii, Guam, CNMI, and American Samoa vessels by species and species group, for U.S. vessels operating in the WCPFC Statistical Area in 2011. Totals may not match sums of values due to rounding to the nearest metric ton (<0.5 t = 0).

	Hawaii					Guam					CNMI					American Samoa				
	2011	2010	2009	2008	2007	2011	2010	2009	2008	2007	2011	2010	2009	2008	2007	2011	2010	2009	2008	2007
<u>Vessels</u>	1593	1570	1668	1541	1447	454	432	368	385	370	31	31	47	52	52	10	7	10	16	19
<u>Species</u>																				
Albacore, North Pacific	4	2	3	1	3															
Albacore, South Pacific																				
Bigeye tuna	110	118	59	74	63															
Pacific bluefin tuna																				
Skipjack tuna	124	96	139	157	87	159	154	150	134	71	147	147	109	77	108	9	1	1	7	6
Yellowfin tuna	433	401	436	427	463	37	11	23	9	22	15	15	11	8	16	6	1	1	9	4
Other tunas	4	11	7	4	5	0	1	3	2	1	14	14	2	1	2	0	0	0	0	0
TOTAL TUNAS	675	628	644	663	621	196	166	176	145	94	176	176	122	86	126	15	2	2	16	10
Black marlin																				
Blue marlin	184	134	164	175	119	9	14	15	4	9	0	0	0	1	0					
Sailfish						1	1				1	1	0	1		1				
Spearfish																				
Striped marlin, N. Pacific	16	19	10	14	13															
Striped marlin, S. Pacific																				
Other billfish	13	10	8	13	10					2										
Swordfish, North Pacific	0	0	0	0	1															
Swordfish, South Pacific																				
TOTAL BILLFISHES	213	163	183	202	143	9	15	15	4	11	1	1	0	2	0	1	0	0	0	0

Table 1g. (Continued.)

	Hawaii					Guam					CNMI					American Samoa				
	2011	**2010**	**2009**	**2008**	**2007**	**2011**	**2010**	**2009**	**2008**	**2007**	**2011**	**2010**	**2009**	**2008**	**2007**	**2011**	**2010**	**2009**	**2008**	**2007**
Blue shark																				
Mako shark																				
Thresher sharks																				
Other sharks	1	1																		
TOTAL SHARKS	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mahimahi	294	305	316	252	304	41	131	67	51	117	25	25	26	6	12	0	0	0	0	0
Moonfish																				
Oilfish																				
Pomfrets									1						2					
Wahoo	139	209	199	227	206	17	21	59	45	20	5	5	5	1	1	0	0	0	0	0
Other pelagics	2	4	2	2	1	3	5	10	3	12	7	7	1	3	1	0	0	0	0	0
TOTAL OTHER	435	518	517	481	511	61	157	136	100	149	37	37	32	10	16	0	0	0	0	1
GEAR TOTAL	**1324**	**1310**	**1344**	**1346**	**1275**	**267**	**337**	**327**	**249**	**254**	**214**	**214**	**154**	**98**	**142**	**16**	**2**	**2**	**16**	**11**

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 2005-2011, to fulfill the reporting requirements of WCPFC CMM 2009-03.

	U.S.-flagged vessels south of 20° S	
Year	Catch (mt) by all vessels	Number of vessels fishing for swordfish
2005	0	0
2006	29	2
2007	confidential	2
2008	confidential	0
2009	<1	0
2010	confidential	0
2011	confidential	0

Note: The catch is only reported for years when 3 or more vessels fished, although the number of vessels fishing for swordfish may be less than the number that fished. The U.S. does not have any longline vessels operating under charter or lease as part of its domestic fishery south of 20° S nor does it have any other vessels fishing within its waters south of 20° S.

Table 2a. Estimated number of United States and Participating Territories vessels operating in the WCPFC Statistical Area, by gear type, from 2007-2011. Data for 2011 are preliminary.

	2011	**2010**	**2009**	**2008**	**2007**
Purse seine	37	37	39	36	21
Longline (N Pac-based)[1]	128	124	127	129	129
Longline (American Samoa-based)	139	37	36	28	29
Total U.S. Longline[2]	152	146	151	155	156
Albacore troll (N Pac)	11	2	0	2[3]	4[3]
Albacore troll (S Pac)	6	6	4	3	4
Tropical troll	2088	2040	2093	1994	1888
Handline	505	480	552	475	424
Tropical Troll and Handline (combined)[4]	2192	2134	2184	2076	1888
Pole and line	2	2	6	3	3
TOTAL	2389	2325	2384	2273	2072

[1]Includes only Hawaii-based vessels in 2007-2011.
[2]Some longline vessels fish in both Hawaii and American Samoa and are counted only once in the TOTAL.
[3]Before 2009 most of these vessels fished on both sides of the equator and are counted only once in the TOTAL.
[4]Some vessels fished both tropical troll and handline, and are counted only once in the TOTAL.

Table 2b. Estimated number of United States and Participating Territories purse seine, longline, pole-and-line, and albacore troll vessels operating in the WCPFC Statistical Area, by gross registered ton categories, 2007-2011. Data for 2011 are preliminary.

Gear and year	0-50	51-150	51-200	501-1000	1001-1500	1500+	Unknown
2007 Purse seine				2	14	5	
2008 Purse seine				2	20	14	
2009 Purse seine				2	19	18	
2010 Purse seine				1	18	18	
2011 Purse seine				1	17	19	
2007 Longline	15		141				
2008 Longline	13		142				
2009 Longline	12		139				
2010 Longline	11		139				
2011 Longline							
2007 Pole and line		3					
2008 Pole and line	1	2					
2009 Pole and line	3	3					
2010 Pole and line		2					
2011 Pole and line		2					
2007 Albacore Troll			4				
2008 Albacore Troll			3				
2009 Albacore Troll			4				
2010 Albacore Troll			6				
2011 Albacore Troll			6				

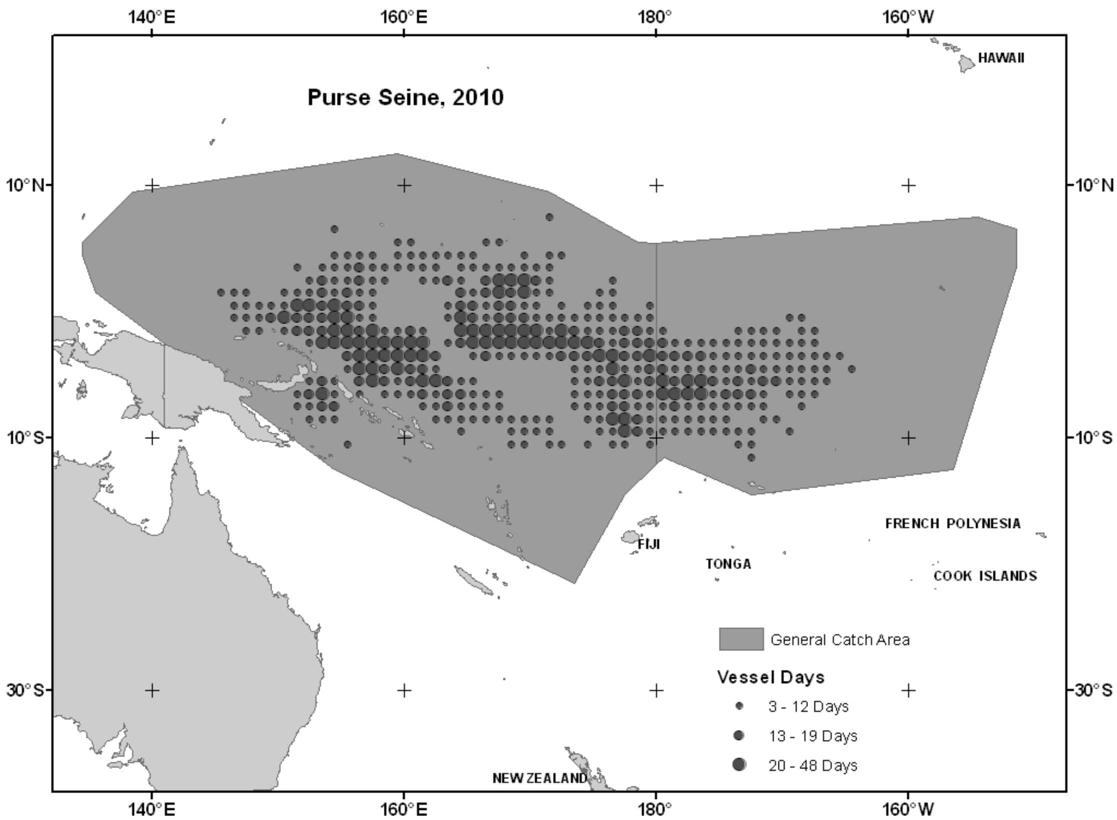

Figure 1. Spatial distribution of reported logbook fishing effort (days fished) by the U.S. purse seine fleet in the western and central Pacific Ocean in 2010 (preliminary). Area of circles is proportional to effort. Effort in some areas is not shown in order to preserve data confidentiality.

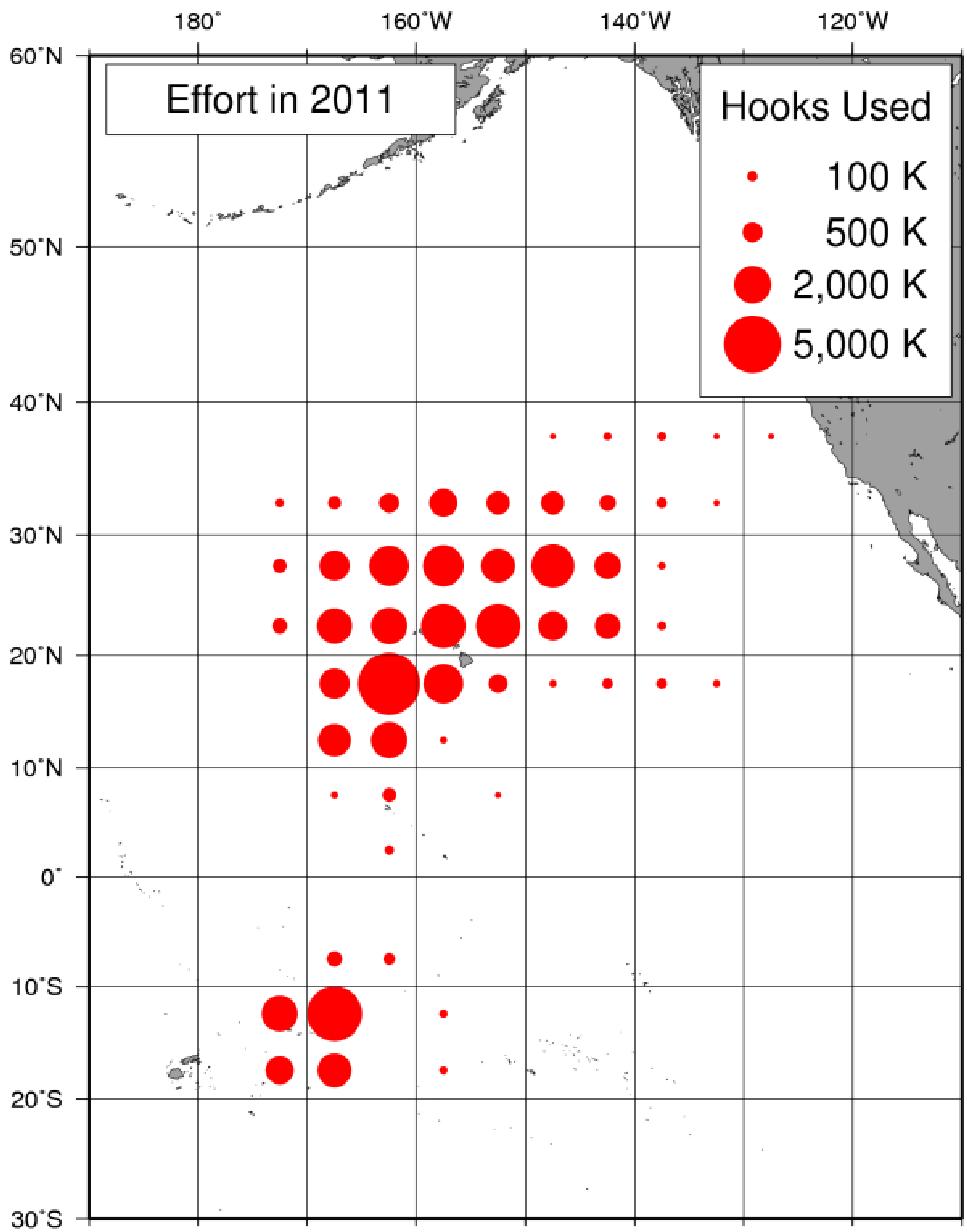

Figure 2a. Spatial distribution of fishing effort reported in logbooks by U.S. flagged longline vessels, in 1,000's of hooks (K), in 2011 (preliminary data). Area of circles is proportional to effort. Effort in some areas is not shown in order to preserve data confidentiality.

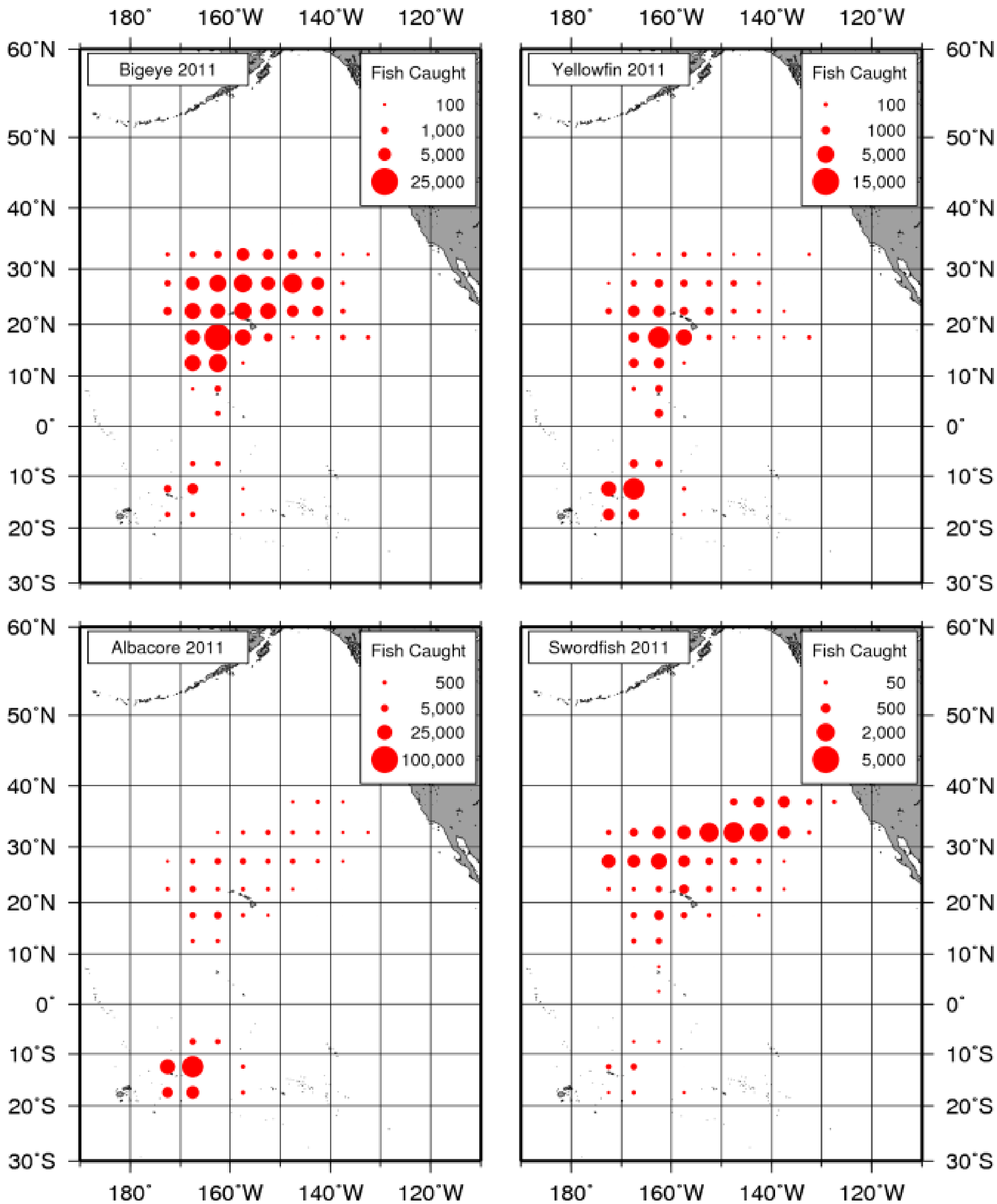

Figure 2b. Spatial distribution of catch reported in logbooks by U.S. flagged longline vessels, in numbers of fish (includes retained and released catch), in 2011 (preliminary data). Area of circles is proportional to catch. Catches in some areas are not shown in order to preserve data confidentiality.

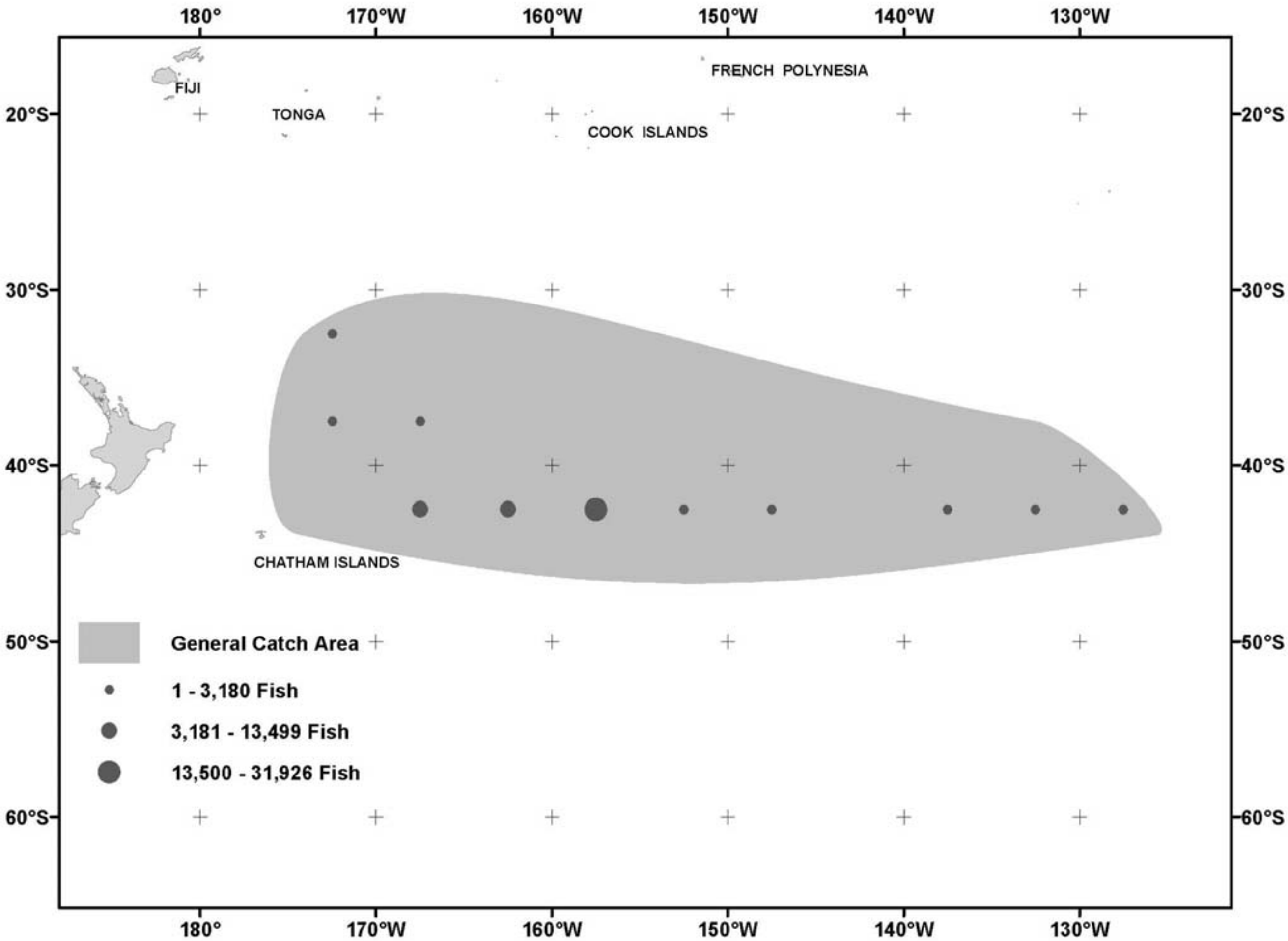

Figure 3. Spatial distribution of reported logbook fishing effort (days fished) by the U.S. albacore troll fleet in the South Pacific Ocean in 2010 (updated data). Area of circles is proportional to effort. Effort in some areas is not shown in order to preserve data confidentiality.

3. Background

[n/a]

4. Flag State Reporting of National Fisheries

4.1 U.S. Purse Seine Fishery

The most accurate description of the recent U.S. purse seine catch of tunas in the Western and Central Pacific Ocean is based on the preliminary 2011 data totaling 203,330 t and the updated 2010 data totaling 2244,778 t which are primarily composed of skipjack tuna, with smaller catches of yellowfin and bigeye tuna. The 2010 and 2011 total catches of tunas decreased significantly from the 2009 catch of 282,848 t (Tables 1a-1c). Yellowfin tuna catches in the fishery decreased from 45,363 t in 2008 to 23,212 t in 2011 and skipjack tuna catches decreased from 253,783 t in 2009 to 176,654 t in 2011. The number of licensed vessels in 2011 was 37 vessels compared to 21 in 2007 (Table 2a). The fishery operated mainly in areas between 10° N and 10° S latitude and 140° E and 160°W longitude in 2010 (Figure 1).

4.2 U.S. Longline Fisheries

The longline fisheries of the U.S. and the Territory of American Samoa in the WCPO include vessels based in Hawaii, California, and American Samoa. The total number of longline vessels active in the WCPO declined from 156 vessels in 2007 to 146 vessels in 2010 and increased to 152 vessels in 2011 (Table 2). The U.S. North Pacific-based longline fishery consistently had the highest number of vessels in operation, with 129 in 2007 and 2008, dropping to 123 vessels in 2010 then increasing to 128 vessels in 2011. Participation in the American Samoa-based fleet declined from 29 vessels in 2007 to 24 in 2011. In 2009 and 2010, a few vessels occasionally operated in both the Hawaii-based and American Samoa-based longline fisheries. U.S. longline catches made outside the portion of the U.S. EEZ around Hawaii by vessels operating with both American Samoa and Hawaii longline permits and landed in Hawaii were attributed to the longline fishery of American Samoa and not to the U.S. longline fishery in the NPO in accordance with WCPFC CMM 2008-01 and federal fisheries regulations (74 FR 63999). These American Samoa longline landings in the NPO (labeled as American Samoa in the NPO in Table 1f) are shown separately from U.S. longline catches in the NPO. The total for American Samoa (Table 1f) includes only the South Pacific portion of the fishery, so the overall American Samoa fishery total would be the sum of its North and South Pacific fisheries. In 2011 the Consolidated and Further Continuing Appropriations Act, 2012 (Pub. L. 112-55, 125 Stat. 552 et seq.) was passed, and if, after November 19, 2011, the U.S. vessel landing the fish was included in a valid arrangement under Sec. 113(a) of the CFCAA, the fish was assigned to the fishery of American Samoa.

The U.S. Hawaii-based longline fishery operated mainly from the equator to 40° N latitude and from 125° W to 175° W in 2011 (Figure 2a), representing some expansion to the east as compared with 2007 and 2008. The American Samoa-based longline fishery operated mostly from 5° S to 20° S latitude and 155° W to 175° W longitude in 2011 (Figure 2a). The Hawaii-based fishery targeted bigeye tuna and swordfish, with significant landings of associated pelagic species, whereas the American Samoa-based fishery targeted mainly albacore. The dominant components of the U.S. longline catch in 2011 werebigeye tuna, albacore, yellowfin tuna, and swordfish (Table 1a, Figure 2b). The total catch of all species during the past 5 years ranged from a low of 12,422 t in 2010, to a high of 16,720 t in 2007 (Tables 1f).

Most of the Hawaii-based longline fishery involved deep-set longline effort directed towards tunas. High ex-vessel tuna prices along with relatively lower operating expenses in this sector of the U.S. longline fishery in the NPO motivated longline fishers to continue targeting bigeye tuna while remaining within the catch limits in the WCPO and EPO in 2011. Targeting of swordfish in the Hawaii-based longline fishery was prohibited from 2001 until early 2004. The swordfish fishery was reopened in April 2004 under a new set of regulations intended to reduce interactions with sea turtles. However, the California-based longline fishery was closed concomitantly with the reopening of the Hawaii fishery; this prompted many California-based longline vessels to relocate to Hawaii. In fact, most of these vessels had been home ported in Hawaii before the 2001 closure so their movement in 2004 was essentially a return to their prior base of operations. In 2006, the Hawaii-based shallow-set longline fishery reached its allowable annual limit of loggerhead interactions (17) in March and accordingly was closed for the remainder of the year. This shallow-set longline fishery has managed to stay under the allowable annual sea turtle limits and remained open throughout 2007-2010. However, the shallow-set fishery reached its allowable annual limit of leatherback interactions (16) in November 2011 and was closed through the end of the year. The effort restriction limiting this sector of the longline fishery to 2,120 shallow sets was removed in early 2010. Although a record 1,873 sets were recorded in 2010, this was still less than the maximum number of shallow sets allowed under the previous effort restriction. The number of shallow sets decreased to 1,447 sets in 2011. Swordfish longline landings in the NPO decreased from 1,428 t in 2007 to 838 t in 2011.

4.3 U.S. Albacore Troll Fishery

In recent years, the U.S. troll fishery for albacore in the WCPO has experienced significant decline in participation. Six vessels participated in the WCPO portion of this fishery in 2011 and only 3 vessels fished in 2008 (Table 2). All of these vessels fished in the South Pacific. The albacore troll fishery operated mostly between 35° S and 45° S latitude and 150° W and 170° W longitude (Figure 3). The catch in this fishery is composed almost exclusively of albacore. The South Pacific albacore troll catches in the WCPO increased from 150 t in 2008 to 321 t in 2011(Tables 1a-1e). The North Pacific albacore catches in the WCPO declined to zero in 2008 - 2010 but increased to 68 t in 2011.

4.4 Other Fisheries of the U.S. and Participating Territories

Other fisheries of the U.S. and Participating Territories include the small-scale tropical troll, handline, and pole-and-line fleets, as well as miscellaneous recreational and subsistence fisheries. In American Samoa, Guam, and CNMI, these fisheries are monitored by creel surveys, and the data are included in the tropical troll statistics, as this fishing method is the most commonly used in the recreational and subsistence fisheries in these areas. Most of the vessels comprising the U.S. and Participating Territories tropical troll fishery, and all of the U.S. handline and pole-and-line vessels are located in Hawaii. The total catch by these fisheries was 2,613 t in 2011. The catch was composed primarily of yellowfin tuna, skipjack tuna, bigeye tuna and mahimahi.

5. Coastal State Reporting

[n/a]

6. Socioeconomic Factors and Trends in the Fisheries

6.1 Socio-economic Surveys and Analyses

NMFS staff and colleagues have undertaken surveys and analyses to better understand the socioeconomic considerations of U.S. fisheries in the WCPO. The following summaries describe recent investigations in this area.

Hawaii Longline Fishery Economics – Since 2004, NOAA Fisheries observers have collected data on fishing costs and other economic information from more than 1,900 longline trips in order to assess changes in important economic indicators of the Hawaii-based longline fisheries (Pan, 2010). Over 2004-2011, the average trip cost in the longline fishery for tuna-targeting trips increased by about 60%, from $13,720 per trip in 2004 to $28,910 per trip in 2011. In 2004, fuel cost made up about 45% of the total trip cost (non-labor items). However, in 2011, fuel cost made up about 62% of the total trip cost. The economics data collection program is continuing with the Hawaii longline fishery and has extended to other fisheries in Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands.

Hawaii Small Boat Economics – NOAA Fisheries conducted a survey to assess economic and social characteristics of the Hawaii small boat pelagic fishery. A total of 343 surveys were completed in 2007-2008, revealing high levels of heterogeneity within the fishery, and diverse motivations for fishing (economic, social, and cultural). The results of the study provide an important baseline that will allow fishery managers to better understand how new fishery regulations and changing macroeconomic conditions may affect the financial performance and behavior of fishers. (Hospital et al., 2011). Similar cost-earnings surveys were also conducted in Guam and CNMI, and for the Hawaii charter fishing (Hospital et al, in press).

Hawaii Seafood Retail Monitoring Project -- NOAA Fisheries conducted a five-year retail monitoring project between 2007 and 2011 to develop a time-series of consumer-level prices for the Hawaii seafood retail market. These data allow researchers to better understand the economic contribution of fisheries and the market impacts of regulations by exploring how price changes travel through the fish ‘value chain’ from the fisherman to the consumer. This will be the first published source of consumer-level prices for Hawaii seafood (Hospital and Beavers, in press).

A related NOAA study explored the pricing dynamics between ‘ahi (tuna) prices received by fishermen and the prices paid by consumers in Hawaii. A greater understanding of retailer pricing behavior and how price changes at the ex-vessel level are passed on to consumers will allow fishery managers to better determine the consumer effects of fishery regulations and identify potential market power issues (Houbcharaun and Hospital, in press).

***Spillover Effects of Hawaii Longline Regulation for Turtles* --** This NOAA Fisheries study provides a quantified estimate of the possible spillover effects resulting from the environmental regulations for sea turtle protection imposed on the Hawaii shallow-set longline fishery for swordfish based on 2 perspectives. First, this study estimates the spillover effect resulting from market replacement as U.S. swordfish consumption shifts from domestic production to foreign imports as a result of the domestic fishery closure. Because U.S. swordfish imports are harvested in different oceans by different countries, the spillover effects are estimated on a global scale (the sum across all oceans). Subsequently, this study estimates the spillover effects resulting from the displacement of production by the competitors in the specific ocean area where the Hawaii shallow-set longline fishery for swordfish operates. From the data that are available and the analysis, the study suggests strong spillover (market transfer effects) from regulation of the Hawaii shallow-set longline fishery for swordfish (Chan and Pan, 2012).

6.2 Relevant Publications

Arita S, Pan M, Hospital J, Leung P. 2011. Contribution, linkages and impacts of the fisheries sector to Hawaii's economy: a social accounting matrix analysis. Joint Institute for Marine and Atmospheric Research, SOEST Publication 11-01, JIMAR Contribution 11-373. University of Hawaii: Honolulu, HI, 54 p.

Chan, H. L., and M. Pan. 2012. Spillover effects of environmental regulation for sea turtle protection: the case of the Hawaii shallow-set longline fishery. U.S. Dep. Commer., NOAA Tech. Memo., NOAA-TM-NMFS-PIFSC-30, 38 p. + Appendices.

Criddle, K., M. Pan, and K. Davidson. [In press.] A Summary of the Pacific Islands Region Catch Share Workshop Honolulu, HI March 9-12, 2010. PIFSC Administrative Report.

Davidson, K., M. Pan, W. Hu, and D. Poerwanto. [In press.] Consumers' Willingness to Pay for Aquaculture Fish Products vs. Wild Caught Seafood- A Case Study in Hawaii. Aquaculture Economics and Management.

Hospital, J. and C. Beavers. [In press.] Hawaii Seafood Markets: Observations from Honolulu (2007-2011). Pacific Islands Fisheries Science Center Administrative Report.

Hospital, J, and C Beavers. [In press] Economic and Social Characteristics of Charter Fishing in Hawaii. Pacific Islands Fisheries Science Center Administrative Report.

Hospital, J, C Beavers, and J Borja. [In press] Economic and Social Characteristics of Boat-Based fishing on Guam. Pacific Islands Fisheries Science Center Administrative Report.

Hospital, J, C Beavers, and R Roberto. [In press] Economic and Social Characteristics of Boat-Based fishing in the Commonwealth of the Northern Mariana Islands.

Pacific Islands Fisheries Science Center Administrative Report.

Hospital, J. and C. Morishige. 2011. Measuring the cost of marine debris to Hawaii's longline fishery. [Abstr.] 5th International Marine Debris Conference. Honolulu, HI March 20-25, 2011.

Hospital J, Scholey Bruce S, Pan M. 2011. Economic and social characteristics of the Hawaii small boat pelagic fishery. Pacific Islands Fisheries Science Center Administrative Report H-11-01, 47 p. + Appendices.

Houbcharaun, A. and J. Hospital. 2011. An empirical look at retail pricing behavior: the case of *ahi* in Hawaii. [Abstr.] North American Association of Fisheries Economists (NAAFE) Forum. Honolulu, HI May 11-13, 2011.

Houbcharaun, A. and J. Hospital. (In press). An empirical look at retail pricing behavior: the case of *ahi* in Hawaii. Pacific Islands Fisheries Science Center Technical Memorandum.

Pan, M., and S. Arita. 2011. Economic impacts of 2010 WCPO Bigeye Closure, Western Pacific Regional Fisheries Management Council, 107th SSC, Honolulu, June 13-15, 2011.

Pan, M., K. Davidson, W. Hu, and D. Poerwanto. 2011. Consumers' Willingness to Pay for Aquaculture Fish Products vs. Wild Caught Seafood- A Case Study in Hawaii. [Abstr.] 9th Asian Fisheries and Aquaculture Forum, April 21-23, 2011, Shanghai, China

Pan, M., K. Davidson, W. Hu, and D. Poerwanto. 2011. Measuring the Effect of Socioeconomic Factors on Consumer Preferences for Seafood: A Case Study in Hawaii. [Abstr.] 9th Asian Fisheries and Aquaculture Forum, April 21-23, 2011, Shanghai, China

Pan, M., and S. Li. [In press.] Evaluation of fishing opportunities under the sea turtle interactions caps – a decision support model for the Hawaii-based longline swordfish fishery management. Our Living Oceans.

Richmond, L., D. Kotowicz, J. Hospital, and S. Allen. [In press]. Adaptation in a Fishing Community: Monitoring Socioeconomic Impacts of Hawaii's 2010 Bigeye Tuna Closure. 35p. submitted to Ocean and Coastal Management.

7. Disposal of Catch

The purse seine catch is stored on board as a frozen whole product. Most of the catch has historically been off-loaded to canneries in Pago Pago, American Samoa, however most vessels now transship their catches in the ports of other Pacific Island countries for canning and loining destinations in Southeast Asia and Latin America. Cannery products from American Samoa are typically destined for U.S. canned tuna markets. Frozen non-tuna catches may be processed locally (e.g., wahoo) or transshipped to foreign destinations (e.g., billfish and shark).

The U.S. longline vessels in the NPO store their catch on ice and deliver their product to the market fresh. Large tunas and marlins are gilled and gutted before storage on the vessel, swordfish are headed and gutted, and the rest of the catch is kept whole. These products are primarily sold fresh locally in Hawaii to restaurants and retail markets, or exported to the U.S. mainland with a 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).

The catch in the albacore troll fishery in the South Pacific is frozen whole and sold in Pacific Island ports or transported to Vancouver, Canada for sale. The other fisheries store their catch in ice. Large tunas and marlins 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.

8. Onshore Developments

[n/a]

9. Future Prospects of the Fisheries

Generally high fuel costs and increasing prices for supplies and goods will result in higher operating costs which will likely continue to constrain the economic performance of most U.S. pelagic fisheries.

In each of the calendar years 2009-2011, the U.S. longline fishery has been subject to a limit of 3,763 t of retained catches of bigeye tuna in the WCPO. The fishery managed to stay under the limit in the WCPO with retained catches of 3,741 t in 2009, 3,577 t in 2010, and 3,566 t in 2011 through restrictions on retained catches imposed late in the calendar year. Catch limits in the eastern Pacific Ocean (EPO) established pursuant to decisions of the Inter-American Tropical Tuna Commission (IATTC) affected the portion of the Hawaii-based longline fleet that operated in the EPO in 2006 when it was projected that the U.S. longline fishery would reach its annual bigeye tuna catch limit of 150 t. The fishery operated throughout 2007 without reaching that year’s limit of 500 t. There was no bigeye tuna limit in the EPO in 2008, but a limit of 500 t for vessels greater than 24 m in length was established for 2009 through 2011. This limit was not reached in 2009, 2010, or 2011.

The Hawaii-based longline fishery is likely to continue to target tunas primarily. Recent removal of an effort limit in the Hawaii-based shallow-set longline fishery for swordfish, might result in increased effort in the swordfish segment of the fishery in the future. The swordfish segment of the Hawaii-based longline fishery is highly seasonal and operates under strict regulations to limit interactions with sea turtles and seabirds. There are viable options to further reduce sea turtle bycatch rates, including voluntary efforts to avoid areas of sea turtle concentrations.

The closure of one of two canneries in Pago Pago, American Samoa in 2009 did not curtail the operation of the American Samoa-based longline fishery in 2010, but the catches were reduced in

2011. This longline fishery is expected to continue targeting albacore and delivering its catch frozen to the remaining cannery.

The prospect for the U.S. small-scale fisheries is expected to be fairly stable although participation is sensitive to a slow economy and high fuel prices. Fuel prices have increased slowly, although they were lower in 2011 than the peak prices in 2008. These 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.

10. Status of Fisheries Data Collection Systems

10.1 Logsheet Data Collection and Verification

Various sources of data are used to monitor U.S. pelagic fisheries. The statistical data systems that collect and process fisheries data consist of logbooks and fish catch reports submitted by fishers, at-sea observers, port samplers; market sales reports from fish dealers; and creel surveys. The coverage rates of the various data systems vary considerably.

The primary monitoring system for the major U.S. fisheries (purse seine, longline, and albacore troll) fisheries in the WCPO consists of the collection of 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 are submitted as a requirement of the South Pacific Tuna Treaty (100% coverage) since 1988. The Hawaii-, American Samoa-, and California-based longline fisheries are monitored using the NOAA Fisheries Western Pacific Daily Longline Fishing Logs for effort and resulting catch. The coverage of logbook data is assumed to be complete (100%), except for the American Samoa fishery where under-reporting of a very small percentage of trips is estimated via a creel survey that monitors catch by small longline vessels. Beginning in 1995, all U.S. vessels fishing on the high seas have been required to submit logbooks to NOAA Fisheries.

In Hawaii, fish sales records from the Hawaii Division of Aquatic Resources (DAR) Commercial Marine Dealer Report database are an important supplementary source of information, covering virtually 100% of the Hawaii-based longline landings. WPacFIN has recently improved its procedures for integrating Hawaii fisheries catch data (numbers of fish caught, from logbooks) and information on fishing trips from fishermen’s reports with fish weight and sales data from the dealers’ sales 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 in this report. Other enhancements to this integration are under development, such as linking the weight of longline-caught fish from the Hawaii Marine Dealer Report records with the Hawaii-based longline logbook data to approximate the weight of catch by geographic location. In addition, species misidentifications on a trip level have been corrected by cross-referencing the longline logbook data, the Hawaii Marine Dealer Report data, and data collected by NOAA Fisheries observers deployed on Hawaii-based longline vessels (see below). Information on these corrections is published (Walsh et al., 2007) but is not yet operationally applied to routine data reporting (i.e., the data reported here).

Small-scale fisheries in Hawaii, i.e., tropical troll, handline, and pole-and-line, are monitored using the Hawaii DAR Commercial Fishermen's Catch Report data and Commercial Marine Dealer Report data. The tropical troll fisheries in American Samoa, Guam, and CNMI are monitored with a combination of Territory and Commonwealth creel survey and market monitoring programs, as part of the Western Pacific Fishery Information Network (WPacFIN).

10.2 Observer Programs

U.S. purse seine vessels operating in the WCPO under the Treaty on Fisheries between the Governments of Certain Pacific Island States and the United States of America (The South Pacific Tuna Treaty) pay for, and are monitored by observers from the Pacific Island States deployed by the Forum Fisheries Agency (FFA). Monitoring includes both the collection of scientific data as well as information on operator compliance with various Treaty-related and Pacific Island Country (PIC)-mandated regulations. These data are not described here. NOAA Fisheries has a field station in Pago Pago, American Samoa that facilitates the placement of FFA-deployed observers on U.S. purse seine vessels.

Starting on January 1, 2010 the observer coverage rate as prescribed by the WCPFC CMM 2008-01 was 100%. Through a modified agreement with the FFA, the required observer coverage rate was maintained throughout 2010 and 2011. The data collected under this enhanced arrangement by FFA deployed- observers are currently provided directly to the WCPFC. NOAA Fisheries has also continued to work with counterpart offices in the Marshall Islands and the Federated States of Micronesia to assist with monitoring and sampling of US purse seine vessels transshipping their catches through Majuro and Pohnpei.

All U.S. longline vessels are subject to observer placement as a condition of the fishing permits issued by NOAA Fisheries Service. The main focus of the longline observer program is to collect scientific data on interactions with protected species, primarily sea turtles. The observer program also collects relevant information on the fish catch and on the biology of target and non-target species. Fish catch data collection now includes measurement 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.

Overall, 254 out of 1,329 deep-set trips were observed, as well as all 82 shallow-set trips, resulting in a combined coverage rate of 25.3% in 2011 (Table 3). The results indicated a higher number of interactions with sea turtles and seabirds, and a much lower number of interactions with marine mammals in 2011 as compared with 2010.

For the American Samoa-based component of the U.S. longline fishery, 2011 was the fifth full calendar year monitored by observers. The coverage rate was 33.3%--for a total of 45 trips and 1,257 sets. Scientists have not yet provided rigorous estimates of the total interactions with protected species for this fishery. Detailed information on the U.S. Pacific Islands Regional Observer Program can be found at http://www.fpir.noaa.gov/OBS/obs_index.html.

Table 3. Estimated total numbers of fishery interactions (not necessarily resulting in mortalities or serious injury) with non-fish species by shallow-set and deep-set (combined) longline fishing in the Hawaii-based fishery during 2007-2011[2]. Estimates of total marine mammal interactions by the deep-set fishery in 2011 have not yet been completed; only the observed values are included here. Statistically rigorous estimates have not yet been developed for the American Samoa-based fishery given the low level of observer coverage in that fleet.

Species	**2007**	**2008**	**2009**	**2010**	**2011**
Marine mammals					
Striped dolphin (*Stenella coeruleoalba*)	0	1	0	2	1
Bottlenose dolphin (*Tursiops truncatus*)	3	0	5	6	2
Risso's dolphin (*Grampus griseus*)	6	6	3	10	4
Blainville's beaked whale (*Mesoplodon blainvillei*)	0	0	0	0	1
Bryde's whale (*Balaenoptera edeni*)	0	0	0	0	0
False killer whale (*Pseudorca crassidens*)	14	12	56	19	4
Humpback whale (*Megaptera novangliae*)	0	1	0	0	1
Shortfinned pilot whale (*Globicephala macrorhynchus*)	2	5	0	0	0
Spotted dolphin (*Stenella attenuate*)	0	3	0	0	0
Unspecified false killer whale or shortfinned pilot whale	0	10	0	3	0
Unidentified Cetacean (Cetacea)	4	3	17	13	4
Unspecified member of beaked whales (Ziphiidae)	0	0	0	0	2
Unspecified pygmy sperm whales (Kogia)	0	1	0	0	1
TOTAL MARINE MAMMALS	29	42	81	53	20
Sea turtles					
Loggerhead turtle (*Caretta caretta*)	21	0	3	11	14
Leatherback turtle (*Dermochelys coriacea*)	9	13	12	13	31
Olive Ridley turtle (*Lepidochelys olivacea*)	26	19	17	10	36
Green turtle (*Chelonia mydas*)	0	1	1	1	9
Unidentified hardshell turtle (Cheloniidae)	0	0	0	0	0
TOTAL SEA TURTLES	56	33	33	35	90

[2] The estimates are made by raising the number of observed interactions by a factor determined according to the design of the observer sampling program. The species listed are those that have been observed. Sources: Pacific Islands Regional Office observer program reports (http://www.fpir.noaa.gov/OBS/obs_qrtrly_annual_rprts.html) and Pacific Islands Fisheries Science Center Internal Reports IR-07-006, IR-08-007, IR-09-011, IR-10-009 and IR-11-005. Hawaii-based longline logbook reported data on fish discards are available at http://www.pifsc.noaa.gov./fmsd/reports.php

Table 3. (Continued.)

Species	2007	2008	2009	2010	2011
Albatrosses					
Blackfooted albatross (*Phoebastria nigripes*)	82	122	133	103	92
Laysan albatross (*Phoebastria diomedia*)	83	87	138	196	236
TOTAL ALBATROSSES	165	209	271	299	328
Other Seabirds					
Red-footed booby (*Sula sula*)	0	4	0	0	0
Brown booby (*Sula leucogaster*)	0	0	0	0	0
Unspecified bird	0	64	25	1	19
TOTAL OTHER SEABIRDS	0	68	25	1	19
Observer Information					
Total trips	1,451	1,409	1,325	1,285	1329
Observed trips	347	380	355	362	336
Proportion of trips observed	23.90%	27.00%	26.80%	28.17%	25.29%
Observed sets	5,002	5,402	5,084	5,476	5,119
Observed hooks	8,912,119	10,126,078	9,644,989	9,980,848	9,871,487

10.3 Port Sampling

Less than 2% of the fish caught by U.S. purse seine, longline, and albacore troll fisheries in the WCPO are measured (fork length) by NOAA Fisheries personnel as vessels are unloading in American Samoa and by SPC port samplers in ports where transshipping takes place. Species composition samples are also taken for more accurately determining catches of yellowfin tuna and bigeye tuna from U.S. purse seine vessel landings. Fish caught by U.S. albacore troll vessels are also measured (fork length) by port samplers in American Samoa when vessels unload there.

10.4 Unloading / Transshipment

A small amount of transshipment of highly migratory fish stocks occurs in the U.S. longline fishery (within the WCPFC Statistical Area) between domestic vessels. For the Hawaii-based longline fishery, there were 5 at-sea transshipments and no in-port transshipments within the Convention Area between U.S. vessels; all were landed in Honolulu. Table 4 shows the species and quantity of transshipments of longline-caught HMS in 2011. There were no at-sea transshipments and no information is available on in-port transshipments of troll-caught HMS in the high seas (i.e., involving vessels in the U.S. albacore troll fleet).

Table 4. Estimated quantities, by species, of longline-caught HMS transshipped by U.S. vessels in 2011. Quantities are rounded to the nearest kg.

Species	Quantity (kg)
Bigeye Tuna	36
Yellowfin Tuna	29
Blue Marlin	84
Shortbilled Spearfish	15
Striped Marlin	22
Mahi Mahi	5
Moonfish	41
Oilfish	7
Wahoo	15
Other*	122
Total	377

*Other includes catches of albacore, monchong, swordfish, escolar and pomfret, which have been combined for confidentiality purposes.

For the U.S. purse seine fishery in the WCPFC Statistical Area in 2011, there were 238 transshipments of purse seine-caught fish offloaded from U.S. vessels, and no transshipments of purse seine-caught fish received by U.S. vessels. All transshipments occurred in port; no transshipments occurred at sea. Of the 164,295 mt of purse seine-caught HMS transshipped in 2011, 148,179 mt were skipjack tuna, 14,471 mt were yellowfin tuna, 1,645 mt were bigeye tuna.

In 2010, there were an estimated 299 transshipments of purse seine-caught fish in port.

10.5 Scientific Survey Data

Cooperative Data Collection Program for North Pacific Albacore – NOAA Fisheries has been collaborating with the American Fishermen's Research Foundation (AFRF) and the American Albacore Fishing Association (AAFA) on monitoring programs for North Pacific albacore. Since 1961, a port sampling program using State fishery personnel has been collecting biological and size data from albacore landings made by the U.S. and Canadian troll fleets along the U.S. Pacific coast. In recent years, with AFRF support, fishermen have collected biological data during selected fishing trips to help fill in gaps in coverage by the port sampling program. Sizes of albacore recorded by fishermen and port samplers were found to be generally similar.

International Billfish Angler Survey – NOAA Fisheries has been collaborating with the billfish angling community since 1963 to study various aspects of billfish biology and to obtain an index of angler success in the Pacific Ocean. The International Billfish Angler Survey, initiated in 1969, provides a 41-year time series of recreational billfish angling catch and effort (number caught per angler fishing day), and is the only billfish survey independent of commercial fisheries in the Pacific Ocean. The main fishing areas include Hawaii, southern California, Baja California (Mexico), Guatemala, Costa Rica, Panama, Tahiti, and Australia.

Central and Western Pacific Fisheries Monitoring – WPacFIN collects and manages data from most of the U.S. central and western Pacific fisheries (Hawaii, American Samoa, Guam, Commonwealth of the Northern Mariana Islands). This includes longline, skipjack pole-and-line, tropical troll, and tropical handline fisheries. In 2011, WPacFIN completed and published the 26th edition of Fishery Statistics of the Western Pacific (Hamm et al., 2011). Annual reports for the Hawaii-based longline fishery and the American Samoa longiine fishery were also published (PIFSC FRMD, 2012; PIFSC FRMD, 2012).

Shark Data Analysis from Longline Observer Program Data **–** NOAA Fisheries produced standardized CPUE time series for blue shark, whitetip shark, and silky shark in the Hawaii longline fishery from the Pacific Islands Regional Observer Program data (1995–2010) for use as input for stock assessments for these species (Walsh and Clarke, 2011). The standardized CPUE for blue shark was adjusted for the effects of extrinsic factors (e.g., geographic position, sea surface temperature, and gear configuration), and will be used in an ISC stock assessment for this species in 2013.

10.6 Relevant Publications

Brodziak J, Ianelli J, Lorenzen K, Methot Jr. RD. 2011. Estimating natural mortality in stock assessment applications. U.S. Dept. of Commerce, NOAA Technical Memorandum NMFS-F/SPO-119, 38 p

Brodziak J, Ishimura G. 2011. Development of Bayesian production models for assessing the North Pacific swordfish population. Fisheries Science 77: 23-34.

Fisheries Research and Monitoring Division, Pacific Islands Fisheries Science Center. 2012. PIFSC Report on the American Samoa Longline Fishery, Year 2011. Pacific Islands Fisheries Science Center, PIFSC Data Report, DR-12-005, 5 p

Fisheries Research and Monitoring Division, Pacific Islands Fisheries Science Center. 2012. The Hawaii-based Longline Logbook Summary Report, January-December 2011. Pacific Islands Fisheries Science Center, PIFSC Data Report, DR-12-003, 14 p

Glaser, S. M., H. Ye, M. Maunder, A. MacCall, M. Fogarty, and G. Sugihara. 2011. Detecting and forecasting complex nonlinear dynamics in spatially structured catch-per-unit-effort time series for North Pacific albacore (*Thunnus alalunga*). Can. J. Fish. Aquat. Sci. 68:400–412.

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Lee HH, Maunder MN, Piner KR, Methot RD. 2011. Estimating natural mortality within a fisheries stock assessment model: An evaluation using simulation analysis based on twelve stock assessments. Fisheries Research 109(1): 89-94.

Lee H-H, Maunder MN, Piner KR, Methot RD. 2012. Can steepness of the stock-recruitment relationship be estimated in fishery stock assessment models? Fisheries Research 125-126: 254-261.

Link JS, Ihde TF, Harvey CJ, Gaichas SK, Field JC, Brodziak JKT, Townsend HM, Peterman RM. 2012. Dealing with uncertainty in ecosystem models: the paradox of use for living marine resource management. Progress in Oceanography. Article in Press. DOI: 10.1016/j.pocean.2012.03.008.

Piner KR, Lee H-H, Maunder MN, Methot RD. 2011. A simulation-based method to determine model misspecification: Examples using natural mortality and population dynamics models. Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science 3: 336-343.

Sundberg M, Underkoffler K. 2011. Size composition and length-weight data for bottomfish and pelagic species sampled at the United Fishing Agency Fish Auction in Honolulu, Hawaii from October 2007 to December 2009. Pacific Islands Fisheries Science Center Administrative Report H-11-04, 34 p

Walsh WA, Clarke SC. 2011. Analyses of catch data for oceanic whitetip and silky sharks reported by fishery observers in the Hawaii-based longline fishery in 1995-2010. Pacific Islands Fisheries Science Center Administrative Report H-11-10, 43 p. + Appendices.

11. Research Activities

11.1 Biological and Oceanographic Research - TUNAS

Age and Growth of North Pacific Albacore – NOAA Fisheries assessed age and growth of north Pacific albacore by examining annual growth increments in sagittal otoliths from 486 fish collected throughout the North Pacific Ocean, dorsal fin spines, length frequency analysis to generate estimates of size-at–age. Overall, ages ranged from 1 to 15 years with the majority of fish between 2 to 4 years of age. Fin spine ages generally matched otolith-derived ages (85% of samples), though samples were only available and analyzed for young fish. Results suggest north Pacific albacore are a relatively long-lived tuna species and provide improved biological parameters useful for stock assessment models. This updated age-specific growth information was used in an ISC north Pacific albacore stock assessment in 2011.

Population Structure of North Pacific Albacore – NOAA Fisheries examined stable isotopes of carbon (δ13C) and oxygen (δ18O) in addition to several trace elements in whole otoliths of albacore (ages 2-4) collected in the northern region (offshore Oregon and Washington, > 40° N) and southern region (offshore southern California and northern Baja California, Mexico, < 40° N) of the Eastern Pacific Ocean. Significant differences existed in otolith chemistry from fish collected between the two regions ($P < 0.05$) and overall cross-validated classification success was 100% with age-specific comparisons exceeding 90% success. Otolith δ18O was significantly enriched in the southern region relative to the northern region, similar to reported seawater δ18O differences. In addition, significantly higher concentrations of sodium and magnesium combined with lower phosphorus in otoliths from fish collected in the southern region are consistent with regional physicochemical conditions (i.e. salinity, temperature, phosphate). The findings support previous studies that have shown limited regional mixing of albacore in the eastern Pacific Ocean and provide life history information useful for management of north Pacific albacore.

Projected Climate Impacts on the Pelagic Ecosystem Size Structure and Catches in the North Pacific over the 21st Century – NOAA Fisheries paired output from an earth system model with a size-based food web model to investigate the effects of climate change on the abundance of large fish over the 21st century. The earth system model combines a coupled climate model with a biogeochemical model including major nutrients, three phytoplankton functional groups, and zooplankton grazing. The size-based food web model includes linkages between two overlapping size-structured pelagic communities: primary producers and consumers. This study focused on seven sites in the North Pacific, each highlighted a specific aspect of forecasted climate change, and included ecosystem exploitation through fishing. Climate-induced phytoplankton changes had a larger effect on the abundance of large fish than did physical warming changes. Projected changes in large phytoplankton density are estimated to result in declines of large fish abundance ranging from 0 - 78% in the central North Pacific and increases of up to 43% in the California Current region. Overall, the model projects changes in the abundance of large fish being of the same order of magnitude as changes in the abundance of large phytoplankton (Woodworth et al. 2012).

11.2 Biological Research – BILLFISHES

Billfish Life History Studies – NOAA Fisheries is collaborating with Charles Sturt University, Australia on a Pelagic Fisheries Research Program (University of Hawaii Joint Institute for Marine and Atmospheric Research) grant to conduct an age and growth study of striped marlin harvested in the Hawaii-based longline fishery. Dorsal fin rays and otoliths for age determination are being collected by observers deployed on Hawaii-based longline vessels. Gonad sub-samples are concurrently collected for determination of gender and sex-specific length at 50% reproductive maturity. Observers also continue to collect small (<110 cm eye-fork length) whole juvenile specimens since billfish of this size are rarely available.

Characterizing Swordfish Catch, Non-target Species Catch and the Behavior of Fishermen – Since 2008 NOAA Fisheries has been conducting the Swordfish and Leatherback Use of Temperate Habitat (SLUTH) project to integrate studies of swordfish and leatherback sea turtles for management and conservation purposes. Part of the SLUTH initiative is to explore creative methods to reduce the bycatch of non-target species in the California drift gillnet fishery. One approach is to use the fisheries data to better understand the environmental factors that affect the distribution of leatherbacks, swordfish, and the fishers themselves. NMFS is using novel statistical approaches including boosted regression trees and random forests to model the relationships between the distribution and abundance of the focal species, fishing effort and a range of factors. The first approach has been to characterize the impact of environment (biotic and abiotic factors) on catch rates. A second approach is to use the fisheries data to better understand the factors that affect the distribution of fishing effort. Results suggest that it is possible to accurately predict fishing effort using a modest set of readily-available predictor variables. Thus, along with information on bycatch species distributions, forecasts of where the probability of bycatch is expected to be high could be provided in order to make in season adjustments to times and areas fished (Soykan et al., in review).

11.3 Biological Research – PELAGIC SHARKS

Electronic Tagging of Sharks -- Since 1999, NOAA Fisheries has used satellite technology to study the movements and behaviors of blue (*Prionace glauca*), shortfin mako (*Isurus oxyrinchus*) and common thresher sharks (*Alopias* spp.) along the U.S. Pacific coast and to link these data to physical and biological oceanography. Other shark species are tagged opportunistically. In recent years, satellite tag deployments (SPOT tags or towed GPS tags) have been carried out in collaboration with Mexican colleagues at CICESE (Centro de Investigación Científica y de Educación Superior de Ensenada), and Canadian colleagues at the DFO Pacific Biological Station in Nanaimo, British Columbia and the TOPP program (www.topp.org). Movements vary among species; thresher sharks remain in coastal waters within 100-200 miles of shore while blue and mako sharks range farther. Individual mako and blue sharks tracked for up to two years each have demonstrated seasonal movements away from southern California with sharks returning the subsequent summer, demonstrating homing to the productive waters off southern California.

Oxytetracycline Age Validation of Juvenile Shortfin Makos – NOAA Fisheries is estimating age and growth of mako, common thresher, and blue sharks from band formation in vertebrae as well as validating aging methods for these three species based on band deposition periodicity determined using oxytetracycline (OTC) to tag animals. The purpose of this current study was to validate vertebral band counts for ageing juvenile shortfin mako sharks and to resolve the discrepancy between the fast observed growth rates and the much slower growth predicted by age-at-length models that assume one band pair is deposited per year. OTC labeled vertebrae of 29 juvenile shortfin mako were obtained from tag-recapture activities. Time at liberty for the 29 sharks ranged from 4 months to 4.4 years (mean=1.3 years). Growth information was also obtained from length frequency modal analyses (MULTIFAN and MIXDIST) using a 29-year dataset of commercial and research catch data, in addition to tag-recapture growth models (GROTAG) using lengths and time-at-liberty. For samples used for age validation, shark size at time of release ranged from 79 to 142 cm FL and from 98 to 200 cm FL at recapture. Results from band counts of vertebrae distal to OTC marks indicate two band pairs (2 translucent and 2 opaque) are formed per year for shortfin mako of the size range examined (Figure AA). In addition, total band pair counts at length compared well with results of a similar study in this region, suggesting vertebral readings were similar, and only assumptions about deposition rate differed. Growth rates calculated from length frequency modal analyses estimate 26.5 to 35.5 cm per year for the first age class mode (85 cm FL), and 22.4 to 28.6 cm per year for the second age class mode (130 cm FL). In addition, the GROTAG model also resulted in a rapid growth rate during time at liberty for tagged fish of the two youngest age classes with estimates of 28.7 and 19.6 cm FL per year at 85 and 130 cm FL, respectively. Collectively, these methods suggest rapid growth of juvenile shortfin mako in the Southern California Bight and suggest biannual deposition in vertebrae (Wells et al., in prep).

Shortfin Mako Shark Genetics – NOAA Fisheries completed a study in collaboration with a University of San Diego graduate student which provides evidence of regional stock structure of mako sharks within the Pacific Ocean. Using mtDNA sequencing, makos in the North Pacific were shown to be genetically distinct from those in the South Pacific and Atlantic Ocean. In a follow-up study, a suite of nuclear microsatellite markers is being developed to further refine the spatial and temporal resolution of shortfin mako stocks within the Pacific. These markers will also be used to develop estimates of effective population size within the California Current region (Michaud et al., in prep).

Thresher Sharks Released from the Recreational Fishery – Since 2007 NOAA Fisheries and Pfleger Institute of Environmental Research have been collaborating to assess the post-release survival of thresher sharks caught by recreational anglers. A major component of this project is education and outreach to the recreational fishing community in order to promote fishing practices that enhance thresher shark catch and release survival, such as mouth hooking. A brochure (http://www.pier.org/flyers/BREP_thresher_brochure.pdf) and video have been produced for recreational anglers that highlight the best fishing practices.

11.4 Research on Bycatch and Fishing Technology – SEA TURTLES

Gear Modification to Reduce Turtle Bycatch – Since 2006 NOAA Fisheries has provided funds and technical expertise to support research experiments world-wide to identify means to reduce sea turtle bycatch in both longline and gillnet fisheries. During the last year, gear modification trials were underway in Brazil, Peru, Mexico, Italy, and Costa Rica. Research from the past few years indicates that relatively large circle hooks effectively reduce the bycatch of both loggerhead and leatherback sea turtles in longline fishing gear (Domingo et al. in press; Piovano et al. 2012, Serafy et al. in press; Swimmer et al., 2011). These hooks also show acceptable catch rates of tuna species, but slightly reduced catch rates of targeted swordfish.

Post-release Survival of Turtles in Longline Fisheries -- Another NOAA Fisheries objective is to improve estimates of sea turtles' post-release survival after their release from fishing gear, specifically regarding shallow longline gear. Current methods involve use of pop-up satellite archival tags (PSATs) and platform terminal transmitters (PTTs) in the North Pacific and South Atlantic Oceans, as well as the Mediterranean Sea. Preliminary results of tracking studies indicate no differences in duration of transmissions as a function of the turtle's 'severity' of injury, specifically deep or shallow hookings, and that most sea turtles were tracked for the duration of the tag's battery life.

A sea turtle post-release mortality workshop was convened in 2011 to ensure that the current estimates continue to be based on the best available science (Swimmer and Gilman, in press). Additional work has been conducted on the role of safe handling to ensure maximal chance of survival after release (Hall et al. 2012). Simultaneous studies are ongoing on the movement patterns of loggerhead sea turtles in the South Atlantic Ocean (Barcelo et al. In press), and on data interpretation for the various tag types deployed on turtles (Musyl et al. 2011, Jones et al. 2012).

11.5 Research on Bycatch and Fishing Technology – PELAGIC SHARKS

Longline Hook Effects on Catch **--** NOAA Fisheries conducted a study which tested the effects of using large (16/0) circle hooks on catch rates in three pelagic longline fisheries in the South Pacific Ocean. Large (16/0) circle hooks were tested against a variety of smaller hooks already in use by longline vessels in American Samoa, Cook Islands, and New Caledonia. A total of 4912 fishes of 33 species were observed on 145,982 hooks from 67 sets. In the Cook Islands fishery, there was no significant difference in catch by hook type for two main target species, but there was an increase in catchability for swordfish. In the New Caledonia fishery, there was no significant difference in catch by hook size for any species. In the American Samoa fishery, 16/0 circle hooks did not significantly affect the catch of albacore, but did significantly reduce the catch of skipjack tuna, dolphinfish, and wahoo. For all locations, catch rates on 16/0 circle hooks were nominally lower, but not always significant for smaller pelagic species. (Curran and Beverly, in press).

11.6 Research on Bycatch and Fishing Technology – OTHER BYCATCH

Genetic and Morphometric Analysis of Opah – Though mainly caught as bycatch in the Hawaii longline fishery, opah (*Lampris* spp.) commands a high price in the market and thus is rarely discarded. NOAA Fisheries port samplers in Honolulu discovered the existence of two opah morphotypes in the Central Pacific with differences in the relative size of the eye. Genetic analyses confirmed that the two morphotypes are distinct, and represent separate species. Further investigations of genetic samples collected worldwide revealed that the Hawaii morphotypes are also different from opah captured in the same geographical range as the originally described *Lampris guttatus*. A DNA bar-coding manuscript, in review, will reveal multiple cryptic lineages of opah and their general distribution. Another manuscript illustrating the various niches of each species using genetically identified samples (fin clips or muscle tissue) obtained from various museums and research institutes is in preparation.

NOAA Fisheries port samplers collected length-weight data from *Lampris* spp. (n=1127) at the Honolulu fish auction in 2007-2009. Length-weight regressions and the coefficient of determination (r^2) were estimated by sex (Sundberg and Underkoffler, 2011). Auction sampling for *Lampris* spp., as well as for other pelagic species caught by the Hawaii longline fishery, continued throughout 2010 and 2011; analysis of this data is ongoing.

Species	Sample Size	R^2 value	Least Squares Line
Lampris spp. (male)	689	0.80	Ln(Wt)=2.5692*ln(FL)-8.2368
Lampris spp. (female)	384	0.80	Ln(Wt)=2.5815*ln(FL)-8.3378
Lampris spp. (unknown)	54	0.90	Ln(Wt)=2.7332*ln(FL)-9.084

11.7 Relevant Publications

Barceló, C., Domingo, A., Miller, P. Ortega, L., Giffoni, B., Sales, G., McNaughton, L., Marcovaldi, M., Heppell, S., Swimmer, Y. (In press). General movement patterns of tracked loggerhead sea turtles (Caretta caretta) in the southwestern Atlantic Ocean. Marine Ecology Progress Series.

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Carretta, James V., and Jay Barlow. 2011. Long-term effectiveness, failure rates, and "dinner bell" properties of acoustic pingers in a gillnet fishery. Marine Technology Society Journal 45(5):7-19.

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