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PART 1: INFORMATION ON FISHERIES, RESEARCH, AND STATISTICS

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Revision 2

UNITED STATES OF AMERICA

2016 Annual Report to the Western and Central Pacific Fisheries Commission

United States of America

PART I. INFORMATION ON FISHERIES, RESEARCH, AND STATISTICS [1] (For 2015)

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 2016	**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.), escolar (*Lepidocybium flavobrunneum*), 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 retained catch by the United States and U.S.-associated Participating Territory fisheries in the Western and Central Pacific Fisheries Commission (WCPFC) Statistical Area in 2015 are dominated by the catch of the purse seine fishery. Preliminary 2015 purse seine catch estimates total 218,867 t of skipjack, 16,804 t of yellowfin, and 1,551 t of bigeye tuna. The estimate of total U.S. purse-seine catch in 2014 has been revised to 296,683 t from last year's preliminary

[1] PIFSC Data Report DR-16-038. Issued 26 July 2016.

estimate. Longline retained catch decreased slightly in 2015. Longline catch in the North Pacific Ocean in 2015 returned to levels recorded during the 2011–2013 period; longline retained catch by American Samoa in the South Pacific Ocean rose slightly from 2014, but remained lower than levels recorded during the 2011–2013 period. Bigeye tuna longline catch by the United States and its Territories increased to 5,773 t in 2015. Albacore longline catch by the United States and its Territories rose to 1,885 t in 2015. Excluding catch attributed to the U.S. Participating Territories (i.e., American Samoa, Commonwealth of the Northern Mariana Islands, and Guam), longline catch of bigeye tuna by U.S. longline vessels decreased to 3,426 t in 2015. These bigeye tuna catch estimates by the U.S. longline fishery were below the limit of 3,502 t established in U.S. fishery regulations (50 *CFR* Part 300) pursuant to the provisions of WCPFC Conservation and Management Measure (CMM) 2008-01 for bigeye and yellowfin tuna during 2009 through 2011, CMM 2011-01 in 2012, CMM 2012-01 in 2013, CMM 2013-01 in 2014 and CMM 2014-01 in 2015. The longline catch of swordfish by the United States and its Territories in the North Pacific Ocean (NPO) decreased to 694 t in 2015. 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 catch. The longline fleet was the next largest fleet, numbering 155 vessels in 2015, while there were 39 purse seine vessels in 2015.

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 research, including biological and oceanographic research, fish stock assessment research, and socio-cultural studies on fisheries for tunas and billfishes. The monitoring and research also address animals caught as bycatch in those fisheries. In 2015, socio-economic studies addressed measuring productivity in the Hawaii longline fishery and spillover effects on turtle bycatch from turtle protection regulations. 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 the Inter-American Tropical Tuna Commission (IATTC). The 2015 stock assessment work on Pacific bluefin tuna and (*Thunnus orientalis*) blue marlin (*Makaira nigricans*) is not described in this report but is detailed in other publications (Brodziak et al., 2015; Lin et al., 2015; Piner et. al., 2016; Xu et. al., 2016).

NOAA Fisheries biological and oceanographic research on tunas, billfishes, and sharks addressed fish movements, habitat preferences, post-release survival, feeding habits, sexual maturity, and age and growth. Research on North Pacific albacore focused on otolith microchemistry and sex-linked genetic markers, and research on Pacific Bluefin tuna covered migration patterns and stock structure, and reproductive maturity. Oceanographic studies in the central North Pacific focused on trophic pathways and energy budgets of micronekton groups, and the transition zone chlorophyll front, Bycatch mitigation studies in the longline and gillnet fisheries included sea turtles, pelagic sharks, and cetaceans.

Tabular Annual Fisheries Information

This report presents estimates of annual catches of tuna, billfish, and other highly migratory species (HMS), and vessel participation during 2011–2015 for fisheries of the United States and its Participating Territories operating in the western and central Pacific Ocean (WCPO). All statistics for 2015 are provisional. Statistics for 2014 have been updated from those reported provisionally in the submission of 2013-2014 U.S. fishery statistics for the western and central Pacific Ocean (NOAA, NMFS 2015). Statistics for 2011–2013 have not been updated. For the purposes of this report, the WCPO is defined as the Western and Central Pacific Fisheries Commission (WCPFC) Statistical Area. 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.

The purse seine fishery remains the largest U.S. fishery in terms of total catch. It accounts for about 94% of the total catch of HMS by the United States and its Participating Territories in the WCPO. The longline, tropical troll, handline and albacore troll fisheries account for 5.0%, 0.7%, 0.3%, and 0.1% of the total catch, respectively.

Fisheries of the United States and its Participating Territories for tunas, billfishes and other HMS produced an estimated catch of 252,416 t in 2015 (Table 1a), down from 311,574 t in 2014 (Table 1b). The catch consisted primarily of skipjack tuna (87%), yellowfin tuna (7%), bigeye tuna (3%), and albacore (1%). Catches of skipjack tuna decreased in 2015 due to lower purse seine catches and bigeye and yellowfin tuna also decreased from the previous year due to lower purse seine catches.

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

Table 1a. Estimated weight (in metric tons) of catch 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 2015 (preliminary). Totals may not match sums of values due to rounding to the nearest metric ton (< 0.5 t = 0). Purse seine species composition estimates have not been adjusted for 2015.

Species and FAO code	Purse seine	Longline	Albacore troll	Tropical troll	Handline	Total
Albacore (ALB), North Pacific		217	0	2	62	281
Albacore (ALB), South Pacific		1,668	151			1,819
Bigeye tuna (BET)	1,551	5,773		59	202	7,585
Pacific bluefin tuna (PBF)		6				6
Skipjack tuna (SKJ)	218,867	275		401	5	219,548
Yellowfin tuna (YFT)	16,804	1,099		557	401	18,861
Other tuna (TUN KAW FRI)				15	1	16
TOTAL TUNAS	237,222	9,037	151	1,034	671	248,115
Black marlin (BLM)		0		4		4
Blue marlin (BUM)		519		197	3	719
Sailfish (SFA)		15		3		18
Spearfish (SSP)		204		11		215
Striped marlin (MLS), North Pacific		415		11		426
Striped marlin (MLS), South Pacific		3				3
Other marlins (BIL)						
Swordfish (SWO), North Pacific		694		1	5	700
Swordfish (SWO), South Pacific		8				8
TOTAL BILLFISHES		1,859		227	8	2,094
Blue shark (BSH)		1				1
Mako shark (MAK)		38				38
Thresher sharks (THR)		6			1	7
Other sharks (SKH OCS FAL SPN TIG CCL)				1		1
TOTAL SHARKS		45		1	1	47
Mahimahi (DOL)		225		404	13	642
Moonfish (LAP)		336				336
Oilfish (GEP)		184				184
Pomfrets (BRZ)		417			13	430
Wahoo (WAH)		349		203	9	561
Other fish (PEL PLS MOP TRX GBA ALX GES RRU DOT)		8				8
TOTAL OTHER		1,519		607	35	2,161
TOTAL	**237,222**	**12,459**	**151**	**1,869**	**715**	**252,416**

Table 1b. Estimated weight (in metric tons) of catch 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 2014 (updated). Totals may not match sums of values due to rounding to the nearest metric ton (< 0.5 t = 0). Purse seine species composition estimates have not been adjusted for 2014.

Species and FAO code	Purse seine	Longline	Albacore troll	Tropical troll	Handline	Total
Albacore (ALB), North Pacific		186	0	3	49	238
Albacore (ALB), South Pacific		1,430	445			1,875
Bigeye tuna (BET)	2,775	5,141		143	206	8,265
Pacific bluefin tuna (PBF)		3				3
Skipjack tuna (SKJ)	268,835	291		370	8	269,504
Yellowfin tuna (YFT)	25,073	1,021		582	385	27,061
Other tuna (TUN KAW FRI)				14	2	16
TOTAL TUNAS	296,683	8,072	445	1,112	650	306,962
Black marlin (BLM)		1		3		4
Blue marlin (BUM)		486		160	4	650
Sailfish (SFA)		17		1		18
Spearfish (SSP)		175		8		183
Striped marlin (MLS), North Pacific		357		12		369
Striped marlin (MLS), South Pacific		7				7
Other marlins (BIL)						
Swordfish (SWO), North Pacific		880		1	7	888
Swordfish (SWO), South Pacific		10				10
TOTAL BILLFISHES		1,932		185	11	2,128
Blue shark (BSH)		1				1
Mako shark (MAK)		37				37
Thresher sharks (THR)		6		1		7
Other sharks (SKH OCS FAL SPN TIG CCL)				1		1
TOTAL SHARKS		43		2		45
Mahimahi (DOL)		263		535	26	825
Moonfish (LAP)		408				408
Oilfish (GEP)		182				182
Pomfrets (BRZ)		392		0	19	411
Wahoo (WAH)		336		259	10	605
Other fish (PEL PLS MOP TRX GBA ALX GES RRU DOT)		6		1		8
TOTAL OTHER		1,587		796	55	2,438
TOTAL	**296,683**	**11,635**	**445**	**2,095**	**716**	**311,574**

Table 1c. Estimated weight (in metric tons) of catch 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 2013 (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	Total
Albacore (ALB), North Pacific		298		2	46	346
Albacore (ALB), South Pacific	1	2,128	390			2,519
Bigeye tuna (BET)	8,157	4,534		148	393	13,232
Pacific bluefin tuna (PBF)		3				3
Skipjack tuna (SKJ)	226,609	288		539	14	227,450
Yellowfin tuna (YFT)	23,277	1,083		531	442	25,333
Other tuna (TUN KAW FRI)		0		5	1	6
TOTAL TUNAS	258,044	8,335	390	1,224	896	268,889
Black marlin (BLM)		1		3		4
Blue marlin (BUM)		378		137	3	518
Sailfish (SFA)		12		2		14
Spearfish (SSP)		177		11		188
Striped marlin (MLS), North Pacific		328		8		336
Striped marlin (MLS), South Pacific		4				4
Other marlins (BIL)		1				1
Swordfish (SWO), North Pacific		583		1	6	590
Swordfish (SWO), South Pacific		11				11
TOTAL BILLFISHES		1,493		161	9	1,664
Blue shark (BSH)		2				2
Mako shark (MAK)		39				39
Thresher sharks (THR)		5			1	6
Other sharks (SKH OCS FAL SPN TIG CCL)		0		1		1
TOTAL SHARKS		46		1	1	48
Mahimahi (DOL)		293		406	22	721
Moonfish (LAP)		450				450
Oilfish (GEP)		216				216
Pomfrets (BRZ)		359		0	20	379
Wahoo (WAH)		274		206	8	487
Other fish (PEL PLS MOP TRX GBA ALX GES RRU DOT)		10		1		11
TOTAL OTHER		1,602		613	50	2,265
TOTAL	**258,044**	**11,476**	**390**	**1,999**	**956**	**272,865**

Table 1d. Estimated weight (in metric tons) of catch 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 2012 (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	Total
Albacore (ALB), North Pacific		595		3	253	851
Albacore (ALB), South Pacific	42	3,147	235			3,423
Bigeye tuna (BET)	5,503	5,162		155	298	11,118
Pacific bluefin tuna (PBF)		7				7
Skipjack tuna (SKJ)	215,702	490		385	12	216,589
Yellowfin tuna (YFT)	31,679	1,196		648	381	33,903
Other tuna (TUN KAW FRI)		0		18	1	19
TOTAL TUNAS	252,925	10,596	235	1,209	945	265,911
Black marlin (BLM)		3		3		6
Blue marlin (BUM)		313		141	2	456
Sailfish (SFA)		9		1		10
Spearfish (SSP)		147		12		159
Striped marlin (MLS), North Pacific		263		11		274
Striped marlin (MLS), South Pacific		7				7
Other marlins (BIL)		1				1
Swordfish (SWO), North Pacific		900		1	6	907
Swordfish (SWO), South Pacific		14				14
TOTAL BILLFISHES		1,656		169	8	1,833
Blue shark (BSH)		18				18
Mako shark (MAK)		50			1	51
Thresher sharks (THR)		13			1	14
Other sharks (SKH OCS FAL SPN TIG CCL)		1		1		2
TOTAL SHARKS		82		1	2	85
Mahimahi (DOL)		351		508	32	891
Moonfish (LAP)		445				445
Oilfish (GEP)		228				228
Pomfrets (BRZ)		270			5	275
Wahoo (WAH)		241		222	7	470
Other fish (PEL PLS MOP TRX GBA ALX GES RRU DOT)		9		4		13
TOTAL OTHER		1,545		734	44	2,323
TOTAL	**252,925**	**13,879**	**235**	**2,114**	**999**	**270,152**

Table 1e. Estimated weight (in metric tons) of catch 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. 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	Total
Albacore (ALB), North Pacific		610	89	4	84	787
Albacore (ALB), South Pacific	1	2,291	402			2,694
Bigeye tuna (BET)	7,838	4,829		110	296	13,073
Pacific bluefin tuna (PBF)		2				2
Skipjack tuna (SKJ)	169,154	300		394	9	169,857
Yellowfin tuna (YFT)	24,442	1,437		501	357	26,738
Other tuna (TUN KAW FRI)	69	0		16	1	86
TOTAL TUNAS	201,504	9,469	491	1,026	747	213,237
Black marlin (BLM)	32	2				33
Blue marlin (BUM)	34	375		199	2	610
Sailfish (SFA)	2	15		2		19
Spearfish (SSP)	0	209		11		220
Striped marlin (MLS), North Pacific		331		16		347
Striped marlin (MLS), South Pacific	3	3				6
Other marlins (BIL)	163	1		5		169
Swordfish (SWO), North Pacific		859			5	864
Swordfish (SWO), South Pacific	0	12				12
TOTAL BILLFISHES	235	1,805		233	7	2,280
Blue shark (BSH)		14				14
Mako shark (MAK)		51				51
Thresher sharks (THR)		18				18
Other sharks (SKH OCS FAL SPN TIG CCL)	279	3		1		284
TOTAL SHARKS	279	87		1		367
Mahimahi (DOL)	3	353		364	17	737
Moonfish (LAP)		396				396
Oilfish (GEP)		233				233
Pomfrets (BRZ)		148			5	153
Wahoo (WAH)	7	270		162	4	443
Other fish (PEL PLS MOP TRX GBA ALX GES RRU DOT)	139	21		12		172
TOTAL OTHER	149	1,421		538	26	2,134
TOTAL	**202,167**	**12,782**	**491**	**1,797**	**780**	**218,017**

Table 1f. Longline retained catch in metric tons (t) by species and species group, for U.S. and American Samoa vessels operating in the WCPFC Statistical Area in 2011–2015. Totals may not match sums of values due to rounding to the nearest metric ton (< 0.5 t = 0). Catch in North Pacific Ocean = NPO and catch in South Pacific Ocean = SPO.

	U.S. (NPO)					CNMI (NPO)			Guam (NPO)	American Samoa (NPO)					American Samoa (SPO)					Total				
	2015	2014	2013	2012	2011	2015	2014	2013	2015	2015	2014	2013	2012	2011	2015	2014	2013	2012	2011	2015	2014	2013	2012	2011
Vessels	135	140	135	127	128	117	109	113	112	23	17	17	115	114	20	23	22	25	24	155	162	157	153	152
Species																								
Albacore, NPO	197	178	265	480	497			23		19	8	11	115	113						217	186	298	595	610
Albacore, SPO															1,668	1,430	2,128	3,147	2,291	1,668	1,430	2,128	3,147	2,291
Bigeye tuna	3,426	3,823	3,654	3,660	3,565	1,000	1,000	492	831	441	236	305	1,338	1,086	74	82	84	164	178	5,773	5,141	4,534	5,162	4,829
Pacific bluefin tuna			0	0	0										6	3	2	7	2	6	3	3	7	2
Skipjack tuna	176	167	188	115	158			25		11	9	9	123	34	88	116	66	251	108	275	291	288	490	300
Yellowfin tuna	670	567	568	576	738			93		105	30	32	272	144	323	424	390	348	555	1,099	1,021	1,083	1,196	1,437
Other tuna			0	0	0			0												0	0	0	0	0
TOTAL TUNA	**4,470**	**4,734**	**4,674**	**4,831**	**4,958**	**1,000**	**1,000**	**633**	**831**	**577**	**283**	**357**	**1,849**	**1,376**	**2,158**	**2,055**	**2,671**	**3,916**	**3,135**	**9,037**	**8,072**	**8,335**	**10,596**	**9,469**
Black marlin	0	1	1	1	1					0	0	0	0	0	0	0	0	2	1	0	1	1	3	2
Blue marlin	439	428	305	226	290			20		55	31	22	50	45	25	28	31	36	40	519	486	378	313	375
Sailfish	11	15	7	5	10			3		2	0	1	3	2	2	2	2	1	4	15	17	12	9	15
Spearfish	188	163	133	111	169			34		15	11	9	35	35	1	1	1	1	5	204	175	177	147	209
Striped marlin, NPO	378	343	262	209	263			42		37	14	23	54	68	0	0				415	357	328	263	331
Striped marlin, SPO										0	0				3	7	4	7	3	3	7	4	7	3
Other marlins			1	1	1			0		0	0		0		0	0				0	0	1	1	1
Swordfish, NPO	669	865	558	862	837			8		25	15	17	38	22	0	0				694	880	583	900	859
Swordfish, SPO										0	0				8	10	11	14	12	8	10	11	14	12
TOTAL BILLFISH	**1,685**	**1,813**	**1,266**	**1,414**	**1,570**			**107**		**134**	**72**	**72**	**180**	**171**	**40**	**47**	**48**	**62**	**64**	**1,859**	**1,932**	**1,493**	**1,656**	**1,805**

Table 1f. (Continued.)

	U.S. (NPO)					CNMI (NPO)			Guam (NPO)	American Samoa (NPO)					American Samoa (SPO)					Total				
	2015	**2014**	**2013**	**2012**	**2011**	**2015**	**2014**	**2013**	**2015**	**2015**	**2014**	**2013**	**2012**	**2011**	**2015**	**2014**	**2013**	**2012**	**2011**	**2015**	**2014**	**2013**	**2012**	**2011**
Blue shark			1	12	9					0	0		2	2	1	1	1	3	2	1	1	2	18	14
Mako shark	35	35	31	42	43			3		4	2	4	8	8				0	0	38	37	39	50	51
Thresher	5	5	5	9	15			0		1	1	0	3	3				0	0	6	6	5	13	18
Other sharks			0	0	2								0	0				0	1	0	0	0	1	3
Oceanic whitetip shark				1																			1	
Silky shark																								
Hammerhead shark																								
Tiger shark																								
Porbeagle																								
TOTAL SHARKS	**40**	**40**	**37**	**65**	**69**			**3**		**4**	**2**	**5**	**14**	**14**	**1**	**1**	**1**	**4**	**4**	**45**	**43**	**46**	**82**	**87**
Mahimahi	199	236	238	288	291			9		22	15	27	52	52	5	12	19	11	11	225	263	293	351	353
Moonfish	279	385	377	356	309			37		55	22	35	86	84	2	1	2	3	3	336	408	450	445	396
Oilfish	164	169	171	169	178			28		20	13	17	59	55	0	0	1	0	1	184	182	216	228	233
Pomfret	378	373	315	215	115			26		39	18	18	56	33	0	0				417	392	359	270	148
Wahoo	255	243	154	117	124			17		28	18	15	39	23	66	75	87	85	123	349	336	274	241	270
Other fish	7	6	9	8	20			0		1	0	0	1	0	1	0	0	0	1	8	6	10	9	21
TOTAL OTHER	**1,280**	**1,411**	**1,263**	**1,154**	**1,036**			**117**		**164**	**87**	**113**	**292**	**248**	**74**	**89**	**109**	**99**	**137**	**1,519**	**1,587**	**1,602**	**1,545**	**1,421**
GEAR TOTAL	**7,474**	**7,999**	**7,241**	**7,464**	**7,632**	**1,000**	**1,000**	**860**	**831**	**880**	**445**	**546**	**2,335**	**1,809**	**2,273**	**2,192**	**2,828**	**4,081**	**3,341**	**12,459**	**11,635**	**11,476**	**13,880**	**12,782**

Table 1g. Estimated catch of tropical troll fishery 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 2011–2015. Totals may not match sums of values due to rounding to the nearest metric ton (< 0.5 t = 0). NPO = North Pacific Ocean and SPO = South Pacific Ocean.

	Hawaii					Guam					CNMI					American Samoa					Total Tropical Troll				
	2015	2014	2013	2012	2011	2015	2014	2013	2012	2011	2015	2014	2013	2012	2011	2015	2014	2013	2012	2011	2015	2014	2013	2012	2011
Vessels	1,564	1,649	1,661	1,698	1,598	372	447	496	351	454	9	19	28	35	48	11	22	13	9	10	1,956	2,137	2,198	2,093	2,110
Species					-																				
Albacore, NPO	2	3	2	3	4																2	3	2	3	4
Albacore, SPO																									
Bigeye tuna	59	143	148	155	110																59	143	148	155	110
Pacific bluefin tuna																									
Skipjack tuna	96	78	149	109	126	273	177	227	142	159	29	109	159	130	101	3	6	3	4	9	401	370	539	385	394
Yellowfin tuna	491	555	488	597	440	51	15	24	13	37	13	8	16	33	19	2	3	3	4	6	557	582	531	648	501
Other tunas	15	12	4	4	2		0	0	2	0		2	1	13	14						15	14	5	18	16
TOTAL TUNAS	**663**	**791**	**791**	**868**	**682**	**324**	**192**	**251**	**157**	**196**	**42**	**120**	**176**	**176**	**133**	**5**	**9**	**6**	**8**	**15**	**1,034**	**1,112**	**1,224**	**1,209**	**1,026**
Black marlin	4	3	3	3																	4	3	3	3	
Blue marlin	179	144	128	131	188	17	13	7	6	9		3	1	4	2	1	1				197	160	137	141	199
Sailfish	2	1	1	1			0	1		1		0	0		1	1	0				3	1	2	1	2
Spearfish	11	8	11	12	11																11	8	11	12	11
Striped marlin, NPO	11	12	8	11	16																11	12	8	11	16
Striped marlin, SPO																									
Other billfish					5																				5
Swordfish, NPO	1	1	1	1																	1	1	1	1	
Swordfish, SPO																									
TOTAL BILLFISH	**208**	**169**	**152**	**159**	**220**	**17**	**13**	**8**	**6**	**9**		**3**	**1**	**4**	**4**	**2**	**1**				**227**	**185**	**161**	**169**	**233**
Blue shark																									
Mako shark																									
Thresher sharks		1																				1			
Other sharks	1	1	1	1	1			0													1	1	1	1	1
TOTAL SHARKS	**1**	**2**	**1**	**1**	**1**			**0**													**1**	**2**	**1**	**1**	**1**
Mahimahi	329	408	290	452	298	72	87	75	38	41	3	39	41	18	25		1	0	0	0	404	535	406	508	364
Moonfish																									
Oilfish																									
Pomfrets												0	0												
Wahoo	189	211	180	194	140	14	42	23	20	17		5	2	8	5		0	0	0		203	259	206	222	162
Other pelagics		1	1	1	1		0		2	3				1	7							1	1	4	12
TOTAL OTHER	**518**	**620**	**471**	**647**	**439**	**86**	**130**	**98**	**60**	**61**	**3**	**44**	**43**	**27**	**37**		**1**	**1**	**0**	**0**	**607**	**796**	**613**	**734**	**538**
GEAR TOTAL	**1,390**	**1,582**	**1,415**	**1,675**	**1,342**	**427**	**335**	**358**	**223**	**267**	**45**	**167**	**220**	**207**	**174**	**7**	**11**	**7**	**9**	**15**	**1,869**	**2,095**	**1,999**	**2,114**	**1,797**

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 2011–2015, to fulfill the reporting requirements of WCPFC CMM 2009-03.

	U.S.-flagged Vessels South of 20° S	
Year	Catch (t) by all vessels	Number of vessels fishing for swordfish
2011	confidential	0
2012	confidential	0
2013	confidential	0
2014	0	0
2015	< 1	0

Note: The catch is only reported for years when 3 or more vessels fished in the area, although the number of vessels fishing for swordfish may be less than the number that fished. The United States 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 2011 to 2015. Data for 2015 are preliminary.

	2015	**2014**	**2013**	**2012**	**2011**
Purse seine	39	40	40	39	37
Longline (N Pac-based) [1]	135	140	135	127	128
Longline (American Samoa-based)	23	17	17	115	114
Total U.S. Longline [2]	155	162	157	153	152
Albacore troll (N Pac) [3]	4	3		2	11
Albacore troll (S Pac) [3]	6	13	6	9	6
Tropical troll	1,956	2,137	2,198	2,093	2,110
Handline	472	499	534	576	508
Tropical Troll and Handline (combined)[4]	2,045	2,212	2,303	2,197	2,214
TOTAL	**2,245**	**2,427**	**2,506**	**2,398**	**2,409**

[1] Includes Hawaii- and California-based vessels that fished west of 150° W.

[2] Some longline vessels fished in both Hawaii and American Samoa, and are counted only once in this U.S. total.

[3] Some vessels fished on both sides of the equator, and are counted only once in the bottom line TOTAL.

[4] Some vessels used both tropical troll and handline gear but were counted only once in this combined 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 tonnage categories, from 2009–2015. Data for 2015 are preliminary.

Gear and year	**0-50**	**51-200**	**201-500**	**501-1000**	**1001-1500**	**1500+**
2011 Purse seine				1	17	19
2012 Purse seine				1	17	21
2013 Purse seine					19	21
2014 Purse seine					19	21
2015 Purse seine					17	22
2011 Longline	13	139				
2012 Longline	15	138				
2013 Longline	15	142				
2014 Longline	13	148				
2015 Longline	12	143				
	0-50	51-150	150+			
2011 Pole and line		2				
2012 Pole and line		1				
2013 Pole and line	1	1				
2014 Pole and line	1	1				
2015 Pole and line	1	1				
2011 Albacore Troll		7	6			
2012 Albacore Troll		6	5			
2013 Albacore Troll		3	2			
2014 Albacore Troll		9	7			
2015 Albacore Troll		5	4			

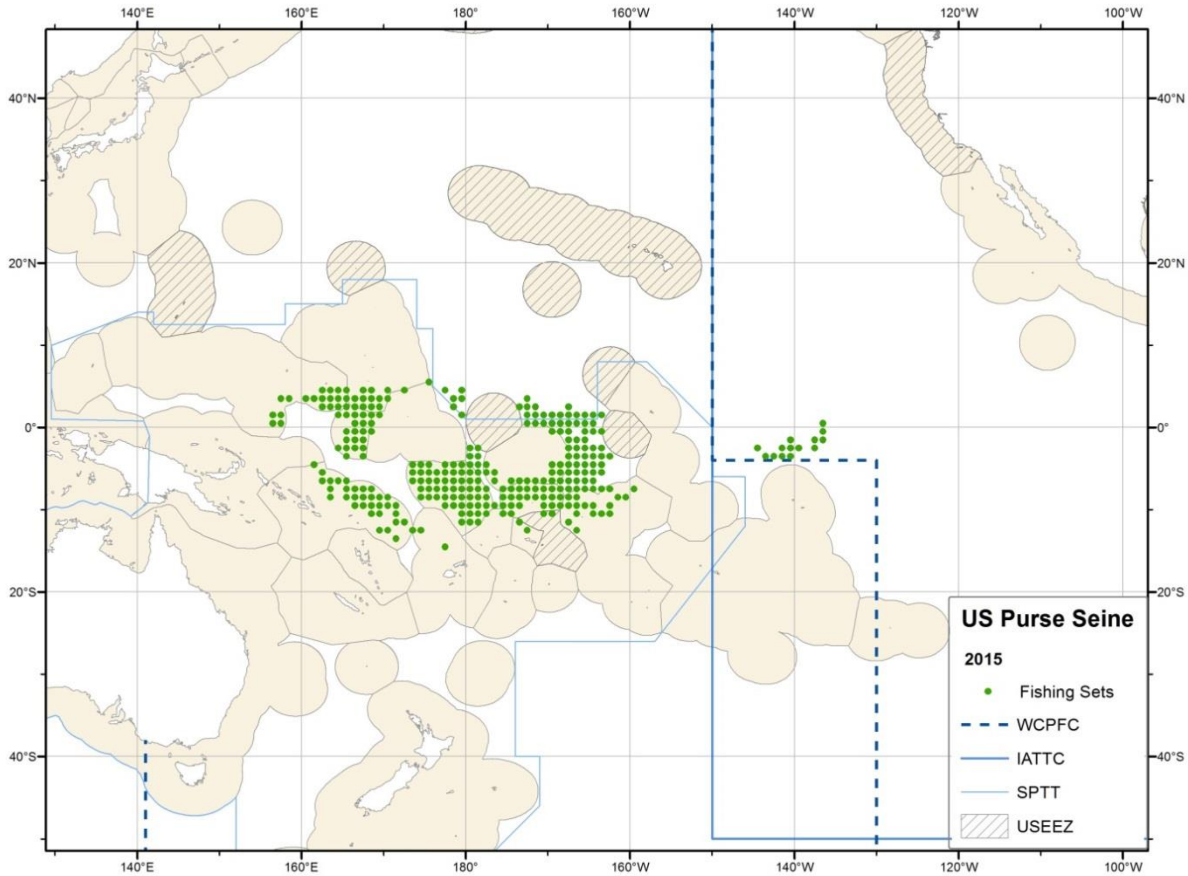

Figure 1. Spatial distribution of fishing effort (fishing sets) reported in logbooks by U.S.-flagged purse seine vessels the Pacific Ocean in 2015 (preliminary data). Effort in some areas is not shown to preserve data confidentiality.

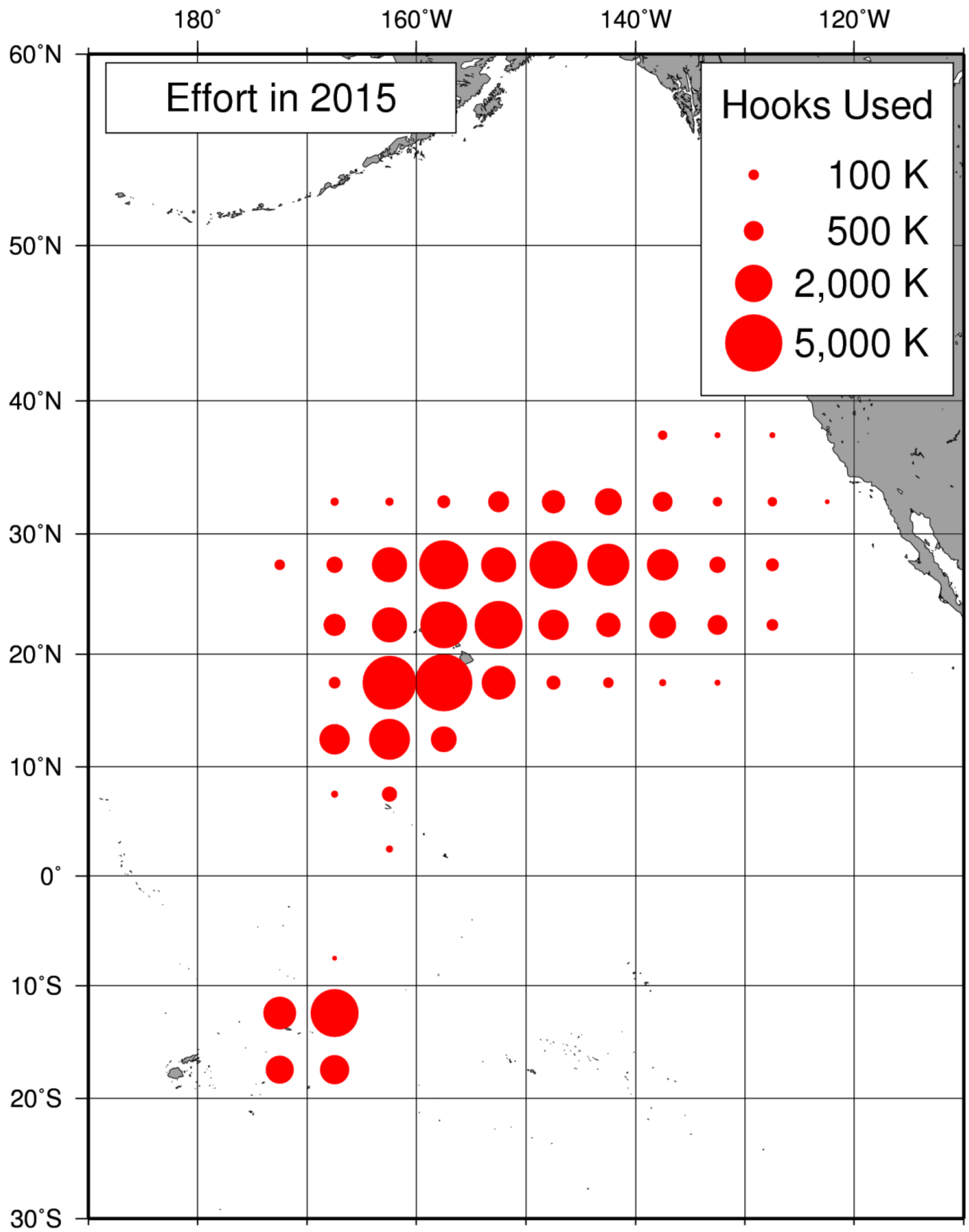

Figure 2a. Spatial distribution of fishing effort reported in logbooks by U.S.-flagged longline vessels, in 1000s of hooks (K), in 2015 (preliminary data). Area of circles is proportional to effort. Effort in some areas is not shown to preserve data confidentiality.

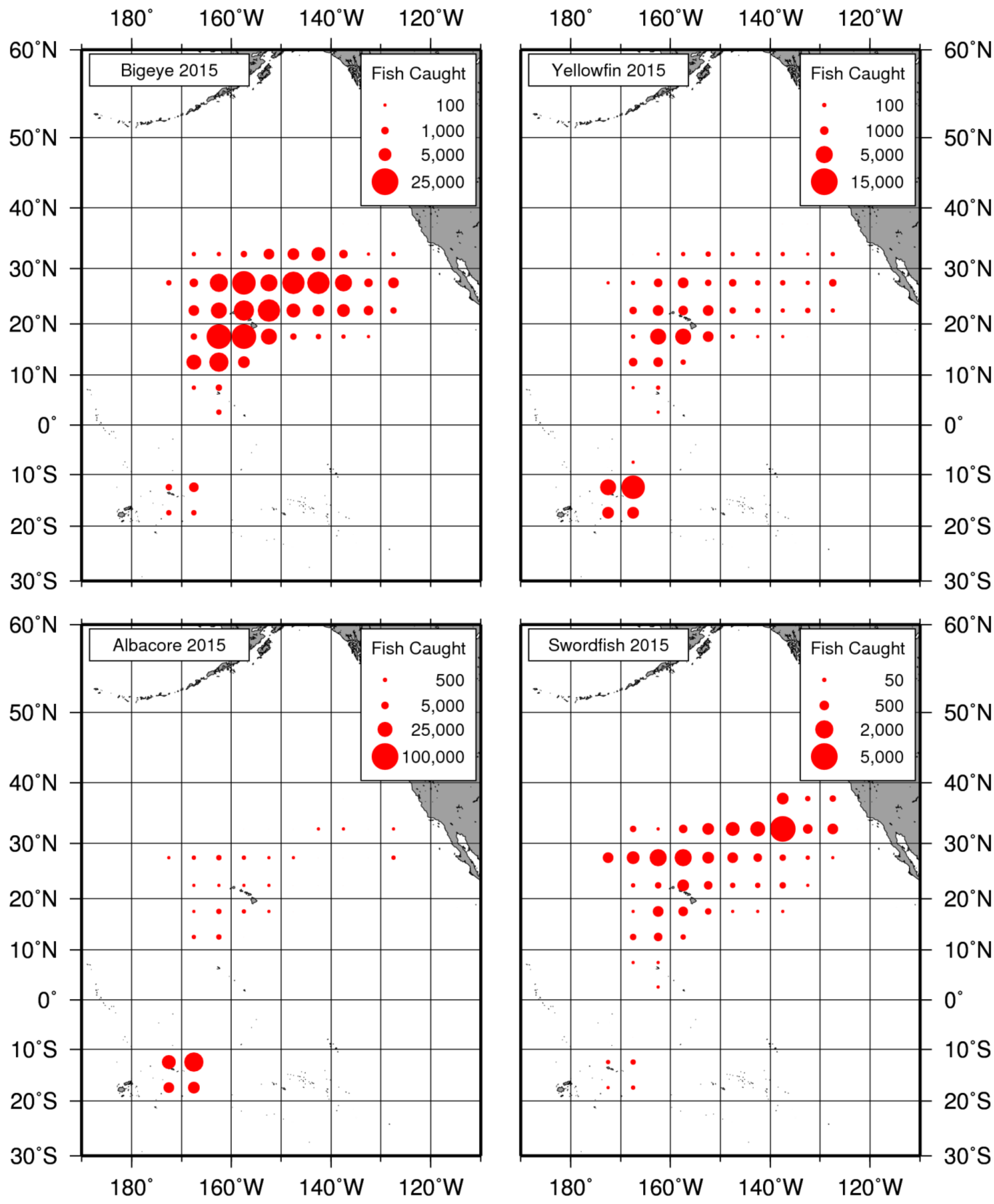

Figure 2b. Spatial distribution of catch reported in logbooks by U.S.-flagged longline vessels, in numbers of fish (includes retained and released catch), in 2015 (preliminary data). Area of circles is proportional to catch. Catches in some areas are not shown to preserve data confidentiality.

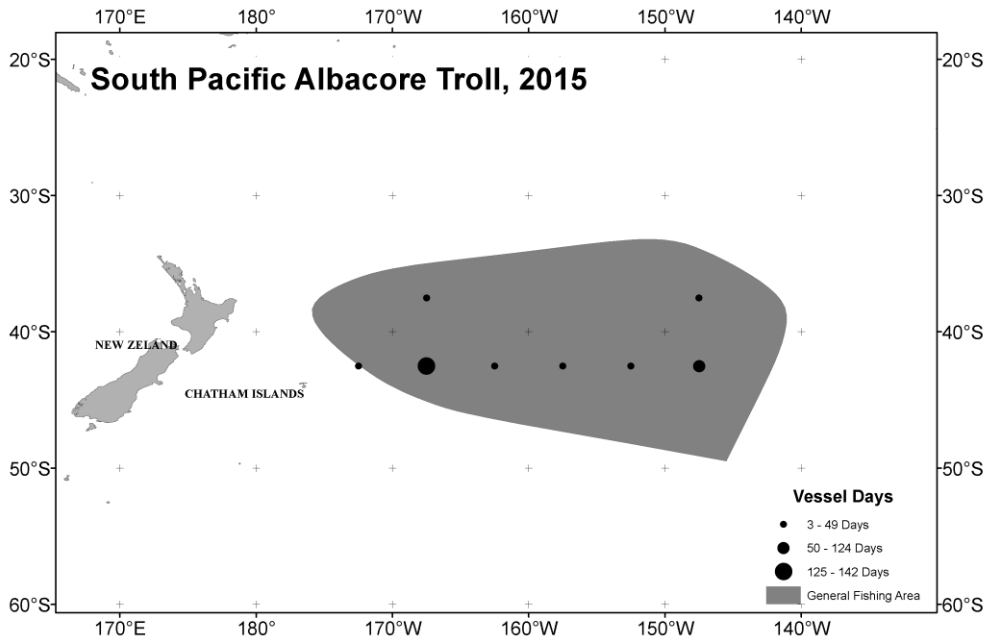

Figure 3a. Spatial distribution of reported logbook fishing effort (vessel-days fished) by the U.S. albacore troll fleet in the South Pacific Ocean in 2015 (preliminary data). Effort in some areas is not shown to preserve data confidentiality.

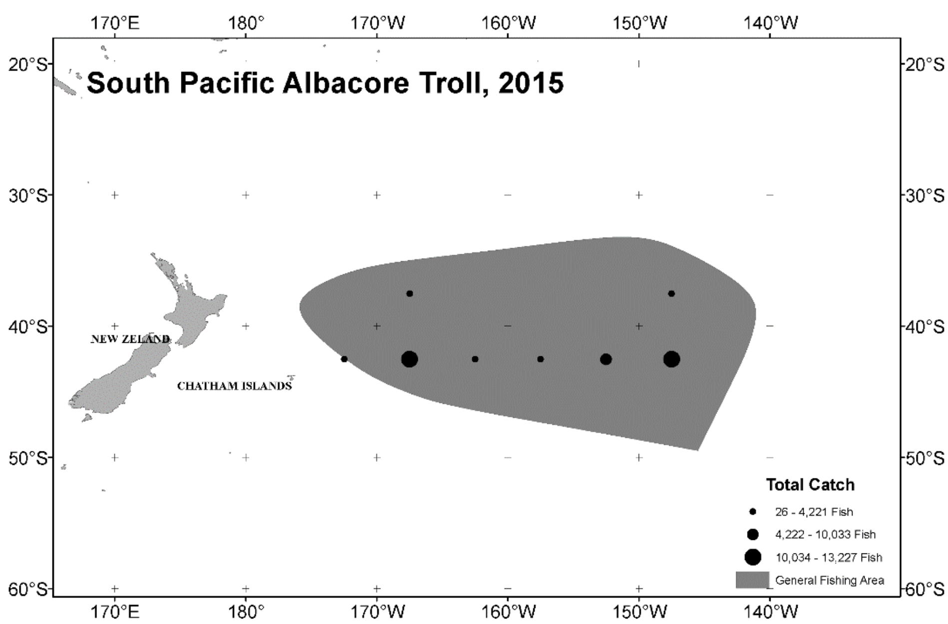

Figure 3b. Spatial distribution of reported logbook fishing catch (number of fish caught) by the U.S. albacore troll fleet in the South Pacific Ocean in 2015 (preliminary data). Catch in some areas is not shown to preserve data confidentiality.

Background [n/a]

Flag State Reporting of National Fisheries

U.S. Purse seine Fishery

The U.S. purse-seine catch of tunas in the WCPO was 237,222 t in 2015 compared to 296,683 t in 2014, and was primarily composed of skipjack tuna, with smaller catches of yellowfin and bigeye tuna. The total catches of tunas have fluctuated over the past 5 years (Tables 1a-1e). The number of licensed vessels in 2015 was 39 vessels, one less than in 2014 (Table 2a). The fishery operated further eastward, and not as far northward as in the prior year, mainly in areas between 5° N and 15° S latitude and 155° E and 135°W longitude (Figure 1).

U.S. Longline Fisheries

The longline fisheries of the United States 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 during 2011–2015 ranged from 152 vessels in 2011 to 162 vessels in 2014, with 155 vessels in 2015 (Table 2). The U.S. longline fishery in the NPO consistently had the highest number of vessels in operation with 135 in 2015. Participation in the American Samoa-based fleet operating in the South Pacific declined from 25 vessels in 2012 to 20 vessels in 2015. A few vessels occasionally operated in both the Hawaii-based and American Samoa-based longline fisheries during 2011–2015. Longline catches made outside of the U.S. EEZ in the North Pacific Ocean by vessels operating with both American Samoa and Hawaii longline permits and landing their fish in Hawaii belong to the longline fishery of American Samoa and not to the U.S. longline fishery in the NPO in accordance with federal fisheries regulations (50 *CFR* 300.224). 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 table entries for American Samoa (Table 1f) include its catches in the South Pacific landed in American Samoa. The overall American Samoa fishery total is the sum of its catches in the South Pacific and in the NPO attributed to American Samoa. In 2011, the Consolidated and Further Continuing Appropriations Act (CFCAA), (Pub. L. 112-55, 125 Stat. 552 et seq.) was passed. Pursuant to this act and NMFS regulations under 50 *CFR* 300.224, if the U.S. vessel landing the fish was included in a valid arrangement under Sec. 113(a) of the CFCAA, its catch during those periods was attributed to the fishery of American Samoa in the NPO from 2011 to 2012, to CNMI during 2013 through 2015 and to Guam in 2015. Under these arrangements in 2014 and 2015 only bigeye tuna were attributed, the other species remained as U.S. catch.

The U.S. longline fishery in the NPO operated mainly from the equator to 40^{o} N latitude and from 120^{o} W to 175^{o} W in 2015 (Figure 2a). The American Samoa-based longline fishery operated mostly from 5^{o} S to 20^{o} S latitude and 165^{o} W to 175^{o} W longitude in 2015 (Figure 2a). The U.S. longline fishery in the NPO fishery targeted bigeye tuna and swordfish, with significant landings of associated pelagic species, whereas the American Samoa longline fishery in the SPO targeted and landed albacore but also produced a noteworthy amount of yellowfin tuna. Pacific bluefin tuna catches are reported on longline logsheets for the American Samoa fishery, however the species may be misidentified (Tables 1a-1f). The dominant components of the longline catch by the United States and its Territories in 2015 were bigeye tuna, albacore, yellowfin tuna, and swordfish (Table 2a, Figure 2b). The total catch of all species during the past 5 years ranged from a low of 11,476 t in 2013, to a high of 13,880 t in 2012 with catch at 12,459 t in 2015 (Tables 1a-1f).

Most of the U.S. longline fishery in the NPO 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. U.S. longline landings of swordfish in the NPO (including Territories) varied substantially from 583 t in 2013 to 900 t in 2012 and 694 t in 2015. The shallow-set U.S. longline fishery for swordfish accounts for the majority of the swordfish catch and has operated under the allowable number of sea turtle interaction limits in 9 out of 12 years since its reopening in 2004.

U.S. Albacore Troll Fisheries

In recent years, the U.S. troll fisheries for albacore in the WCPO have experienced a significant decline in participation. Six vessels participated in the South Pacific albacore troll fishery in 2015 compared to 13 vessels in 2014 (Table 2). The South Pacific albacore troll fishery operates mostly between 30° S and 45° S latitude and 145° W and 175° W longitude (Figure 3a). The catch in this fishery is composed almost exclusively of albacore (Figure 3b). The South Pacific albacore troll catches in the WCPO decreased from 445 t in 2014 to 151 t in 2015 (Tables 1a-1e). Four vessels from the North Pacific albacore troll fishery caught less than 0.5 t in the WCPO in 2015.

Other Fisheries of the United States and Participating Territories

Other fisheries of the United States 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 one most commonly used in the recreational and subsistence fisheries in these areas. Most of the vessels comprising the United States 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 2,584 t in 2015. The catch was composed primarily of yellowfin tuna, skipjack tuna, bigeye tuna, and mahimahi.

Coastal State Reporting

[n/a]

Socioeconomic Factors and Trends in the Fisheries

Socio-economic Surveys and Analyses

NMFS staff and colleagues have conducted 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.

Longline Fishery Economics. Since August 2004, NOAA Fisheries economists and the NOAA Observer Program have implemented a "real-time" data collection program in Hawaii in order to assess changes in important economic indicators of the Hawaii-based longline fisheries (Pan et al., 2014). Through 2013, trip cost data were collected from over 1,600 Hawaii-based longline trips. Trip costs were made up of non-labor variable cost items including diesel fuel, engine oil, bait, ice, trip base gear resupply, provisions, and communications. During the period 2005–2014, trip costs show an increasing trend, with swordfish-targeting trips generally lasting longer and costing more than tuna- targeting trips. The average trip cost in the longline fishery in 2014 was $30,255 for a tuna-targeting trip, and $51,200 for a swordfish-targeting trip, increasing 88% and 44% respectively compared to 2005. The rising cost of fuel was the main cause of the increase in trip costs. Fuel price reported from the fishermen increased from $2.06 per gallon in 2005 to $3.87 per gallon in 2014. As a result, fuel cost made up about 56% of the total trip costs in 2014, compared to 47% in 2005.

Since 2006, NOAA Fisheries economists and observers have collected real-time trip level cost data from the American Samoa-based longline fishery. Additionally, since 2012 NOAA economists have conducted in-person interviews in American Samoa with vessel owners and owner operators/captains to collect trip expenditure information. Since the length of a fishing trip (total days of a trip) for the American Samoa longline fleet varied substantially across the years, the cost per set (usually one set per day) is a better index than cost per trip for comparison across years. In general, the fishing cost in the American Samoa longline fishery showed an increasing trend during the period 2006– 2014. The average cost per set peaked in 2013 at $2,137 per set, but decreased in 2014 to $1,553 per set. While the fishing cost was high in 2013, revenue decreased, resulting in a negative net revenue of $372 per set. The economic performance of the American Samoa longline fleet in 2014 improved slightly over 2013. The revenue increased slightly to $1933 per set while the variable costs decreased to $1553 per set in 2014, resulting in a positive net revenue.

Measuring productivity in a shared stock fishery: a case study of the Hawaii longline fishery. Fisheries productivity is the result of many factors, including endogenous and exogenous elements, such as regulation and stock condition. Understanding changes in productivity and the factors affecting that change is important to fishery management and a sustainable fishing industry. However, no study has been conducted to measure productivity change in the Hawaii longline fishery, the largest fresh bigeye tuna and swordfish producer in the United States. Using a Lowe productivity index, productivity change in the Hawaii longline fleet between 2000 and 2012 is measured in a study by Pan and Walden (2015). In addition, a biomass quantity index is constructed to disentangle biomass impacts in a pelagic environment to arrive at an "unbiased" productivity metric. This is particularly important in the Hawaii longline fishery where catches rely mostly on transboundary (shared) stocks with little control on the total amount of extraction. As resource depletion of the transboundary stocks occurs, productivity loss may follow if less output is obtained from the same input usage, or more inputs are used to extract the same catch level from the fishery. Finally, the study compares productivity change under different fishing technologies.

Spillover Effects of Environmental Regulation for Sea Turtle Protection in the Hawaii Longline Swordfish Fishery. NOAA Fisheries researchers examined spillover effects resulting from U.S. fishing regulations instituted to protect sea turtles. Sea turtles, along with U.S. and foreign fisheries for swordfish co-occur on the high seas in the north and central Pacific and that allows for "spillover effects." A study by Chan and Pan (2016) found that when one fishery is required to curtail fishing activity to reduce incidental fishing mortality on sea turtle populations, the activity of other, unregulated fleets may change in ways that adversely affect the very species intended for protection. This study provides an empirical model that estimates these "spillover effects" on sea turtle bycatch resulting from production displacement between regulated U.S. and less-regulated non-US fleets in the north and central Pacific Ocean. The study demonstrates strong spillover effects, resulting in more sea turtle interaction due to increased foreign fleet activity when Hawaii swordfish production declines.

Evaluation of fishing opportunities under sea turtle interaction limits – a decision support model for Hawaii-based longline swordfish fishery Management. Conservation measures of setting annual caps on sea turtle, Cheloniidae, interactions and other regulations have resulted in a significant reduction in sea turtle interactions in the Hawaii-based longline fishery. However, the conservation measures created a limitation on swordfish production and created uncertainty for participants in the fishery because the fishery would be closed whenever the cap is reached. This study explores the trade-offs between the risks of sea turtle interactions and economic returns from swordfish fishing, and identifies examples of alternative management options that could allow the swordfish fishery to operate throughout the year with a reduced risk of exceeding the cap on loggerhead sea turtle (*Caretta caretta*) interactions. In addition, the study by Pan and Li (2016) compares the trade-offs in terms of foregone swordfish production based on one interaction reduction before and after the implementation of the conservation measures. A spatial bioeconomic model is developed to conduct simulation analyses. A Generalized Additive Model (GAM) is applied to Hawaii longline logbook data to examine and predict sea turtle interactions in response to changes in spatial and temporal distributions of fishing effort and oceanographic conditions. A cost function is built into the model for making economic analyses to estimate net revenue returns.

Monitoring socioeconomic impacts of Hawai'i's 2010 bigeye tuna closure: Complexities of local management in a global fishery. A study by Richmond et al. (2015) presents the results of a study to monitor the socioeconomic impacts of the first extended closure of the western and central Pacific Ocean (WCPO) bigeye tuna (bigeye) fishery to U.S. longliners from the state of Hawai‘i. We applied qualitative and quantitative approaches to examine how diverse members of Hawai‘i's bigeye fishery community, including fishermen, a large fish auction, dealers, processors, retailers, consumers, and support industries, perceived and were affected by the constraints of the 40-day closure of the WCPO bigeye fishery at the end of 2010. This study highlights the challenges and equity considerations inherent in efforts to achieve meaningful conservation benefits from localized management actions within a global fishery. It also demonstrates the importance of interdisciplinary socioeconomic monitoring to examine how global fisheries policies scale down to individual fishing communities.

Relevant Publications

Chan HL, Pan M. 2016. Spillover Effects of Environmental Regulation for Sea Turtle Protection in the Hawaii Longline Swordfish Fishery. Marine Resource Economics. Ahead of Print Available online: http://www.journals.uchicago.edu/doi/abs/10.1086/686672.

Pan M, Li S. 2016. Evaluation of fishing opportunities under sea turtle interaction limits – a decision support model for Hawaii-based longline swordfish fishery Management. Marine Fisheries Review 77(3) (February 2016). http://spo.nmfs.noaa.gov/mfr773/mfr7733.pdf

Pan M, Walden J. 2015. Measuring productivity in a shared stock fishery: a case study of the Hawaii longline fishery. Marine Policy 62: 302-308. doi:10.1016/j.marpol.2015.07.018.

Richmond L, Kotowicz D, Hospital J. 2015. Monitoring socioeconomic impacts of Hawai'i's 2010 bigeye tuna closure: Complexities of local management in a global fishery. Ocean and Coastal Management 106: 87-96. doi:10.1016/j.ocecoaman.2015.01.015.

Disposition of Catch

The purse seine catch is stored onboard 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 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.

U.S. longline vessels in the NPO 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 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 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).

The catch in the albacore troll fishery in the South Pacific is frozen whole and sold in Pacific Island ports or transported to the U.S. west coast and 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.

Onshore Developments

[n/a]

Future Prospects of the Fisheries

Due to the high demand for tunas in Hawaii and the mainland, the future prospect for the U.S. longline fishery in the NPO is likely to continue to have a greater proportion of effort in the deep-set sector targeting tunas. This sector of the longline fishery is constrained by catch limits for bigeye tuna in the WCPO & EPO. The U.S. longline fishery bigeye tuna limit in the WCPO was reduced from 3,763 t in 2014 to 3,554 t in 2015 and remains the same in 2016. Bigeye tuna catch limits in the eastern Pacific Ocean (EPO) established pursuant to decisions of the Inter-American Tropical Tuna Commission (IATTC) is limited to 500 t for vessels greater than 24 m. About 33 Hawaii-based longline vessels greater than 24 m are affected by the bigeye tuna limit in the EPO. This limit was exceeded by 50 t in 2015.

The effort by shallow-set sector targeting swordfish varied during 2011–2015 despite the removal of the effort restriction in 2006 and revised sea turtle interaction limits in 2012. The bigeye tuna catch limits does not affect the shallow-set longline fishery as adversely as the deep-set sector since this species represents only a small proportion of its catch. The shallow-set longline fishery for swordfish is highly seasonal and will continue to operate under strict regulations to limit interactions with sea turtles.

Fuel costs were very low in the early part of 2016 while prices for supplies and goods remained constant or increased slightly. Although the price of fuel increased slightly in 2016, the fishery still seems to be operating under a favorable cost environment. This should benefit the economic performance of most U.S. pelagic fisheries. Other issues facing both sectors of the U.S. longline fishery in the north Pacific Ocean are exceeding false killer whales interaction limits in the main Hawaiian Islands EEZ and the proposed expansion on the NWHI Monument out to the 200 mile EEZ. The U.S. longline fishery in the north Pacific Ocean is expected continue targeting bigeye tuna and swordfish as well as catch of other associated pelagic species and deliver them fresh to service local and mainland markets.

Catches by the American Samoa longline fishery in the South Pacific decreased from years 2011 to 2014 and remained low in 2015. However, the American Samoa longline fishery in the South Pacific is expected to continue targeting albacore and delivering its catch frozen to the two canneries in Pago Pago Harbor. After completion of the 5,000 plus metric ton cold storage facility in Pago Pago in 2013, the second cannery was completed in 2015, with processing and packing capabilities.

The prospect of participation and catch from the U.S. small-scale troll and handline fisheries is expected to be fairly stable although these fisheries are challenged by a shortage of crew due to an improving economy, low unemployment rate and the uncertainty of fish prices. Fuel prices dropped dramatically in 2015 and remained low into 2016 and should help with the cost of operations for this fishery. 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.

Status of Fisheries Data Collection Systems

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, and 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) 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- and American Samoa-based longline fisheries are monitored using the NOAA Fisheries Western Pacific Daily Longline Fishing Logs for effort and resulting catch. The California-based longline fishery is monitored using the High Seas Pelagic Longline/Gillnet Logbook. The coverage of logbook data is assumed to be complete (100%); for the American Samoa fishery, there may be under-reporting of a very small percentage of trips which can be 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. The Western Pacific Fisheries Information Network (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' 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 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 has been published, 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 WPacFIN.

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 deployed by the Pacific Islands 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 requirements. 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 in the U.S. purse seine fishery in the Convention Area has been 100%. Through an agreement with the FFA, the 100% observer coverage rate was maintained throughout 2011–2015. The data collected under this arrangement by FFA-deployed observers are currently provided directly to the WCPFC.

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 are required to be placed aboard Hawaii-based pelagic longline vessels targeting swordfish (shallow-set, 100% coverage) and tunas (deep-set, 20% coverage) and American Samoa-based longline vessels targeting tuna (deep-set, 20% coverage).

The main focus of the longline observer program is to collect scientific data on interactions with protected species. 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 with those species.

For the U.S. longline fishery in the NPO, there were observers on 283 trips out of a total of 1,377 deep-set trips, as well as on all 66 shallow-set trips, resulting in coverage rates of 20.6% and 100%, respectively in 2015. For the American Samoa-based longline fishery, 2015 was the ninth full calendar year monitored by observers. The coverage rate was 22.0% for a total of 18 trips out of 82 trips. These coverage statistics are from 2015 reports of the NOAA Pacific Islands Regional Observer Program (PIROP) and are based on longline trips that departed with observers in calendar year 2014. Detailed information on the U.S. Pacific Islands Regional Observer Program can be found at:
http://www.fpir.noaa.gov/OBS/obs_qrtrly_annual_rprts.html.

Per reporting requirements agreed to at WCPFC 11, Table 3 contains estimates on observer coverage in U.S. longline fisheries for 2015 in the WCPFC Area exclusive of the U.S. EEZ.

Table 3. Observer coverage in 2015 of the U.S. longline fisheries in the WCPFC Area exclusive of the U.S. EEZ.

Fishery	Number of Hooks			Days Fished			Number of Trips		
	Total estimatedd	Observed	%	Total estimated	Observed	%	Total estimated	Observed	%
Hawaii and California-based	19,151,199	4,326,788	23	7,623	1,867	25	825	193	23
American Samoa	148,306	8,801	6	46	3	7	7	3	43

Fishery Interactions with Protected Species

Information on estimated fishery interactions with non-fish species by the Hawaii-based longline fishery in 2015 is not yet available, but counts of observed interactions are provided. In 2014, NOAA observers recorded 139 fishery interactions with sea turtles, 325 with sea birds, and 97 with marine mammals.

Information on estimated fishery interactions with non-fish species by the Hawaii-based longline fishery during 2011–2015 is provided in Table 4. The results indicated a higher number of interactions with sea turtles and marine mammals in 2014 as compared with 2013. For the American Samoa-based component of the U.S. longline fishery, scientists have not yet provided rigorous estimates of the total interactions with protected species.

CMM 2011-01 requires CCMs to report instances in which cetaceans have been encircled by purse seine nets of their flagged vessels. In 2015, purse seine vessels reported 4 instances of interactions with 8 individual marine mammals.

CMM 2011-04 requires CCMs to estimate the number of releases of oceanic whitetip sharks including their status upon release. For the U.S. purse seine fishery, limited observer data has been processed for 2015, and information available as of June 28, 2016 indicate that there were 90 oceanic whitetip sharks released in 2015. In the longline fishery, observer data indicate that 512 oceanic whitetip sharks were released (378 alive and 134 dead) in the Hawaii-based deep set fishery, 22 oceanic whitetip sharks were released (20 alive and 2 dead) in the Hawaii-based shallow-set fishery (100% observer coverage), and 181 oceanic whitetip sharks were released (119 alive and 62 dead) in the American Samoa-based fishery.

CMM 2012-04 requires CCMs to report instances in which whale sharks have been encircled by purse seine nets of their flagged vessels. In 2015, purse seine vessels reported 56 instances of interactions with 64 individuals of whale sharks.

CMM 2013-08 requires CCMs to estimate the number of releases of silky sharks including their status upon release. For the U.S. purse seine fishery, limited observer data has been processed for 2015, and information available as of June 28, 2016 indicate that there were 4,416 silky sharks released in 2015. In the longline fishery, observer data indicate that 303 silky sharks were released

(226 alive and 77 dead) in the Hawaii-based deep set fishery (21% observer coverage), 1 silky shark was released (dead) in the Hawaii-based shallow set fishery (100% observer coverage), and 343 silky sharks were released (231 alive and 112 dead) in the American Samoa-based fishery (22% observer coverage).

Table 4. 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 2011–2015[2]. Estimates of total interactions by the deep-set fishery in 2015 have not yet been completed; only the observed values are included here.

Species	2011	2012	2013	2014	2015
Marine mammals					
Striped dolphin (*Stenella coeruleoalba*)	4	1	0	2	0
Common dolphin (*Delphinus delphis, D. capensis*)	0	0	0	1	0
Bottlenose dolphin (*Tursiops truncatus*)	2	1	13	4	2
Risso's dolphin (*Grampus griseus*)	4	0	3	6	5
Blainville's beaked whale (*Mesoplodon blainvillei*)	1	0	0	0	0
Bryde's whale (*Balaenoptera edeni*)	0	0	0	0	0
False killer whale (*Pseudorca crassidens*)	11	16	22	54	7
Humpback whale (*Megaptera novangliae*)	1	0	0	5	1
Shortfinned pilot whale (*Globicephala macrorhynchus*)	0	0	4	0	1
Spotted dolphin (*Stenella attenuate*)	0	0	0	0	0
Rough-toothed dolphin (*Steno bradenensis*)	0	0	6	0	0
Sperm whale	6	0	0	0	0
Northern elephant seal	0	0	1	1	0
Pygmy false killer whale	0	0	5	0	0
Pygmy sperm whale (*Kogia Breviceps*)	0	0	0	10	0
Unspecified member of Mesoplodont beaked whale	0	0	1	0	0
Unspecified false killer whale or shortfinned pilot whale	11	5	0	0	0
Unidentified Cetacean (Cetacea)	0	7	3	13	4
Unspecified member of beaked whales (Ziphiidae)	1	0	1	0	1
Unspecified pygmy or dwarf sperm whales (Kogia)	0	0	0	0	0
Unspecified eared seal (Otariidae)	0	0	0	1	0
Total marine mammals	**41**	**30**	**59**	**97**	**21**
Sea turtles					
Loggerhead turtle (*Caretta caretta*)	14	5	16	13	17
Leatherback turtle (*Dermochelys coriacea*)	31	13	22	57	13
Olive Ridley turtle (*Lepidochelys olivacea*)	36	34	42	51	15
Green turtle (*Chelonia mydas*)	9	0	5	17	1
Unidentified hardshell turtle (Cheloniidae)	0	0	1	1	0
Total sea turtles	**90**	**52**	**86**	**139**	**46**

[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-08-007, IR-09-011, IR-10-009, IR-11-005, IR-12-012, IR-13-014, IR-13-029, and IR-14-022. Hawaii-based longline logbook reported data on fish discards are available at http://www.pifsc.noaa.gov./fmsd/reports.php

Table 4. (Continued.)

Species	2011	2012	2013	2014	2015
Albatrosses					
Blackfooted albatross (*Phoebastria nigripes*)	92	194	285	204	161
Laysan albatross (*Phoebastria diomedia*)	236	163	282	113	69
Total albatross	**328**	**357**	**567**	**317**	**230**
Other seabirds					
Red-footed booby (*Sula sula*)	0	0	0	0	1
Brown booby (*Sula leucogaster*)	0	0	0	0	0
Unidentified shearwater (Procellariidae)	19	36	45	8	5
Total other seabirds	**19**	**36**	**45**	**8**	**6**
Observer information					
Total trips	1,329	1,380	1,379	1,380	1,525
Observed trips	336	338	324	352	367
Proportion of trips observed	25.29%	24.49%	23.50%	25.51%	24.07%
Observed sets	5,119	4,966	4,742	5,180	5,410
Observed hooks	9,871,487	10,187,571	10,278,217	11,117,964	12,121,568

Port Sampling

Less than 2% of the fish caught by U.S. purse seine, and longline 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.

Unloading / Transshipment

Information on the quantities transshipped and the number of transshipments by the U.S. longline and purse-seine fisheries in 2015 is provided in Table 5.

For the U.S. purse-seine fishery in the WCPFC Statistical Area in 2015, approximately 75% of the total landings of yellowfin, skipjack, and bigeye were transshipped to foreign ports for processing in 2015. There were an estimated 263 transshipments of purse-seine-caught fish in port in 2015, as compared to 292 transshipments in 2014.

There was no available information on transshipments for the longline fishery, albacore troll fishery, or any other HMS gear type in 2015.

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 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 size 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. In 2001 NOAA Fisheries and American Fishermen's Research Foundation (AFRF) initiated an archival tagging program to study migration patterns and stock structure of juvenile (3-5 year old) albacore in the North Pacific . As of June, 2015, 1,042 archival tags have been deployed on albacore off the west coast of North America and 29 tags have been recovered. Three tagged albacore were recaptured in 2014 ranging from 25 to 1,035 days at liberty and in recapture areas ranging from the coast of Washington to tropical waters of the western Pacific. Following procedures established by NOAA Fisheries, 327 albacore were measured from one cooperating vessel in 2015.

Table 5. Information on quantities transshipped and numbers of transshipments of HMS species by U.S. purse seine fisheries in 2015 to satisfy reporting requirements of CMM 2009-06.

Gear Type		Purse Seine	
		Quantities transshipped	Number of Transshipments
Offloaded	Transshipped in Port	182,392	263
	Transshipped at sea in areas of national jurisdiction	0	0
	Transshipped beyond areas of national jurisdiction	0	0
Received	Transshipped in Port	0	0
	Transshipped at sea in areas of national jurisdiction	0	0
	Transshipped beyond areas of national jurisdiction	0	0
Transshipped inside the Convention Area		182,392	263
Transshipped outside the Convention Area		0	0
Caught inside the Convention Area		177,522	257
Caught outside the Convention Area		4,870	6
Species	BET	1,788	
	SKJ	165,520	
	YFT	15,084	
Product Form	Fresh	0	
	Frozen	182,392	

International Billfish Angler Survey. NOAA Fisheries has been collaborating with the billfish angling community since 1963 to study various aspects of billfish biology and toobtain an index of angler success in the Pacific Ocean. The International Billfish Angler Survey, initiated in 1969, provides a greater than 40-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 2014, WPacFIN completed and published the 28th edition of Fishery Statistics of the Western Pacific (Lowe et al., 2014). Annual reports for the Hawaii-based longline fishery and the American Samoa longline fishery were also published (PIFSC FRMD, 2014a; PIFSC FRMD, 2014b; PIFSC FRMD, 2015a; PIFSC FRMD, 2015b).

Length-weight relationships for 73 species and species groups as reported in the 2011–2013 national bycatch reports for pelagic longline fisheries in Hawaii and American Samoa. This report (Curran and Bigelow, 2016) provides summaries of length-weight relationships for pelagic species reported in the Hawaii and American Samoa based longline fisheries. NOAA periodically produces a National Bycatch Report (NBR) estimating total weight by species or species group for all species taken by these fisheries. Previous reports have utilized both unpublished and published estimates of length-weight relationships to apply an average weight for an individual of each species to the total number reported in a fishery. The data sources used to generate the length-weight regression coefficients necessary to convert average length of a species (from observer collected length frequency data) have not been well documented. This report provides documentation on the data sources, sample sizes, size ranges, and assumptions used to generate the length-to-weight conversion equations for each species/species group as reported in the NBR report for 2011–2013 catch estimates.

Relevant Publications

Brodziak J, Mangel M, Sun Chi-Lu. 2015. Stock-recruitment resilience of North Pacific striped marlin based on reproductive ecology. Fisheries Research 166: 140-150. doi:10.1016/j.fishres.2014.08.008.

Curran D, Bigelow K. 2016. Length-weight relationships for 73 species and species groups as reported in the 2011-2013 national bycatch reports for pelagic longline fisheries in Hawaii and American Samoa. Pacific Islands Fisheries Science Center, PIFSC Data Report, DR-16-004, 9 p. doi:10.7289/V5CF9N42.

Fisheries Monitoring Branch, Pacific Islands Fisheries Science Center. 2015. The Hawaii-based Longline Logbook Summary Report, January-December 2014. Pacific Islands Fisheries Science Center, PIFSC Data Report, DR-15-007, 14 p. doi:10.7289/v5z899d2.

Fisheries Research and Monitoring Division, Pacific Islands Fisheries Science Center, NOAA Fisheries. 2016. PIFSC report on the American Samoa limited-access longline fishery from 1 January to 31 December 2015. Pacific Islands Fisheries Science Center, PIFSC Data Report, DR-16-005, 14 p. doi:10.7289/V57P8WDB.

Fisheries Research and Monitoring Division, Pacific Islands Fisheries Science Center, NOAA Fisheries. 2016. PIFSC report on the Hawaii-based limited-access longline fishery from 1 January to 31 December 2015. Pacific Islands Fisheries Science Center, PIFSC Data Report, DR-16-006, 17 p. doi:10.7289/V53X84NJ.

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Piner KR, Lee HH, Maunder MN. 2016. Evaluation of using random-at-length observations and an equilibrium approximation of the population age structure in fitting the von Bertalanffy growth function, Fish. Res. 180: 128-137 http://dx.doi.org/10.1016/j.fishres.2015.05.024.

Xu Y, Teo SLH, Piner KR, Chen KS, Wells RJD. 2016. Using an approximate lengthconditional approach to estimate von Bertalanffy growth parameters of North Pacific albacore (Thunnus alalunga), Fish. Res. 180: 138-146 http://dx.doi.org/10.1016/j.fishres.2015.08.017.

Research Activities

Biological and Oceanographic Research - TUNAS

Modeling mercury dynamics. Mercury (Hg) is an environmental contaminant of global human health concern. The primary route of Hg transfer to humans worldwide is via consumption of marine fish. A collaborative study with Harvard University, Monterey Bay Aquarium, and NOAA Fisheries scientists has modeled Hg dynamics in Pacific bluefin tuna. Application of the model to Hg data from nine large pelagic species showed that Hg dynamics were determined by the interaction of multiple parameters: biodilution via growth, prey Hg concentration, and Hg accumulation due to trophic increase. In some cases, relationships between Hg in the top predators and the Hg concentrations of their prey were counterintuitive, and could not be predicted or inferred from predator [Hg] patterns alone. This new model thus allows for quantitative comparison of factors driving Hg dynamics within and across pelagic species and/or ocean basins. In conjunction with measured data, the model can guide selective wild harvest or captive rearing conditions to minimize Hg in wild or farmed fish destined for human consumption and predict changes in wild fish [Hg] as a result of increasing inputs of Hg into the marine environment. A manuscript describing these results is currently being drafted.

Radioanalysis of Cesium-134 in the Pacific bluefin tuna muscle tissue. Understanding movement patterns of migratory marine animals is critical for effective management, but often challenging due to the cryptic habitat of pelagic migrators and the difficulty of assessing past movements. A collaborative study with the State University of New York (SUNY) combined a Fukushima-derived radiotracer (^{134}Cs) with bulk tissue and amino acid stable isotope analyses of Pacific bluefin to distinguish recent migrants from residents of the eastern Pacific Ocean, and to time the migrations of juvenile bluefin as they cross the Pacific Ocean. The proportion of recent migrants to residents decreased in older-year classes. All fish smaller than 70 cm FL were recent migrants, confirming that fish caught locally are from the western Pacific. Looking across age classes, the number of recent migrants decreased from ~ 80% for 1-2 year olds to ~ 30% for 2-3 year olds and ~2% for 3-4 year olds. The peak arrival time from the western Pacific is April and May. This novel toolbox of biogeochemical tracers can provide new insights into the dynamics of migration and can be applied to any species that crosses the North Pacific Ocean. See list of publications for several manuscripts on these results. This work is ongoing and an additional publication is in preparation.

Collection and Analysis of Biological Samples to Support Stock Assessments. Given the uncertainty surrounding current growth models, stock structure, and ecosystem interactions of several tuna and tuna-like species in the North Pacific, NOAA Fisheries scientists are working with a range of partners to collect biological samples of otoliths, muscle, DNA fin biopsies, gonads, and stomachs from a number of species along the U.S. West Coast. In 2007 NOAA Fisheries started a biological sampling program in collaboration with Sportfishing Association of California and the San Diego commercial passenger fishing vessel fleet. This has provided us access to a large number of samples from different species across years and supports a range of research projects. Donations have been expanded to include the local seafood restaurants and private boater donations

Sample collection is ongoing and supports the ISC's proposed North Pacific-wide sampling program to address the uncertainties regarding biological information, notably growth models, maturity schedules, and stock structure of several tuna and tuna-like species. Since 2008, more than 3000 samples of albacore, Pacific bluefin, yellowfin, skipjack (*Katsuwonus pelamis*), yellowtail (*Seriola lalandi*), opah (*Lampris guttatus*), and dorado (*Coryphaena hippurus*) have been collected.

These biological samples are used to address an array of questions. These include (1) diets of tunas in the SCB using stomach contents to investigate inter-annual and interspecific differences, (2) stable isotope analysis of muscle tissue aimed at providing an integrated picture of foraging and migration patterns of tunas, opah, yellowtail and swordfish in the California current (CC), (3) using otoliths to better characterize age and growth of albacore, (4) radioanalysis of cesium-134 and 137 found in the muscle tissue of Pacific bluefin tuna exposed to waters containing radionuclides discharged from the failed Fukushima nuclear power plant in Japan, combined with stable isotope analysis to determine migration rates and stock structure of juvenile Pacific bluefin tuna in the CC, (5) using otolith microchemistry to determine the dynamics and stock structure of albacore, bluefin, and swordfish in the North Pacific, (6) characterizing the genetic diversity of California yellowtail in preparation for commercial aquaculture production off southern California, (7) comparing inshore- versus offshore-caught California yellowtail with respect to ontogeny and migration patterns using stable isotope analysis and lab derived trophic discrimination factors, (8) developing a sex-linked genetic marker for albacore, (9) characterizing the diet of opah, (10) exploring mercury dynamics in pelagic predators and (11) examining the reproductive maturity of bluefin in the SCB.

Composition of oceanic mid-trophic micronekton groups determines apex predator biomass in the central North Pacific. NOAA Fisheries researchers updated and expanded a model of the pelagic ecosystem for the area of the central North Pacific occupied by the Hawaii-based longline fishery. Specifically, results from the most recent diet studies were used to expand the representation of the lesser-known non-target fish species (e.g. lancetfish, opah, snake mackerel) and 9 mid-trophic micronekton functional groups (Choy et al., 2016). The model framework Ecopath with Ecosim was used to construct an ecosystem energy budget and to examine how changes in the various micronekton groups impact apex predator biomass. Model results indicate that while micronekton fishes represented approximately 54% of micronekton biomass, they accounted for only 28% of the micronekton production. By contrast, crustaceans represented 24% of the biomass and accounted for 44% of production. Simulated ecosystem changes resulting from changes to micronekton groups demonstrated that crustaceans and mollusks are the most important direct trophic pathways to the top of the food web. Other groups appear to comprise relatively inefficient pathways or 'trophic dead-ends' that are loosely coupled to the top of the food web (e.g. gelatinous animals), such that biomass declines in these functional groups resulted in increased biomass at the highest trophic levels by increasing energy flow through more efficient pathways. Overall, simulated declines in the micronekton groups resulted in small changes in biomass at the very top of the food web, suggesting that this ecosystem is relatively ecologically resilient with diverse food web pathways. However, further understanding of how sensitive micronekton are to changes in ocean chemistry and temperature resulting from climate change is needed to fully evaluate and predict potential ecosystem changes.

The Transition Zone Chlorophyll Front updated. The dynamic ocean feature called the Transition Zone Chlorophyll Front (TZCF) was first described 15 years ago based on an empirical association between the apparent habitat of loggerhead sea turtles and albacore linked to a basin-wide chlorophyll front observed with remotely sensed ocean color data. Subsequent research has provided considerable evidence that the TZCF is an indicator for a dynamic ocean feature with important physical and biological characteristics. New insights into the seasonal dynamics of the TZCF suggest that in the summer it is located at the southern boundary of the subarctic gyre while its position in the winter and spring is defined by the extent of the southward transport of surface nutrients. While the TZCF is defined as the dynamic boundary between low and high surface chlorophyll, it appears to be a boundary between subtropical and subarctic phytoplankton communities. Furthermore, the TZCF is also characterized as supporting enhanced phytoplankton net community production throughout its seasonal migration. Lastly, the TZCF is important to the growth rate of neon flying squid and to the survival of monk seal pups in the northern atolls of the Hawaiian Archipelago. NOAA Fisheries researchers review these and other findings that advance our current understanding of the physics and biology of the TZCF from research over the past decade (Polovina et al., 2015).

Variation in phytoplankton composition between two North Pacific front zones along 158 degrees west NOAA Fisheries researchers reported that data from three research cruises along the 158°W meridian through the North Pacific Subtropical Frontal Zone (STF) during spring 2008, 2009, and 2011 were used to estimate phytoplankton functional types and size classes. These groups were used to describe phytoplankton composition at the North Pacific Subtropical (STF) and Transition Zone Chlorophyll (TZCF) Fronts, which represent ecologically important large-scale features in the central North Pacific. Phytoplankton class composition was consistent at each front through time, yet significantly different between fronts. The STF contained lower integrated chlorophyll-*a* concentrations, with surface waters dominated by picophytoplankton and a deep chlorophyll maximum equally made up of pico- and nanophytoplankton. The TZCF contained significantly higher concentrations of nanophytoplankton through the water column, specifically the prymnesiophyte group. Integrated chlorophyll-*a* concentrations at the TZCF were 30–90% higher than at the STF, with the dominant increase in the signal from the nanophytoplanktonic prymnesiophyte group. The meridional position of the STF was consistently located near 32°N through these 3 years, with the more spatially variable TZCF ranging from 2° to 4° farther north of the STF. This variability in the frontal position of the TZCF may lead to ecological impacts though the food web. Continued in-situ and remote monitoring, specifically during El Niño and ENSO neutral phases, will provide additional ecological information to help understand mechanistic causes of phytoplankton variability in this important ecological region (Howell et al., 2015a).

Optimization of a micronekton model with acoustic data In the pelagic foodweb, micronekton at the mid-trophic level (MTL) are one of the lesser known components of the ocean ecosystem despite being a major driver of the spatial dynamics of their predators, of which many are exploited species (e.g. tunas). The Spatial Ecosystem and Population Dynamics Model is one modelling approach that includes a representation of the spatial dynamics of several epi- and mesopelagic MTL functional groups. The dynamics of these groups are driven by physical (temperature and currents) and biogeochemical (primary production, euphotic depth) variables. A key issue to address is the parameterization of the energy transfer from the primary production to these functional groups. NOAA fisheries researchers present a method using in situ acoustic data to estimate the parameters with a maximum likelihood estimation approach (Lehodey et al., 2015). A series of twin experiments conducted to test the behaviour of the model suggested that in the ideal case, that is, with an environmental forcing perfectly simulated and biomass estimates directly correlated with the acoustic signal, a minimum of 200 observations over several time steps at the resolution of the model is needed to estimate the parameter values with a minimum error. A transect of acoustic backscatter at 38 kHz collected during scientific cruises north of Hawaii allowed a first illustration of the approach with actual data. A discussion followed regarding the various sources of uncertainties associated with the use of acoustic data in micronekton biomass.

Biological Research – BILLFISHES

Billfish Life History Studies –NOAA Fisheries (PIFSC) and Commonwealth Scientific and Industrial Research Ogranisation (CSIRO) scientists from Australia met in Honolulu, Hawaii in January 2015 to compare swordfish age & growth and maturity research results and methodologies for their determination for their respective fisheries. Both length-at-age and length at 50% maturity estimates for swordfish differ significantly between these two regions. Efforts were made to better standardize protocols for both age reading and classifying gonad histology developmental stages. Efforts by CSIRO are continuing to refine the determination of these life-history parameters as inputs for future stock assessment efforts in the southwest Pacific region.

NOAA Fisheries (PIFSC and PIRO) assisted Texas A&M graduate student Veronica Quesnell in the collection of swordfish otoliths through the collection of heads removed at sea and saved by Hawaii longline observers onboard Hawaii-based swordfish longline vessels. Extraction of otoliths from these samples was performed by Ms. Quesnell in the PIFSC laboratory and assisted by PIFSC staff. These and other otolith cores collected by Ms. Quesnell from other sites across the Pacific will be analyzed to determine whether chemical composition is geographically distinct and could be used as markers to recognize and distinguish spatially separate stocks of swordfish. PIFSC, PIRO, and the Hawaii longline observer program also supported a fin clip sampling request of graduate student Nadya Mamoozadeh (Virginia Institute of Marine Science) supplying her with some 150 samples as part of her research on the population structure of striped marlin across the Pacific. PIFSC is also supporting research conducted by graduate student Hsiao-Yun Chang (University of Hawaii Manoa) to develop a length-at-age growth curve for striped marlin based on age determination of sectioned dorsal spines (annual growth zones) and sagittal otoliths (daily growth increments).

Biological Research – PELAGIC SHARKS

Validated age estimates for large white sharks of the northeastern Pacific Ocean: altered perceptions of vertebral growth shed light on complicated carbon 14 results. Age validation studies of large shark species using bomb radiocarbon (14C) dating have revealed that the growth of vertebrae can cease in adults. In a previous study of white sharks (*Carcharodon carcharias*) of the northeastern Pacific Ocean the latest growth material (leading edge of the corpus calcareum) was assigned a known date-of-formation assumed to coincide with the individual's date of capture. This perspective prevented the assignment of older years of formation (a shift in age) to this material, leading to complicated results and no validated age estimates. A reanalysis of the bomb 14C data, in light of the recent findings for other species, has led to a validated lifespan estimate exceeding 30 years for white sharks of the northeastern Pacific Ocean (Andrews and Kerr, 2015).

Research on Bycatch and Fishing Technology – SEA TURTLES

Reducing green turtle bycatch in small-scale fisheries using illuminated gillnets: the cost of saving a sea turtle. Gillnet fisheries exist throughout the oceans and have been implicated in high bycatch rates of sea turtles. In this study, NOAA Fisheries researchers examined the effectiveness of illuminating nets with light-emitting diodes (LEDs) placed on float lines to reduce sea turtle bycatch in a small scale bottom-set gillnet fishery. In Sechura Bay, northern Peru, 114 pairs of control and illuminated nets were deployed. The predicted mean catch-per-unit-effort (CPUE) of target species, standardized or environmental variables using generalized additive model (GAM) analysis, was similar for both control and illuminated nets. In contrast, the predicted mean CPUE of green turtles (*Chelonia mydas*) was reduced by 63.9% in illuminated nets. A total of 125 green turtles were caught in control nets, while 62 were caught in illuminated nets. This statistically significant reduction (GAM analysis, $p < 0.05$) in sea turtle bycatch suggests that net illumination could be an effective conservation tool. Challenges to implementing the use of LEDs include equipment costs, increased net-handling times, and limited awareness among fishermen regarding the effectiveness of this technology. Cost estimates for preventing a single sea turtle catch are as low as 34 USD, while the costs to outfit the entire gillnet fishery in Sechura Bay can be as low as 9200 USD. Understanding these cost challenges emphasizes the need for institutional support from national ministries, international non-governmental organizations and the broader fisheries industry to make possible widespread implementation of net illumination as a sea turtle bycatch reduction strategy (Ortiz et al., 2016).

Enhancing the TurtleWatch product for leatherback sea turtles, a dynamic habitat model for ecosystem-based management. Fishery management measures to reduce interactions between fisheries and endangered or threatened species have typically relied on static time-area closures. While these efforts have reduced interactions, they can be costly and inefficient for managing highly migratory species such as sea turtles. The NOAA TurtleWatch product was created in 2006 as a tool to reduce the rates of interactions of loggerhead sea turtles with shallow-set longline gear deployed by the Hawaii-based pelagic longline fishery targeting swordfish. TurtleWatch provides information on loggerhead habitat and can be used by managers and industry to make dynamic management decisions to potentially reduce incidentally capturing turtles during fishing operations. TurtleWatch is expanded here to include information on endangered leatherback turtles (*Dermochelys coriacea*) to help reduce incidental capture rates in the central North Pacific. Fishery-dependent data were combined with fishing effort, bycatch and satellite tracking data of leatherbacks to characterize sea surface temperature (SST) relationships that identify habitat or interaction 'hotspots'. Analysis of SST identified two zones, centered at 17.2° and 22.9°C, occupied by leatherbacks on fishing grounds of the Hawaii-based swordfish fishery. This new information was used to expand the TurtleWatch product to provide managers and industry near real-time habitat information for both loggerheads and leatherbacks. The updated TurtleWatch product provides a tool for dynamic management of the Hawaii-based shallow-set fishery to aid in the bycatch reduction of both species. Updating the management strategy to dynamically adapt to shifts in multi-species habitat use through time is a step towards an ecosystem-based approach to fisheries management in pelagic ecosystems (Howell et al., 2015b).

The developmental biogeography of hawksbill sea turtles in the North Pacific. High seas oceanic ecosystems are considered important habitat for juvenile sea turtles, yet much remains cryptic about this important life history period. Recent progress on climate and fishery impacts in these so-called "lost years" is promising, but the developmental biogeography of hawksbill sea turtles (*Eretmochelys imbricata*) has not been widely described in the Pacific Ocean. This knowledge gap limits the effectiveness of conservation management for this globally endangered species. NOAA fisheries researchers address this with 30 years of strandings observations, 20 years of bycatch records, and recent simulations of natal dispersal trajectories in the Hawaiian Archipelago. We synthesize the analyses of these data in the context of direct empirical observations, anecdotal sightings, and historical commercial harvests from the insular Pacific. We find hawksbills 0–4 years of age, measuring 8–34 cm straight carapace length, are found predominantly in the coastal pelagic waters of Hawaii. Unlike other species, we find no direct evidence of a prolonged presence in oceanic habitats, yet satellite tracks of passive drifters (simulating natal dispersal) and our small sample sizes suggest that an oceanic phase for hawksbills cannot be dismissed. Importantly, despite over 600 million hooks deployed and nearly 6,000 turtle interactions, longline fisheries have never recorded a single hawksbill take. We address whether the patterns we observe are due to population size and gear selectivity. Although most sea turtle species demonstrate clear patterns of oceanic development, hawksbills in the North Pacific may by contrast occupy a variety of ecosystems including coastal pelagic waters and shallow reefs in remote atolls. This focuses attention on hazards in these ecosystems – entanglement and ingestion of marine debris – and perhaps away from longline bycatch and decadal climate regimes that affect sea turtle development in oceanic regions (Van Houten et al., 2016).

Research on Bycatch and Fishing Technology – PELAGIC SHARKS

Post-release survival of juvenile silky sharks captured in a tropical tuna purse seine fishery. Juvenile silky sharks (*Carcharhinus falciformis*) comprise the largest component of the incidental elasmobranch catch taken in tropical tuna purse seine fisheries. During a chartered fishing trip on board a tuna purse-seine vessel conducting typical fishing operations, University of Hawaii and NOAA researchers investigated the post-release survival and rates of interaction with fishing gear of incidentally captured silky sharks using a combination of satellite-linked pop-up tags and blood chemistry analysis (Hutchinson et al., 2015). To identify trends in survival probability and the point in the fishing interaction when sharks sustain the injuries that lead to mortality, sharks were sampled during every stage of the fishing procedure. The total mortality rates of silky sharks captured in purse seine gear was found to exceed 84%. Survival declined precipitously once the silky sharks had been confined in the sack portion of the net just prior to loading. Additionally, shark interactions recorded by the scientists were markedly higher than those recorded by vessel officers and the fishery observer. Future efforts to reduce the impact of purse seine fishing on silky shark populations should be focused on avoidance or releasing sharks while they are still free swimming.

Research on Bycatch and Fishing Technology – CETACEANS

Injury determinations for marine mammals observed interacting with Hawaii and American Samoa longline fisheries during 2009–2013. NOAA Fisheries researchers reported that marine mammal interactions (i.e., hookings and entanglements) with the Hawaii and American Samoa longline fisheries observed during 2009–2013 were compiled, and the number of marine mammal deaths, serious injuries, and non-serious injuries by fishery, species, and management area were assessed. These values form the basis of the mortality and serious injury estimates included in the stock assessment reports of stocks impacted by these fisheries. Injury determinations were made using a nationally standardized process and established criteria for distinguishing serious from non-serious injuries (National Marine Fisheries Service, 2012). In the Hawaii deep-set fishery, 45 marine mammal interactions were observed from 2009 to 2013; most involved false killer whales (53.3%), resulted in death or serious injury (75.6%), and occurred outside the U.S. exclusive economic zone (EEZ) (55.6%). In the Hawaii shallow-set fishery, 43 marine mammal interactions were observed from 2009 to 2013; most involved Risso's dolphins (39.5%), resulted in death or serious injury (69.8%), and occurred outside the U.S. EEZ (90.7%). In the American Samoa deep-set fishery, 13 marine mammal interactions were observed from 2009 to 2013; most involved rough-toothed dolphins (46.2%), resulted in death or serious injury (92.3%), and occurred within the U.S. EEZ (76.9%) (Bradford and Forney, 2016).

Injury determinations for humpback whales and other cetaceans reported to NOAA response networks in the Hawaiian Islands during 2007–2012. Reports of cetaceans with human-caused injuries in Hawaiian waters are made each year to the Pacific Islands Region Marine Mammal Response Network (PIR-MMRN, coordinated by the Pacific Islands Regional Office) and the Hawaiian Islands Entanglement Response Network (HIERN, coordinated by the Hawaiian Islands Humpback Whale National Marine Sanctuary). These injury reports have largely involved humpback whales that were entangled in fishing gear or marine debris or struck by a vessel. Previously, determinations of injury severity (i.e., serious or non-serious) for Hawaiian cetaceans, using systematic and nationally-consistent criteria, have only been made for cetaceans observed interacting with the Hawaii pelagic longline fisheries. Accordingly, most injuries reported to PIR-MMRN and HIERN have not been accounted for in the mortality and serious injury (M&SI) estimates that are a key component of the Stock Assessment Reports (SARs) for cetaceans in Hawaiian waters. The present paper addresses this gap by providing a summary of injury determinations for cetaceans in Hawaii reported injured by human causes during 2007–2012. Injury determinations were made using a revised process and refined criteria for distinguishing serious from non-serious injuries (National Marine Fisheries Service, 2012). From 2007 to 2012, 95 reports of cetaceans with human-caused injuries were identified, which include 39 humpback whales involved in vessel collisions, 48 humpback whales entangled in fishing gear, one other cetacean struck by a vessel, and seven other cetaceans hooked or entangled in fishing gear or marine debris. Only the 2008–2012 determinations are relevant to the 2014 SAR year. The 76 humpback whale vessel collisions and entanglements during 2008–2012 led to 34.88 serious injuries and one mortality. The resulting average of 7.18 mortalities and serious injuries per year can be considered a minimum estimate of M&SI from Hawaii for use in the 2014 SAR. For the other cetaceans in 2008–2012, serious injury determinations of relevance to the SAR were made for spinner dolphins of the Hawaii Island (n=2) and Oahu/4-Islands (n=1) stocks, a spotted dolphin of the 4-Islands stock, and a sei whale of the Hawaii stock. More effort is needed to report, document, and monitor injured Hawaiian cetaceans other than humpback whales (Bradford and Lyman, 2015).

Line-transect abundance estimates of cetaceans in the Hawaiian EEZ. A ship-based, visual line-transect survey was conducted during the summer–fall of 2010 to obtain abundance estimates of cetaceans in the U.S. Exclusive Economic Zone of the Hawaiian Islands (Hawaiian EEZ). A multiple-covariate approach was used to estimate the detection function and abundance of sighted cetaceans. Given the low sighting rates in the study area, the 2010 sightings were pooled with sightings of the same and, as appropriate, other species collected during previous line-transect surveys of the central Pacific for estimating detection functions. Estimated trackline detection probabilities are the first to account for the effect of survey sighting conditions and are markedly lower than estimates used in previous studies. Twenty-three cetacean species (17 odontocetes and 6 mysticetes) were seen during the 2010 survey, and abundance was estimated for 19 of them (15 odontocetes and 4 mysticetes). Group size and Beaufort sea state were the most important factors affecting the perpendicular detection distances to cetacean groups. Across all species, abundance estimates and coefficients of variation range from 133 to 72,528 and 0.29 to 1.13, respectively. Estimated abundance is highest for delphinid species, particularly for rough-toothed (Steno bredanensis), striped (Stenella coeruleoalba), pantropical spotted (S. attenuata), and Fraser's (Lagenodelphis hosei) dolphins; and lowest for rorqual species, especially blue (Balaenoptera musculus) and fin (B. physalus) whales, and killer whales (Orcinus orca). Overall, cetacean density in the Hawaiian EEZ is low in comparison to other regions reflecting the oligotrophic waters of the study area (Bradford et al., 2016).

Revised stock boundaries for false killer whales (Pseudorca crassidens) in Hawaiian waters. Three populations of false killer whales (Pseudorca crassidens) have been identified in the U.S. Exclusive Economic Zone of the Hawaiian Archipelago (Hawaiian EEZ): 1) a main Hawaiian Islands (MHI) insular population, 2) a pelagic population, and 3) a Northwestern Hawaiian Islands (NWHI) population. Spatially-explicit stock boundaries are needed to assess and manage each population. New data, primarily satellite telemetry data, were collected that indicate the existing stock boundaries should be refined. These data were used by the False Killer Whale Stock Boundary Revision Working Group to establish revised, scientifically-defensible stock boundaries that appropriately reflect uncertainty and are robust to routine inputs from ongoing data collection. For each stock, several stock boundary options were identified by the Working Group and reviewed by the Pacific Scientific Review Group before the revised stock boundaries were finalized. The MHI insular stock boundary was changed from a uniform 140 km radius around the MHI to a minimum convex polygon bounded around a 72 km radius of the MHI, resulting in a boundary shape that reflects greater offshore use in the leeward portion of the MHI. While the wide-ranging pelagic stock continues to be assessed within the Hawaiian EEZ, the inner stock boundary was reduced from a 40-km to an 11-km radius around the MHI, a result of individuals occurring closer to shore than previously observed. The NWHI stock boundary largely remained the area of the Papahānaumokuākea Marine National Monument extended to include a 50-nmi radius around Kauai, although 2 vertices were removed to widen the eastern portion, accounting for movement outside of the existing boundary. The following report summarizes the stock boundary revision process for the 3 false killer populations. Additionally, because the stock boundary placement affects the line-transect abundance estimates of the pelagic and NWHI stocks and the proration of false killer whale bycatch, the report also provides updated abundance estimates for pelagic and NWHI false killer whales and outlines a revised approach for bycatch proration (Bradford et al., 2015).

Marine mammals reported under catch lost to predators on fishermen's commercial catch reports to the State of Hawaii, 2003–2014. This report provides preliminary summaries of data on marine mammals named by fishers as predators responsible for reported losses of fish catch. The data were derived from a variety of Commercial Fish Catch Reports submitted by fishers to the State of Hawaii on forms in use after 2002. These are not observer data, but rather commercial fishermen's self-reports; as required by State of Hawaii regulations. These data were requested by the Scientific Review Group (SRG) for Pacific Marine Mammals and by the Take Reduction Team for False Killer Whales (Boggs et al., 2015).

Habitat-based models of cetacean density and distribution in the central North Pacific. The central North Pacific Ocean includes diverse temperate and tropical pelagic habitats. Studies of the abundance and distribution of cetaceans within these dynamic marine ecosystems have generally been patchy or conducted at coarse spatial and temporal scales, limiting their utility for pelagic conservation planning. Habitat-based density models provide a tool for identifying pelagic areas of importance to cetaceans, because model predictions are spatially explicit. In this study, we present habitat-based models of cetacean density that were developed and validated for the central North Pacific. Spatial predictions of cetacean densities and measures of uncertainty were derived based on data collected during 15 large-scale shipboard cetacean and ecosystem assessment surveys conducted from 1997 to 2012. We developed generalized additive models using static and remotely sensed dynamic habitat variables, including distance to land, sea-surface temperature (SST), standard deviation of SST, surface chlorophyll concentration, sea-surface height (SSH), and SSH root-mean-square variation. The resulting models, developed using new grid-based prediction methods, provide finer scale information on the distribution and density of cetaceans than previously available. Habitat-based abundance estimates around Hawaii are similar to those derived from standard line-transect analyses of the same data and provide enhanced spatial resolution to inform management and conservation of pelagic cetacean species Forney et al., 2015).

11.7 Relevant Publications

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Appendix 1.

Mass Balance Reconciliation Exercise for the United States

Introduction

At WCPFC12, the Commission approved a recommendation from the TCC requesting CCMs to provide any data on disposal, receipt and redistribution of bigeye, yellowfin, skipjack and albacore species for the 2013 calendar year to be included as part of their 2016 Annual Report Part I. Minimum data requirements for the disposal of species (export and domestic market) include flag CCM, catch location (CCM EEZ or WCPFC HS area), destination (domestic or country), gear code, net weight (processed) kg., and estimated whole weight. Data fields for the receipt and redistribution of species (re-export and re-imports, transshipment activities) include the export year, export CCM or domestic, import CCM, harvest year, gear code, net weight (processed) kg., and estimated whole weight.

<u>Disposal of Species</u>

In 2013, U.S. fisheries in the Western and Central Pacific Ocean (WCPO) caught albacore, bigeye, skipjack and yellowfin tuna. With the exception of fish caught by U.S. purse seiners, most of the fish caught is consumed domestically. Occasionally, fish caught by longline or albacore troll vessels are exported, but no data exists indicating any exports of WCPO fish from these two gear types in 2013. Fish landed by longline boats can either be harvested within the U.S. or within the high seas areas of the WCPFC area. Fish landed by tropical troll and handline vessels are typically caught entirely within the U.S. EEZ, and fish caught by albacore troll vessels are harvested entirely within the WCPFC area. The U.S. does not collect information on processed weights in these fisheries, only estimated whole weight is recorded. These records reflect fish harvested in calendar 2013. Trips may span years and so fish may be offloaded in the next year. For this mass balance reconciliation exercise, we assume all fish caught in the calendar year in these fisheries were landed that calendar year. Tables 1-4 describe the disposal of albacore, bigeye, skipjack and yellowfin tuna harvested within the WCPO in 2013 by U.S.-flagged longline, troll and handline vessels.

Table 1. Disposal of albacore harvested within the WCPO in 2013 by U.S. longline, troll, and handline vessels.

Flag CCM	United States	American Samoa	American Samoa	CNMI	United States	United States	United States
Catch Location	WCPFC HS and U.S. EEZ	WCPFC HS and A.S. EEZ	WCPFC HS	WCPFC HS	WCPFC HS	U.S. EEZ	U.S. EEZ
Destination	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic
Gear Code	Longline	Longline	Longline	Longline	Albacore Troll	Tropical Troll	Handline
Net Weight (processed) kg	No Data Available	No Data Available	No Data Available	No Data Available	No Data Available	No Data Available	No Data Available
Estimated Whole Weight (mt)	265	2,128	11	23	390	2	84

Table 2. Disposal of bigeye tuna harvested within the WCPO in 2013 by U.S. longline, troll, and handline vessels.

Flag CCM	United States	American Samoa	American Samoa	CNMI	United States	United States
Catch Location	WCPFC HS and U.S. EEZ	WCPFC HS and A.S. EEZ	WCPFC HS	WCPFC HS	U.S. EEZ	U.S. EEZ
Destination	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic
Gear Code	Longline	Longline	Longline	Longline	Tropical Troll	Handline
Net Weight (processed) kg	No Data Available	No Data Available	No Data Available	No Data Available	No Data Available	No Data Available
Estimated Whole Weight (mt)	3,654	84	305	492	148	67

Table 3. Disposal of skipjack tuna harvested within the WCPO in 2013 by U.S. longline, troll, and handline vessels.

Flag CCM	United States	American Samoa	American Samoa	CNMI	American Samoa	CNMI	Guam	United States	United States
Catch Location	WCPFC HS and U.S. EEZ	WCPFC HS and A.S. EEZ	WCPFC HS	WCPFC HS	U.S. EEZ	U.S. EEZ	U.S. EEZ	U.S. EEZ	U.S. EEZ
Destination	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic
Gear Code	Longline	Longline	Longline	Longline	Tropical Troll	Tropical Troll	Tropical Troll	Tropical Troll	Handline
Net Weight (processed) kg	No Data Available	No Data Available	No Data Available	No Data Available	No Data Available	No Data Available	No Data Available	No Data Available	No Data Available
Estimated Whole Weight (mt)	188	9	66	25	3	159	227	149	14

Table 4. Disposal of yellowfin tuna harvested within the WCPO in 2013 by U.S. longline, troll, and handline vessels.

Flag CCM	United States	American Samoa	American Samoa	CNMI	American Samoa	CNMI	Guam	United States	United States
Catch Location	WCPFC HS and U.S. EEZ	WCPFC HS and A.S. EEZ	WCPFC HS	WCPFC HS	U.S. EEZ	U.S. EEZ	U.S. EEZ	U.S. EEZ	U.S. EEZ
Destination	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic
Gear Code	Longline	Longline	Longline	Longline	Tropical Troll	Tropical Troll	Tropical Troll	Tropical Troll	Handline
Net Weight (processed) kg	No Data Available	No Data Available	No Data Available	No Data Available	No Data Available	No Data Available	No Data Available	No Data Available	No Data Available
Estimated Whole Weight (mt)	568	390	32	93	3	16	24	488	442

Purse Seine

U.S. purse seine vessels catch significant quantities of skipjack, bigeye, and yellowfin tunas. As purse seine trips may span calendar years, fish caught at the end of one calendar year may be offloaded the following year, and if fish are transshipped, there may be further delays at to when they are physically landed and processed. For this mass balance exercise, the U.S. chose to identify to the best of its abilities, where fish caught by its vessels was processed. U.S. vessels are required to submit information after unloading as well as provide sizing information once the fish arrive at a cannery for processing. Fish processed within American Samoa "customs territory" is destined for domestic consumption, while fish processed in other countries may be consumed elsewhere or re-imported back to the U.S. (customs territory) for consumption.

All fish caught on purse seine trips in 2013 were caught within the WCPFC convention area. Table 5 shows the destination country listed on the unloading logsheets and quantities of fish by species, and Table 6 depicts the destination country listed on the final out-turn receipts from the canneries and quantities of fish by species.

Destinations, quantities and species of fish on the purse seine unloading logsheets and cannery final out-turns are all self-reported by the vessels and canneries, respectively. The U.S. does not verify the destinations and weights of the fish processed. Although, it is possible to discern where fish were caught within the WCPFC convention area using information from regional purse seine logsheets, it is not possible to determine the destination country for the fish as fish in these trips are caught in different zones and the unloadings do not track where within the WCPFC area the fish was caught.

Table 5. Quantities of bigeye, yellowfin and skipjack tuna by unloading destination listed on the unloading logsheet for U.S. purse seine trips that arrived in 2013.

Country	BET	MIX (BET, YFT and SKJ)	SKJ	YFT	Total
ECUADOR	663	83	7,010	1,184	8,940
MEXICO	248	49	3,176	382	3,856
OTHER	201	23	6,776	713	7,713
THAILAND	3,412	576	82,666	10,267	96,921
UNITED STATES OF AMERICA	1,298	492	51,193	3,224	56,208
UNKNOWN	2,658	1,168	79,351	8,804	91,982

Other includes China, Colombia, Philippines, Thailand and Samoa which were combined for confidentiality reasons.

Table 6. Quantities of bigeye, yellowfin, and skipjack tuna by cannery location as listed on the final out-turn documents for U.S. purse seine trips that arrived in 2013.

Country	BET	MIX (BET, SKJ and YFT)	SKJ	YFT	Total
CHINA	115	14	1,914	327	2,370
COLOMBIA	119	9	6,737	793	7,658
ECUADOR	933	211	19,051	2,116	22,311
JAPAN	91	1	817	300	1,208
MEXICO	466	102	7,400	655	8,623
PHILIPPINES	191	26	5,660	633	6,511
OTHER	34	6	738	220	997
THAILAND	3,889	1,455	104,481	13,428	123,254
UNITED STATES OF AMERICA	1,298	474	52,283	3,227	57,283
VIETNAM	400	4	4,521	357	5,282
UNKNOWN	679	68	23,788	2,313	26,848

Other includes Korea, Samoa, Spain and United Kingdom which were combined for confidentiality reasons.

Imports, Exports and Re-exports

The U.S. tracks general statistics on the import, export and re-export of tunas. This general tracking does not include the origin of fish, gear type, harvest year or estimated whole weight. Tables 7-9 describe the imports, exports and re-exports of tuna in the U.S. in 2013.

Table 7. Imports of tunas (mt) by species into the U.S. by country in 2013 for all product types. Product types include fresh, frozen (whole, eviscerated head-on and head-off), canned, fillet, and unspecified.

COUNTRY	ALB	BET	SKJ	UNSPECIFIED	YFT
AUSTRALIA	13	5			104
BARBADOS		2			153
BRAZIL		350			172
CANADA	2,143	146		939	53
CAPE VERDE		4		16	0
CHILE		3			2
CHINA	258			23,010	
CHINA - HONG KONG				128	
CHINA - TAIPEI			9	326	44
COLOMBIA				9,511	
COOK IS.	1	2			22
COSTA RICA		14		559	1,064
CYPRUS					1
DOMINICAN REPUBLIC					1
ECUADOR	1,459	865		16,390	840
EL SALVADOR				9	
FEDERATED STATES OF MICRONESIA				47	
FIJI	559	246		11,902	772
FRANCE	0			2	
FRENCH POLYNESIA	269	245	9	7	112
GERMANY				15	
GREECE	1			1	
GRENADA					752
INDIA		0		3	3
INDONESIA	4,164	48	30	12,406	1,542
ISRAEL	14			155	
ITALY	59			61	
IVORY COAST	10			3	
JAPAN	94	0	9	170	2
KIRIBATI				1	0
MALAYSIA				248	
MALDIVE IS.				41	1,236
MALTA				0	
MARSHALL IS.		708		1,036	88
MAURITIUS				7,464	
MEXICO	819		40	2,830	1,001
NEW ZEALAND	6				

PANAMA		56	169	153	1,312
PAPUA NEW GUINEA				928	
PERU				97	4
PHILIPPINES	37	133	48	19,975	2,161
POLAND				3	
PORTUGAL	7	10	3	206	3
SENEGAL				0	8
SEYCHELLES		1		107	5
SINGAPORE		37		155	28
SLOVAKIA		0			1
SLOVENIA	0			0	
SOLOMON IS.		14		1,296	172
SOUTH AFRICA		149		20	206
SOUTH KOREA	220	469		862	2
SPAIN	134	19		249	
SRI LANKA	106	614		445	1,305
SURINAME		3		41	807
SWEDEN					3
THAILAND	8,606	46		97,413	266
TONGA					1
TRINIDAD & TOBAGO		37		17	1,620
TUNISIA				8	
TURKEY		1		0	
TURKS & CAICOS IS.		5			7
VANUATU		3			17
VENEZUELA		103			860
VIETNAM	5,006	183	23	17,572	1,847
WESTERN SAMOA					2

Table 8. Exports of tunas (mt) by species from the United States by country in 2013 for all product types. Product types included fresh, frozen (unspecified, fillet, meat), and prepared/preserved.

COUNTRY	ALB	BET	SKJ	UNSPECIFIED	YFT
ANGUILLA	4			7	2
ANTIGUA & BARBUDA	2		2	35	
ARUBA			29	65	
AUSTRALIA				17	84
BAHAMAS				201	11
BAHRAIN				1	0
BARBADOS	1		1	45	0
BELGIUM	2				
BELIZE				7	
BERMUDA				10	
BRITISH VIRGIN IS.				24	
CAMBODIA	1				
CANADA	9,790	64	4	536	113
CAYMAN IS.	28			18	2
CHINA	433			71	
CHINA - HONG KONG		2		9	
CHINA - TAIPEI	7		517	71	
COLOMBIA				28	396
COSTA RICA				16	20
CURACO	1		1	3	
DENMARK				2	
DOMINICAN REPUBLIC				46	45
ECUADOR	477				
EL SALVADOR	1			2	4
EQUATORIAL GUINEA				3	
FIJI				0	
FRANCE	212				
FRENCH POLYNESIA			1	7	
GEORGIA				6	
GERMANY	48		1	0	1
GREECE				0	
GRENADA				4	
GUATEMALA			2	39	
HAITI				4	
HONDURAS	1			13	5
INDIA				0	
INDONESIA				184	

ISRAEL				15	
ITALY				0	
JAMAICA				43	
JAPAN	744	104		111	41
KUWAIT	28			0	
LEBANON	0				
MALAYSIA				1	
MAURITIUS	48			13	
MEXICO	41			135	2
MONGOLIA	1				
MONTSERRAT				9	
NAMIBIA				19	
NETHERLANDS	9			29	2
NEW ZEALAND				0	
NICARAGUA	0			4	
PANAMA	19		2	165	3
PERU				3	
PHILIPPINES	1			120	
RUSSIAN FEDERATION					9
SAUDI ARABIA				9	
SINGAPORE					0
SINT MAARTEN	13			66	6
SOUTH KOREA	24	2			
SPAIN	2,836			510	
SRI LANKA					15
ST.KITTS-NEVIS				6	4
ST.LUCIA			0	14	
ST.VINCENT-GRENADINE				9	
SURINAME	2				
SWEDEN				0	
THAILAND	155		25	425	69
TRINIDAD & TOBAGO	11			66	
TURKS & CAICOS IS.				8	
UNITED ARAB EMIRATES				34	
URUGUAY				1	
VIETNAM	314			85	15

Table 9. Re-exports of tunas by species from U.S. by country in 2013 for all product types. Product types included fresh, frozen (unspecified, meat, fillet) and prepared/preserved.

COUNTRY	ALB	BET	SKJ	UNSPECIFIED	YFT
ARUBA				43	
AUSTRALIA	239			0	
BAHAMAS				1	
BARBADOS				37	
BERMUDA				1	
BRITISH VIRGIN IS.				2	
CANADA	127	168	164	1,030	188
CHILE				25	
COLOMBIA	3			22	
COSTA RICA				78	
DOMINICAN REPUBLIC				21	
EL SALVADOR				2	
FIJI	7				
FRENCH POLYNESIA	12				
GUATEMALA				21	
HONDURAS				15	
INDONESIA				88	
ITALY	4				
JAMAICA				20	
JAPAN	9				0
MEXICO	7			42	8
NETHERLANDS				11	
NICARAGUA				8	
PANAMA				82	
PHILIPPINES				51	
SINT MAARTEN				1	
SOUTH KOREA					0
SRI LANKA				32	
ST.LUCIA				3	
THAILAND				736	35
TRINIDAD & TOBAGO				1	
VIETNAM				24	0