

Appendix A

Fishing Effort in the Pacific Ocean

Despite the ban on high-seas driftnet fishing in the north Pacific Ocean in the early 1990s, fishing effort by trawlers, longliners, purse seiners, trollers, and driftnetters continues throughout the Pacific Ocean. The annual number of vessels operating per fishery per country varies greatly, from less than 10 vessels per fishery for some of the small island nations, to over 600 for the more economically powerful countries. For most of these fishing fleets, little or no data exists regarding the incidental bycatch of marine mammal and sea turtle populations, particularly for those species in danger of extinction. Without such information, it is difficult to assess the impacts of these fisheries on species included in this Opinion. Nevertheless, bycatch information, including survival rates following entanglements, collected by observers and through fisher self reporting does exist for some fisheries in the eastern and western Pacific Ocean. Given such data, coupled with information on fishing distribution and effort and distribution and abundance records for the various species, one can at least gain a sense of the possible impacts of those fisheries for which no information exists. The following sections summarize past and current fishing effort in the eastern and central western Pacific Ocean.

A. Fishing effort in the Central Western Pacific Ocean

Although high-seas driftnet vessels no longer operate in the North Pacific, longliners, purse seiners, trollers, and pole-and-liners continue to fish, mainly for tuna species, in the Central Western Pacific Ocean, typically west of the 150°E longitude and north and south of the equator. Most of this information is from the Tuna Fishery Yearbook, 2002, Oceanic Fisheries Programme, Secretariat of the Pacific Community, Noumea, New Caledonia.

Table 1 provides a summary of the known number of active longline vessels, by country, by year, from 1990-2002 in the Central Western Pacific Ocean. Preliminary estimates are represented in parenthesis () and are only based on data from the last known year. Where known, the number of total hooks deployed during a particular year was included (e.g. Korea and Taiwan-distant water). While many of the small Pacific island countries have relatively small longline fleets, Japan and Taiwan clearly dominate this fishery, fishing coastally, in distant water, and offshore. The number of Japanese coastal water tuna longliners has remained relatively constant from 1990-2002 (averaging approximately 750 vessels per year). In contrast, the number of Japan's active offshore tuna longliners have declined by over one half since the early 1990s to the present¹. Taiwan's offshore fleet is particularly large, composed of an average of 1,500 active vessels per year (based on data from 1990-99), while the number of vessels included in its distant water fleet ranged from 52 to 88 vessels during the 1990s and has increased in

¹Distant-water longlining is conducted by large, freezer-equipped vessels that make trips of up to several months' duration, and offshore longlining is conducted by small vessels making trips of usually less than two weeks' duration (Ocean Fisheries Programme, SPC, 2003).

the last two years. The number of vessels included in Korea's longline fleet has remained relatively constant from 1990-2002, averaging 168 active vessels per year. The number of active longliners in other countries over the past 10 years appears relatively steady, with American Samoa and the Solomon Islands entering the fishery in 1995, an increase by China in the mid-1990s, and increases since the early to mid-1990s by Fiji, Federated States of Micronesia, New Caledonia, New Zealand, Papua New Guinea, Samoa, and Tonga.

Table 1. Number of active longline vessels fishing, by country, by year, in the Central Western Pacific Ocean

Country/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
American Samoa	–	–	–	–	–	3	12	21	25	28	37	67	60
Australia - domestic (#vessels and # hooks)	117	111	124	109	110	109	119	137	156	145	140	(140)	144
	1,274	1,822	2,393	2,065	3,274	3,898	4,220	5,606	8,776	9,661	9,355	10,711	11,837
Australia-Japan JV	14	29	56	66	52	21	–	–	–	–			
China	23	39	72	311	456	422	325	144	124	115	106	116	123
Cook Islands	–	–	–	–	2	3	2	–	1	2	--	1	16
Fed States Micronesia	–	3	8	7	9	11	9	15	23	27	27	25	25
Fiji	6	9	18	22	37	48	42	34	39	43	55	101	101
French Polynesia	2	8	25	50	66	65	59	60	54	57	57	57	54
Indonesia	151	145	141	309	293	(293)	(293)	(293)	(293)	(293)	(293)	(293)	(293)
Japan - coastal	685	768	793	790	819	738	711	698	712	703	732	777	(777)
Japan- distant water	791	790	768	767	749	744	703	695	679	618	541	539	682
Japan - offshore	362	332	302	272	255	222	200	180	164	152	145	145	
Japan - #hooks for both distant water and offshore	192,000	170,000	154,000	164,000	151,000	135,000	121,000	114,000	113,000	108,000	112,000	103,000	...
Kiribati	–	–	–	–	–	1	1	–	–	–	--	--	--
Korea (# vessels and total # hooks) ¹	182	220	166	148	160	154	156	148	169	171	176	177	162
	73,216	53,452	62,125	56,190	76,380	81,831	73,420	68,241	66,193	...	...	...	...
Marshall Islands	–	–	2	5	2	4	–	–	–	–	--	--	--
New Caledonia	7	6	4	4	5	8	8	9	11	13	14	18	25
New Zealand	13	22	27	42	59	93	82	62	86	92	112	132	156
Papua New Guinea	–	–	–	1	4	11	7	8	28	47	57	51	50
Philippines	26	12	10	10	10	10	10	(10)	9	13	14	(14)	(14)
Samoa	–	–	–	17	25	45	90	170	200	175	154	148	114
Solomon Islands	–	–	–	–	–	9	13	18	21	16	14	8	8

Taiwan - distant water (# vessels and # hooks) ¹	52	74	88	72	67	62	56	53	64	65	78	101	133
	37,681	58,783	35,089	28,440	41,083	52,615	31,394	...	...	...	...	...
Taiwan - offshore (W of 130EE)	1,139	800	1,898	1,791	1,753	1,603	1,274	1,877	1,712	1,696	(1,696)	(1,696)	(1,696)
Taiwan - offshore (E of 130EE)	–	–	–	254	355	366	420	361	281	281	284	(284)	(284)
Tonga	1	1	1	6	5	7	7	8	10	13	14	21	35
United States	138	78	130	129	139	127	115	118	121	133	133	128	124
Vanuatu	–	–	–	–	–	2	3	1	1	--	--	--	--
TOTAL	3,709	3,447	4,633	5,182	5,432	5,181	4,717	5,120	4,983	4,898	4,879	5,039	5,076

¹Number of hooks is in thousands (000s)

Source: Secretariat of the Pacific Community, 2003. Tuna Fishery Yearbook, 2002 (Timothy A. Lawson, editor, Noumea, New Caledonia).

Table 2 provides a summary of the known number of active purse seine vessels, by country, by year, from 1990-2002 in the Central Western Pacific Ocean.

Table 2. Number of active purse seine vessels fishing, by country, by year, in the Central Western Pacific Ocean

Country/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Australia - domestic	1	6	13	7	4	3	4	5	4	6	8	3	3
Australia - distant water	8	6	2	1	–	–	–	–	–	–	--	--	--
Fed. States of Micronesia	–	6	7	7	8	6	4	4	3	4	7	5	7
Japan - coastal	43	38	31	27	23	20	21	20	20	22	23	19	(19)
Japan - offshore and distant water	35	35	38	36	33	31	32	35	35	36	37	36	36
Kiribati	–	–	–	–	1	1	1	1	1	1	1	1	1
Korea	39	36	36	34	32	30	28	27	26	26	26	26	28
Marshall Islands	--	--	--	--	--	--	--	--	--	--	5	5	5
New Zealand	9	6	7	5	7	6	6	7	6	6	8	11	11
Papua New Guinea	–	–	–	–	2	3	4	10	13	17	20	22	26
Philippines - domestic (purse seine & ring)	549	546	407	399	(399)	(399)	(399)	(399)	127	191	164	(164)	(164)
Philippines - distant water	13	15	12	12	11	13	12	12	13	10	9	10	11
Russia	5	4	3	8	4	–	–	–	–	–	--	--	--
Solomon Islands	4	3	3	3	3	3	3	4	4	5	5	2	2
Spain	--	--	--	--	--	--	--	--	--	8	12	6	1
Taiwan	32	39	45	43	43	42	42	42	42	42	42	41	41
United States	43	43	44	42	49	44	39	35	39	36	33	32	29
Vanuatu	–	–	–	–	1	2	2	5	5	7	7	--	--
Total	781	783	648	624	620	603	597	606	338	417	407	384	387

Source: Secretariat of the Pacific Community, 2003. Tuna Fishery Yearbook, 2002 (Timothy A. Lawson, editor, Noumea, New Caledonia).

Table 3 provides a summary of the known number of active pole-and-line vessels, by country, by year, from 1990-2002 in the Central Western Pacific Ocean.

Table 3. Number of active pole-and-line vessels fishing, by country, by year, in the Central Western Pacific Ocean

Country/year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Australia	17	16	12	12	10	11	16	15	7	4	4	2	2
Fiji Islands	10	10	11	9	10	9	7	5	1	1	1	2	(2)
French Polynesia	118	106	100	70	70	77	75	70	80	74	63	60	53
Indonesia	900	872	849	823	820	(820)	(820)	(820)	(820)	(820)	(820)	(820)	(820)
Japan - coastal	2,228	2,277	2,093	1,927	1,830	481	512	436	382	416	357	285	(285)
Japan - distant water	88	82	63	59	63	62	60	62	62	64	65	64	(64)
Japan - offshore	167	160	153	144	122	112	105	101	101	99	96	92	(92)
Kiribati	5	3	3	3	3	3	...	...	--	--	--	--	--
New Zealand	3	3	1	7	13	15	9	3	2	5	4	3	3
Palau	1	0	1	1	1	...	...	...	...	...	...	...	...
Solomon Islands	31	32	32	27	27	32	34	31	28	27	18	12	11
Tuvalu	1	1	1	--	--	--	--	--	--	--	--	--	--
United States	...	...	...	...	...	7	8	8	7	7	7	6	6
Total	3,569	3,562	3,319	3,082	2,969	1,629	1,646	1,551	1,490	1,517	1,435	1,346	1,338

Source: Secretariat of the Pacific Community, 2003. Tuna Fishery Yearbook, 2002 (Timothy A. Lawson, editor, Noumea, New Caledonia).

Table 4 provides a summary of the known number of active troll vessels, by country, by year, from 1990-2002 in the Central Western Pacific Ocean.

Table 4. Number of active troll vessels fishing, by country, by year, in the Central Western Pacific Ocean

Country/year	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	00-02
Canada	3	3	3	3	3	3	3	3	3	5	5	4	4
French Polynesia	3	4	2	4	0	4	4	1	...	...	...	...
New Zealand	198	211	273	414	492	474	441	309	302	201	285	328	325
United States	39	56	55	44	13	21	53	27	36	21	36	33	14
Total	243	274	333	465	508	502	501	340	341	227	326	365	343

Source: Secretariat of the Pacific Community, 2003. Tuna Fishery Yearbook, 2002 (Timothy A. Lawson, editor, Noumea, New Caledonia).

B. Fishing effort in the Eastern Pacific Ocean (non-U.S.)

Fisheries Operating Under the Inter-American Tropical Tuna Commission

The Inter-American Tropical Tuna Commission (IATTC) operates under the authority and direction of a convention originally entered into by Costa Rica and the United States. The convention, which came into force in 1950, is open to adherence by other governments whose nationals fish for tropical tunas and tuna-like species in the eastern tropical Pacific Ocean (ETP). Under this provision, the following countries have adhered: United States, Costa Rica, Panama, Ecuador, Mexico, Canada, Japan, France, Nicaragua, Vanuatu, Venezuela and El Salvador. Canada withdrew from the IATTC in 1984.

The IATTC staff maintains records of gear, flag, and fish-carrying capacity for most of the vessels which fish with surface gear for yellowfin, skipjack, big-eye, or bluefin tuna in the ETP. Historically, detailed records have not been maintained for most longline vessels, nor for sport-fishing vessels and small craft such as canoes or launches, although recently the staff began compiling and maintaining these records and will continue in the future. During the past few years, the IATTC staff has used well volume, in cubic meters, instead of weight, in metric tons, to measure the carrying capacities of the vessels. The size classes and well volumes are as follows: Class 1: <53 m³; Class 2: 58-106 m³; Class 3: 107-212 m³; Class 4: 213-310 m³; Class 5: 320-425 m³; and Class 6: >425 m³.

The international tuna purse seine fleet represents the majority of the fishing effort and carrying capacity in the eastern tropical Pacific tuna fishery, with much of the total capacity consisting of purse seiners greater than 400 st. These large vessels comprised nearly 70 percent of the total fishing capacity operating in the ETP in 1996 (IATTC, 2002). An average of 122 foreign vessels with a carrying capacity greater than 400 st fished each year in the ETP during 1996 to 2001. In addition to these larger vessels, the foreign fleet contains smaller vessels less than 400 st that target tuna in the ETP. From 1996 to 2001, an average of 59 foreign vessels ranging from 45 to 400 st carrying capacity fished in the ETP each year (IATTC, 1999, 2001, 2002a-b).

Tables 5 and 6 include the number of purse seine vessels and pole-and-line vessels, by country from 1990 to 2001 that have fished all or part of the year in the ETP for the four species of tuna mentioned above.

Table 5. Number of documented active purse seine vessels fishing, by country, by year, in the Eastern Tropical Pacific Ocean (IATTC annual reports)

Country/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Belize	--	--	--	2	2	5	4	5	7	6	4	2
Bolivia	--	--	--	--	--	--	--	--	--	--	3	5
Columbia	1	3	3	6	10	10	10	9	9	9	9	10
Costa Rica	1	--	--	--	--	1	1	--	--	--	--	--
Cyprus	--	1	1	1	1	1	1	1	1	--	--	--
Ecuador	34	33	35	33	37	44	47	56	67	73	75	73
El Salvador	--	--	--	--	--	--	--	--	2	2	--	2
Guatemala	--	--	--	--	--	--	--	--	--	4	4	4
Honduras	1	1	--	--	--	--	1	2	1	2	1	3
Liberia	--	--	--	--	--	--	1	--	--	--	--	--
Mexico	52	49	58	50	53	55	57	54	53	54	54	54
New Zealand	--	--	1	1	1	1	--	--	--	--	--	--
Nicaragua	--	--	--	--	--	--	--	--	--	1	1	1
Panamá	7	6	7	5	5	6	6	6	5	9	9	10
Perú	1	1	--	--	--	--	--	--	--	--	--	--
Russia	--	--	--	1	--	--	--	--	--	--	--	--
Spain	1	2	2	3	1	2	2	3	6	5	5	5
St. Vincent and Grenadines	--	--	--	--	2	--	--	--	--	--	--	--
Taiwan	--	--	--	--	--	--	--	1	--	--	--	--
USA	46	24	20	25	27	18	23	25	25	14	13	8
Vanuatu	11	11	11	12	18	14	12	12	12	11	11	6
Venezuela	24	21	17	18	20	18	20	22	21	23	22	25
Total	179	152	155	157	177	175	185	196	209	213	211	208

Table 6. Number of documented active pole-and-line vessels, by country, by year, in the Eastern Tropical Pacific Ocean

<u>Country/year</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>
Ecuador	7	6	5	1	1	1	1	1	--	--	1	1
Mexico	11	9	8	7	7	8	9	10	12	12	10	10
United States	6	4	6	7	12	9	8	13	11	2	--	--
Total	23	19	19	15	20	18	18	24	23	22	11	11

Longliners

The IATTC Resolution on large-scale longline vessels in 2003 established the list of longline vessels over 24 meters authorized to fish for tunas and tuna-like species in the eastern Pacific Ocean. The number of authorized longline vessels operating in the ETP are included in Table 7.

<u>Country</u>	<u>Number of vessels</u>
China	77
Costa Rica	1
Ecuador	20
Spain	125
France	14
Japan	516
Korea	177
Mexico	9
Panamá	52
Perú	1
Taiwan	140
United States	23
Total	1,155

Source: <http://www.iattc.org/vessellistopen/ALLVList.aspx>

Other fisheries operating in the Eastern Tropical Pacific

Fishing effort in Central and South America is often difficult to summarize, primarily because of the lack of data surrounding the artisanal fleets. First, artisanal fleet sizes are estimates and the number of vessels are likely underestimated. The artisanal fleets use a variety of fishing gear, from hand lines, longlines, various sizes and styles of nets, and traps. The majority of these vessels are “pangas,” using outboard motors and usually carrying a maximum of two fishermen. Because of the large number of vessels and landing sites, landings are difficult to monitor. In addition, often landings are not separated by gear types. The following section summarizes known fishing effort by country, starting from Mexico and heading south to Central and South America.

Mexico

In 1983, Mexico established a 50 nautical mile (NM) sportfishing-only zone along its coast to protect billfish, swordfish, tuna, and other popular species and to manage them for the recreation and tourist industries. Commercial fisheries for swordfish outside this exclusion zone included longliners until 1990 and drift gillnetters. Limited longline permits were issued in 1987, allowing only about 15 vessels to fish within Mexico’s EEZ. Operating under these permits, the Japanese/Mexico joint venture fleet increased fishing effort to 2.3 million hooks between 1986-88. Due to the reduction in longline permits, a small (2 vessels) drift gillnet fleet appeared in northern Baja California in 1986, growing to 20 by 1990 and to 31 by 1993. Fishing effort increased from 15 days/month in 1989 to 20-30+ days/month in 1993. By 1994, the number

of vessels had declined to 16, primarily due to low catch. Most of these vessels are home-based out on Ensenada and are similar in appearance and operation to the California/Oregon drift gillnet fishery, although they use nets up to twice as long as those used on U.S. vessels. The swordfish fishery begins in the fall for the Mexican drift gillnetters, off Ensenada, moving south to central Baja, California (between 25°N and 27°N) during December and January (Holts and Sosa-Nishizaki, 1998).

Guatemala

According to recent estimates from Guatemala, their artisanal longline fleet is comprised of approximately 8,430 vessels, while their industrial fleet (longline) consists of approximately 65 vessels. Currently, no foreign longliners offload in Guatemala (E. Everett, IATTC, personal communication, November, 2003).

Shrimp trawlers also operate along the Pacific coast of Guatemala, with an annual average of 50-60 vessels. Effort is focused on white and pink shrimp. In 1999, 48 “large scale” or industrial licenses were granted and 13 “small scale” licenses were granted to artisanal fishermen, who use cast nets in sounds, coastal lagoons, or shallow coastal waters. There are no closed seasons in this fishery (Arauz, 2000).

El Salvador

Recent estimates of fleet sizes from El Salvador report that the artisanal longline fleet is comprised of approximately 4,867 vessels, while their industrial fleet (longline) consists of approximately 4 vessels (E. Everett, IATTC, personal communication, November, 2003).

For the shrimp trawl fishery in El Salvador, approximately 55 to 85 vessels operate per year. Shrimp exports rank third in value for this country, behind coffee and cotton. The fishery is scattered along the Pacific coast, with the most important port being Acajutla. Since 1993, the fleet has fluctuated between 65 and 75 vessels (Arauz, 2000).

Honduras

Little is known about the fleet size out of Honduras, although the Pacific coast of this country is relatively small compared to its neighbors. Approximately 4 vessels comprise the longline fleet, while an unknown number of vessels participate in the Honduran artisanal fleet. Currently, no foreign longliners offload in Honduras (E. Everett, IATTC, personal communication, November, 2003).

Nicaragua

In Nicaragua, the artisanal longline fleet is composed of approximately 4,900 vessels, while the industrial longline fleet includes 42 vessels. Currently, no foreign longliners offload in Nicaragua (E. Everett, IATTC, personal communication, November, 2003).

Nicaragua also has a shrimp trawl fishery, with approximately 30 vessels operating off the Pacific coast. Most of the Pacific local fleet is owned by PROMASA, a private company. Foreign vessels also operate in Nicaraguan waters, based out of Honduras and Ecuador. Nicaraguan vessels operate an average of 13 days per month, with 19 operative vessels and an average of 28 landings per month. Foreign vessels operate an average of 31 days per month with 11 operative vessels and an average of 12 landings per month (*in* Arauz, 2000). There are no seasonal closures for the fishery on the Pacific coast, but there are restrictions in waters surrounding Wildlife Refuges (Chacocente, La Flor, and Isla Juan Venado) (Arauz, 2000).

Costa Rica

In Costa Rica, the artisanal longline fleet is comprised of approximately 1,837 vessels, while there are 73 industrial longliners. The majority of the foreign flag longliners (53) unload in Puntarenas, Costa Rica (E. Everett, IATTC, personal communication, November, 2003).

Costa Rica also has an active shrimp trawl fishery. The Costa Rican Fisheries Institute (INCOPECSA) grants 38 licenses to catch pink and white shrimp and 17 additional licenses to catch deep shrimp (55 total licenses). During the 1990s, the number of active vessels fluctuated between 45 and 50 vessels. There is no closed season for this fishery; however, in the interior area of the Gulf of Nicoya, there is a closed season from June 1 through July 31 (Arauz, 2000).

Panama

Panama has approximately 6,000 vessels taking part in the artisanal longline fleet, while approximately 337 industrial longliners fish in the eastern Pacific. In addition, 6 foreign flag longliners offload in Panama (E. Everett, IATTC, personal communication, November, 2003).

Panama also has a large shrimp trawl fishery. During 1998, 223 vessels operated along the Pacific coast of Panama. The main shrimping ports are Pedredgal (David), Mutis (Veraguas), Agua Dulce and Bacamonte. Vessels are only allowed to operate 18 days/month, and there is a 70 day closed season from February 1 through April 11 (Arauz, 2000).

Colombia

Colombia's commercial fleet is dominated by the coastal shrimp fleet (nearly half), but there are also a large number of tuna vessels, primarily purse seiners. As shown in the Table 8, foreign vessels also operate out of Colombia, including Japanese longliners targeting tuna. In 1997, there were eight foreign longliners operating out of Colombia, with over half of Japanese nationality. Most artisanal fishermen out of Colombia operate very close to shore, targeting mainly pelagics. Little is known about the number of artisanal vessels operating off the Pacific coast of Colombia; however, they are known to deploy small longlines, driftnets and purse seines (Weidner and Serrano, 1997).

Table 8. Columbia - commercial fishing fleet 1992-95.

Year	Domestic Vessels	Foreign vessels*	Total
1992	252	215	467
1993	n/a	150	n/a
1994	156	174	330
1995	192	168	360

*Foreign vessels licensed and working in association with Columbia companies.

Source: Weidner and Serrano, 1997.

Ecuador

Ecuadoran commercial fishing operations, consisting mainly of seiners, are conducted nearly entirely within their 200 mile Exclusive Economic Zone (EEZ); however, sever larger longliners have operated over 1,000 km off the coast, west of the Galapagos Islands. The fleet continues to expand, and it is likely that operations to the west of the Galapagos will increase, given the profitability of swordfish and expanding

technical capabilities. The artisanal fisheries of Ecuador are generally limited to inshore coastal waters, although some longline fishermen have begun to fish around the Galapagos. In 1996, the bulk of the Ecuadorian fishing fleet was comprised of artisanal vessels (93%), and although estimates vary, there may have been as many as 6,000-8,000 active fishing vessels in Ecuador (3,971 estimated vessels in 1996). Foreign longliners have also been operating off Ecuador for many years, and most are from Japan. In 1996, there were an estimated 15-20 foreign longliners, all Japanese, except for one (Weidner and Serrano, 1997).

Currently, the artisanal fleet is composed of roughly an estimated 5,000 vessels, while the industrial longline fleet is composed of approximately 181 vessels (E. Everett, IATTC, personal communication, November, 2003).

Peru

Unlike Chile and Ecuador, Peru has not developed a substantial longline or driftnet fleet, and there is little information on the number of vessels, both commercial and artisanal, that are currently operating in various fisheries off Peru. Artisanal longliners generally deploy in shallow water, no deeper than 100 meters, and generally close to shore (normally no more than 50 km from the mainland), while drift gillnetters rarely fish more than 20-30 miles offshore. As of 1997 there were only four domestically built longliners, and fishing generally occurs about 50 km from the coast. Between 1980-97, there were 17 Peruvian-owned commercial longliners. There is limited information on foreign fleet operations off Peru, but vessels, mostly Japanese and Spanish, do fish primarily off the southern coast, both inside and outside the 200 mile limit. Between 1980-97, there were at least 9 foreign leased longliners (Japan) and 11 Spanish longliners (Weidner and Serrano, 1997).

Chile

Despite significant reverses since swordfish catch peaked in 1991, Chile continues to conduct the largest gillnet and longline swordfish fishery in Latin America. This fishery is economically significant to both commercial and artisanal fishermen. Since 1980, this fishery grew by nearly an order of magnitude as fishermen developed more efficient methods and foreign demand for swordfish expanded. From 1987 the Chilean swordfish driftnet fishery expanded rapidly with many hundreds of boats concentrated primarily in four ports - Chañaral, Valparaiso, San Antonio, and Concepcion. Most of these vessels were small (14-15 meters) and switched from a harpoon fishery to a driftnet fishery. The artisanal swordfish fleet alone expanded from 4,777 days-at-sea in 1987 to 40,692 days-at-sea in 1993 (Weidner and Serrano, 1997). Table 9 provides a summary of the various Chilean fisheries operating from 1993-96.

Table 9. Chile – Fishing fleet, 1993-96. () indicates # of artisanal swordfish vessels.

Year	Seiners	Trawlers	Long-liners	Driftnets	Traps	Harpoon	Comm. Total	Artisanal	Grand Total
1993	410	72	115	40	2	1	640	8,904 (350)	9,544
1994	383	72	88	32	3	--	578	10,864 (275)	11,442
1995	370	70	74	28	3	--	545	12,045 (286)	12,590
1996	385	73	45*	19	2	--	524	12,619	13,143

*Primarily targeting groundfish

Source: *in* Weidner and Serrano (1997).

REFERENCES

Any references used in this Appendix are listed in the Biological Opinion.

Appendix B

Trends in Eastern Pacific Nesting Populations of Leatherbacks

Table 1. Estimated abundance of nesting female leatherbacks in the Eastern Pacific. [] = number of nests

Year/Beach	80-81	83-84	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00
<u>Mexico</u>																
Tierra Colorada	10,000 ¹								1,000-2,000 ¹		50-100 ¹					[402] ⁷
Bahía Chacahua	2,000 ¹								50-100 ¹	50-100 ¹						
Mexiquillo	3,000-5,000 ¹		959 ¹	240 ¹						16 ¹		[1,280]	[60] ⁵	[123] ⁵	[53] ⁵	[463 ⁵ -469 ⁷]
Barra de la Cruz										299 ¹						[296] ⁷
Other Mex. Beaches																[922] ⁷
Pacific Coast of Mexico												700-900 ¹ 1,093 ³ [5,354]	236 ³ [981 ³ - 1,093 ⁵]	250-329 ³ [1,596] ⁵	[1,117]	[4,317] ⁵
<u>El Salvador</u>																[20] ⁷
<u>Guatemala</u>																[109] ⁷
<u>Nicaragua</u>																[183] ⁷

<u>Total (Mex. and Central America, w/o Costa Rica)</u>																	~1000 ⁷
<u>Year/Beach</u>	80-81	83-84	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	
<u>Costa Rica</u>																	
Playa Grande					1,367 ⁴ - 1,646 ²	1,340 ⁴ - 1,643 ²	665 ⁴ - 830 ²	770 ⁴ - 932 ²	909 ⁴ - 1,078 ²	180 ⁴ - 202 ²	469 ² - 506 ⁴	421 ⁴ 800- 1000 ^{1,6}	125 ⁴	195 ⁴	117 ⁴		
Playa Langosta							229 ⁸				239 ²	(800- 1000) ^{1,6}					
Playa Naranjo		62 ²				93 ²	242 ²					30-240 ¹					

¹Summarized in Spotilla, *et al.* (1996), using an estimated clutch frequency of 5.

²Summarized in Steyermark, *et al.* (1996), using an estimated clutch frequency of 5.

³Summarized in Sarti *et al.* (1998), using annual average clutch frequency (observed and estimated).

⁴Summarized in Spotilla, *et al.* (2000).

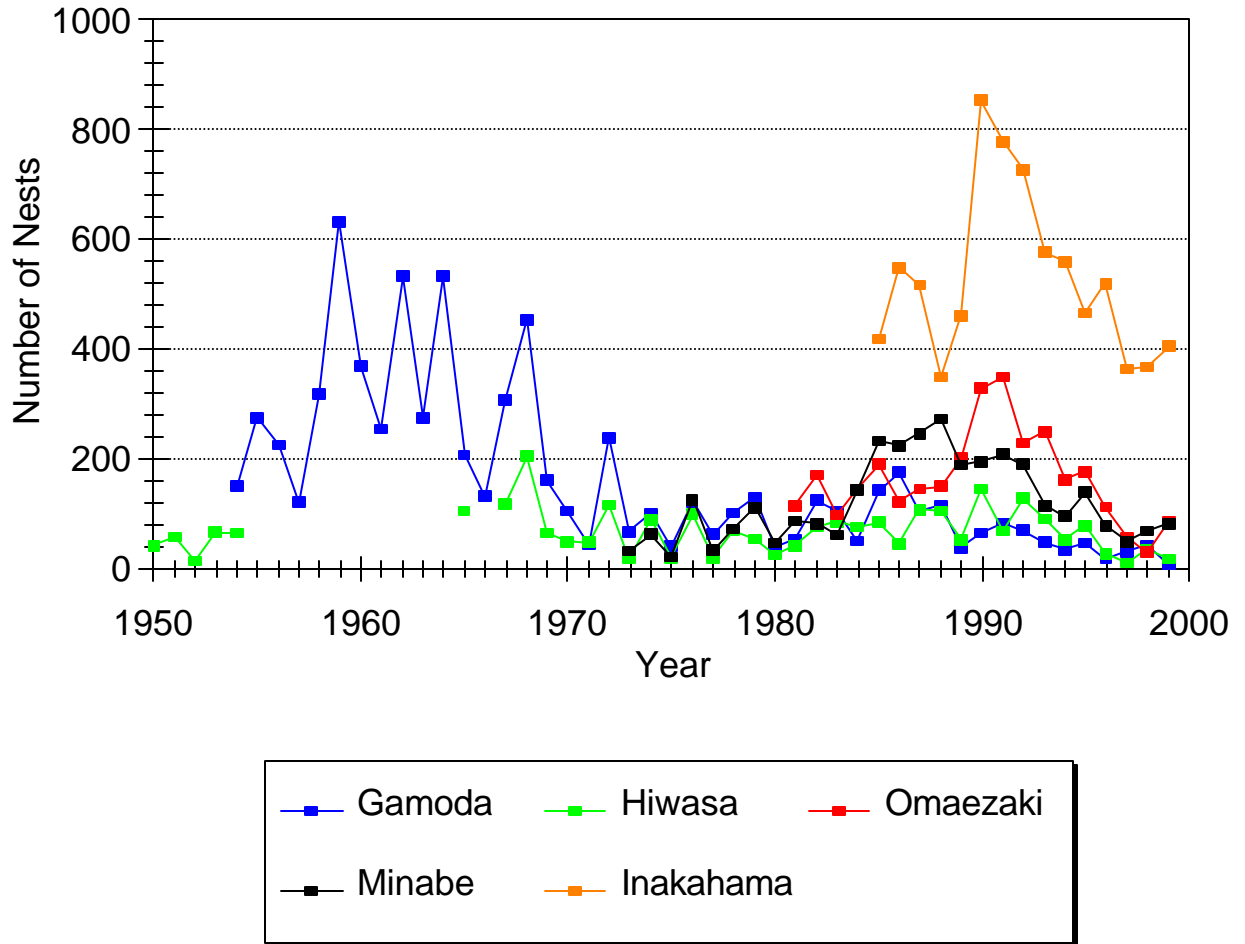
⁵Sarti, L., personal communication, 2000.

⁶800-1,000 estimated nesting females on both Playa Grande and Playa Langosta

⁷Preliminary results presented by L. Sarti, Leatherback Working Group Meeting, 23-24 May, 2000. Other beaches include Llano Grande, Playa Ventura, Agua Blanca.

⁸Chaves, *et al.*, 1996.

Trends in Loggerhead Nesting in Japan



Source: Naoki Kamezaki

Figure 1. Annual trends of nesting beaches in Japan