

Korea has its eyes set on becoming the fifth largest fishing nation by 1976.

Fisheries of the Republic of Korea

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INTRODUCTION

The year 1972 was exceptionally good for the fishermen of the Republic of Korea (ROK). First, they made a record harvest of 1,343,569 metric tons; 20 percent more than the 1,073,733 metric tons caught in 1971 and considerably more than the 1,096,252 metric tons called for in Korea's Third 5-Year Economic Development Plan. Secondly, this catch represented a threefold increase in production over the 470,187 metric tons caught in 1962—a remarkable rate of growth for any nation's fisheries. Third, the 1972 catch was worth US \$270 million, 5 percent more than the 1971 catch, which was worth \$256 million. Fourth, Korean processors produced 161,846 metric tons of seafood products, 38,429 metric tons more than the 123,417 produced in 1971. Fifth, exports of ROK fishery products were 187,300 metric tons (146,394 in 1971) worth \$152 million (versus \$114 million in 1971). Thus Korea's fisheries not only helped to feed the population, but were also an important source of foreign currency.

The year 1972 was important for other reasons as well. The catch capacity of the ROK high-seas trawler fleet was increased considerably by the addition of several ultramodern stern trawlers and the tuna fleet grew rapidly in number. In 1972, ROK high-seas fishermen fished in three oceans, operated out of 18 foreign

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ports, and helped man over 455 deep-sea vessels registering 159,290 Gross Registered Tons (GRT). By contrast, in 1961 there was only one tuna vessel in the entire South Korean high-seas fishing fleet. South Korea's coastal fishermen also had reason to be proud. In 1972 these fishermen increased their production by more than 20 percent over 1971. Rapid progress was also made in the shallow-sea aquaculture program during the year. Also, Korea's inland fishermen had modest gains. Only the whaling industry and the inland, freshwater culture industries suffered setbacks during 1972.

Throughout the ROK fishing industry far-reaching efforts have been made—and more are planned—to expand, modernize, train, and equip the nation's fishing industries and fishermen. This effort, applied for over a decade and projected into the coming decade, has helped to make Korea one of the world's most dynamic fishing nations.

CATCH STATISTICS

Despite tremendous obstacles—World War II, the Korean War, and the resulting economic dislocations—the Koreans have struggled tenaciously to expand their fishery. Table 1 and Figure 1 show the growth of this nation's fisheries since 1944.

Almost 99 percent of Korea's catch comes from that nation's saltwater fisheries; in 1972 the marine catch was 1,342,411 metric tons compared with 1,158 metric tons (1 percent) from the nation's freshwater fisheries.

The ROK coastal fisheries are the most productive. In 1972 these fisheries provided 71 percent of the entire

AUTHOR'S NOTE

The statistics used in this report were taken from the Republic of Korea's Office of Fisheries publication, *Yearbook of Fisheries Statistics, 1973* (with data for 1972). These statistics are generally quite accurate, but occasionally the rounding of some figures resulted in totals which are either smaller or larger than the actual sum of the supporting data. There are also a few miscalculations in certain tables and, because of conflicts with other sources, a correct answer was not always available. As a result, it was sometimes necessary to rely exclusively upon the *Yearbook of Fisheries Statistics, 1973*, since it is the official statistical source for ROK fisheries.

For general background information, the Office of Fisheries publication *Current Fisheries in Korea, 1972* (with data for 1971) was used heavily. Korean and Japanese newspaper reports along with U.S. Embassy reports supplied additional material. In addition, the Republic of Korea's Fisheries Attache in Washington, D.C., Kim Han Mo, provided guidance and information not available elsewhere. His assistance is gratefully acknowledged.

catch, followed by the high-seas fisheries with 16 percent, the shallow-sea aquaculture program with 12 percent, and the inland fisheries and whaling with only 1 percent of the total catch. Table 2 gives a breakdown of the ROK catch, by each fishery, for the period 1962-72.

In 1972 fish accounted for 71 percent of the entire catch (947,661 metric tons), followed by mollusks (17 percent or 231,475 metric tons), seaweed (10 percent or 128,830 metric tons), crustaceans (slightly over 1 percent or 23,423 metric tons), and "other" marine species (slightly under 1 percent or 12,180 metric tons).

Alaska pollock became the ROK's most abundant species in 1972 with a total coastal and high-seas catch of 148,453 metric tons. Hairtails took second place (110,309 metric tons), followed by anchovy (104,174 metric tons), mackerel (90,416 metric tons), tuna (84,151 metric tons), oysters (72,708 metric tons), dulse (58,151

Table 1.—Republic of Korea's fisheries catch, 1944-72.

Year	Quantity
	Metric tons
1972	1,343,569
1971	1,073,733
1970	935,462
1969	862,784
1968	852,291
1967	750,349
1966	702,295
1965	636,512
1964	599,824
1963	532,153
1962	470,187
1961	447,634
1960	357,181
1959	392,060
1958	403,304
1957	409,309
1956	346,561
1955	265,895
1954	254,642
1953	266,995
1952	281,849
1951	266,849
1950	219,450
1949	290,204
1948	289,147
1947	301,952
1946	296,346
1945	228,188
1944	295,747

SOURCES: Office of Fisheries, *Yearbook of Fisheries Statistics, 1973* (for the period 1950-72) and Fisheries Research and Development Agency, *Statistics of Fisheries Catches, 1961*.

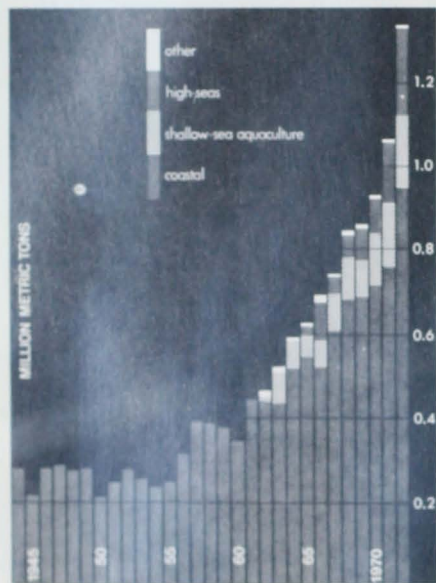


Figure 1.—Republic of Korea's fisheries catch, 1944-72.

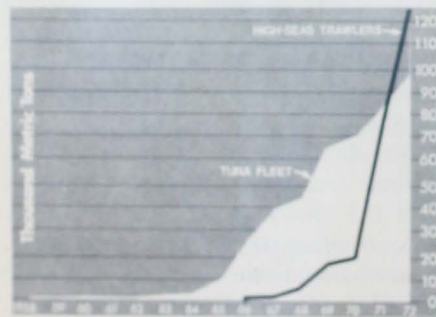


Figure 2.—Republic of Korea's high-seas catch by tuna fleet and high-seas trawler fleet, 1958-72.

Table 2.—Republic of Korea's catch, by type of fishery, 1962-72.

Year	Marine fisheries				Total marine	Inland fisheries		Total inland	Grand total
	High seas	Whaling	Coastal	Aquaculture		Fisheries	Culture		
	Metric tons								
1972	224,135	1,622	958,276	160,378	1,342,411	1,103	55	1,158	1,343,569
1971	159,307	2,155	764,179	147,221	1,072,862	696	174	871	1,073,733
1970	89,621	1,866	724,365	119,211	935,064	381	17	398	935,462
1969	82,782	1,322	691,348	86,316	861,768	895	120	1,015	862,784
1968	50,074	1,044	687,034	113,031	851,183	1,086	22	1,108	852,291
1967	40,484	1,140	610,707	97,131	749,462	854	33	887	750,349
1966	26,852	1,128	528,893	91,060	701,933	337	25	362	702,295
1965	8,563	860	553,070	73,675	636,168	314	30	344	636,512
1964	2,605	2,801	519,459	72,885	597,750	2,035	39	2,074	599,824
1963	2,558	1,710	441,638	85,285	531,191	923	39	962	532,153
1962	657	1,778	448,117	18,709	469,261	895	31	926	470,187

SOURCE: Office of Fisheries, *Yearbook of Fisheries Statistics, 1973*, Republic of Korea. Note: Because of rounding of data, totals do not necessarily agree.

Table 3.—Republic of Korea's high-seas catch, by fishery, 1958-72.

Year	Catch by fishery			Total catch
	Tuna	Trawl	Other	
	Metric tons			
1972	97,670	126,465	—	224,135
1971	83,784	75,523	—	159,307
1970	71,363	18,258	—	89,621
1969	66,637	16,145	—	82,782
1968	43,519	6,555	—	50,074
1967	38,334	2,024	126	40,484
1966	25,473	1,379	—	26,852
1965	8,563	—	—	8,563
1964	2,605	—	—	2,605
1963	2,558	—	—	2,558
1962	657	—	—	657
1961	367	—	—	367
1960	914	—	—	914
1959	538	—	—	538
1958	257	—	—	257

SOURCE: Office of Fisheries, *Yearbook of Fisheries Statistics, 1973*, Republic of Korea.

Table 4.—Republic of Korea's high-seas trawler fleet catch, by species and by ocean, 1962-72.

Species	Ocean										
	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962
	Metric tons										
North Pacific:											
Alaska pollock	107,961	60,086									
Bastard halibut	7	470									
Cod	245	571									
Flounder	1,665	85									
Octopus	—	2,159									
Seabream	8	45									
Shrimp	185	72									
Squid	451	429									
Other	611	4,674									
Total	117,138	68,591	12,708	15,137	2,471	—	—	—	—	—	—
Atlantic:											
Bastard halibut	26	135									
Cod	9	—									
Flounder	226	132									
Octopus	1,230	1,695									
Seabream	1,819	472									
Shrimp	133	34									
Squid	4,039	2,377									
Other	1,845	2,087									
Total	9,327	6,932	5,550	1,008	809	2,007	1,379	—	—	—	—
East China Sea	—	—	—	—	731	—	—	—	—	—	—
Indonesian waters	—	—	—	—	2,544	17	—	—	—	—	—
Total:											
Alaska pollock	107,961	60,086									
Bastard halibut	33	605									
Cod	254	571									
Flounder	1,891	217									
Octopus	1,230	3,854									
Seabream	1,827	517									
Shrimp	318	106									
Squid	4,490	2,806									
Other	8,461	6,761									
Total	126,465	75,523	18,258	16,258	6,555	2,024	1,379	—	—	—	—

SOURCES: Office of Fisheries, *Yearbook(s) of Fisheries Statistics, 1973* (and 1972), Republic of Korea.

South Korean catch. Table 3 provides catch statistics for the high-seas fleet for the period 1958-72, and Figure 2 graphically illustrates this growth.

Trawl Fleet Catch

The 95-vessel ROK high-seas trawl fleet caught 126,465 metric tons of fish in 1972 versus 75,523 metric tons in 1971. This is 60 percent of the total high-seas catch, and it marks a turning point in the ROK high-seas fisheries, because the tuna fleets had traditionally outfished the trawl fleets. Much of the increase in the trawl catch was due to the introduction of several new stern trawlers into the Alaska pollock fisheries in 1971-72 and to the growing professionalism and experience of South Korean crewmen aboard these vessels.

Most of the ROK trawl catch was made in the North Pacific, and Alaska pollock was the principal species caught—107,961 metric tons out of a total catch of 117,138 metric tons. ROK trawlers also fished in the waters off Northern Hokkaido and Kamchatka, and others fished for squid, octopus, and seabream from bases in the Atlantic Ocean. Table 4 provides catch statistics for 1966-72.

Tuna Fleet Catch

The ROK high-seas tuna fleet also increased production from 83,784 metric tons in 1971 to 97,670 metric tons in 1972 (Table 5), but the increase was not enough to match the dramatic catches made by the trawler fleets. In terms of value, however, the tuna catch was worth \$59.7 million while the larger trawl catch was worth only \$21.8 million.

In 1972, the best area for the Korean tuna fleets was the Pacific Ocean where 40,358 metric tons were caught; albacore and yellowfin tuna were the most abundant species. The catch in the Atlantic Ocean dropped slightly in 1972 from 37,142 metric tons to 36,345 metric tons, despite increased catches of albacore and yellowfin tuna. The catch in the Indian Ocean increased to 20,967 metric tons—slightly over the 1971 catch.

Albacore was the principal species caught: 32,757 metric tons were

Table 5.—Republic of Korea's high-seas tuna longline fleet catch of tuna and allied species, by species and by oceans, 1962-72.

Species	Metric tons											
	Oceans	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962
PACIFIC OCEAN:												
Tunas:												
Albacore	15,579	12,504										
Bigeye	7,801	4,665										
Bluefin	480	3,226										
Skipjack	452	154										
Yellowfin	11,778	5,328										
Other:												
Marlin	1,902	589										
Sharks	83	51										
Other	2,283	3,339										
Total	40,358	29,856	27,690	35,431	19,299	19,030	17,598	8,043	2,438	2,558	657	
ATLANTIC OCEAN:												
Tunas:												
Albacore	13,577	11,539										
Bigeye	5,730	7,353										
Bluefin	30	3,039										
Skipjack	45	47										
Yellowfin	11,078	9,901										
Other:												
Marlin	1,714	780										
Shark	609	405										
Other	3,562	4,078										
Total	36,345	37,142	34,865	12,594	12,624	12,836	7,114	520	167	—	—	—
INDIAN OCEAN:												
Tunas:												
Albacore	3,601	2,108										
Bigeye	4,337	4,059										
Bluefin	72	537										
Skipjack	11	23										
Yellowfin	9,580	6,454										
Other:												
Marlin	1,151	719										
Shark	371	352										
Other	1,844	2,534										
Total	20,967	16,786	8,808	18,612	11,596	6,594	761	—	—	—	—	—
TOTAL CATCH:												
Tunas:												
Albacore	32,757	26,575										
Bigeye	17,868	16,097										
Bluefin	582	6,514										
Skipjack	508	222										
Yellowfin	32,436	21,702										
Other:												
Marlin	4,767	2,116										
Shark	1,063	808										
Other	7,689	9,750										
Total	97,670	83,784	71,363	66,637	43,519	38,460	25,473	8,563	2,605	2,558	657	—

NOTE: 1971 catch figures do not add correctly.

Table 6.—Republic of Korea's whale catch by number of individual whales and by quantity (metric tons), 1962-72

Year	Large whales		Small whales		Total whales	
	Number	Quantity	Number	Quantity	Number	Quantity
1972	753	1,585	16	37	769	1,622
1971	697	2,017	58	138	755	2,155
1970	606	1,623	134	244	740	1,866
1969	35	542	386	780	421	1,322
1968	28	472	316	572	344	1,044
1967	20	376	336	764	356	1,140
1966	14	215	309	913	323	1,128
1965	17	317	249	543	266	860
1964	88	1,816	384	985	472	2,801
1963	55	840	291	870	346	1,710
1962	82	1,353	170	425	252	1,778

SOURCE: Office of Fisheries, *Yearbook of Fisheries Statistics, 1973*, Korea.
NOTE: The designation "Large whales" includes fin, sei, minke, and other whales. The designation "Small whales" includes humpback whales, minke whales, and other whales. Apparently, minke whales fit into both categories depending only upon the size of the whale.

landed—narrowly above the 32,436 metric tons of yellowfin tuna caught by the South Koreans in 1971. The catches of all other species except

bluefin tuna also increased during 1972. Bluefin tuna dropped from 6,514 metric tons in 1971 to a mere 582 metric tons in 1972. This drop in

production may be attributable to overfishing in recent years; the Japanese have already agreed voluntarily to limit their catch of bluefin tuna.

WHALE CATCH

The Republic of Korea is not a member of the International Whaling Commission. Its whale catch continued to increase in 1972 (Table 6). The catch of whales rose from 755 individuals in 1971 to 769 individuals in 1972. Despite the increased numbers caught, the weight of the catch decreased from 2,155 metric tons in 1971 to 1,622 metric tons in 1972. This decrease in weight was due to a sharp drop in the average size of the "large" whales. Most of this catch is processed and then exported to Japan.

COASTAL CATCH

Korea's coastal waters have historically played a surprisingly important role in that nation's fisheries. A little more than a quarter of a century ago, for example, Korea was the world's third largest producer of fish! This feat was achieved in 1948, the year that the Republic of Korea was formally established under United Nations' auspices. In that year Korea (the northern and southern regions combined) caught 1,769,000 metric tons of fish, and almost all of this came from their coastal waters. In 1948, only Japan and the United States outfished Korea.

The Korean War, which erupted on 25 June 1950, divided this once unified nation into two bitter factions and left the southern half—the Republic of Korea—a war-torn land with few resources. With their economy shattered by three years of war the Koreans could only turn to the sea for national survival. Fortunately the Koreans were skilled fishermen, gifted with rich fishing grounds just off their shores.

The 600-mile-long Korean peninsula is surrounded by the ocean; no Korean lives more than 68 miles from the sea. The peninsula stretches down towards the East China Sea and is bounded on the east by the Sea of Japan and on the west by the Yellow Sea. Beyond the 9,325-mile coastline

the warm waters of the Tsushima Current react with the cold waters of the Rimian Current to bring Korean fishermen a wide array of warm- and cold-water species in great abundance.

Figure 3 is a map of the Republic of Korea showing the location of many of that nation's fishing ports.

In 1972 South Korea's coastal fishing industry accounted for most of the ROK national catch; 71 percent of the catch or 966,272 metric tons versus 764,179 metric tons in 1971. This 20-percent increase is especially significant for modern South Korea for several reasons. First, pollution of coastal waters is slowly becoming a problem. Second, this fishery employs almost all of the nation's fishermen and their livelihood depends on the coastal catch. Third, 97 percent of the ROK fleet (about 66,000 vessels) are employed in this fishery and

80.5 percent of these vessels are unpowered, old, and not very efficient. Despite these difficulties the catch increased.

In 1972 fish accounted for 732,998 metric tons (573,608 metric tons in 1971) of the entire coastal catch, followed by mollusks with 114,834 metric tons (95,018 metric tons in 1971), seaweeds with 74,922 metric tons (68,364 metric tons), crustaceans 22,964 metric tons (15,279 metric tons), and "other" aquatic species (such as sea cucumbers and sea urchins) with 10,558 metric tons (versus 11,910 metric tons in 1971).

Table 7 gives a complete breakdown of the ROK coastal fisheries catch by species for the years 1962-72. A brief summary of the more important coastal species is provided below.

Hairtails: In 1962 the catch of hair-tails in South Korea was 39,307



Figure 3.—Republic of Korea.

Table 7.—Republic of Korea's coastal fishery catch, by species, 1962-72.

Species	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962
<i>Metric tons</i>											
FISH:											
Alaska pollock	40,492	11,241	13,418	10,062	28,678	17,503	21,013	26,696	20,653	22,600	27,792
Anchovy	104,174	66,904	54,047	115,056	63,127	78,538	66,349	56,761	35,592	32,392	46,955
Bastard halibut	6,659	4,336	3,123	2,510	3,738	3,897	2,625	2,117	2,011	2,178	2,297
Cod	757	2,571	2,753	3,279	2,218	2,286	2,211	2,252	1,465	853	1,389
Corvenia:											
Yellow	25,352	24,554	31,765	30,447	45,392	35,680	44,543	39,608	47,018	23,049	21,653
Other	20,024	19,230	23,408	12,951	8,454	21,841	9,879	2,857	2,032	1,308	319
Croaker	997	967	1,597	1,142	2,526	2,150	2,840	3,163	4,174	3,358	2,943
Flathead	1,425	1,036	1,622	1,125	1,839	2,256	1,633	1,434	1,386	1,275	933
Flounder	19,113	18,633	21,648	20,133	19,758	16,457	12,021	13,495	10,252	11,410	8,639
Gurnards	26	98	273	121	274	497	621	700	28	89	81
Hairtails	110,309	82,868	69,082	47,922	18,592	48,713	45,384	37,683	29,961	30,451	39,307
Halfbeak	1,116	958	239	591	500	462	226	914	175	264	23
Herring:											
Big-eyed	4,941	3,107	3,479	2,600	3,705	2,831	1,558	2,554	2,395	1,910	1,255
Other	6,311	6,718	746	893	1,246	20	—	7	—	—	256
Hickory shad	4,354	5,205	7,861	3,761	5,083	3,493	3,803	1,877	1,953	3,786	2,602
Kangdali	11,939	3,760	5,904	2,429	1,279	—	—	—	2,649	3,974	1,794
Lizardfish	345	245	252	232	140	112	232	127	322	250	308
Mackerel:											
Horse	2,753	8,904	883	2,042	2,543	5,280	10,058	26,496	19,581	12,440	18,419
Spanish	8,694	6,584	5,276	3,367	5,126	7,581	7,590	5,608	4,465	2,956	3,432
Other	78,969	60,599	38,256	42,103	10,481	2,772	2,078	7,339	2,441	5,406	4,058
Marine eels:											
Sea	4,613	3,943	5,452	4,480	4,548	3,574	2,647	2,185	1,202	1,072	1,341
Shark-toothed	4,242	2,789	2,732	2,633	3,829	2,807	2,717	1,572	1,577	1,606	1,761
Other	—	—	—	321	—	—	—	—	1,856	2,007	2,128
Mulletts	1,969	2,295	2,742	2,272	2,351	2,034	2,120	1,909	1,280	960	1,631
Pomfret	8,318	4,492	4,727	1,432	6,077	6,169	7,852	4,972	5,434	3,992	2,250
Puffer	3,046	3,127	4,096	5,691	5,229	4,241	3,150	6,262	—	—	—
Redfish	1,057	1,355	1,535	1,298	1,498	1,467	3,313	2,356	1,992	1,526	774
Rockfish	1,132	1,338	1,548	930	1,093	993	683	769	423	490	702
Salmon	382	226	83	153	34	42	64	166	59	27	37
Sandfish	9,961	24,809	16,110	9,854	13,606	7,118	6,242	9,098	2,659	2,439	5,751
Sandlance	2,434	497	7,038	6,275	4,464	3,890	2,311	1,029	6,461	2,100	6,691
Sardine	315	138	101	—	32	3	—	18	60	—	10
Saury	38,544	30,592	25,036	29,748	29,893	27,858	39,404	32,281	25,370	12,544	39,972
Sea bass:											
Common	321	263	438	437	492	549	584	368	366	516	460
Other	54	238	359	121	165	253	114	72	153	142	283
Seabream:											
Black	487	499	346	406	1,005	603	393	432	279	415	499
Red	1,796	967	792	856	1,806	1,460	1,445	1,118	2,235	1,032	1,651
Yellow	347	111	43	—	—	—	—	—	495	295	217
Other	599	433	693	506	911	921	695	515	50	82	119
Shark:											
Blue	4,951	4,753	5,743	8,852	2,105	2,251	786	3,696	37	580	77
Grey	279	276	778	—	1,085	844	429	—	—	—	—
Other	1,857	1,643	2,059	—	3,466	5,205	3,071	4,214	4,345	7,139	7,133
Skates & rays	9,918	7,172	7,691	9,116	11,299	9,179	9,471	8,574	8,211	7,414	7,637
Sole	2,703	2,945	2,568	1,693	2,235	2,623	2,600	1,985	2,092	2,213	2,554
Tuna	38	60	278	19	79	116	1	—	—	2	—
Whiting	928	1,772	777	1,432	65	39	33	219	967	596	1,124
Yellowtail	1,301	761	1,718	2,247	2,942	1,654	1,331	1,136	789	1,182	1,440
Other marine fish	182,656	147,551	124,948	119,398	135,029	101,793	75,570	67,942	61,660	38,832	26,646
TOTAL FISH	732,998	573,608	506,063	512,935	460,037	440,055	401,690	384,578	318,610	249,152	297,343
CRUSTACEANS:											
Crabs:											
Blue	5,701	4,113	2,700	1,279	2,483	2,121	1,550	—	—	—	—
Large	132	494	247	253	435	756	403	271	2,179	2,348	3,544
Other	3,120	3,167	2,404	1,141	1,430	1,224	1,235	4,469	—	—	—
Shrimp:											
Barley	810	571	95	78	—	—	—	—	—	—	—
Helmet	45	52	49	7	56	—	—	—	—	—	—
Large	704	266	457	230	2,301	3,097	1,406	1,992	1,358	696	559
Medium	846	906	606	1,031	1,007	1,281	1,072	1,189	1,485	1,281	1,162
Small	4,897	2,825	6,509	—	—	—	—	—	—	—	—
Other	2,813	1,626	2,981	5,404	8,044	16,595	9,637	14,014	15,201	12,109	18,662
Other:											
Other crustaceans	3,896	1,259	306	—	—	—	—	—	—	—	—
TOTAL CRUSTACEANS	22,964	15,279	16,354	9,423	15,756	25,074	15,303	21,935	20,223	16,434	23,927
MOLLUSKS:											
Abalone	959	553	373	318	450	414	544	449	1,089	391	369
Clams:											
Short-necked	6,007	6,752	4,966	4,580	3,235	3,743	3,840	1,939	10,905	2,273	3,637
Hard	1,798	3,184	2,462	2,305	3,284	1,487	3,332	228	1,634	1,252	1,229
Cockles	4,519	4,842	3,898	4,704	2,314	2,282	3,099	681	7,221	1,520	2,034
Cuttlefish	3,976	5,400	3,077	5,012	3,909	2,753	—	2,224	86,628	116,876	56,938
Mussels:											
Sea	9,543	6,266	3,891	1,944	3,168	3,282	2,670	2,608	3,277	2,743	2,917
Fun	2,231	1,984	363	371	140	935	724	1,587	462	—	83
Other	1,418	1,878	476	113	—	—	—	—	—	—	—

(Continued)

Table 7.—Republic of Korea's coastal fishery catch, by species, 1962-72—continued.

Species	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962
Metric tons											
Octopus:											
Octopus	1,133	907	503	1,121	1,715	1,940	2,654	953	1,238	1,599	2,351
Other	2,801	1,878	2,410	1,615	2,335	1,330	815	1,106	1,447	1,002	1,055
Oysters	8,394	7,851	5,618	6,351	3,486	2,402	3,744	1,247	10,240	3,529	4,160
Squid	52,749	37,625	72,142	59,898	84,664	38,945	75,473	68,398	—	—	—
Topshell whelk	5,046	3,903	2,587	2,620	2,921	2,760	4,892	2,718	1,439	1,938	1,146
Other mollusks	14,260	11,995	11,069	7,631	10,786	7,629	6,884	7,171	8,763	3,751	3,069
TOTAL MOLLUSKS	114,834	95,018	113,835	98,583	122,407	69,902	108,671	91,309	134,343	136,874	78,988
AQUATIC ANIMALS:											
Sea cucumber	1,877	1,682	1,331	1,080	1,264	1,201	1,392	716	1,049	391	332
Sea urchin	1,904	2,041	3,364	981	592	739	448	201	301	251	95
Other	6,777	8,187	11,075	9,160	10,152	12,330	5,045	5,969	1,953	645	471
TOTAL AQUATIC ANIMALS	10,558	11,910	15,770	11,221	12,008	14,270	6,885	6,886	3,303	1,287	898
SEAWEEDS:											
Agar-agar	2,651	3,143	3,154	4,948	3,137	4,249	3,803	2,868	2,739	2,581	3,888
Duckweed	2,362	4,579	2,204	1,865	2,275	2,119	1,656	1,292	689	713	1,715
Dulse	28,123	29,721	38,420	19,789	50,442	31,240	30,075	31,939	17,734	18,365	26,334
Fusiforme	9,961	10,607	8,622	6,867	66,503	7,283	5,614	5,956	4,066	5,342	5,473
Irish moss	1,189	1,357	2,365	3,845	2,686	2,877	2,492	2,545	1,602	1,584	2,675
Kelp	1,037	1,468	780	204	31	205	27	104	56	7	39
Laver	3,155	1,213	1,171	1,141	581	200	242	1,078	3,897	5,443	1,700
Other	26,444	16,276	15,627	20,527	11,171	13,233	6,183	2,580	12,197	3,856	5,137
TOTAL SEAWEED	74,922	68,364	72,343	59,186	76,826	61,406	50,344	48,362	42,980	37,891	46,961
TOTAL COASTAL FISHING	956,276	764,179	724,365	691,348	687,004	610,707	582,893	553,070	519,459	441,638	448,117

SOURCE: Office of Fisheries, *Yearbook of Fisheries Statistics, 1973*, Republic of Korea, September 1973.

Note: Total catch figures do not necessarily agree with statistics for individual species because of the rounding of figures for some species.

metric tons, and it remained in the 30,000-to-40,000-metric ton range until 1971 when production suddenly increased to 69,082 metric tons. The catch continued to increase and reached 110,309 metric tons in 1972, making hairtails Korea's most abundant coastal species. Part of this increase in recent years is due to the slow modernization of the coastal fishing fleet, which is now able to fish farther out into the East China Sea. Hairtails accounted for 12 percent of the entire ROK coastal catch in 1972.

Anchovy: This species accounted for 104,174 metric tons—11 percent of the ROK coastal fisheries catch. This amount is well above the average yearly catch, because, with the sole exception of 1969 when the anchovy catch increased to 115,056 metric tons, the catch of this species has averaged around 55,000 metric tons. Recent discoveries of new fishing grounds and excellent weather in 1972 apparently contributed to the increased haul of this species.

Mackerel: Korea's coastal mackerel catch was 90,416 metric tons in 1972, and this included 2,753 metric tons of jack (horse) mackerel, 8,694 metric tons of Spanish mackerel, and 78,969 metric tons of "other" mackerels, representing, in total, 8 percent of the entire coastal catch. During the past decade the catch of "other"

mackerels has soared from 4,058 metric tons in 1962 to its present record, while the catch of jack mackerel has slowly decreased: in 1962 the catch of jack mackerel was 18,419 metric tons.

Squid: Squid landings were greatest in 1968 when ROK coastal fishermen caught 84,664 metric tons. In 1971 the catch was poor, about 37,625 metric tons, but production in 1972 increased to 52,749 metric tons. Korean fishermen generally use jigging machines to catch squid at night. The catch is normally dried and eaten with beer, a combination as popular in Korea as pretzels and beer in the United States. The coastal catch is augmented by the ROK high-seas squid catch in West African waters, and considerable amounts are dried or frozen for export throughout southeastern Asia.

Corvenia: In 1972 the catch of corvenias was 45,376 metric tons. This total included 25,352 metric tons of yellow corvenia, which was slightly above the 1971 catch, but which is also well below the catch for the period 1966-70 when catches of 30,000 to 50,000 metric tons were common. Other corvenia are also caught in about the same amounts. Much of this catch is processed and frozen; the remainder is generally sold locally as fresh or chilled fish.

Alaska pollock: South Korean coastal fishermen catch Alaska pollock off the Korean peninsula, and 1972 was a particularly successful year: 40,492 metric tons were caught, whereas in the past three years the catch never exceeded 13,000 metric tons and before that the catch generally fluctuated between 20,000 and 30,000 metric tons. One reason for the increased catch in 1971-72 was the lifting of size restrictions on Alaska pollock by the South Korean Government in October 1970.

The coastal catch of Alaska pollock, when combined with the high-seas catch of 107,961 metric tons, depressed the local market price for Alaska pollock from \$0.10/lb in May 1972 to a low of \$0.04/lb in August 1972. Partially as a result of this dramatic drop in price, and because of strong protests by coastal fishermen and fish merchants whose earnings were affected, some of the ROK stern trawlers fishing for pollock in the Bering Sea switched their fishing efforts to the squid fisheries off West Africa. In addition, efforts were begun to develop a filleting industry to export Alaska pollock to the United States and Japan.

Saury: The catch of saury in 1972 was 38,544 metric tons, the highest it has been since 1966 when landings reached 39,404 metric tons. The in-

creased ROK catch of saury is the result of improved stock conditions. The Koreans usually process this saury for use as tuna bait, but other types of seafoods are also manufactured.

Dulse: The harvest of dulse by Korea's coastal fishermen has been slowly decreasing ever since production peaked at 50,442 metric tons in 1968. The 1972 harvest of 28,123 metric tons, which is slightly below the 1971 harvest, reflects this continued decrease in production. ROK officials have said that this drop in production is due to slackening demand and lower prices throughout Southeast Asia.

SHALLOW-SEA AQUACULTURE HARVEST

The ROK shallow-sea—or tide-land—aquaculture fishery has yielded positive returns in the past decade: production increased over 800 percent from 18,709 metric tons in 1962 to 160,378 metric tons in 1972. This fishery now provides 12 percent of the total ROK catch. Production generally increased by an average of 15,000 tons per year, except for the period 1964-65 and 1969 when the harvest declined. Table 8 provides a statistical breakdown of Korea's shallow-sea aquaculture fishery for 1962-72.

The shallow-sea aquaculture fishery is devoted primarily to the harvest of mollusks and the collection of seaweeds. In 1972 mollusk production was 106,349 metric tons or 66 percent of the tideland harvest, while seaweed collections (mainly dulse and laver) were 53,908 metric tons or 34 percent of the harvest.

The principal species harvested is the Japanese oyster, *Crassostrea gigas*. In 1972 oyster production was 64,314 metric tons, which accounts for nearly 60 percent of the entire tideland harvest of cultivated mollusks. There was also a harvest of 8,394 metric tons of oysters by coastal fishermen.

Koreans have been culturing oysters since 1891, but this fishery was not of great importance to ROK planners until 1966. About 85 percent of Korea's oyster cultivation is by stone culture: culture with stick, rack, raft, and longline accounts for the rest. Beginning in 1966 ROK officials began to promote both raft and longline culture as a means of improving production.

Most of Korea's oyster culture takes place along the rugged southern coast where the warm waters of the Tsushima Current produce ideal conditions for the raising of the oysters. The area under cultivation grew from about 1,200 hectares in 1962 to about 6,500 hectares in 1972, and

ROK officials hope to add another 30,000 hectares by 1976.

A significant event in 1972 for Korea's oyster fishermen was the US-ROK Shellfish Sanitation Agreement which was signed on 24 November 1972. Briefly stated, this Agreement allows Korea, under certain conditions, to export fresh and frozen oysters, clams, and mussels to the United States. The Agreement requires that uniform sanitation principles be applied to the production and handling of all fresh or frozen oysters, clams, and mussels intended for export to the United States. These sanitation standards must be the same as those adopted by the U.S. Public Health Service in the national shellfish sanitation program.

Because of a parasite problem in Korea's fresh oysters (not related to human health) the export of fresh ROK oysters into the United States is presently being prohibited, pending resolution of the problem through joint research. Frozen oyster exports, however, are being permitted.

ROK officials now believe that their nation can soon become a major world supplier of canned and frozen oysters. These officials optimistically estimate that Korea will be able to harvest 1,040,000 metric tons of unshucked oysters by 1976 and this should yield 250,000 metric tons of

Table 8.—Republic of Korea's shallow-sea aquaculture harvest, by species, 1962-72.

Species	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962
<i>Metric tons</i>											
FISH:											
Yellowtail	—	20	—	—	—	—	—	—	—	—	—
Other	—	—	22	—	—	—	—	—	—	—	—
Total	—	20	22	—	—	—	—	—	—	—	—
CRUSTACEANS:											
Shrimp	86	20	10	34	17	30	—	—	—	—	—
Other	36	10	—	—	182	—	5	—	—	—	—
Total	122	30	10	34	199	30	5	—	—	—	—
MOLLUSKS:											
Abalone	14	19	9	—	—	—	—	—	558	—	1,464
Clams:											
Hard	7,392	8,521	5,602	2,199	4,580	3,584	1,339	1,227	1,202	1,112	314
Short-necked	8,988	8,316	5,747	8,536	9,549	11,312	11,425	7,240	7,816	5,288	2,801
Cockles	10,767	18,087	19,295	19,935	17,893	10,940	7,690	7,246	8,270	5,006	212
Mother of pearl shell	—	—	—	179	—	—	—	—	—	—	—
Octopus	2	1	—	—	—	—	—	—	—	—	—
Oysters	64,314	45,663	36,981	26,814	34,683	41,959	48,218	44,747	32,419	53,337	7,636
Sea mussels	14,070	16,778	6,888	6,645	2,611	2,019	2,052	274	963	358	203
Other	802	970	346	522	755	866	926	325	2,923	552	25
Total	106,349	98,354	74,868	64,829	70,071	70,680	71,650	61,059	54,151	65,653	12,655
SEAWEEDS:											
Agar-agar	866	996	1,149	1,113	1,810	67	1,364	1,257	1,662	1,103	896
Dulse	29,028	11,103	6,625	3,355	4,344	306	3,692	1,257	5,023	1,624	369
Laver	23,042	34,801	35,782	16,204	36,443	26,025	8,478	9,838	11,081	16,783	3,439
Other	972	1,918	756	782	164	23	5,871	264	968	122	1,350
Total	53,908	48,818	44,312	21,454	42,761	26,421	19,405	12,616	18,734	19,632	6,054
TOTAL SHALLOW-SEA	160,378	147,221	119,211	86,316	113,031	97,131	91,060	73,675	72,885	85,285	18,709

SOURCE: Office of Fisheries, *Yearbook of Fisheries Statistics, 1973*, Republic of Korea, September 1973.

Note: Total catch figures do not necessarily agree with statistics for individual species because of rounding of the figures for some species.

Table 9.—Republic of Korea's inland fisheries catch and aquaculture harvest, by species, 1962-72.

Species	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962
<i>Metric tons</i>											
INLAND FISHERIES:											
Fish:											
Anchovy (<i>Colia</i> spp.)	48	—	—	—	—	—	—	—	—	—	—
Carp:											
Common	224	91	70	46	269	69	11	—	—	36	53
Other	241	115	62	—	—	—	—	—	—	8	4
Eel	134	84	62	398	270	292	280	308	1,819	507	614
Loach	71	52	2	—	—	—	—	—	—	—	—
Mandarin fish	8	2	—	—	—	—	—	—	—	—	—
Mudfish	—	—	—	—	—	—	—	—	90	288	76
Salmon	—	1	1	—	5	—	1	—	2	8	51
Snakehead	26	17	3	—	—	—	—	—	124	9	2
Sweetfish (ayu)	10	1	—	—	—	—	—	—	—	—	—
Trout	62	22	—	—	—	—	—	—	—	—	—
Whitefish	—	—	—	—	—	—	—	—	—	—	—
Other	217	77	50	451	542	493	45	6	—	67	—
Total	1,041	464	254	895	1,086	854	337	314	2,035	923	895
Crustaceans:											
Shrimp	20	—	—	—	—	—	—	—	—	—	—
Other	—	14	—	—	—	—	—	—	—	—	—
Total	20	14	—	—	—	—	—	—	—	—	—
Mollusks:											
Shellfish	42	143	125	—	—	—	—	—	—	—	—
Other	—	77	2	—	—	—	—	—	—	—	—
Total	42	220	127	—	—	—	—	—	—	—	—
Total fisheries	1,103	696	381	895	1,086	854	337	314	2,035	923	895
INLAND AQUACULTURE:											
Fish:											
Carp:											
Common	25	6	3	93	13	25	22	30	39	39	30
Grass	2	1	—	—	—	5	1	—	—	—	—
Eel	6	158	9	21	6	—	—	—	—	—	—
Goldfish	2	2	—	1	3	—	1	—	—	—	—
Trout	15	7	3	—	—	—	—	—	—	—	—
Other	6	1	1	6	—	3	1	—	—	—	1
Total	55	174	17	120	22	33	25	30	39	39	31
TOTAL INLAND FISHERIES	1,158	871	398	1,015	1,108	887	362	344	2,074	962	926

SOURCE: Office of Fisheries, *Yearbook of Fisheries Statistics, 1973*, Republic of Korea.

Note: Total catch figures do not necessarily agree with statistics for individual species because of rounding of data for some species.

canned and frozen (and possibly some fresh) oyster products earning about \$32 million.

Another development was the founding of the Korea Oyster Export Company Ltd. on July 13, 1972. This firm was established to act as a monopoly agent, along with the Korea General Foods Company Ltd. and the Jedong Industrial Company, for Korea's oystermen. By coordinating their sales, these three firms hope to achieve a higher price for their products on the world market.

In addition to oysters the Koreans are also attempting to develop other resources in their tideland areas on the western coasts of Korea. Since 1966 they have been trying to raise hard clams for export. Cockle culture is also expected to increase as soon as problems of seed production are solved.

INLAND FISHERIES CATCH

The Korean inland freshwater fisheries involve both fishing and fish farming. Fishermen caught 1,103 metric tons of fish—mostly carp, eel,

loach, and trout—in 1972. Fish farmers produced 55 metric tons of fish—mainly carp, trout, and eel. Thus, the total inland harvest was 1,158 metric tons—slightly less than 1 percent of the entire ROK catch. Fluctuations in the catch of inland species during the past decade have made it difficult to establish a distinct growth pattern for this fishery (Table 9).

The small quantity of eels (140 metric tons) caught or cultured during 1972 is a little misleading, because these eels (mainly elvers or baby eels) were exported to Japan at extremely high prices; in 1972, the ROK shipped 13,372 kg (29,482 lb) of live elvers to Japan at \$129.97/kg (\$58.95/lb) for a total return of \$1,737,964!

Table 10.—Republic of Korea's fishing fleet, number and tonnage, 1954-72.

Year	Powered		Unpowered		Total	
	Number	GRT	Number	GRT	Number	GRT
1972	14,741	366,844	52,938	84,923	67,679	451,767
1971	14,675	307,256	53,612	85,393	68,269	392,649
1970	14,085	268,182	54,270	90,184	68,355	358,365
1969	12,852	251,065	53,263	91,215	66,115	342,280
1968	11,444	206,321	50,558	86,641	62,002	292,962
1967	10,989	179,117	46,266	82,961	57,255	262,079
1966	8,884	160,487	44,410	85,474	53,294	245,962
1965	7,572	119,515	43,480	83,648	51,052	203,164
1964	6,463	86,514	42,253	80,908	48,716	167,423
1963	6,107	80,335	41,110	79,706	47,217	160,042
1962	6,085	80,105	39,419	81,604	45,504	161,709
1961	5,015	65,457	37,285	79,412	42,300	144,869
1960	4,349	57,979	30,089	49,038	34,438	107,017
1959	3,978	52,216	24,913	37,204	28,891	89,420
1958	5,891	62,015	32,241	48,390	38,132	110,405
1957	4,598	52,241	33,154	53,105	37,752	105,346
1956	4,623	52,937	35,011	64,155	39,634	117,092
1955	4,141	52,348	35,379	73,233	39,520	125,581
1954	3,745	38,732	38,983	78,530	42,728	117,262

SOURCE: Office of Fisheries, *Yearbook of Fisheries Statistics, 1973*, Republic of Korea.

Japanese businessmen began cooperating with Koreans in 1970 in the culture of the Asian eel (*Anguilla japonica*). The Korea Eel Culture and Processing Company was one of the first joint eel culture ventures to be established. Four joint eel culture ventures were established in 1971 and by the end of that year 23 firms (including 5 joint ventures) were culturing eels in 183,612 m² of ponds. In 1972 the Japanese firm Ataka and Company and a Korean partner built a 1-million m² pond near the Naktong River and announced that they would raise over 300 metric tons of cultured eels per year beginning in 1973. Other Japanese firms have also begun to look to Korea as a source of cultured eels, and this business is expected to boom in coming years.

The Koreans have had some luck in culturing trout. In 1972, Korea had six firms in the trout business with 17,600 m² of water devoted to trout culture.

The Koreans have also tried, rather unsuccessfully to date, to develop a salmon culture program. There is a possibility that changes will be made in 1974 to improve conditions in the salmon culture industry, but a number of years will be required before it will be significant.

FLEET

In 1972 the ROK fishing fleet had 67,679 vessels totaling 451,769 GRT. This total is 590 vessels fewer than 1971, but represents a tonnage increase of 59,120 GRT, which means that the ROK fishing fleet has fewer, but larger, vessels. This development is still relatively new, because the ROK fleet increased in both number and tonnage through 1970. Table 10 provides data on the number and tonnage of the ROK fishing fleet for the period 1954-72.

Most of the ROK fishing fleet is composed of some 52,938 unpowered vessels (674 vessels fewer than in 1971) amounting to 84,923 GRT (470 GRT less than 1971). Almost all of these unpowered vessels (98 percent) are wooden of less than 1.6 GRT; together they account for 78 percent of the entire ROK fishing fleet. These craft generally work the

Table 11.—Republic of Korea's steel, powered fleet, by fishery and by tonnage, 1972.

Fishery	Gross registered tons						Total vessels
	1-10	10-20	20-50	50-100	100-200	Over 200	
MARINE FISHERIES:							
HIGH-SEAS:							
Otter trawlers	—	—	—	11	6	71	88
Tuna longliners	—	—	—	—	120	240	360
Other	—	—	—	—	—	7	7
Total	—	—	—	11	126	318	455
WHALING:							
Whalers	—	—	—	8	—	—	8
Total	—	—	—	8	—	—	8
COASTAL:							
Gillnetters:							
Saury	—	—	1	—	—	—	1
Yellow corvenia	—	—	1	—	—	—	1
Total	—	—	2	—	—	—	2
Lift-net:							
Large	—	—	42	23	—	—	65
Total	—	—	42	23	—	—	65
Longline:							
Shark	—	—	9	—	—	—	9
Total	—	—	9	—	—	—	9
Purse seine:							
Powered	—	—	67	87	1	2	157
Total	—	—	67	87	1	2	157
Seiners:							
Anchovy drag net	—	7	27	4	—	—	38
Total	—	7	27	4	—	—	38
Trawlers:							
Large (One boat)	—	—	1	62	8	—	71
Large (Two boat)	—	—	6	108	47	—	161
Medium (One boat)	—	—	5	—	7	—	12
Shrimp	—	—	—	—	2	—	2
Total	—	—	12	170	64	—	246
FRESHWATER FISHERIES:							
Fishing	1	—	—	—	—	—	1
Total	1	—	—	—	—	—	1
OTHER VESSELS:							
Fish carriers	—	1	2	20	1	1	25
Patrol boats	—	4	21	9	12	4	50
Research/training	—	—	5	17	8	7	37
Total	—	5	28	46	21	12	112
TOTAL VESSELS	1	12	187	349	212	332	1,093

SOURCE: Office of Fisheries, *Yearbook of Fisheries Statistics, 1973*, Republic of Korea.

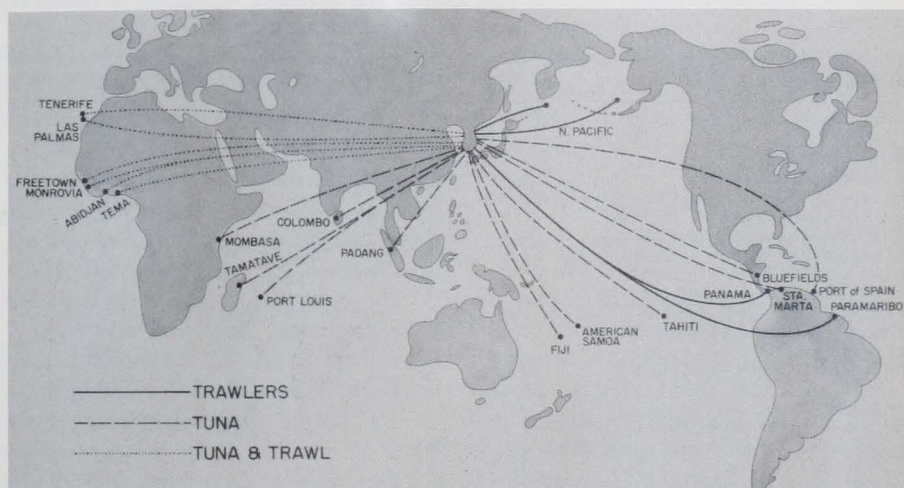


Figure 4.—Republic of Korea's high-seas tuna and trawl fleet bases and fishing grounds, 1973.

coastal, shallow-sea, and inland fisheries of Korea and are slowly being replaced by more advanced vessels.

In 1972 the ROK had 14,741 powered vessels (84 vessels above 1971) which registered 366,844 GRT (59,588 GRT above 1971). These powered craft now average 26 GRT (versus

21 GRT in 1971) in tonnage and account for 22 percent of the entire fleet. This powered fleet includes 1,093 steel-hulled vessels. These include: 13 vessels under 20 GRT; 187 in the 20- to 50-GRT range, 349 vessels in the 50- to 100-GRT class, 212 vessels in the 100- to 200-GRT

range, 332 vessels in the 200 GRT and higher tonnage range (Table 11).

Unfortunately, complete information on the ROK high-seas fleet for 1972 is not yet fully available. Information for 1971 and (curiously) for

1973 is available. Data for 1971 are referred to in the text and accompanying tables whereas data for 1973 are summarized below.

In 1973 there were reportedly 552 vessels (455 vessels in 1972)

totaling 195,204 GRT (159,290 GRT in 1972) in the ROK high-seas fleet. These vessels operated from 21 foreign bases, were manned by 15,433 fishermen, and produced 382,800 metric tons (224,135 metric tons in 1972) of fish in 1973. There were 173 vessels deployed in the Atlantic Ocean, 112 vessels in the Indian Ocean, and 267 vessels in the Pacific. Figure 4 shows the location of the ROK high-seas fleet in 1973, while Table 12 provides statistics for 1971.

The ROK Government announced in early 1974 that this high-seas fleet would be increased by 150 new vessels for a total of 702 during the year. ROK officials have also projected a figure of 19,600 fishermen with a production goal of 630,000 metric tons for the high-seas fleet during 1974.

Many Korean vessels use the word "Ho" at the end of their names, e.g., *Cheog Yang Ho*. The word "Ho" in Korean means "vessel," and it is used much like the Japanese word "Maru" in identifying a vessel. Also, when numbering their vessels the Koreans avoid the number "four" because it rhymes in Korean with the word "death." This sometimes causes con-

Table 12.—Republic of Korea's high-seas fleet, areas of fishing, and overseas bases, 1971.

Oceans and bases	Fishery				Total
	Tuna	Trawl	Shrimp	Other ¹	
Atlantic Ocean:					
Abidjan	46	—	—	—	46
Capetown	—	—	—	—	—
Freetown	7	—	—	—	7
Las Palmas	16	15	—	2	33
Monrovia	—	—	—	—	—
Montevideo	—	—	—	—	—
Paramaribo	—	—	5	—	5
Port-of-Spain	13	—	—	—	13
St. Martin	12	—	—	—	12
Tema	4	—	—	—	4
Tenerife	19	—	—	—	19
Total	117	15	5	2	139
Indian Ocean:					
Mombasa	10	—	—	—	10
Penang	4	—	—	—	4
Port Louis	15	—	—	—	15
Tamatave	23	—	—	—	23
Total	52	—	—	—	52
Pacific Ocean:					
Bering Sea	—	34	—	—	34
Fiji	20	—	—	1	21
Off Japan	—	3	—	—	3
Samoa	102	—	—	—	102
Total	122	37 ²	—	1	160
Grand total	291	52 ²	5	3	351

¹Unidentified. Believed to operate from these bases, but exact location has not been specified.

²In addition there were 20 additional vessels reportedly "attached" to the high-seas trawl fleet operating in the Pacific Ocean. These vessels were included in some of the trawl fleet statistics to show a total of 77 vessels, but were not included in other statistics. These 20 vessels reportedly were not fish carriers, but may include research vessels, patrol vessels, fuel or supply ships. As such they may not be a part of the high-seas fishing fleet (which numbers 351 vessels), but could be related to this fleet.

Table 13.—Republic of Korea's high-seas tuna longline fleet operations, by number of vessels reported based, or transshipping, in overseas bases or ports, 1958-72.

Overseas base or Transshipping port	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962	1961	1960	1959	1958
	Number of vessels														
ATLANTIC OCEAN:															
Abidjan, Ivory Coast	44	46	25	6	3	—	—	—	—	—	—	—	—	—	—
Capetown, South Africa	—	—	—	3	—	—	—	—	—	—	—	—	—	—	—
Fortaleza, Brazil	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Freetown, Sierra Leone	—	7	—	21	21	1	2	—	—	—	—	—	—	—	—
Las Palmas, Canary Islands	—	16	—	10	10	1	1	—	—	—	—	—	—	—	—
Monrovia, Liberia	—	—	—	—	—	—	15 ²	—	—	—	—	—	—	—	—
Port-of-Spain, Trinidad	—	13	—	—	—	—	1	1	1	—	—	—	—	—	—
Saint Martin, Neth. Antilles	—	12	—	4	4	—	—	—	—	—	—	—	—	—	—
Sao Vicente, Cape Verde	—	—	—	5	5	3	—	—	—	—	—	—	—	—	—
Tema, Ghana	—	4	—	11	10	1	12 ²	—	—	—	—	—	—	—	—
Tenerife, Canary Islands	—	19	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	117	—	—	60	53	—	29	—	1	—	—	—	—	—	—
INDIAN OCEAN:															
Durban, South Africa	—	—	—	20	15	1	1	—	—	—	—	—	—	—	—
Mombasa, Kenya	—	10	—	—	—	—	—	—	—	—	—	—	—	—	—
Penang, Malaysia	—	4	—	6	10	1	1	—	—	—	—	—	—	—	—
Port Louis, Mauritius	—	15	—	—	3	—	3	—	—	—	—	—	—	—	—
Tamatave, Malagasy Republic	—	23	—	12	6	—	1	—	—	—	—	—	—	—	—
Total	—	52	—	38	34	—	3	—	—	—	—	—	—	—	—
PACIFIC OCEAN:															
Espiritu Santo, New Hebrides	—	—	—	7	7	—	15	—	2	—	—	—	—	—	—
Pago Pago, American Samoa	—	102	—	67	72	67	48	30	17	10	5	1	3	3	2
Suva, Fiji Islands	—	20	—	18	20	—	—	—	—	—	—	—	—	—	—
Total	—	122	—	92	99	—	63	—	19	10	5	1	3	3	2
GRAND TOTAL	—	291	—	190	186	—	95	—	20	10	5	1	3	3	2
Total high-seas tuna fleet	360	291	246	191	179	170	130	65	20	10	5	1	3	3	2

¹Unspecified number of vessels reported operating out of, or transshipping through, an overseas base or port.

²Vessels known to have operated from more than one base or port during the same year (i.e., 15 vessels fished out of Liberia in early 1966, then 12 of these vessels were based at Tema for the remainder of the year).

Note: Information for 1972 and 1970 is not yet available. In other instances a blank space denotes the possibility that vessels may, or may not, have operated from these bases.

fusion because the number of vessels shown is always more than the actual number of vessels in the fleet.

The following sections examine the historical development of both the high-seas tuna and trawl fleets. Information on both fleets has been rather sketchy to date, and it is expected that this treatment will provide a full understanding of the history and future direction of both fleets.

High-seas Tuna Fleet

Korea's high-seas tuna fishery dates back to 1957 when the ROK National Fisheries Development Office dispatched the Jedong Industrial Company's 229-short ton longliner, the *Chinam-Ho No. 1* to the Indian Ocean for exploratory fishing. The cruise lasted 100 days and produced only an estimated 50 metric tons of tuna. Poor financing and the poor condition of the vessel contributed to the lack of success of the mission.

After the vessel's return, the Jedong Company negotiated a contract to supply tuna to the cannery of the Van Camp Sea Food Company at Pago Pago in American Samoa. Accordingly, the *Chinam-Ho* left with a sister ship to begin fishing for tuna in the Pacific Ocean. During 1959 and 1960 three longliners fished out of American Samoa, but, in 1961, only one fished there.

In 1962 the Korean authorities and industry leaders decided that tuna fishing was worth developing. First, five tuna vessels were ordered and built in Japan with financial assistance from U.S. tuna industry backers. Second, ROK fishery officials set in motion a multimillion-dollar project to build a large fleet of tuna longliners in Italy and France. This project, however, was delayed for several years because of the tremendous financial outlays required. The agreement was finally signed on 13 March 1964 and totaled \$35 million (a considerable drop from the \$120 million originally proposed). The program called for the construction of 61 tuna longliners in France and 15 longliners in Italy, which—along with some additional trawlers (see the next section)—totaled 91 vessels.

While this project was still being

negotiated, a series of loan agreements were reached in 1963 with private U.S. financial companies and with a West German group for the construction of additional tuna vessels. Five vessels were added to the existing tuna fleet in 1963 for a total of 10 vessels. The ROK tuna fleet doubled in size in 1964 to 20 vessels.

On 30 April 1965, the first of the Italian-French Consortium-built vessels, the *Nam Hae 202, 205, and 206*, were turned over to ROK captains at the France-Gironde shipyards at Bordeaux. The 144-GRT longliners immediately left for Pago Pago. By the end of 1965 about 30 to 35 of these Italian- and French-built vessels were fishing, many of them from ports in West Africa. In 1966, all but a few had been delivered and the South Koreans re-entered the Indian Ocean tuna fishery with three longliners which were based in Port Louis.

In 1967, just 10 years after the *Chinam-Ho No. 1* had entered the Indian Ocean, the South Koreans had 170 tuna longliners in operation in all three oceans; their catch in 1967 was 38,460 metric tons valued at \$12 million. Since then the ROK high-seas tuna fleet has increased rapidly with each passing year: 179 longliners in 1968, 191 vessels in 1969, 246 in 1970, 291 in 1971, and 360 in 1972. Table 13 provides details on the deployment of this fleet throughout the world for the period 1958-72.

Unfortunately, detailed information regarding the ROK tuna fleet, its areas of operation, and its catch for 1972 is not available. However, since information for 1971 is available it has been summarized below.

In 1971 the ROK fleet had 291 tuna longliners. All were under 10 years old, and all were built of steel. These longliners were owned by 36 different companies including 23 firms which had only tuna vessels and 13 companies which had both tuna vessels and trawlers. In 1971 some 7,475 fishermen were employed in the tuna fisheries. About 28 percent of the tuna fleet were between 101 and 200 GRT, 40 percent were between 201 and 300 GRT, and 28 percent were between 301 and 650 GRT.

These 291 vessels operated out of

13 different overseas bases in 1971. The most important of these bases, with 102 longliners, was American Samoa. In 1971 the Koreans built a "Korea House" on the island which is used to provide crews with personal articles, mail, supplies, and recreational facilities. Abidjan in the Ivory Coast was the next most important base for the ROK high-seas tuna fleet in 1971.

These 291 vessels were deployed as follows: 122 longliners (42 percent of the fleet) fished in the Pacific Ocean where they caught 36 percent of the total tuna catch. In the Atlantic Ocean were 117 vessels (40 percent of the fleet), which landed 44 percent of the total tuna catch. Finally, 52 vessels (18 percent of the fleet) fished in the Indian Ocean and caught 20 percent of the total catch.

As indicated previously, the ROK high-seas tuna fleet increased in size to 360 vessels in 1972 and probably included over 400 longliners in 1973. This number will probably continue to grow, because ROK planners have already begun to discuss expansion plans for the period 1974-81.

High-seas Trawl Fleet

The French-Italian Consortium loan that helped spark the development of the ROK high-seas tuna fleet also enabled the Koreans to develop a modern high-seas trawl fleet. The loan included provisions for the construction of:

- Ten 130 GRT side-trawlers
- Two 1,330 GRT stern trawlers
- Two 220 GRT stern trawlers
- One 300 GRT research vessel¹

The first high-seas trawler to be launched was the 1,330 GRT stern trawler *Kang Wha 601* (Fig. 5), which was christened in June 1965 at the Dubigeon-Normandie shipyards in France. The vessel was outfitted in December 1965 and in early 1966 began fishing out of Las Palmas in the Canary Islands.

This vessel was later joined by her sister ship, the *Kang Wha 602*, two 220 GRT stern trawlers called the *Keo Mun 501* and *502*, plus four 130

¹The plans to construct the research vessel were later cancelled, and a 530 GRT stern trawler, the *Huk San No. 701*, was built in its place.



Figure 5.—The Republic of Korea's first high-seas stern trawler, the 1,330 GRT *Kang Wha 601*, photographed off Alaska in 1969.

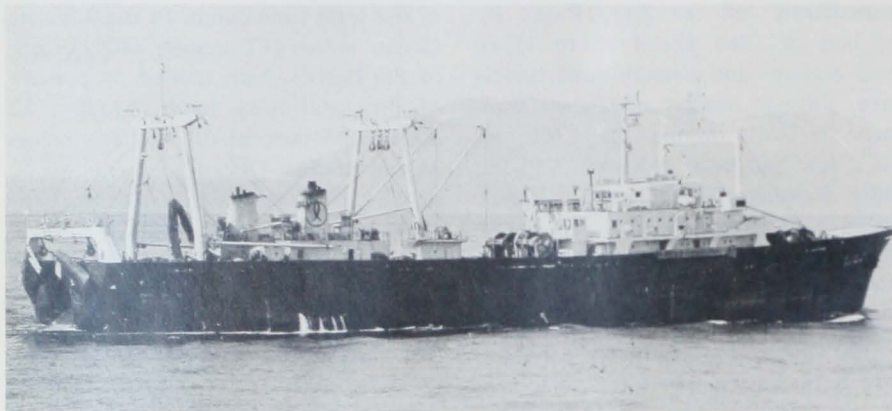


Figure 6.—The 3,000 GRT stern trawler *Cheong Yang Ho* steaming off the eastern Aleutian Islands.

GRT coastal side-trawlers (10 were eventually built) called *Baek Nyong*. These eight French-built vessels reportedly caught 1,379 metric tons of fish during 1966.

The year 1966 also marked the beginning of Korea's entry into the North Pacific trawl fisheries. On 16 July 1966 the Pusan Fisheries College training vessel *Paekkyong-Ho* (White Whale) left Pusan Harbor bound for the waters off Alaska. Between August and September 1966 the vessel fished in both the Bering Sea and the Gulf of Alaska before returning home in October. The results of this experimental voyage were to spark the development of Korea's commercial high-seas trawl fishery in the North Pacific.

On 18 August 1967 the Samyang Fisheries Company launched its First ROK Fishing Expedition to the North Pacific. A 957 GRT refrigerated transport, the *Sam Su No. 301*, was the mothership for eight 99 GRT Japanese-built otter trawlers called *Sam Su Nos. 2, 3, 5, 6, 7, 8, 9, and 10*. The expedition was a disaster. First, two of the

company's new otter trawlers sank in heavy seas near Adak and 29 crewmen lost their lives. Second, the president of the Samyang Company died unexpectedly while investigating the earlier tragedy. Third, bad weather reduced fishing to a total of 5 days out of the 50-day expedition and the few fish that were caught were eaten by the crew before the fleet reached home port. Finally, the fleet was dogged by mechanical difficulties and lack of adequate navigational equipment. The crews, largely untrained conscripts, were unable to deal with the harsh conditions of the North Pacific fisheries.

Despite the difficulties in the North Pacific the Koreans had made a commitment to build a modern, high-seas fleet and progress in this direction was being made. In the Atlantic Ocean two additional 130 GRT coastal sidetrawlers (*Baek Nyong*) were added to the existing fleet of eight vessels that fished in 1966.

In a related development the former dry cargo vessel *Bataan* was completely refitted in the Norwegian

shipyards of the Akers Group of Oslo for the Shin Hung Refrigeration Co. This 7,073 GRT vessel, renamed *Shin Hung*, was rebuilt to process 100 metric tons of raw fish per day. When work was completed the vessel had a cold-storage facility that could hold 2,900 metric tons of fish at -25°C in a 6,800 m^3 hold. Additionally, the vessel had a two-line canning plant able to process 10 tons/hour with a storage area for 2,500 metric tons of canned fish plus a 25 metric ton/day fishmeal production capacity with a 400 metric ton fishmeal and a 200 metric ton fish oil storage hold. The vessel was to appear in the North Pacific in 1969.

In 1968 the Koreans withdrew seven vessels from their 10-vessel Atlantic fleet and sent three of these vessels to the North Pacific. The newly launched *Huk San 701* was, instead, added to the Atlantic fleet, thus leaving four vessels off West Africa. This fleet reportedly landed 809 metric tons of fish. The remaining vessels were presumably sent back to Korea.

In 1968 the ROK Pacific fleet included the Samyang Company fleet with its mothership, six trawlers, and the refrigerated transport *Sam Su No. 201*. The Samyang Company again encountered many difficulties: bad weather, mechanical breakdowns, snarled gear, lack of drinking water, U.S. immigration problems, and untrained crews. The three vessels which had previously fished in the Atlantic fleet—the *Keo Mun 501* and *502* and the *Kang Wha 601*—however, had no difficulties in their fishing for Alaska pollock in these northern Pacific waters.

In 1969 an 800 GRT stern trawler (unidentified) was added to the fleet of four vessels operating in the Atlantic Ocean fisheries off western Africa. Three of these vessels were based in Las Palmas, the other two in Monrovia, Liberia.

In August 1969, five 72-ft steel-hulled shrimp trawlers were built by the Mexican shipyard Astilleros Unidos del Pacifico for the Jedong Fishery Company. These shrimp trawlers, called *Jinam Ho*, cost \$96,000 each, and they were quickly sent to the

shrimp grounds off Paramaribo in Surinam.

On the Pacific side the Koreans added 17 new vessels to their fleet in 1969. The Samyang Company again operated the largest fleet in 1969. The company employed seven new 133 GRT Japanese-built otter trawlers called *Kook Yang*, under the command of the 7,073 GRT mothership *Shin Hung* (which had been rebuilt in Norway in 1967). The *Shin Hung* was actually owned by the Shin Hung Refrigeration Co., but that firm, instead, operated a mothership called the *Kook Yang No. 51*. To confuse matters even more, the Shin Hung Company employed the identical vessel used by the Samyang Company, e.g., five 133 GRT Japanese-built vessels called *Kook Yang*. These vessels, however, were rigged for gill netting. Finally, in addition to these vessels, the ROK operated four independent stern trawlers.

Most of the ROK North Pacific fishing in 1969 proceeded smoothly, except for the salmon gill netters. The U.S. Coast Guard immediately discovered this effort, and the fleet was kept under continual surveillance while strong protests were made by the Alaska fishing industry and government, the U.S. Congress, and the State Department. The ROK gill net fishery abruptly ended on 8 July 1969.

The year 1970 was a turning point for the ROK high-seas trawl fisheries in the North Pacific. First, the number of ROK vessels in this fishery reached a peak: two motherships, 11 trawlers, 11 gill netters, two support vessels, and two independent trawlers. In subsequent years the size of the ROK fleet was reduced. This was apparently because of the severe financial strains suffered by many of the companies which had fished in the North Pacific in previous years. It was apparent that the smaller vessels could not profitably work in this fishery, and, as a consequence, ROK industry and government leaders decided to concentrate on larger vessels. Secondly, the Koreans realized that any salmon fishing would immediately encounter strong resistance from the United States (a short-lived attempt was made to fish salmon in 1970, but the fishery was

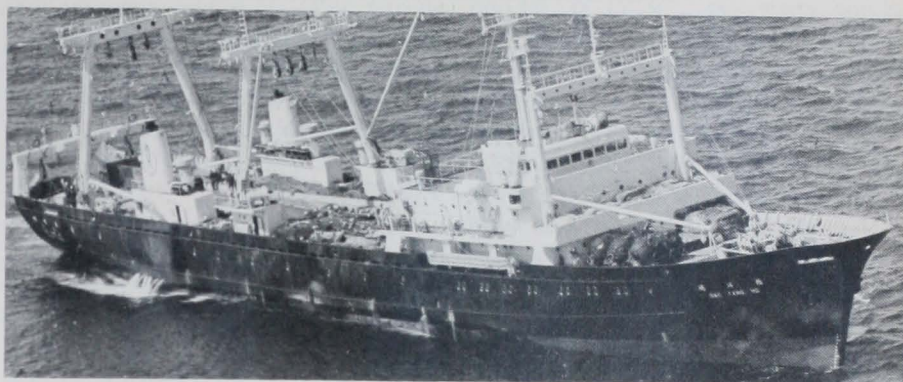


Figure 7.—The 3,000 GRT *Gae Yang Ho* photographed off Alaska in July 1973. Her sister ship is the *Cheog Yang Ho* (Fig. 6).



Figure 8.—The *Lila*, a 912 GRT stern trawler, was built in a Republic of Korea shipyard in November 1971.

again promptly discovered and United States objections finally forced the end of this abortive fishery).² As a consequence the ROK realized that its future in the North Pacific fisheries lay in the development of the Alaska pollock resources.

The year 1970 was also a turning point in the high-seas trawl fisheries in the Atlantic Ocean. The three stern trawlers that had previously fished in the Pacific Ocean (1968-69) were sent back to the Atlantic Ocean along with four of the 130 GRT side trawlers that had been pulled out in 1968. The Atlantic Ocean trawl fisheries have since remained an important element in ROK high-seas trawl fisheries.

In 1971, the ROK North Pacific fleet was reduced to 17 vessels: one mothership, 10 otter trawlers, three support vessels, and three independent stern trawlers. All these vessels fished

²In late 1972, the United States and the Republic of Korea entered into a 5-year fisheries agreement whereby the ROK agreed not to fish for salmon or Pacific halibut east of 175° West longitude in the eastern Bering Sea and northeastern Pacific Ocean.

primarily for Alaska pollock. The most important development of the year for this fishery was the entry of the newly constructed 3,000 GRT stern trawlers *Cheog Yang Ho* (Fig. 6) and *Gae Yang Ho* (Fig. 7). These two Japanese-built stern trawlers were the newest and largest in the entire ROK fleet. The two vessels were supported by a 1,652 GRT refrigerated transport, the *Chil Bo San No. 5*, which was the newest and largest vessel of this type built in Korean shipyards.

In 1971 the ROK high-seas trawl fleet in the Atlantic was increased from 17 vessels to 20 vessels and reportedly caught 6,941 metric tons of fish. The size of this fleet remained unchanged in 1972, but the catch increased to 9,327 metric tons.

In 1972 the North Pacific trawl fleet declined in number; only eight independent stern trawlers, without any support vessels, fished in the North Pacific. Seven of these trawlers fished off Alaska while one was reported fishing off Kamchatka. These eight vessels included: *Cheog Yang Ho*

(3,000 GRT), *Gae Yang Ho* (3,000 GRT), *Clover* (1,400 GRT), *Lila* (912 GRT), *Kum Yung No. 105* (400 GRT), *Ode Yang No. 107* (300 GRT), *Kaiyogo*, and *Iris* (700 GRT estimated), which fished off Kamchatka.

All these vessels except the *Kum Yung No. 105*, which was a used Japanese vessel, were relatively new. The *Lila*³ (Fig. 8) had been launched in Pusan (recently renamed Busan) in November 1971. The *Clover* was launched in Japan during the same month, and it is logical that the *Iris* was also a recent addition. There are no additional facts about the *Ode Yang No. 107* and the *Kaiyogo*, but there is reason to believe that these vessels were also recently constructed. These eight vessels reportedly landed 117,138 metric tons of fish during the season which lasted from March through September 1972.

Additionally, several other vessels were added to the ROK high-seas fleet during 1972, but these new vessels were not reported as having fished in the North Pacific during that year (many were sighted off Alaska in 1973). These other new vessels included: *Hwa Rang* (404 GRT) launched on 17 December 1971, *Kum Kang San* (739 GRT) launched in May 1972, and the *Han Il Ho* (1,179 GRT) launched in June 1972. These three stern trawlers were all built in the Niigata Shipyards in Japan for the Korea Wonyang Company. Another new addition was the 1,000 GRT stern trawler *Shinam Ho No. 305*, which was launched on 12 May 1972, at the Daisen Shipyard of Busan. Other additions included the *Dong Bang No. 71* (1,459 GRT) which was built in Japan in December 1972, the *Mae Kum Kang* (1,800 GRT), the *Han Jin Ho* (2,100 GRT), and the *Goyo Ho No. 70* (1,600 GRT). Complete details regarding these four vessels are not yet available. Finally, there was a report of the construction of a 3,500 GRT vessel identified as *Hoyo*, which is probably an error.

In summary the Koreans were intensely busy modernizing their fleet

during 1972. It is also apparent that the South Koreans have deliberately embarked upon a program designed to make their nation a major high-seas fishing nation.

FISHERMEN

There were 1,061,562 people employed in the ROK fisheries in 1972, which is 103,670 below 1970. Employment in the Korean fisheries began declining in 1968, and the drop during the period 1970-72 is nearly a 9-percent drop. This is a rather sharp decrease, but because the ROK fisheries are still overmanned, this decrease in the population will not have a negative impact.

A surprising factor in the ROK fishery population is that the labor is almost equally divided between men (52 percent) and women (48 percent). Korean women harvest seaweeds, mollusks, and other aquatic marine life in addition to playing an important role in fish processing.

Another rather surprising fact is that the sea continues to attract young people. In nearby Japan, by contrast, the fishing industry appears to be losing in its efforts to lure new recruits while maintaining the overall fishing population and the Japanese badly need new people in their fishing industry. Fortunately, the ROK fishing industry can afford to trim its ranks.

There were 188,443 persons classified as full-time workers deriving all of their income from fisheries in 1972 as against 873,119 part-time workers. This means that the hard core of the fishing industry is relatively small, making it easy to manage and train.

Education for ROK fishermen began to play an increasingly important role in the early 1960s when ROK planners began to develop programs to build a high-seas fishery. Through trial and error it had become obvious that Korean fishermen would need new skills to master the intricacies of high-seas fishing. In 1964 the ROK Government placed \$1.6 million—along with a \$1.3 million United Nations Development Program (UNDP) loan—into the establishment of a Deep-Sea Fisheries Training Center. The program began on 1

July 1965. Initially, training for masters and engineers lasted for 12 months and included five months of classroom training, six months of training aboard ship, and one month of final schooling and examinations. The program was later extended to 18 months. Rigorous training and iron discipline were demanded in every phase of the work. Training took place aboard one of the three deep-sea training vessels purchased by the Center: the *Chindalle No. 1* and 2 and the *Kaenali*. By late 1972 a total of 709 officers and engineers had graduated and more than one-third of the entire ROK high-seas fleet was manned by graduates of this program.

This training program was so successful that a Coastal Fishing Training Center was established on 8 July 1969. The objectives of this program were the same as with the Deep-Sea Center with the exception that these graduates (216 men in 1971) were to fill the ranks of Korea's coastal fisheries. In order to train these coastal fishermen the Government of Korea purchased the *F/T Dong Baeg No. 1* and 2 (50 and 60 GRT, respectively). These two vessels were used to train crewmen in the art of fishing with longlines, gill nets, and Danish seines. Two additional vessels were also purchased with UNDP funds: the *Dong Baeg No. 3* and 5 (both 120 GRT) are now used for purse seining and stern trawling. Each vessel carries a crew of seven and each has room for 14 to 15 trainees. The catch is sold locally and the funds received in payment are deposited in a special account which is used to offset operating costs.

In early 1972 the Coastal Fishing Training Center, backed by a \$500,000 UNDP grant, ordered two new skipjack pole-and-line vessels from the Usuki shipyards in Japan. On 31 July 1972, the Center took delivery of the 200 GRT *Gwanag San No. 1* and 2. On 8 January 1973, a reconditioned Japanese skipjack vessel purchased by the UNDP, the 253 GRT *Gwanag San No. 3*, was delivered to the Center.

With UNDP assistance a one-year training program for a group of 10 deck officer trainees and five engineering students was begun. Special emphasis was placed on live bait fishing.

³The vessel probably should be called *Lilac* since the other two vessels in her class—the *Iris* and *Clover*—both have names of flowers.

Table 14.—Republic of Korea's production of seafood products, by major commodity groups, 1950-72.

Year	Dried	Salted dried	Cooked	Salted preserved	Pickled	Canned	Frozen	Dried seaweed	Agar-agar	Ground fish	Seasoned fish	Fishmeal & oil	Others	Total
Metric tons														
1972	16,794	346	8,955	2,153	8,650	7,883	90,236	15,937	118	1,608	1,463	2,606	5,097	161,846
1971	7,247	373	4,269	1,362	5,951	13,588	75,377	10,595	227	543	1,183	1,150	1,553	123,417
1970	13,855	756	2,951	1,562	4,581	5,352	62,312	11,297	461	443	937	527	576	105,610
1969	9,651	2,512	7,766	1,576	4,036	5,067	24,291	13,165	471	56	735	482	6	69,814
1968	19,176	2,906	4,475	3,774	11,660	3,688	18,487	11,490	—	—	—	628	983	77,267
1967	8,967	2,474	10,217	4,546	15,669	4,956	22,136	13,154	—	—	—	922	1,917	84,758
1966	14,187	1,806	9,944	5,080	7,852	6,336	25,353	9,730	—	—	—	1,152	973	82,413
1965	14,012	1,823	3,718	1,711	8,905	7,438	38,751	11,623	—	—	—	2,007	1,962	91,950
1964	17,619	919	2,240	2,803	8,308	4,741	18,935	8,415	—	—	—	1,309	50	65,339
1963	23,576	919	4,735	5,041	8,539	2,207	3,590	10,123	—	—	—	1,179	179	60,088
1962	18,872	1,380	7,594	5,692	11,112	1,236	163	10,591	—	—	—	845	47	57,532
1961	20,182	725	9,580	9,914	13,116	6,713	53	8,206	3	—	—	793	140	69,425
1960	11,984	626	13,542	7,260	8,157	8,616	—	5,775	—	—	—	659	11	56,630
1959	12,710	1,819	9,943	10,429	18,039	10,317	3	5,807	—	—	—	704	—	69,771
1958	12,512	2,068	9,063	12,489	14,619	1,275	—	5,385	—	—	—	93	—	57,504
1957	12,323	2,827	8,866	14,475	19,002	792	28	7,730	—	—	—	237	10	66,290
1956	8,434	2,490	8,412	13,591	16,622	268	—	6,409	—	—	—	217	59	56,502
1955	8,014	1,049	4,535	13,628	5,579	1,051	—	5,527	—	—	—	94	300	39,777
1954	7,217	1,424	4,744	16,843	6,542	—	—	10,236	—	—	—	376	10	47,395
1953	7,726	2,524	11,752	22,558	9,877	223	—	3,196	—	—	—	198	—	58,054
1952	—	—	—	—	—	—	—	—	—	—	—	—	—	45,539
1951	—	—	—	—	—	—	—	—	—	—	—	—	—	45,140
1950	—	—	—	—	—	—	—	—	—	—	—	—	—	38,694

SOURCE: Office of Fisheries, *Yearbook of Fisheries Statistics*, 1973, Republic of Korea.

catching, and holding methods. Additional training was provided for a group of 15 to 20 seamen in skipjack fishing methods.

Before the year had ended it was reported that two Panamanian-flag skipjack vessels, manned by South Koreans, had begun fishing out of Tema, Ghana. The two vessels were both 190 GRT baitboats exported from Japan to Panama. Their operations were reportedly funded by the Japanese trading firm Marubeni Iida. In December 1972 it was reported in the Japanese press that the Korea Wonyang Company had signed a contract with Mitsubishi Shoji for construction of two 424 GRT skipjack vessels. These vessels, named *Paektusan No. 1* and 2, were built at the Miho Shipyard and were delivered in the summer of 1973 for skipjack fishing out of Tema, Ghana. Finally, as a follow up to these developments, the Central Federation of Fisheries Cooperatives, backed by a \$13.3 million Asian Development Bank loan, announced in late 1973 that it would accept bids for the construction of eight 400 GRT skipjack pole-and-line vessels. Thus, the training programs of the UNDP and the Coastal Fishing Training Center resulted in a rapid development of a new fishery for the Korean nation.

In addition to these training programs, Korea also has two fishery colleges, four junior colleges (or

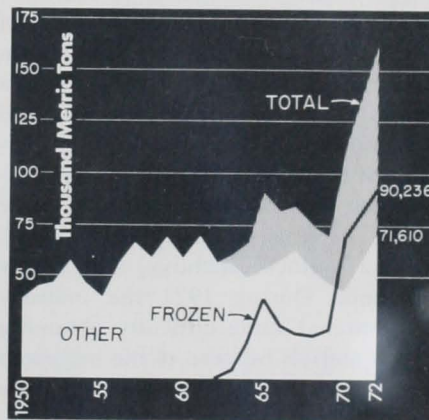


Figure 9.—Republic of Korea's seafood production, 1950-72.

technical schools), and nine fishery high schools. Finally, under various foreign training agreements, some 16 Korean fishermen trained abroad during 1971.

SEAFOOD PROCESSING

In 1972 some 739 processing facilities in Korea utilized 405,787 metric tons of raw fishery products and produced 161,846 metric tons of processed seafood. This was 38,429 metric tons more than the 123,417 metric tons produced in 1971. The South Korean seafood industry has grown rapidly in recent years, mainly because of the rapid expansion of the frozen seafood industry. Table 14 and Figures 9 and 10 provide statistical and graphic evidence of the growth of this industry since 1953.

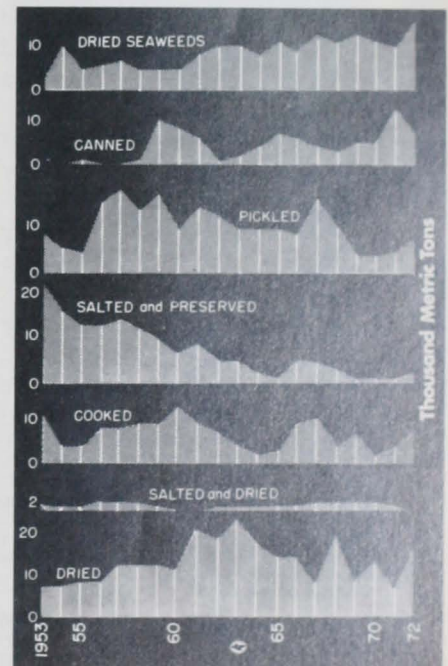


Figure 10.—Republic of Korea's production of processed fishery products by major commodity groups, 1953-72.

A capsule summary of the various seafood products manufactured in Korea is provided below in order of importance:

Frozen: The most impressive developments in the ROK seafood processing sector have been made by the frozen seafood industry. In the late 1950s this industry began producing a small amount of frozen shrimp. In 1962, production began in earnest and the industry expanded its operation to include mackerel and yellow

corvenia for human consumption and frozen saury for use as bait on tuna vessels. By 1965, the industry's output had soared to 38,751 metric tons; however, this rapid expansion caused some production and marketing problems and production decreased between 1966 and 1968. In 1969, partly as a result of the ROK Government's efforts to expand production and introduce new products, and partly as a result of better world markets, the industry again began expanding production. By 1972, frozen seafoods accounted for 56 percent (90,236 metric tons) of all processed seafoods manufactured in Korea. Most of this production was frozen yellowtail, squid, octopus, short-necked clams, topshells, scallops, cockles, and oysters, plus shrimp, mackerel, yellow corvenia, and saury. In addition to these products, Korea's 118 frozen seafood plants have also branched out and now sell ice to fishermen and process both poultry and livestock.

The most significant development for Korea's frozen seafood industry in 1972 was the dedication of a 6,000-ton-per-year Alaska pollock filleting plant in Ulsan. The plant was built by the Han Sung Industrial Company, which has already begun exporting to the United States and Australia. Towards the end of the year the Japanese Hokushi Fisheries Associa-

tion announced that it would build a 100 percent Japanese-owned Alaska pollock filleting factory in the free zone at Masan. Frozen fillet blocks produced by this company are to be exported to the United States and Japan.

This development is important because the local Korean market was glutted with Alaska pollock during the summer of 1972 and prices dropped sharply. With increased domestic landings and with the tremendous high-seas production of Alaska pollock, the move to build processing plants able to produce an exportable product will relieve the market disruptions suffered during 1972. Alaska pollock fillets should become a major item manufactured by the South Koreans during the coming years.

Dried: This industry was Korea's top producer in 1964, but it has since dropped to second place because of the rapid expansion of the frozen seafood industry. In 1972, Korea produced 16,794 metric tons of dried seafood, which accounted for 10 percent of the total processed fish production of that country. The 46 major firms in this industry dry squid, Alaska pollock, anchovy, and yellow corvenia. During 1971 the industry encountered some difficulty obtaining raw materials because of the increased production of frozen squid and the

utilization of more yellow corvenia in the seasoned and flavored products industry.

Dried seaweed: In 1972 Korea produced 15,937 metric tons of dried seaweed, which also accounts for about 10 percent of Korea's seafood production. Dulse, laver, fusiforme, and Irish moss are the main species of seaweed dried in Korea. An estimated 52 firms in Korea produce "slightly burned" seaweed, and 33 others manufacture other types of dried seaweed.

Cooked: In 1972, Koreans prepared 8,955 metric tons of cooked seafood (6 percent of the country's output). A clear background regarding the types of products made by this industry has not been provided in Korean literature, but at least one product, "mackerel pike," is boiled and canned.

Pickled: Anchovy and shrimp are the two species of importance in Korea's seafood pickling industry, and 8,650 metric tons of this product were produced in 1972.

Canned: The most important decrease in production in 1972 was suffered by the canning industries of Korea: production dropped from 13,588 metric tons in 1971 to 7,883 metric tons in 1972. There have been no explanations for this drop, except that 1971 was an exceptionally pro-

Table 15.—Republic of Korea's exports of fishery products and equipment, by quantity and by value, 1962-72.

Commodity	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962
Quantity:											
	<i>Metric tons</i>										
Agar-agar	493	342	329	425	415	804	610	734	569	524	506
Canned seafoods	2,628	951	377	2,053	1,846	665	4,647	2,891	3,132	355	545
Dried laver	325	1,257	1,452	969	1,243	672	528	571	434	247	226
Dried seaweeds	5,108	4,085	2,939	3,100	1,855	3,055	3,975	4,177	3,999	2,663	3,314
Frozen seafoods	18,200	11,528	8,394	4,581	3,679	4,518	4,914	3,472	2,179	2,099	1,140
Live or fresh seafoods	37,890	24,458	14,805	11,884	13,877	13,307	15,724	17,479	14,790	11,564	10,992
Preserved seafoods	1,413	1,247	479	854	866	1,724	2,008	1,212	641	986	—
Squid	4,808	4,377	6,346	3,616	1,780	4,678	7,606	7,413	10,827	5,691	6,361
Tuna	107,334	90,725	89,621	80,800	50,074	36,200	26,852	6,438	1,338	2,313	—
Other seafoods	2,754	1,429	470	413	804	802	758	1,371	872	224	1,800
Fishing nets	6,347	5,995	4,953	3,617	—	—	—	—	—	—	—
Total quantity	187,300	146,394	130,165	112,312	76,439	66,425	67,622	45,758	38,781	26,666	24,884
Value:											
	<i>US\$1,000</i>										
Agar-agar	1,731	1,171	1,227	1,780	1,851	5,800	2,753	2,176	1,849	1,641	1,420
Canned seafoods	5,006	1,885	375	2,184	2,221	519	1,655	1,406	826	372	272
Dried laver	3,223	4,749	11,592	21,721	17,054	14,371	6,838	3,781	5,391	1,343	1,267
Dried seaweeds	3,234	2,678	1,525	998	588	929	1,002	819	654	328	352
Frozen seafoods	12,510	8,001	5,994	4,556	4,653	6,084	3,872	2,368	2,255	1,763	1,381
Live or fresh seafoods	27,366	18,217	11,353	6,764	7,232	6,721	6,967	7,389	6,059	4,190	4,327
Preserved seafoods	4,554	2,629	1,566	1,224	1,217	1,730	1,368	882	519	843	—
Squid	11,435	9,361	10,335	4,156	1,970	4,630	6,290	5,452	5,010	2,078	2,371
Tuna	68,032	55,103	37,663	24,072	15,559	11,969	7,971	2,404	320	625	—
Other seafoods	5,382	2,074	1,109	492	732	635	477	561	402	404	951
Fishing nets	10,091	9,113	7,313	5,969	4,246	4,111	2,843	1,254	381	103	—
Total value	152,564	114,981	90,052	73,916	57,323	57,499	42,036	28,492	23,666	13,690	12,341

SOURCE: Office of Fisheries, *Yearbook of Fisheries Statistics, 1973*, Republic of Korea.

ductive year for three reasons: (1) the renewed ROK military purchases of canned seafood, (2) a drop in the price of certain raw fish, and (3) a surge in exports of canned oysters. The only other time that production of canned goods exceeded 10,000 metric tons was in 1959 when large sales were made to Korean military forces. Another possible reason for the decrease in 1972 (although not reported) is that Korean canners also pack mushrooms and peaches, and it is possible that increased production of these fruits and vegetables may have been at the expense of fishery items.

Canned oysters, saury, and mackerel

are the principal species packed by this industry. Others include squid, crab, topshell, shrimp, abalone, and sea mussels. In the past two years the Koreans have also been attempting to develop a market for canned herring and squid packed with vegetables, in addition to other types of canned fishmeal, sausages, and crab roes. These are being packed under the Government's plan to diversify the products available for export.

Salted and preserved: Koreans prepared 2,153 metric tons of salted and preserved products in 1972. This accounts for 1 percent of the seafood output during the year.

Fishmeal and oil: The waste prod-

Table 16.—Republic of Korea's fishery exports, by value and country, 1962 and 1966-72.

Country	1972	1971	1970	1969	1968	1967	1966	1962
US\$1,000								
Japan ¹	73,101	48,919	38,657	36,190	33,752	35,546	25,442	7,333
United States	36,387	29,332	34,592	20,293	12,445	13,112	9,205	1,646
Nigeria	2,675	3,565	1,767	1,781	1,152	1,449	1,325	—
Kenya	2,046	1,878	547	355	285	208	104	—
Hong Kong	1,865	837	1,020	497	299	567	754	1,826
Italy	1,446	1,854	344	240	385	321	215	6
Sierra Leone	1,377	1,480	1,816	965	—	318	—	—
Malaysia	1,363	—	—	—	—	—	—	—
Ghana	1,334	—	—	—	—	—	—	—
Netherlands	1,258	1,655	1,334	810	191	113	30	—
Singapore	953	650	946	592	500	778	735	333
Taiwan	934	2,459	421	2,270	1,018	825	735	155
Indonesia	925	—	—	—	—	—	—	—
Canada	502	127	78	212	110	227	305	36
Thailand	269	219	502	553	338	717	593	354
West Germany	195	—	—	—	—	—	—	—
United Kingdom	177	—	—	—	—	—	—	—
Sweden	14	—	—	—	—	—	—	—
Other	25,743	22,006	8,028	9,158	6,848	3,318	2,548	636
Total	152,564	114,981	90,952	73,916	57,323	57,499	42,036	12,325

¹Includes Okinawa.

Note: Malaysia, Ghana, Indonesia, West Germany, the United Kingdom, and Sweden may have been listed under "other" countries in previous years.

Table 17.—Republic of Korea's fishery exports, by country, commodity, and quantity, 1972.

Country	Exports by commodity										Total	
	Tunas	Live/fresh	Frozen	Dried seaweed	Squid	Canned	Preserved	Agar	Laver	Other		Nets
Metric tons												
Japan ¹	a/a	37,889	15,980	4,636	4,135	48	1,384	270	262	2,187	360	67,151
United States	n/a	—	579	145	34	1,900	24	6	21	76	504	3,289
Nigeria	—	—	—	—	—	—	—	—	—	—	1,646	1,646
Hong Kong	—	—	4	68	287	55	—	62	—	301	29	806
Indonesia	n/a	—	—	—	—	—	—	—	—	—	396	396
Taiwan	—	1	—	—	308	9	5	—	28	10	20	381
Ghana	n/a	—	—	—	—	—	—	—	—	—	309	309
Canada	—	—	—	—	—	162	—	—	1	1	129	293
Singapore	n/a	—	—	—	29	7	—	60	—	87	68	251
Netherlands	n/a	—	94	4	—	9	—	1	1	13	30	152
Sierra Leone	n/a	—	—	—	—	—	—	—	—	—	122	122
Kenya	n/a	—	—	—	—	—	—	—	—	102	102	102
West Germany	—	—	30	2	—	44	—	1	—	6	15	98
United Kingdom	n/a	—	—	—	—	—	—	—	—	—	89	89
Thailand	—	—	—	—	15	—	—	45	1	1	15	77
Italy	n/a	—	67	—	—	—	—	—	—	3	—	70
Malaysia	—	—	—	—	—	—	—	3	—	1	10	13
Sweden	—	—	6	—	—	—	—	—	—	1	4	10
Others	n/a	—	1,440	253	—	394	—	45	11	69	2,499	4,711
Total	107,334	37,890	18,200	5,108	4,808	2,628	1,413	493	325	2,754	6,347	187,300

¹Includes Okinawa.

n/a - Quantities of tuna shipped have not been reported and do not appear in total export figures.

* - Less than 1 metric ton.

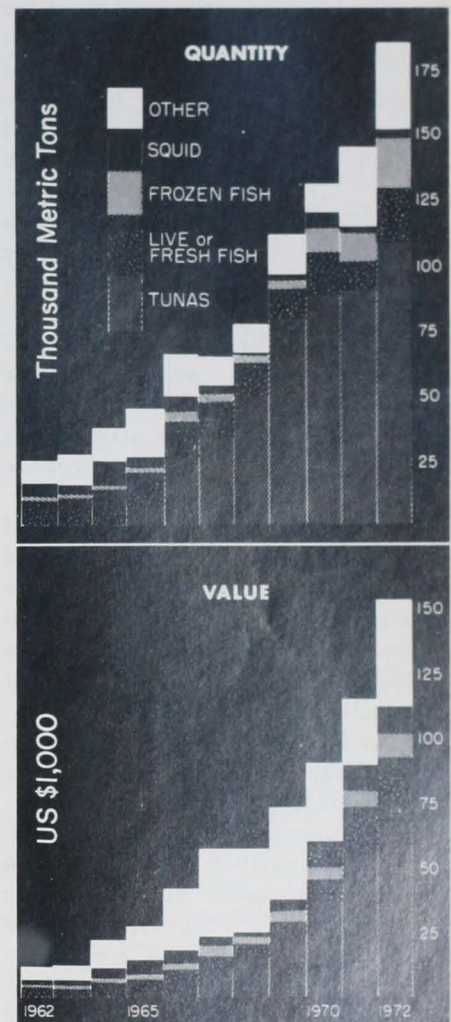


Figure 11.—Republic of Korea's exports of fishery products, by quantity and value, 1962-72.

ucts from Korea's canneries, seasoning-flavoring industries, and from the fish-drying industries are used in fishmeal production. Processing of fishmeal is undertaken by four firms. Some 90 firms produce fish liver oil (mainly from shark livers) and fish oil.

Seasoned: This industry involves the adding of soy sauce and sugar to certain fishery products, particularly squid. In 1972, this industry purchased unusually large quantities of yellow corvenia which normally would have been dried. In 1972 some 35 firms engaged in the manufacture of 1,463 metric tons of seasoned or flavored seafood products.

Ground: In 1972 Korea produced 1,608 metric tons of ground or minced fish. Generally only the cheapest species of fish are ground for local consumption. Some 70 small-scale companies undertake this type of production.

Salted and dried: In 1972, production of salted and dried seafood was 346 metric tons.

Agar-agar: Production of this seaweed began in 1969 when 471 metric tons of processed agar-agar were manufactured. Production has since fallen steadily, and in 1972 only 118 metric tons were produced.

Other: The Koreans produced 5,097 metric tons of "other" seafood products during 1972. Production of whale products (by three firms) is believed to be a part of this production. No other information is available on these other forms of processed seafood products.

FISHERY EXPORTS

Koreans exported a record-breaking 187,300 metric tons of fishery products worth \$152 million to more than 80 different countries during 1972. In terms of quantity, this achievement represents a sevenfold increase over the 24,884 metric tons exported in 1962, while the value of these shipments is 12 times greater than the \$12 million worth of goods sold by Korea in 1962.

The rapid rate of growth during the past few years can be directly attributed to the ROK Government's efforts to expand and promote exports. This effort was begun in 1969 because

of the decrease in ROK exports to Japan and the United States in 1968. Korean officials were quick to realize the dangers of relying too heavily upon a few products sent to a few countries. Therefore, these officials called for the diversification of production techniques, the development of new products, and the establishment of new markets. Despite these efforts, however, the Japanese and United States markets still dominate Korea's exports: in 1972 the Japanese purchased 47 percent of Korea's total exports while the United States imported 24 percent of that nation's fishery products for a 71 percent total of Korea's fishery exports.

Table 15 and Figure 11 provide additional statistical and graphic information on the development of Korea's fishery exports by quantity and value for the period 1962-72. A brief description of Korea's 1972 exports follows.

Tuna: In 1972 Korea exported 107,334 metric tons of tuna worth \$68.0 million: U.S. importers or canneries purchased \$31.0 million worth of this tuna, or slightly less than half of this amount. Japan was Korea's second largest customer for tuna, accounting for \$9.1 million. Exports were also made to Kenya (\$1.8 million), Malaysia (\$1.3 million), Italy (\$1.3 million), Sierra Leone (\$1.1 million), and the Netherlands (\$1.0 million). Smaller shipments were made to Ghana, Indonesia, Singapore, and Great Britain. An additional \$19.6 million worth of ROK tuna was exported to "other" countries. Unfortunately, ROK statistics do not provide the quantities of tuna exported to these countries. Most of these sales were made directly from ROK tuna longliners based in many of these nations or through transshipments made abroad.

Live or fresh: Korea exported 37,890 metric tons of live or fresh fishery products worth \$27.3 million in 1972, and 99 percent of these exports went directly to Japan; only 1 metric ton worth \$75,000 went to Taiwan. With the Japanese market within easy reach of Korea it is possible to fly shipments to the Japanese fish markets within hours of the fishes' being caught or harvested. The

shipment of live eels to Japan was an especially profitable business for South Korean eel culturists during the year.

Frozen: Exports of frozen fish (excluding tuna) were 18,200 metric tons worth \$12.5 million in 1972. Japan took the lion's share of this trade with 15,980 metric tons worth \$10.8 million, and the United States followed with 579 metric tons worth \$411,000. Exports of frozen seafoods were also made to the Netherlands, Italy, West Germany, Sweden, and Hong Kong, in addition to other countries.

Squid: Korea's total squid exports were 4,808 metric tons worth \$11.4 million, and almost all of this (4,129 metric tons worth \$9.9 million) went to Japan. Squid, which is considered a delicacy throughout Southeast Asia, also went to Taiwan, Hong Kong, Singapore, and Thailand. Shipments were also made to the United States, Canada, and West Germany.

Canned: Korea exported 2,628 metric tons of canned seafoods worth \$5 million during 1972. The United States purchased more than half these exports, or 1,900 metric tons worth \$3.5 million. Canada came second with 162 metric tons, followed by Hong Kong, Japan, West Germany, the Netherlands, Taiwan, Singapore, and other countries.

Seaweeds: In 1972 Korea exported 5,108 metric tons of dried seaweed worth \$3.2 million, 325 metric tons of dried laver worth \$3.2 million, and 493 metric tons of agar-agar worth \$1.7 million (agar-agar exports exceed the total production figure for this product in 1972—no explanations have been provided by ROK authorities for this difference). Most of Korea's seaweed exports went to Japan, but small shipments were sent to many other nations throughout the world.

Pickled, salted, or preserved: 1,413 metric tons of variously preserved seafoods worth \$4.5 million were exported in 1972 and, again, Japan imported the lion's share—1,384 metric tons worth \$4.5 million.

Fishing nets and ropes: The Koreans have developed a profitable fish net and rope industry and have found customers for these products all over the world. In 1972 they exported

6,347 metric tons of netting and rope worth \$10 million.

Tables 16 and 17 provide additional statistics on Korea's exports of fishery products to different countries, for different commodities, during the period 1962-72.

SUMMARY

It is always difficult to project the future direction of a nation's fisheries. However, in the case of the Republic of Korea, it is quite possible

that the Koreans may meet or exceed their targets during the coming years. These goals were outlined by the Director General of the ROK Office of Fisheries, Kim Dong Soo, in October 1972:

"The nation's fisheries production is projected at 2 million metric tons and annual exports of marine products at \$350 million by 1976. As a result, the nation is anticipated to rank the fifth in the world in terms of fisheries production and

the first in terms of annual exports of marine products."⁴

Whether or not these projections are reached, it is certain that the Republic of Korea will become better able to serve the needs of the nation in fishing and it is also certain that Korean fishermen will be recognized throughout the world as ambitious and skilled fishermen.

⁴Office of Fisheries, *Pictorial Korean Fishery*, Republic of Korea, 1972.

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MFR PAPER 1099

Abnormal red color can be removed from oysters by heat treatment.

Thermal Bleaching of Red Algal Pigment in Shucked Oysters

V. G. BURRELL, JR.

ABSTRACT—A technique for decoloring oysters exhibiting "red liquor" due to ingesting algal pigment is described. The abnormal color was permanently removed by holding the oysters at 55°C for 25 minutes in the aeration tanks. Heat treatment did not noticeably affect the taste or keeping quality of the oyster meat and is feasible using equipment commonly found in most Chesapeake Bay shucking houses.

INTRODUCTION

"Red liquor" in shucked oysters has been a chronic problem for packers (Beaven, 1964; Burrell, 1971; Hunter, 1920; Lear, 1958; Lear and Manning, 1957; and Sieling, 1971). Plant pigments, derived from algae on which the oyster has been feeding, constitute a principal cause of this coloration (Lear, 1958). The color is often not noticeable when the oysters are shucked and packed but may develop several days after packing, when oysters are held at temperatures just above freezing, or immediately after frozen oysters have thawed. The

wholesomeness and flavor of such oysters is in no way impaired, but customer rejection often causes serious financial losses to packers (Nelson, 1948).

Oysters feed on the algae causing red color only about two weeks out of each year. Such algae are usually present before oysters cease to feed in the fall and are a problem for only a week or two in shucked oysters. However, during some years the pigment apparently is retained in the intestinal tract of oysters from fall to the following spring (Lear, 1958). Thus, "red" oysters can be a problem to shucking houses for the entire season. Serious outbreaks of red liquor in oysters

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appear to follow an extended warm fall (Nelson, 1948).

A method of eliminating red pigmentation from shucked oysters would be advantageous to the oyster industry. For a bleaching technique to be of value to the industry, 1) the treated product must have all the attributes of fresh oysters in appearance, taste, and keeping quality, 2) cost of labor and equipment to process oysters must be minimal, and 3) yield after processing should not be greatly reduced.

The purpose of this study was to determine the feasibility of thermal bleaching, employing laboratory and field tests.

LABORATORY TESTS

Objective

Laboratory tests were undertaken to determine the length of time oysters must be held at a specific temperature to decolor red algal pigment. A temperature-time regime least affecting