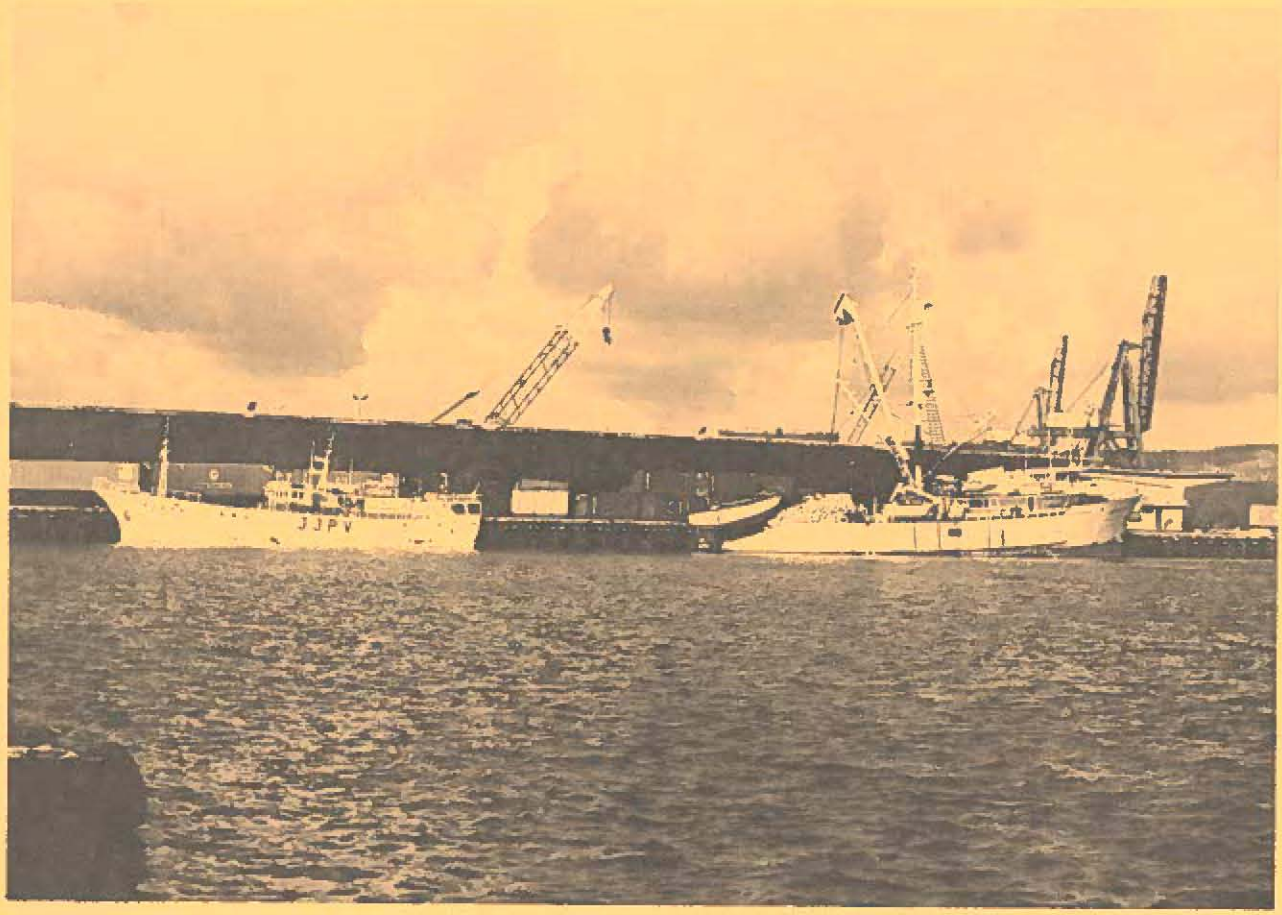
AN ANALYSIS OF TUNA TRANSSHIPMENT AT THE COMMERCIAL PORT OF GUAM

Paul Callaghan and Barbara Simmons



UNIVERSITY OF GUAM MARINE LABORATORY

Technical Report No. 65

May 1980

A project funded by the U.S. Department of Commerce, NOAA, National Marine Fisheries Service, through the Pacific Tuna Development Foundation under agreement with the University of Guam.

AN ANALYSIS OF TUNA TRANSSHIPMENT AT THE COMMERCIAL PORT OF GUAM

by

PAUL CALLAGHAN and BARBARA SIMMONS

College of Business and Public Administration
University of Guam, UOG Station, Mangilao, Guam 96913

University of Guam Marine Laboratory

Technical Report No. 65

May 1980

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

At the outset, it should be noted that this study applies specifically to the Territory of Guam; however, it is believed that material presented will also prove of use to other island and industry entities.

The primary purpose of this study is to analyze past and present tuna transshipment activities at the Commercial Port of Guam. Principal objectives include: an assessment of primary economic benefits accruing to the island from transshipment; an evaluation of tuna transshipment efficiency under existing procedures; and the formation of recommendations to improve and encourage the growth of tuna transshipment in the Territory.

A secondary purpose of this study is to provide the reader with basic information on tuna harvest, processing, and consumption patterns in the Pacific. It is hoped that this background material will enable better formulation of judgements regarding potential future growth and long run viability of tuna transshipment in Guam.

Chapter II provides general information on tuna resources - their location, abundance, and harvest. Market conditions for tuna products are also reviewed. Chapter III attempts to summarize the few existing studies related to the industrial economics of Pacific tuna. Chapter IV outlines the historical and current status of transshipment in Guam.

Data collection, analytical procedures, and results are explained in Chapter V. Conclusions and recommendations are presented in Chapter VI.

ACKNOWLEDGEMENTS

This study was made possible through the cooperation and assistance of several agencies and individuals. Special thanks go to: the staff of the Port Authority of Guam, especially Bruce Pecon and Charo Concepcion for their many efforts, and to Moses Muna, whose knowledge of dockside operations proved invaluable; Andy Anderson and Bob Hamrick of Atkins-Kroll, Bob Hahn and Sandy Perez of Maritime Agencies of the Pacific for allowing access to vessel records; Fred Siles of Van Camp International; and the staff of Petroco, Inc; also, both the Pacific Tuna Development Foundation and the National Marine Fisheries Service, Honolulu contributed to the successful completion of this study.

CHAPTER II

BACKGROUND INFORMATION

A. Tuna Species

Tunas have been defined as those genera which are members of the tribe Thunnini within the subfamily Scombrinae and the family Scombridae (Klawe 1977). Tuna are migratory fish, inhabiting both temperate and tropical waters.

The six market species of tuna are yellowfin, northern bluefin, southern bluefin, albacore, bigeye, and skipjack. These species comprise 73 percent of the international landings of tuna and tuna-like species (United Nations 1978) and virtually 100 percent of the worldwide tuna trade (Salia and Norton 1974). Skipjack landings account for 38 percent of the principal market species landed; yellowfin tuna landings, on the average, account for 12 percent (Klawe 1978b). Tuna transshipments at Guam Commercial Port are composed almost entirely of skipjack and yellowfin.

B. Geographical Distribution

Principal market species inhabiting the world's temperate and subtropical waters are albacore and the northern and southern bluefins; the shorter-lived yellowfin, skipjack, and bigeye tunas are found primarily in tropical waters. Table 2-1 depicts world distributions of tunas, based on 1975 landings.

TABLE 2-1

WORLD DISTRIBUTION OF TUNAS, BY OCEAN
BASED ON 1975 LANDINGS
(Tonnages in Metric Tons)

	Atlantic	Pacific	Indian
Skipjack	61,277	464,291	47,446
Albacore	61,249	112,867	10,832
Yellowfin	118,300	326,846	38,742
S. Bluefin	1,695	9,613	22,798
Bigeye	49,748	107,719	31,611
N. Bluefin	24,539	16,165	-0-
Total	316,808	1,037,501	151,429

Source: W. L. Klawe, World Catches of Tuna and Tuna-like Fishes in 1975 (La Jolla: Inter-American Tropical Tuna Commission, 1978b):143, table 8.

C. Harvesting Techniques

Although there are many methods for harvesting tuna, the three most commercially successful methods are the purse seine, pole-and-line, and the longline (State of Hawaii 1977). The former two methods are used primarily in the harvest of skipjack and yellowfin, while the latter is associated with deeper swimming fishes.

The purse seine method involves setting a net around a school of fish and drawing, or pursing, the net closed. As the net decreases in volume, a large portion of it is brought aboard the vessel and the fish are scooped from the net into the ship's holds. This method has been used predominately where waters are murky, thermocline is shallow, and the line of demarcation between warm and cold currents is distinct (Matsumoto 1974). Seining has met with less success in tropical waters due to the clarity of water, deep thermocline, and erratic, fast moving tuna schools. However, research carried on in recent years by Japanese

and American fishermen shows promise of overcoming many of the difficulties associated with this technique in tropical areas (Otsu 1976; Living Marine Resources 1979). The future should bring increased purse seine activity around Guam.

The pole-and-line method employs live bait in the harvesting of surface schools consisting primarily of skipjack and yellowfin. When a school is sighted, live bait is thrown into the water, exciting the tuna. The fish are caught using a bamboo pole, short line, and a feather or metal lure attached to a barbless hook. The viability of the pole-and-line method depends not only upon the abundance of tuna, but also on the availability of baitfish (Rothschild and Uchida 1968). The waters surrounding Guam do not harbor sufficient natural bait resources to support pole-and-line fishing. Japanese pole-and-line vessels, using bait procured at home ports, fish throughout the central and western Pacific.

The longline method is used to harvest large deep-swimming tunas, which include all principal market species except the skipjack tuna (Matsumoto 1974). This method consists of a main horizontal line to which glass floats and flagged bamboo poles are attached. Branch lines are hung from the main line. Frozen bait is used on hooks fastened to the branch lines. As many as two thousand baited hooks covering a distance of seventy-five nautical miles can be set at once; such a line might take approximately three hours to set and thirteen hours to retrieve (Uyemae 1975). Japanese, Korean, and Taiwanese longline vessels fish throughout the Pacific as well as in the other oceans of the world.

D. Resource Supply

Of the six major species, only the bigeye tuna and skipjack are not yet approaching maximum yields; the skipjack has been classified as an underutilized resource (Matsumoto 1974; Suda 1972; Salia and Norton 1974).

Maximum sustainable yield (MSY) is that yield from a species of the world that can be sustained over the long run. World MSY has been predicted for all species of tuna by a number of investigators. Bell et al. (1970) estimate world MSY at 2.6 million metric tons, while Gulland projects a lesser figure of 1.892 million metric tons (U. S. Dept. of Commerce 1973); Fullenbaum calculates the MSY for the principal market tunas to be 2.33 million metric tons (Salia and Norton 1974). Table 2-2 illustrates the differences in projected maximum sustainable yields of Fullenbaum and Gulland by area and species.

Based on catch statistics compiled by Klawe (1978b), Japan and the United States accounted for 52.4 percent of the world tuna landings. Fourteen nations accounted for over 90 percent of the total catch of principal market tunas. In 1977, the world's catch of the principal tunas was 1,627,399 metric tons, of which 40 percent was skipjack, 34 percent yellowfin, 13 percent bigeye, 9 percent albacore, 2 percent northern bluefin and 2 percent southern bluefin (United Nations 1978). The world catch is fast approaching Gulland's estimated MSY. In 1977, world catches were still approximately 700,000 metric tons shy of Fullenbaum's predicted maximum sustainable yield.

The Food and Agriculture Organization, under the auspices of the United Nations, has divided the world into major fishing areas for statistical purposes. The Pacific fishing areas appear in figure 2-1.

TABLE 2-2

MSY ESTIMATES OF PRINCIPAL TUNA SPECIES BY AREA
(Tuna Tonnages in Thousands of Metric Tons)

	Fullenbaum	Gulland
Atlantic Ocean		
albacore	40.4	90.0
bigeye	NA	32.5
bluefin	18.8	45.0
skipjack	101.1	275.0
yellowfin	44.4	60.0
Total	204.7	502.5
Pacific Ocean		
albacore	133.2	110.0
bigeye	109.6	100.0
bluefin	72.7	45.0
skipjack	1080.0	650.0
yellowfin	205.4	145.0
Total	1600.0	1050.0
Indian Ocean		
albacore	*	20.0
bigeye	*	20.0
bluefin	*	30.0
skipjack	258.9	230.0
yellowfin	265.9**	40.0
Total	524.8	340.0
Grand Total	2329.5	1892.5

Sources: Saul B. Salia and Virgil J. Norton, Tuna: Status, Trends, and Alternative Management Arrangements, RFF/PISFA Paper No. 6 (Wash., D. C.: Resources for the Future, Inc., 1974):32.

U. S. Dept. Commerce, NOAA, NMFS, Tuna 1947 to 1972, Current Fisheries Statistics No. 6130, Basic Economic Indicators (Wash., D. C.: 1973):34.

* Included within yellowfin classification
** Includes all large tunas

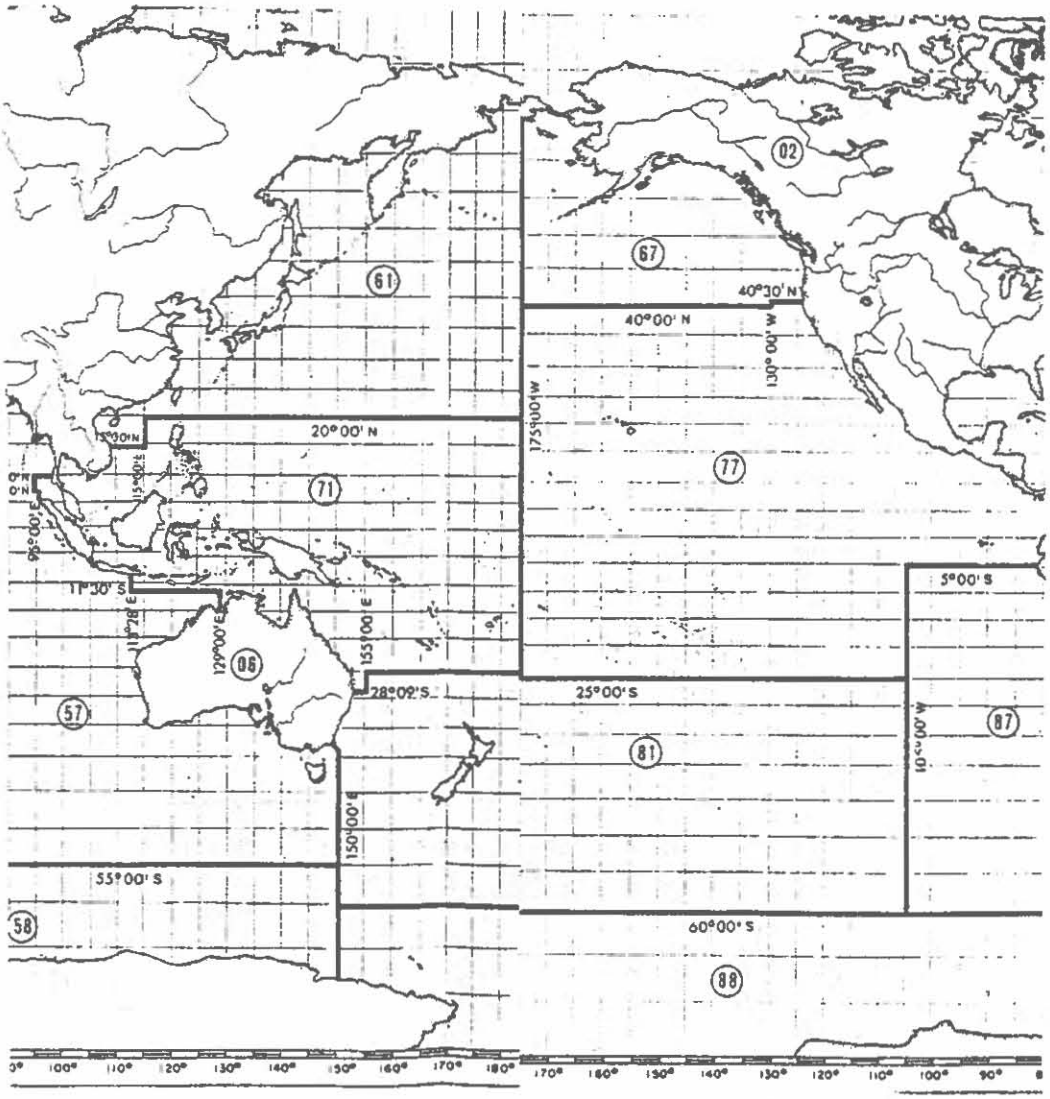


Figure 2-1. Major Pacific fishing areas for statistical purposes, as designated by the United Nations Food and Agriculture Organization.

Source: W. L. Klawe, World Catches of Tunas and Tuna-Like Fishes in 1975, Internal Report No. 11 (La Jolla: I. A. T. T. C., 1978): plate 8.

The 1977 tuna catch from each of these areas is presented in table 2-3. The countries contained within Area 71 include Guam, the Trust Territories, Papua New Guinea, Republic of the Philippines, New Caledonia, West Irian, Tuvalu, Nauru, Gilbert Islands, Wallis and Futuna, New Hebrides, Solomon Islands, Fiji, Indonesia, Borneo, Malaysia, and parts of Vietnam and Australia. It can be concluded that Area 71 supplied approximately 26 percent of the total world catch of major market tunas, including 42 percent of the world's skipjack, 37 percent of the bigeye, and 21 percent of the global yellowfin landings (Klawe 1978b). In 1977, Pacific catches surpassed Gulland's estimated 1050 million metric ton MSY, and it appears that harvests are fast approaching Fullenbaum's predicted maximum sustainable yield.

Guam's transshipment commerce is currently generated from catches within Area 71. Any potential expansion of transshipment activities on Guam would depend heavily on the availability and harvest of resources within this Area.

Major resource harvesting nations within Area 71 include Japan, which landed an average of 55.25 percent of the major market tunas caught, Republic of the Philippines, landing an average of 22.5 percent, and Papua New Guinea, with catches averaging 7.0 percent of the total tuna harvested (United Nations 1978).

E. Resource Demand

The world aggregate consumption of canned and frozen tuna has risen from 930,127 metric tons in 1956 to 1,508,166 metric tons in 1970. Five countries account for 66 percent of the world's consumption of tuna: United States (33 percent), Japan (19 percent), Taiwan (7 percent), Spain (4 percent) and Peru (3 percent).

TABLE 2-3

1977 LANDINGS OF TUNA, BY FAO FISHING AREA
(Tuna Tonnages in Thousands of Metric Tons)

Area	Skipjack	Yellowfin	Albacore	Bigeye	N. Bluefin	S. Bluefin
51	26.521	55.889	2.423	22.901	0.000	0.583
57	5.961	10.403	3.409	10.395	0.000	19.747
61	129.017	40.490	41.933	18.482	8.527	0.000
67	0.445	2.210	7.991	0.000	0.000	0.000
71	271.697	118.328	6.980	31.925	0.038	0.000
77	96.658	177.074	14.990	76.757	8.907	0.000
81	6.363	4.581	15.692	3.105	0.000	3.521
87	4.135	7.969	0.671	6.247	0.000	0.002

Source: United Nations, Food and Agriculture Organization, Yearbook of Fishery Statistics, 1977, Volume 44 (Rome: FAO, 1978):102-106, table B-36.

Bell et al. (1970) have projected that the world consumption of tuna will reach 1,657,000 metric tons in the year 2000. United States consumption by 2000 is estimated to reach 632,940 metric tons, or 4.53 pounds per capita. The United States Department of Commerce (1976) predicts that only one third of the United States raw product demand can currently be supplied through domestic sources.

Tuna is consumed in four principal forms: canned, frozen, fresh, and fish meal. United States consumption is nearly 100 percent in canned form (Bell 1978), while other countries consume more fresh tuna. Frozen tuna is used primarily as an input into canning operations. However, recently developed low temperature freezing processes allow thawed tuna to compete effectively with the fresh product in some markets. Almost all frozen tuna transshipped through Guam is sent to United States canneries in Hawaii, Los Angeles, San Diego, or Puerto Rico.

United States demand for canned tuna is considered to be price inelastic (Marasco 1974), indicating that substitutions for tuna are less likely to be made when tuna prices rise. This belief is further substantiated by price and income elasticities for tuna of -0.6966 and +1.2091 (U. S. Dept. of Commerce 1973). These estimates imply that if prices increase by 1 percent, the sale of tuna will fall by 0.69 percent, and if income rises by 1 percent, the sale of tuna will increase by 1.2 percent. Generally for normal goods, consumption of food will increase absolutely with rises in income, until a level of high affluence is attained (Bell 1978).

Close substitutions for tuna are generally regarded as being salmon, poultry, swine, and beef. Consumption of tuna is related to the prices of these products. Marasco (1974) suggests, for example, that in

the United States, a 1 percent increase in the price of canned salmon will result in a 0.5 pound per capita increase in consumption of tuna.

CHAPTER III

REVIEW OF RELEVANT LITERATURE

A wealth of literature is available in the fields of tuna biology and fishing activity. Literature pertaining to the economies of the tuna fisheries is scant by comparison. The following works reviewed are considered relevant to this study.

Rockland (1978) has analyzed the effects of the tuna industry on employment in San Diego. The San Diego fleet is composed primarily of purse seine vessels, which fish for yellowfin and skipjack, and secondarily of jig boats, which catch albacore. The bulk of the purse seine catch is taken off the coasts of Mexico and South America. A reduction of the yellowfin fishing season has resulted in the utilization of vessels with a greater deadweight carrying capacity in order to better reap the benefits of the first come, first serve quota system instituted by the Inter-American Tropical Tuna Commission. The San Diego fleet capacity increased from 31,750 tons in 1969 to 52,840 tons in 1974. Landings of tuna during the same period increased from 30,556 tons to 36,964 tons.

Due to expansion of the fleet, key personnel such as captains and masters are in short supply. Often crew members are Mexican nationals. This is so partly because they are paid on a per ton rather than share basis, and partly because the Mexican Government requires crews of vessels fishing in its waters to be comprised of at least 50 percent native residents.

Two canneries are located in San Diego, Sunland Industries (recently purchased by Bumble Bee of Castle and Cook) and Van Camp, a subsidiary of Ralston Purina. These two canneries have a combined pack capacity of 775 tons per day, cold storage totalling 11,000 tons, and employ 700 persons. Rockland estimates that approximately 20 percent of the employees are holders of green cards. Both canneries produce pet food, fish meal, and oil as by-products.

Rockland estimates that there are twelve secondary industries which are influenced by the presence of the tuna fleet. Included are the industries of boat construction and repair, chandling, electronic equipment, customhouse brokers, marine insurance, food, fuel, salt, unloaders, and netters.

It was found that tuna related employment is steadily growing in San Diego, except in the area of vessel construction, which has declined due to a decrease in the yellowfin fishing season and a decline in catch rates. Employment in all tuna related industry sectors increased from 3692 persons in 1970 to 4351 in 1975. The largest increases were seen in employment of fishermen and of persons who unload the catch from shipside to dockside (see table 3-1). The tuna related employment has remained a small part of San Diego County's employment, accounting for under 1 percent of the county's total work force.

Rockland performed a regression of employment (E) to tuna landlings (TL), which resulted in an estimated equation of $E = 536 + 0.103TL + e$; R^2 equalled 0.714. This equation implies that when landings increase by ten tons, tuna related employment will increase by an average of one position. This relationship was

significant at the ninety-five percent confidence level. Rockland concludes that tuna related employment growth would be increased through an expansion of tuna landings, which could be perpetuated through an expansion of the tuna processing facilities.

TABLE 3-1

SAN DIEGO TUNA INDUSTRY EMPLOYMENT ESTIMATES

	1965	1970	1971	1972	1973	1974	1975
Cannery	560	607	620	640	660	680	700
Cust. Brok.	5	6	6	6	6	6	7
El. Equip.	12	17	20	23	28	32	34
Fishermen	1176	1360	1351	1358	1545	1633	1685
Food	8	8	8	9	9	12	12
Fuel	9	10	11	12	13	14	15
Mar. Ins.	10	10	9	8	7	6	5
Misc.	NA	39	40	42	47	49	55
Netters	10	10	11	12	13	14	15
Salt	3	3	3	3	4	4	4
Ship. Chandl.	NA	70	72	75	78	81	83
Skiffs	13	13	14	17	20	23	26
Bldg. & Rep.	NA	1509	1721	1303	1749	1404	1619
Unloaders	6	30	40	50	60	70	80
Total	1812	1692	4126	3558	4239	4028	4351

Source: Steven Rockland, "The San Diego Tuna Industry and Its Employment Impact on the Local Economy," Marine Fisheries Review 40 (July, 1978):10.

Although his work is somewhat dated, Doumenge's study of the economic effects of tuna related operations in American Samoa, the New Hebrides, Fiji, and New Caledonia ranks as one of the most extensive research studies done in the Pacific on the subject (Doumenge 1966).

It was found that United States demand for tuna and a Japanese desire for more efficient fishing bases were the prime motivations behind establishment of these Pacific tuna centers. Local governments

perceived the new industry as a basis for expansion of their respective economies and national incomes.

Of the four operations discussed by Doumenge, the canning operation in American Samoa, established in 1953, and the freezer plant at Pallicolo, New Hebrides, started in 1957, are the oldest. The bases in New Caledonia and Fiji began in 1963; data on these operations is less detailed. The operations were found to have certain advantages in common: employment of local labor, development of infrastructure, establishment of fishing associated industry, and an increase in commerce. Mutual disadvantages and constraints included a lack of skilled local labor, high turnover rates of employees, and potential over-fishing of nearby fishing grounds.

While a positive effect is seen on the island economies, Doumenge concluded that this effect was disproportionately small when compared to the economic gains derived by the two principal investors, the United States and Japan. The reason for this imbalace in benefits was found to lie in the proportion of local investment participation. At Pallicolo, local capital is invested in the operation, which allows for a more prominent role of local citizens in profit sharing. In American Samoa, local investment is virtually non-existent. Doumenge concludes that it "...is not in the utilization of the labor force but in the formation and investment of local capital that, in the end, is found the true source of the industrial and commercial profits affecting the territory" (Doumenge 1966:26).

Kent investigated international corporations, and in particular multinational corporations, involved in fishing ventures with Pacific island nations (Kent 1978). Citing the examples of Pacific Fishing

Company Ltd. (PAFCO) in Fiji and Solomon-Taiyo, Ltd. in the Solomon Islands, he illustrated some of the possible consequences of the present tuna industry activities on island economies.

In PAFCO and Solomon-Taiyo, Japanese interests account for approximately three-fourths of the corporate ownership, leaving one-fourth to local governments and island-based concerns. As a result, he concluded that lesser economic benefits can be garnered by island nations than if the companies were wholly locally owned. With the current arrangement, the islands list the tuna as an export and Japan categorizes it as an import, but it is in actuality a transfer within a corporation, leaving little profit for the island nations.

According to Kent, another major consequence for many developing island nations was found to be almost total dependence on a single commodity for export trade. Kent does not deal with the solutions to these problems, nor does he suggest what can be done to stimulate a more equal partnership between the island nations and fishing companies.

Appendix A-1 contains information regarding tuna industry related activities undertaken in Pacific island nations and entities.

CHAPTER IV

TUNA TRANSSHIPMENT ACTIVITY AT GUAM COMMERCIAL PORT

A. Legal and Historical Information

The first step toward establishment of Guam as a tuna transshipment center was made in 1962, when executive order number 11040 removed Guam from its classification as a naval defense sea area and airspace reservation. This cleared the way for ships of foreign registry to enter the Commercial Port of Guam for the first time since the beginning of World War II (Bretschneider and Corwin 1972).

Guam's transshipment operations began in 1974, with the shipment of 3675 metric tons of tuna through the Port, destined for California canneries (Van Camp 1979). In 1978, 15,021.14 metric tons of tuna passed through the Commercial Port (Port Authority of Guam 1979a). Van Camp has been responsible for the bulk of tuna transshipment activity. Historically, this company has accounted for 85 percent of the tuna commerce through Guam (Port Authority of Guam 1979a).

Most tuna discharged at the Port is brought to Guam in either carrier vessels (reefers) or purse seine vessels. Pole-and-line and longline vessels seldom discharge tuna at Guam. Aside from an occasional United States vessel, the large proportion of fishing and carrier vessels are either foreign built or under a foreign flag.

The shipment of tuna from Guam to the United States is governed by the Merchant Marine Act of 1920, more popularly known as the Jones Act. The purpose of the Act is to provide for the growth of

United States foreign and domestic commerce shipped in vessels built, owned, and operated by United States citizens (Merchant Marine Act, 46 USC 861).

The use of foreign owned or foreign built vessels, except in limited cases, in United States coastwise trade is prohibited by 46 USC 883. The section states that:

> No merchandise shall be transported by water, or by land and water, on penalty of forfeiture thereof, between points in the United States, including Districts, Territories, and possessions thereof embraced within the coastwise laws, either directly or via a foreign port, or for any part of the transportation, in any other vessel than a vessel built in and documented under the laws of the United States and owned by persons who are citizens of the United States or vessels to which the privilege of engaging in the coastwise trade is extended by section 13 or 808 of this title.

The discharge of fish by a foreign flag vessel at a United States port is prohibited by 46 USCA 251a of the Nicholson Act. The Bureau of Customs in Marine Circular No. 124 (1953) declared that Guam was exempt from section 251 (see appendix A-2). The Act of August 1, 1950, the Organic Act, declared that no law of the United States thereafter enacted would pertain to Guam unless specific reference was made either to Guam by name or by reference to United States possessions. The Nicholson Act (46 USC 251-252), a law of the United States thereafter enacted, makes no specific mention of Guam or United States possessions, thereby enabling foreign vessels to discharge their catch of fish on Guam.

The 200 mile economic zones of all States of the United States were defined in the Fishery Conservation and Management Act of 1976. The Act specifically does not include tuna, which have been defined in the Act as highly migratory species. In a report by the United States House of Representatives, it was concluded that the Act does not impinge on

the interpretation of the jurisdiction of the Nicholson Act as it pertains to American Samoa and Guam.

Catches from within the 200 mile economic zones of Guam and the Trust Territories (see figure 4-1) accounted for an average of 32 percent of all longline catches within the 200 mile economic zones of all South Pacific Commission countries (Klawe 1978a). Within the 200 mile zone of Guam and the Trust Territory, longline effort increased from 1972 through 1976 by 4.8 percent per year. During the same period, the longline harvest increased by only 3.8 percent per year (see table 4-1).

Declining catch per unit of effort is also evident throughout the entire South Pacific Commission area. Landings by Japanese, Korean, and Taiwanese longlines within all 200 mile economic zones decreased from a high of 61,522 metric tons in 1972 to 60,772 metric tons in 1976. During the same period, effort, measured in number of hooks set, increased from 85,368,999 hooks in 1972 to 101,123,457 hooks in 1976 (Klawe 1978a).

In 1972 Japan accounted for 99 percent of all longline landings of tuna within the Guam and Trust Territory area. Korean longliners are not represented in the data prior to 1975. In 1975, the Koreans accounted for 3 percent of the total tuna landed, while Japan's share diminished to 94 percent (Klawe 1978a).

The most recent data on Japanese catch and effort within 200 miles of Guam and the Commonwealth of the Northern Marianas is presented in table 4-2.

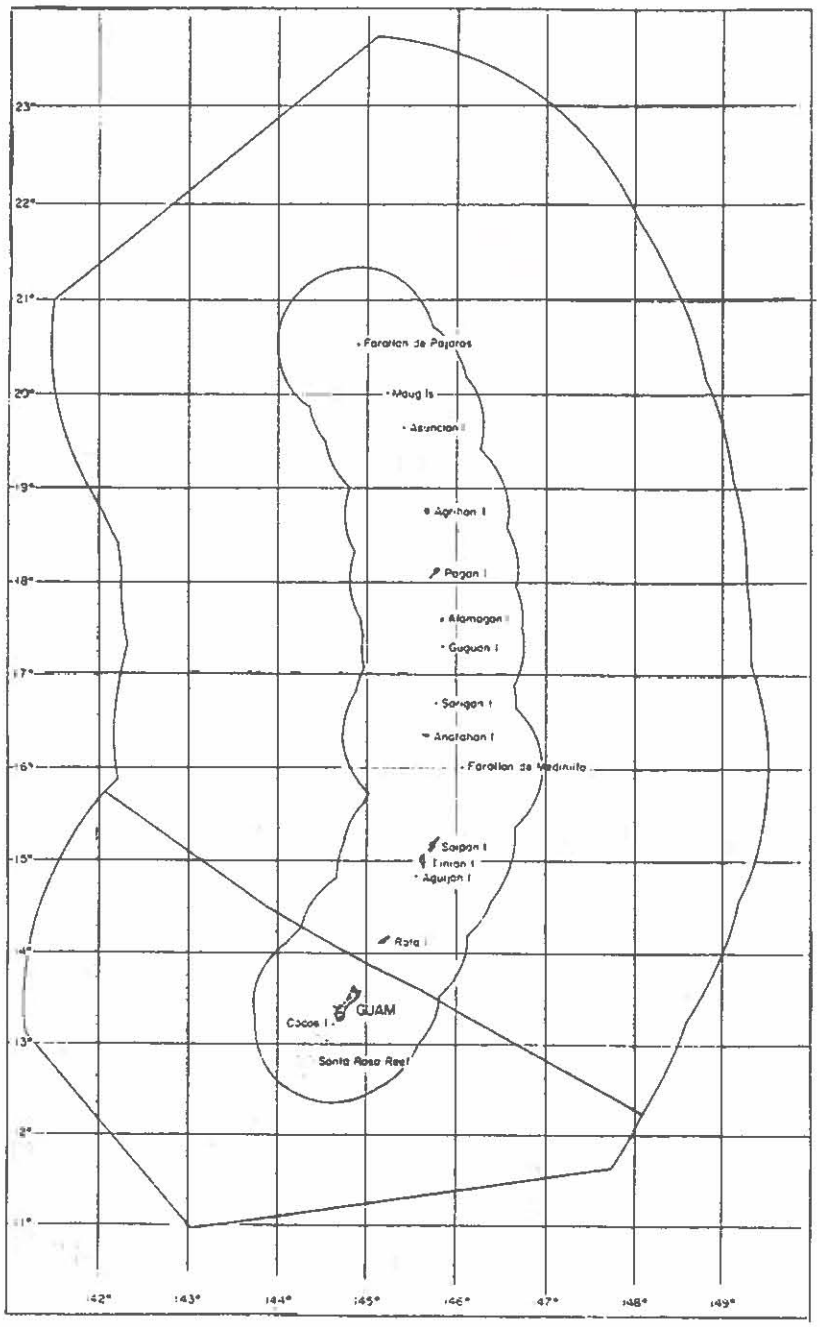


Figure 4-1. The 50-mile limits and the Fishery Conservation Zone around Guam and the Northern Mariana Islands.

Source: Marian Y. Y. Yong and Jerry A. Wetherall, Estimates of the Catch and Effort by Foreign Tuna Longliners and Baitboats in the Fishery Conservation Zone of the Central and Western Pacific, 1965-77, Southwest Fisheries Center Administrative Report No. H-80-4 (Honolulu: Southwest Fisheries Center, 1980): figure 4.

TABLE 4-1

NOMINAL CATCHES OF LONGLINE CAUGHT TUNAS AND BILLFISHES FROM THE 200-MILE ECONOMIC ZONES OF GUAM AND THE TRUST TERRITORIES FOR THE YEARS 1972-1976

	Effort*	YF	ALB	BE	OT	BILL	Total**	Total Tuna	C/U***
1972									
Japan	27,705,113	7499	455	7767	17	2147	17885	15738	0.65
Taiwan	163,452	979	1	52	0	3	1035	1032	0.95
Total	27,868,565	8478	456	7819	17	2150	18920	16770	0.65
1973									
Japan	25,715,185	8742	358	4959	23	2322	16404	14082	0.64
Taiwan	278,684	250	1	25	0	11	287	276	1.03
Total	25,993,870	8992	359	4984	23	2333	16691	14358	0.64
1974									
Japan	33,387,271	9421	781	6509	62	2150	18923	16773	0.57
Taiwan	1,236,065	495	183	218	0	43	939	896	0.76
Total	34,623,336	9916	964	6727	62	2193	19862	17669	0.57
1975									
Japan	33,762,526	9467	608	7316	13	1638	19042	17404	0.56
Korea	1,927,694	350	5	268	0	8	631	623	0.32
Taiwan	973,234	143	250	43	0	58	494	436	0.51
Total	36,663,454	9960	863	7627	13	1704	20167	18463	0.55

TABLE 4-1 CONTINUED

	Effort*	YF	ALB	BE	OT	BILL	Total**	Total Tuna	C/U***
1976									
Japan	30,343,875	10845	664	6470	29	1513	19521	18008	0.64
Korea	605,095	196	11	205	2	15	429	414	0.71
Taiwan	875,326	141	241	124	12	133	651	518	0.74
Total	31,824,296	11182	916	6799	43	1661	20601	18940	0.65

Source: W. L. Klawe, Estimates of Catches of Tunas and Billfishes by the Japanese, Korean and Taiwanese Longliners fron within the 200-mile Economic Zone of Member Countries of the South Pacific Commission, South Pacific Commission Occasional Paper No. 10 (Noumea: South Pacific Commission, 1978a):14-38; table 4.

* Units of effort in number of hooks
** All catches in metric tons
*** Kilograms per hook

YF = yellowfin
ALB = albacore
BE = bigeye
OT = skipjack and northern bluefin
BILL = marlins, sailfish, and swordfish

TABLE 4-2

ANNUAL JAPANESE TUNA CATCH AND EFFORT WITHIN 200 MILES OF GUAM AND THE COMMONWEALTH OF THE NORTHERN MARIANAS*

	Tuna Catch (metric tons)		Fishing Effort (vessel days)		Catch per Day (metric tons)	
	Guam	CNMI	Guam	CNMI	Guam	CNMI
1970	766	9270	315	2632	2.43	3.52
1971	453	13055	183	3667	2.48	3.56
1972	312	3257	138	2241	2.26	1.45
1973	278	7523	109	1836	2.55	4.10
1974	317	4993	340	1712	0.93	2.91
1975	1329	6795	484	2038	2.75	3.33
1976	1032	2930	785	1244	1.31	2.36
1977	4048	4822	1532	1986	2.64	2.43

Source: Compiled from data developed by Marian Y. Y. Yong and Jerry A. Wetherall, Estimates of the Catch and Effort by Foreign Tuna Longliners and Baitboats in the Fishery Conservation Zone of the Central and Western Pacific, 1965-77, Southwest Fisheries Center Administrative Report No. H-80-4 (Honolulu: Southwest Fisheries Center, 1980):tables 26,27,28,29, 30,31,32,33,77,78,79,80,81,82,83,84.

* Data includes longlining and pole-and-line catches and excludes purse seine catch

B. Facilities and Location

Public Law 7-48, passed in July 1963, allowed the transfer of Port operations from the Department of Commerce to the manager of the Commercial Port (Guam Legislature 1963). Today, the Port remains a semi-autonomous agency of the Government of Guam. The Port is classified as a public corporation, providing employment for some 760 individuals, full and part-time.

The Commercial Port is currently located on the western side of Guam, occupying thirty-three acres of land on Cabras Island. The Port is centrally located in the western Pacific. Distances to major alternative transshipment ports are as follows: 520 miles to Palau; 1187 miles to Rabaul, Papua New Guinea; 1352 miles to Tokyo; 1499 miles to Manila; 2177 miles to Espirtu Santo, New Hebrides; 2784 miles to Suva, Fiji; 3156 miles to Pago Pago, American Samoa; 3318 miles to Honolulu; and 5379 miles to San Diego (see figure 4-2).

Dock space measures 2650 feet (Bretschneider and Corwin 1972), with gantry crane service from docks F4 to F7. Support equipment pertinent to the discharge of tuna include a steel discharge ramp, cranes ranging in class from 35 tons to 250 tons, and a straddle carrier. The container yard currently has a capacity, with a mixture of twenty foot and forty foot containers stacked four high, of fifteen hundred containers. However, the yard has a bank of only 135 reefer plugs (Pecon 1979a), which limits the Port's storage capacity of refrigerated containers.

Within the Port's confines are approximately 1.5 million square feet of covered space. Included within the facilities are administration offices, transit sheds, maintainence and equipment service shops,

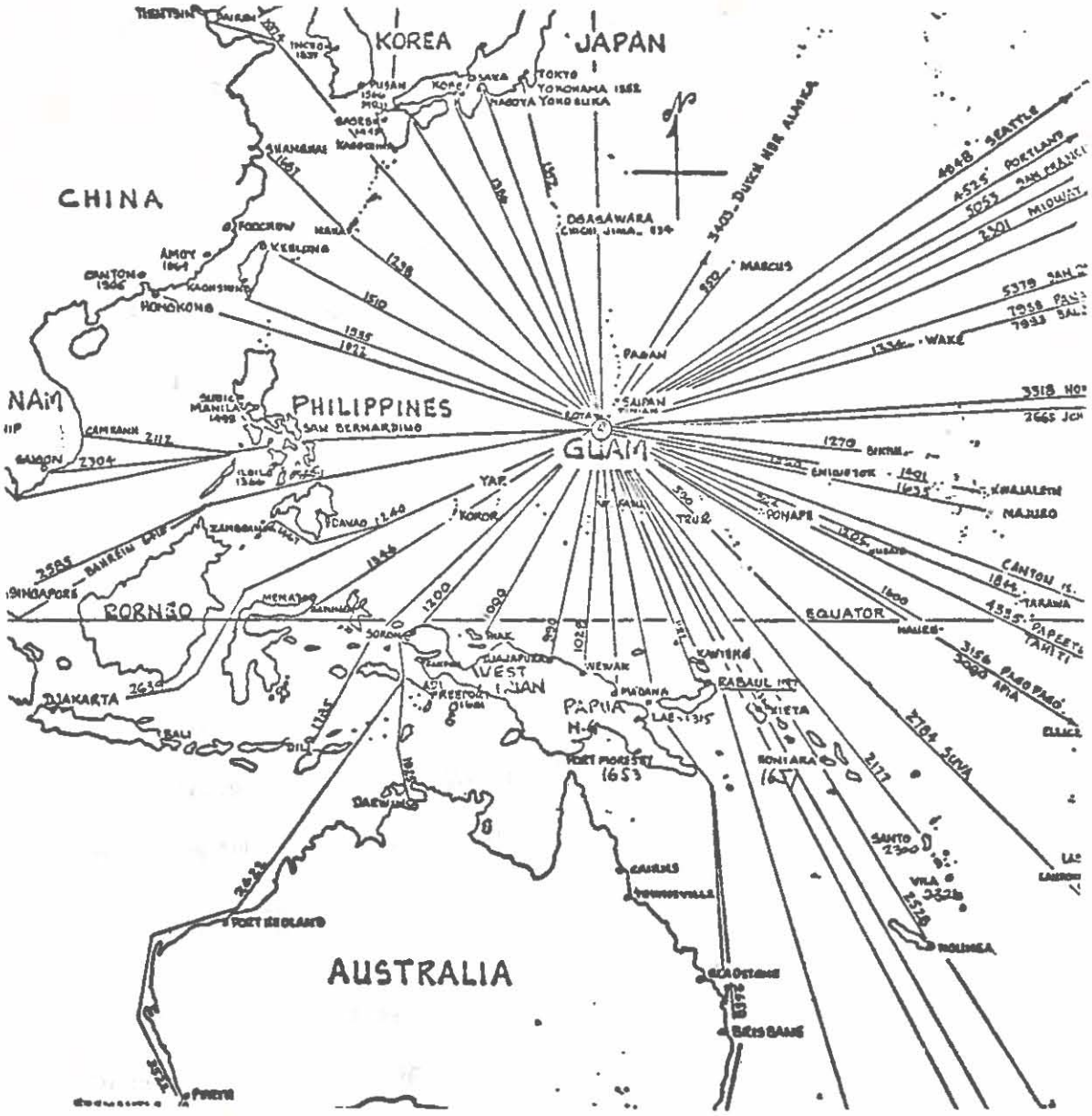


Figure 4-2. Guam's position in respect to other Pacific ports and islands.

Source: Atkins-Kroll (Guam) Ltd., Steamship Division, ["Guam's Position in Respect to Other Pacific Ports and Islands"] 1973. (Mimeographed).

and a supply warehouse (Bretschneider and Corwin 1972). In the industrial park surrounding the Port, space is leased to several petroleum companies, a development corporation, a moving company, several restaurants, and various maritime services (see figure 4-3).

Annual data on the number of vessels calling at the Port and the volume of cargo processed is presented in tables 4-3 and 4-4. In 1978, vessels arriving from Japan accounted for 26 percent of total arrivals; vessels from the United States represented 15 percent, inter-island vessels 32 percent, and vessels of other origins 27 percent. The volume of cargo processed through the Port has increased 69 percent from 1970 to 1978. During this same period, general transshipment activities for both tuna and non-tuna items have increased dramatically from 7917 tons to 206,588 tons (Government of Guam 1979).

C. Fees, Charges, and Administrative Procedures

Rates charged by Guam's Commercial Port for transshipment services are governed by two documents, the Terminal Tariff and a Special Cargo Handling Services Contract (see appendix A-3). The Contract was originally negotiated in 1975 between the Commercial Port of Guam, Island Navigation Co., Ltd., and Star-Kist Foods. Initially, this Contract was to expire after six months, and rates were set which at the time appeared to be competitive with other Pacific ports. However, the rates and conditions set forth are still adhered to for all tuna transshipment operations. Table 4-5 provides a list of current rates applicable to the transshipment of tuna and to vessels discharging such cargo.

The Contract states that the Commercial Port will provide dockside stevedores and other services as required to facilitate the

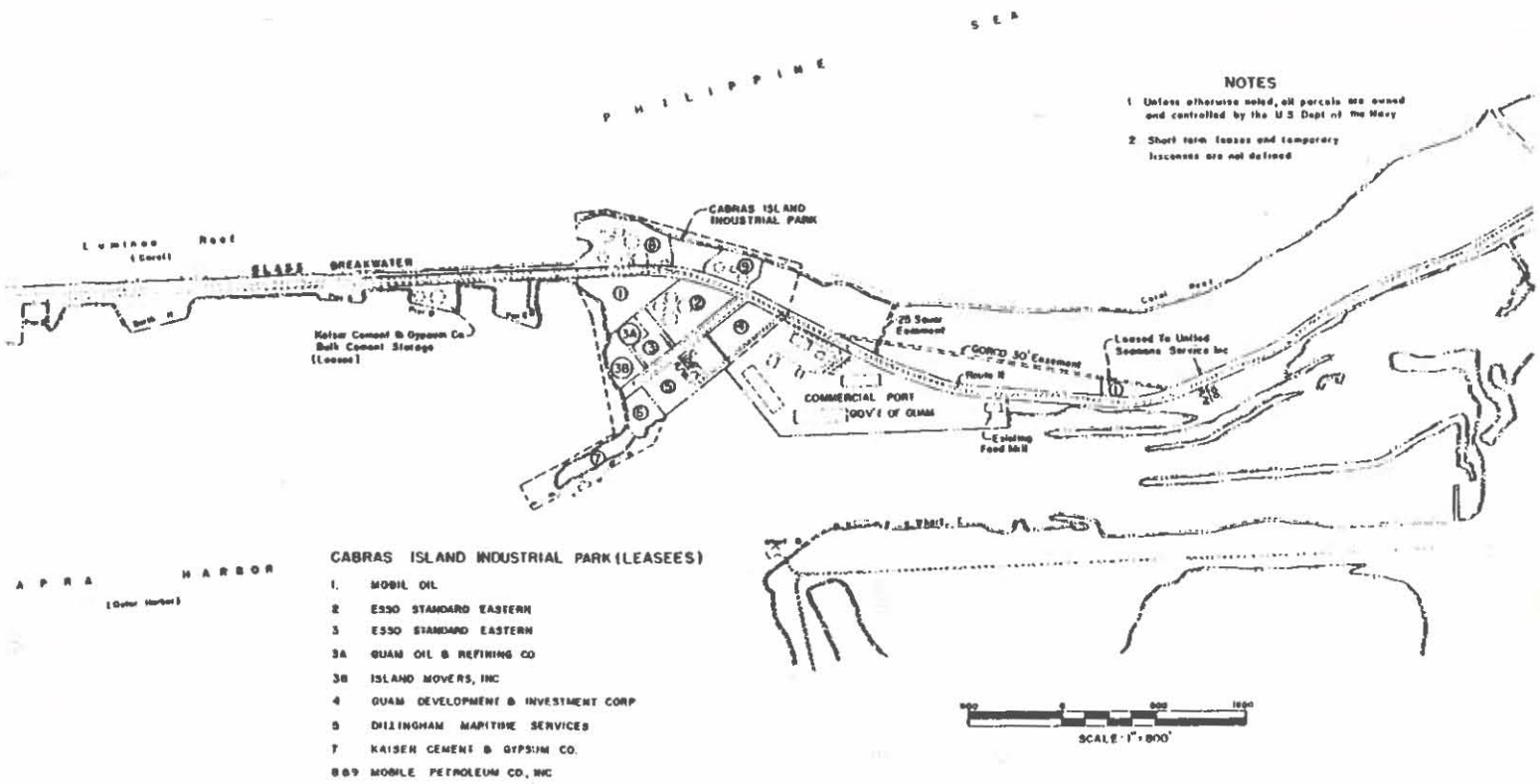


Figure 4-3. Industrial park facilities supporting Guam Commercial Port.

Source: Charles L. Bretschneider and T. J. Corwin, Jr., Master Plan-Commercial Port of Guam Phase I (Agana: Greenleaf/Telesca & Ahn, 1972):34; plate 3.

TABLE 4-3

VOLUME AND ORIGIN OF VESSELS CALLING AT
THE COMMERCIAL PORT OF GUAM
1970 - 1978

	Inter-Island	Japan	U. S.	Other	Total	Percent Change
1970	128	81	69	330	608	NA
1971	140	129	72	418	759	+25%
1972	156	158	44	471	829	+ 9%
1973	124	195	108	523	950	+15%
1974	152	227	110	477	966	+ 2%
1975	137	203	124	171	635	-34%
1976	197	201	159	263	820	+29%
1977	187	174	134	249	744	- 9%
1978	262	213	125	227	827	+11%

Source: Government of Guam, Dept. of Commerce, Economic Research Center, Annual Economic Review (Agana: E. R. C., 1979):97.

TABLE 4-4

METRIC TONS OF CARGO PROCESSED BY THE
COMMERCIAL PORT OF GUAM
1970 - 1978

	Unload	Load	Transship	Total	Percent Change
1970	370,097	63,791	7,917	441,805	NA
1971	560,742	77,168	16,562	654,472	+48%
1972	542,360	106,743	23,387	672,490	+ 3%
1973	608,068	71,617	126,035	805,714	+20%
1974	609,518	76,713	94,822	781,053	- 3%
1975	486,213	105,014	28,210	619,437	-21%
1976	401,674	110,019	116,207	627,900	+ 1%
1977	499,863	98,007	161,434	759,304	+21%
1978	466,557	71,617	206,388	744,562	- 2%

Source: Government of Guam, Dept. of Commerce, Economic Research Center, Annual Economic Review (Agana: E. R. C., 1979):97.

TABLE 4-5

SCHEDULE OF RATES CHARGED BY THE PORT AUTHORITY OF GUAM FOR OPERATIONS ASSOCIATED WITH THE TRANSSHIPMENT OF TUNA

Wharfage		
minimum fee		$ 1.24
rate per revenue ton		1.24
Bunkerage		
per gallon marine diesel oil		0.005
Entry		
1000 gross tons & under		8.00
1000 - 2000 gross tons		16.00
Dockage (per 24 hours)		
Overall Length		
0.00 - 30.48 meters		18.00
30.48 - 45.72		27.00
45.72 - 60.96		35.00
60.96 - 91.44		88.00
91.44 - 106.68		123.00
Equipment Rental (per hour)		
	minimum	
crane, P&H 250	2 hours	250.00
Manitowoc 140	2 hours	140.00
crane, P&H 35	2 hours	35.00
crane, P&H 40	2 hours	40.00

Water	
per metered ton	$ 0.40
Stevedoring (per short ton)	
Short tons discharged per day	
1-50	8.00
50-80	7.00
80 tons and over	6.00
Special Services (Per person, per hour)	
stevedoring	9.30
line handling	9.30
detention	9.30
cancellation	9.30
Demurrage (per container, per day)	
20 foot container	5.00
27 foot container	7.00
40 foot container	10.00
Transshipment cargo is entitled to free time until the first available vessel leaves port.	

Sources: Port Authority of Guam, Board of Directors, Terminal Tariff (Agana: P. A. G., Aug. 4, 1977): 5,6,8,9,10,11,17,20,21.

Port Authority of Guam, "Special Cargo Stevedoring Services Between Star-Kist Foods, Inc., & Island Navigation Co., Ltd., and Commercial Port of Guam," 1975. (Mimeographed.)

transshipment process. Wharfage charges are billed to the outbound carrier transporting the containerized tuna to the buyer.

Stevedoring charges for the discharge of tuna during a normal eight hour day are $8.00 per short ton for one to fifty tons discharged per day, $7.00 per short ton for fifty to eighty tons discharged, and $6.00 per short ton for eighty tons and over. When overtime is warranted, the Contract states that the buyer of the tuna will be responsible for the difference between straight-time and overtime for personnel assigned to discharge operations.

The Port reserves the right to implement a special services stevedoring rate in circumstances when less than thirty short tons are discharged per day. This prerogative has been instituted only twice in the last two years (Cruz 1979). In such instances, the special services rate has been $9.30 per hour per stevedore. This rate is the same rate charged for all other non-tuna related stevedore activity at the Port (Port Authority of Guam 1977). Stevedore charges are billed by the Port to the vessel agent who in turn bills the buyer of the tuna.

In addition to stevedoring charges, fees related to the use of all auxiliary equipment in the tuna transshipping operations are also borne by the buyer of the tuna. Demurrage fees are charged to the buyer in instances when the tuna filled container does not leave the container storage yard on the first available outbound vessel.

Other fees billed by the Port to the vessel agent include: dockage fees for the vessel's use of berth space; bunkerage, for utilization of the Port's fueling facilities; charges for fresh water taken on board by the vessels; and a fee levied for entering the Port. All Port fees, with the exception of wharfage, are billed to the vessel

agent who in turn bills either the vessel owner or the buyer of the tuna. Wharfage is billed directly to the company handling the outbound carrier, who in turn bills the tuna buyer.

Administrative activities surrounding tuna transshipment are initiated through the "Notices of Vessel Arrival" distributed to the offices of stevedore services and harbor master by the transshipping agents. The harbor master requires advance notice of arrival in order to adequately apportion dock space required by the vessel. Stevedore services requires at least forty-eight hours notice in order to assemble gangs and equipment.

Three primary divisions are involved in the billing process that ensues after the actual transshipment activity terminates. The harbor master's office compiles charges related to dockage, entry, bunkerage, and water services. The service and production division compiles charges accrued in the categories of stevedoring, equipment rental, and special services. The terminal department records all expenses associated with the containerized cargo.

The reports of all these departments are assembled by the billing department of the Commercial Port into an itemized bill. The vessel agent receives three copies and two copies are sent to the general accounting department. Normally, a total of three to five weeks elapse after vessel departure before a bill for Port services is compiled and presented to the agent for payment (Concepcion and Pecon 1979).

CHAPTER V

ANALYSIS OF TUNA TRANSSHIPMENT AT GUAM COMMERCIAL PORT

A. Volume and Seasonality

From May, 1974 through August, 1979, a total of 57,077 metric tons of tuna have been transshipped through Guam (see table 5-1). Transshipment volume is presented graphically in figure 5-1.

A log-linear trend fitted to the data produces an estimated monthly compound growth rate of 2.55 percent. However, application of a twelve month moving average to the data reveals a decrease in volume transshipped since January, 1978.

The tuna fishing season is known to run from May through October in the area surrounding Guam and the Northern Marianas. In order to discern whether variations in tuna transshipment commerce are dependent upon the tuna fishing season, analysis of variation was undertaken utilizing seasonal dummy variables. Results implied that statistically significant seasonal patterns in transshipment were absent. It can be concluded that fluctuations in tuna transshipment are caused by factors other than seasonal patterns of tuna abundance proximal to Guam.

B. A Profile of Tuna Vessels Entering Guam

During the period from Feburary through August, 1979, observations were compiled in order to obtain a profile of fishing and carrier vessels entering the Port, reasons for entry, and estimates of potential transshipment commerce.

TABLE 5-1

MONTHLY TONNAGES OF TUNA TRANSSHIPPED THROUGH GUAM
MAY, 1974 - AUGUST, 1979
(Tuna Tonnages in Metric Tons)

	1974	1975	1976	1977	1978	1979
January	NA	281.31	1,118.06	720.40	1,286.93	1,445.01
February	NA	113.43	277.86	954.26	671.60	958.33*
March	NA	9.07	576.59	1,354.81	1,901.63	1,546.63*
April	NA	226.86	0.00	1,785.30	1,341.38	1,226.52*
May	299.46	953.90	519.24	415.52	1,654.99	283.75*
June	598.91	423.05	765.43	655.17	975.50	746.96*
July	644.20	2,290.29	661.07	701.91	1,398.73	278.27*
August	653.36	643.56	923.14	756.17	1,364.07	1,053.81*
September	807.62	428.49	790.11	1,158.26	822.50	NA
October	612.52	1,099.91	1,494.65	1,518.60	1,056.90	NA
November	490.94	1,049.91	2,157.80	1,381.58	289.02	NA
December	435.57	707.35	447.91	1,222.87	2,257.80	NA
Total	4,532.58	7,627.13	9,731.86	12,624.85	15,021.05	7,539.28

Sources: Port Authority of Guam, "Tuna Tonnage [1975 - 1978]," 1979a. (Mimeographed.)
Van Camp Guam,["Van Camp Tuna Transshipped from Guam"], 1979. (Mimeographed.)

* Assembled from project data

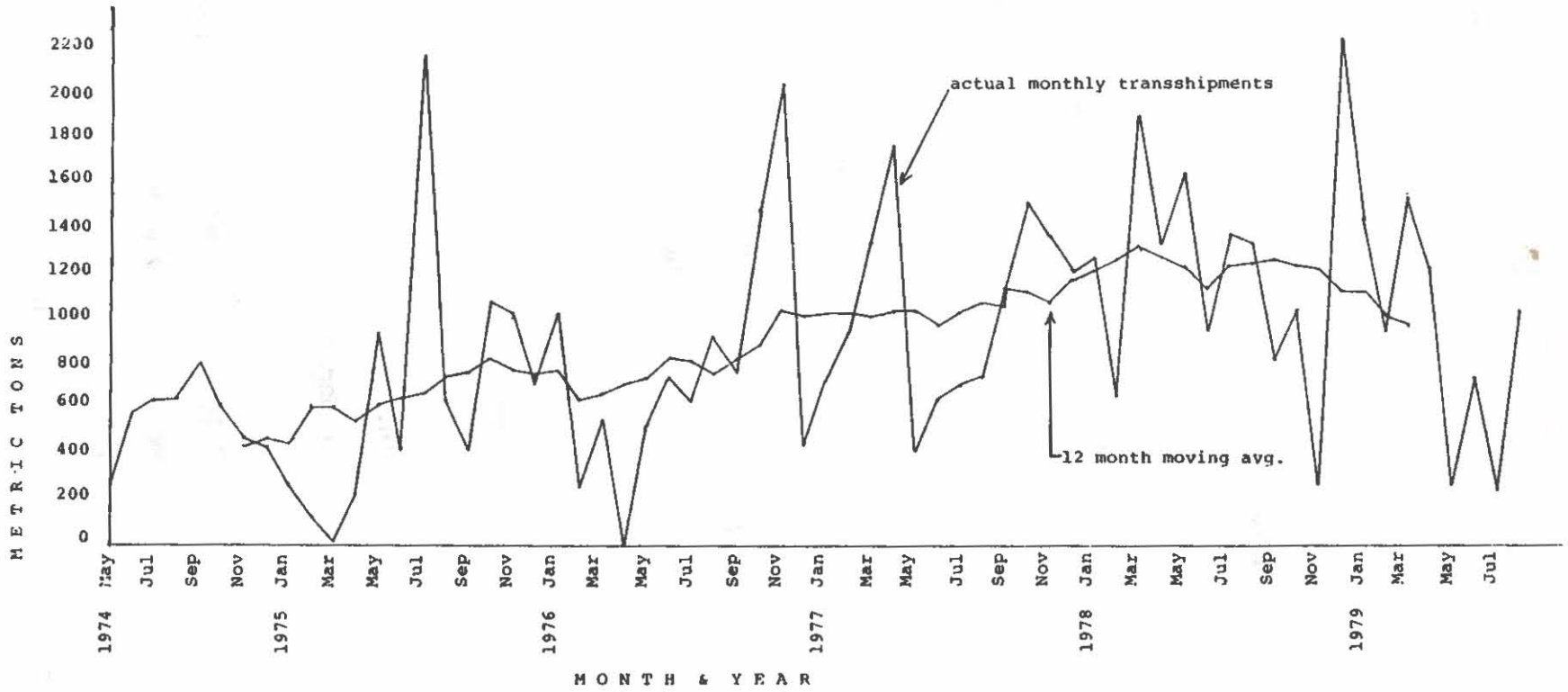


Figure 5-1. Monthly tonnages of tuna transshipped from Guam; May, 1974 - August, 1979.

There are two major sources of data. The "Harbor Master's Daily Memorandum of Vessel Movement" provides information on arrivals and departures, gross tons, overall length, and reasons for visit. The "Notices of Vessel Arrival", supplied by the vessels' agents, serve as a source for crew nationality, crew size, vessel flag, net tons, and as a cross reference for gross tons, overall length, and reason for visit.

A total of 165 fishing and carrier vessels entered the Commercial Port of Guam during the observation period. Data on each vessel was arranged according to month of arrival. If a vessel arrived during one month and departed during another, the days spent in port were apportioned between the months affected (see table 5-2).

Vessels arriving for purposes other than transshipment or transfer of fish accounted for 83 percent of the fishing and carrier vessel activity. Transshipping vessels accounted for only 14 percent of all activity, while vessels engaging in the transfer of fish represented 4 percent of the total arrivals. Transfer occurs when tuna is moved from fishing vessels to motherships without crossing over the docks. Transfer is accomplished without the aid of Port employed stevedores.

Vessels of six different nations, Japan, Panama, Korea, the United States, the Trust Territories, and the Netherlands, entered the Port during the sample period. Of these nations, the Japanese flag predominated, representing 78 percent of all arriving fishing and carrier vessels.

The vast majority of the fishing and carrier vessels observed during the sample period were operated by either Japanese or Korean crews. Only 4 percent of the crews were from the United States. The mean number of crew members per vessel averaged 15.82 persons. Average

TABLE 5-2

DESCRIPTIVE CHARACTERISTICS OF 165 FISHING AND CARRIER VESSELS
CALLING AT THE COMMERCIAL PORT OF GUAM
FEBRUARY - AUGUST, 1979

	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.
No. Vessels	17	16	21	21	25	31	34
Vessel Flag							
Japan	8	14	15	17	20	26	29
Panama	5	0	1	1	0	2	2
Korea	3	2	5	2	3	1	1
U. S.	1	0	0	1	1	2	1
T. T.	0	0	0	0	0	0	1
Netherlands	0	0	0	0	1	0	0
Mean Gross Tons	283.99	222.42	181.74	209.81	196.89	212.08	169.82
Mean Net Tons	171.75	111.16	88.89	103.65	98.17	97.20	77.94
Mean Overall							
Length (meters)	43.34	39.15	35.18	32.61	33.60	32.39	31.76
Mean Days in Port	4.97	3.69	3.90	3.52	3.68	3.87	3.55
Mean Crew Size	17.65	14.75	16.43	16.00	15.32	15.65	15.44
Crew Nationality							
Japanese	48%	88%	64%	70%	66%	78%	78%
Korean	47%	12%	36%	25%	27%	12%	17%
U. S.	5%	0%	0%	5%	7%	10%	5%
Reason for Visit							
Transship	6	4	2	1	4	1	3
Transfer	3	0	0	1	3	0	0
Other	8	12	19	19	18	30	31

length of stay was 3.78 days, ranging from 4.97 days per vessel in February to 3.52 days per vessel in May. The typical vessel during the sample period possessed ratings of 205.36 gross tons and 102.18 net tons. The average length was 34.60 meters.

The data seem to indicate a trend toward a greater proportion of smaller vessels during the summer months. Observation over a longer time period will be needed in order to confirm that this is in fact an annual pattern.

1. Non-transshipping Vessels

From February through August, 1979, a total of 137 fishing and carrier vessels entered the Port for reasons other than the transshipment or transfer of tuna (see table 5-3).

By far the most prevalent reason for vessel visits was bunkerage. Over ninety percent of all vessels entering the Port listed bunkerage as one of the reasons for the call. Of these, 64 percent reported bunkerage as the only motive for entry. Of the vessels listing more than one motive for entry, 7 percent arrived for bunkers and repairs, 9 percent for bunkers and provisions, and 11 percent for bunkers and water. Only eleven ships, 9 percent of the total arriving during the sample period, reported needs other than bunkers: seven arrived for repairs, one for provisions, one for water, and two for miscellaneous purposes.

Japanese flag vessels dominated the fishing and carrier vessels entering the Port for purposes other than transshipment or transfer of tuna, accounting for 87 percent of the total. Non-transshipping vessels spent an average of 2.88 days in port per visit.

TABLE 5-3

DESCRIPTIVE CHARACTERISTICS OF 137 FISHING AND CARRIER VESSELS
ARRIVING AT THE COMMERCIAL PORT OF GUAM FOR PURPOSES
OTHER THAN THE TRANSSHIPMENT OR TRANSFER OF TUNA
FEBRUARY - AUGUST, 1979

	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.
No. Vessels	8	12	19	19	18	30	31
Vessel Flag							
Japan	6	12	15	16	17	26	27
Panama	2	0	1	1	0	2	2
Korea	0	0	3	1	0	0	0
U. S.	0	0	0	1	1	2	1
T. T.	0	0	0	0	0	0	1
Mean Gross Tons	201.39	136.28	152.24	194.56	145.46	204.14	140.34
Mean Net Tons	90.32	63.33	71.04	93.74	63.42	92.94	62.53
Mean Deadweight Tons	225.80	158.32	178.91	234.36	158.55	232.34	156.32
Mean Overall Length (meters)	36.26	29.72	33.11	31.50	27.90	32.18	29.66
Mean Days in Port	2.63	1.92	2.53	3.57	3.06	2.80	3.19
Mean Crew Size	18.63	14.25	16.68	15.95	14.72	15.60	15.23
Crew Nationality							
Japanese	71.1%	100.0%	69.7%	77.2%	90.2%	81.2%	80.1%
Korean	28.9%	0.0%	30.3%	16.9%	0.0%	8.1%	14.4%
U. S.	0.0%	0.0%	0.0%	5.9%	9.8%	10.7%	5.5%

TABLE 5-3 CONTINUED

	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.
Reason(s) for Visit*							
B	6	8	9	11	13	20	20
BR	2	1	1	2	2	1	1
BP	0	1	1	1	0	5	5
BW	0	2	7	2	1	1	2
R	0	0	1	3	1	0	2
P	0	0	0	0	0	1	0
W	0	0	0	0	0	1	0
O	0	0	0	0	1	0	1

* B = bunker
BR = bunker and repair
BP = bunker and provisions
BW = bunker and water
R = repair
P = provision
W = water
O = other

Japanese crews represented 81 percent of the total crew members on non-transshipping vessels. Koreans accounted for 13 percent and the United States 6 percent of all crew members. The average non-transshipping vessel during the sample period was 167.36 gross tons, had an overall length of 31.11 meters, and carried 14.2 crew members.

An estimate of potential transshipment commerce can be derived by considering the deadweight tonnage of vessel entering the Port but not transshipping tuna. By definition (Bradford 1944), deadweight tonnage is the carrying capacity of the vessel in actual tons, less fuel and stores. This can be best estimated by multiplying the vessel's net ton rating by a factor of 2.5. The typical vessel entering Guam during the period possessed a deadweight tonnage, or fish carrying capacity, of 191.45 tons. During the entire observation period, vessels calling on the Port for reasons other than the transshipment or transfer of tuna possessed a cumulative deadweight tonnage of 26,228.65 metric tons. However, given the records kept by the various sources consulted, there was no way of ascertaining the exact tonnage of fish actually on board these non-transshipping vessels at the time of their Port calls.

2. Transshipping Vessels

A total of twenty-one vessels transshipped tuna at the Commercial Port of Guam from February through August, 1979. As can be seen from table 5-4, February was the most active month; other months during the sample period experienced extremely low levels of transshipment activity. Purse seiners represented 52 percent of all transshipping vessels. The remainder were carriers, or reefers. Longline vessels were absent from the population during the sample period.

TABLE 5-4

VESSELS TRANSSHIPPING TUNA THROUGH THE COMMERCIAL PORT OF GUAM
FEBRUARY - AUGUST, 1979

	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.
No. Vessels	6	4	2	1	4	1	3
Vessel Type							
Purse Seiner	4	2	0	0	1	1	2
Carrier	2	2	2	1	3	0	1
Vessel Flag							
Japan	2	2	0	1	2	0	2
Panama	3	1	1	0	1	1	0
Korea	0	1	1	0	0	0	1
U. S.	1	0	0	0	0	0	0
Netherlands	0	0	0	0	1	0	0
Country of Registry							
Japan	2	2	0	1	2	0	2
Puerto Rico	1	0	0	0	0	0	0
Panama	2	0	0	0	1	1	0
PNG	1	1	1	0	0	0	0
Korea	0	1	1	0	0	0	1
Curacao	0	0	0	0	1	0	0
Crew Nationality							
Japanese	59%	57%	0%	100%	52%	0%	72%
Korean	28%	43%	100%	0%	48%	100%	28%
U. S.	13%	0%	0%	0%	0%	0%	0%

Japanese flags were flown by 43 percent of all transshipping vessels; 33 percent flew the flag of Panama. Others represented were Korea, the United States, and the Netherlands. Vessels reported ports of registry in six countries. Those home ported in Japan represented the majority, comprising 43 percent of all transshipping vessels. Other ports of registry included Korea, Papua New Guinea, Puerto Rico, and Curacao. Crew members of transshipping vessels were either Japanese, Korean, or American. Korean crew members accounted for 51 percent of all crewmen, with the Japanese representing 47 percent and the Americans 4 percent.

Table 5-5 presents descriptive statistics of vessels transshipping tuna during the sample period. The average transshipping vessel remained in port 10.52 days. However, duration of Port stay was erratic, ranging from a minimum of two days to a maximum of forty-one days. Crew size ranged from a high of twenty-one to a low of eight persons, and averaged 15.33 crew members per vessel.

Transshipments of tuna ranged from 480.97 metric tons to 13.58 tons, averaging 294.76 tons per vessel. The typical transshipping vessel had ratings of 473.44 gross tons and 246.91 net tons. Transshipping vessels averaged 50.84 meters in overall length.

When comparing transshipping vessels with non-transshipping vessels, it appears that vessels transshipping tuna at the Commercial Port of Guam are larger, spend a longer time in port, and are operated by larger crews.

TABLE 5-5

DESCRIPTIVE STATISTICS OF VESSELS TRANSSHIPPING TUNA
THROUGH THE COMMERCIAL PORT OF GUAM
FEBRUARY - AUGUST, 1979

	Symb.	Units	Mean	Median	Maximum	Minimum	Std. Dev.	Coef. of Var.
Gross Tons	G	tons	473.44	497.00	898.00	299.89	112.93	0.24
Net Tons	N	tons	246.91	225.00	496.00	170.06	66.52	0.27
Overall Length	OL	meters	50.84	50.99	59.13	38.71	5.95	0.12
Crew Size	C	persons	15.33	15.00	21.00	8.00	3.64	0.24
Days in Port	DP	days	10.52	8.00	41.00	2.00	8.67	0.82
Tons of Tuna								
Transshipped	TD	tons	294.76	292.96	480.97	13.58	127.19	0.43
Skipjack			253.97	269.91	464.29	13.58	112.71	0.44
Yellowfin			38.82	16.68	159.71	0.00	53.36	3.21
Disbursements*	D	dollars	56,954	53,462	103,353	28,555	22,333	0.39

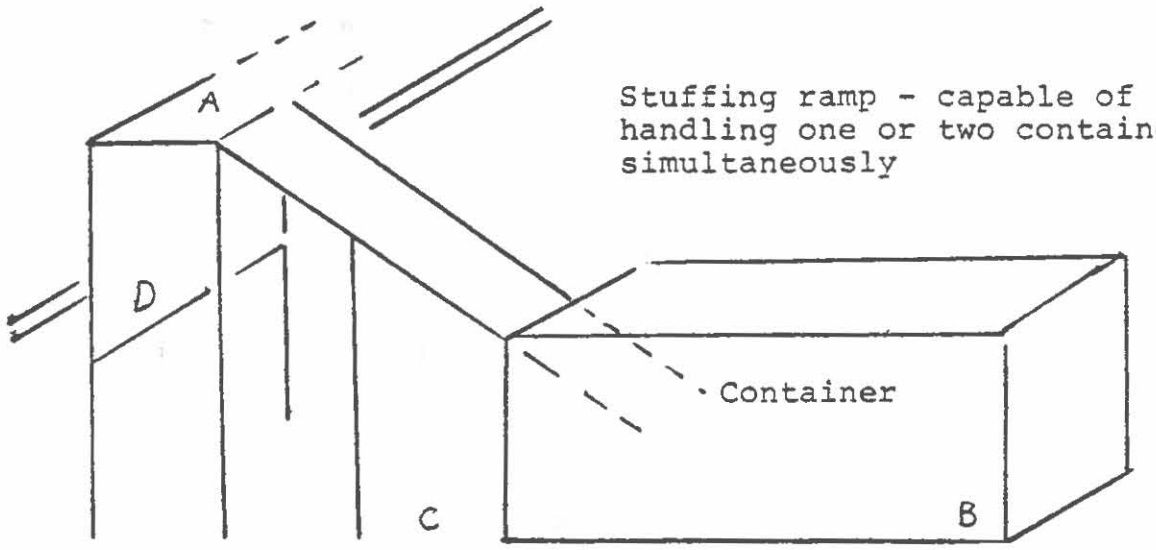
* Rounded off to the nearest dollar

C. Discharge Operations

Three groups of laborers engage in the discharge of tuna into refrigerated containers. These are the vessel crew, stevedores, and support personnel. The primary function of the vessel crew is the loading of fish from the ship's hold into either nets or buckets, which are then hoisted by the vessel winch or shoreside winch onto the dockside stuffing ramp. The stevedores remove the tuna from the nets or buckets and stuff the fish down the stuffing ramp and into reefers. Support personnel include supervisors and equipment operators.

The vessel crew operates in three positions. The bulk of the crew per shift work in the ship's hold, separating the frozen tuna and loading them into either vessel owned nets or false-bottomed buckets. These receptacles are lifted, when filled, by a winch onto the dockside stuffing ramp. One crew member operates the vessel winch and one additional crew member per hatch acts as signalman, alerting the winchman as to when to raise the filled container from the hold.

During transshipment operations, four designated posts are occupied by the longshoremen: stuff, level, custodian, and rest (see figure 5-2). Stevedores at the stuff level are positioned atop a ramp leading into the reefer. Workers at this post clear the containers carrying the fish from the vessel and subsequently stuff the fish down the ramp and into the container by means of a wooden broom. Longshoremen inside the container level the cargo within each container. A custodian polices the grounds surrounding the loading and retrieves fish spilled during the loading process. The remainder of the gang is at the rest position. These persons relieve the longshoremen inside the reefer every thirty to forty-five minutes.



A: Stuff position - stevedores who clear nets or buckets and use wooden brooms to stuff frozen tuna down the ramp and into the container. Position is occupied by two persons, whether only one container is loaded or a pair is loaded simultaneously.

B: Level position - stevedores who even out the cargo within the container. Stevedores in this position generally do not begin work until the container is approximately one fourth full. Every thirty to forty-five minutes, they rotate with the longshoremen at rest in position D. Two workers are normally inside each container.

C: Custodian position - stevedores responsible for container area cleanup, including retrieval of all fish spilled off the ramp during the operation.

D: Rest position - stevedores at rest between shifts in the container.

Figure 5-2. Dockside functional layout and activity positions.

Stevedore gangs are under the immediate supervision of the longshoreman leadingman, who works with the longshoremen in the loading of cargo. A longshoreman leadingman must have at least one year of experience as a longshoreman and may be either a regular or casual employee.

The Port employs ninety-seven stevedores, forty-five regular stevedores and fifty-two casual stevedores, at an average rate of $4.80 per hour and $4.30 per hour, respectively (see appendix A-4) (Pecon 1979b). Approximately 80 percent of all stevedores are experienced in tuna transshipment operations (Cruz 1979).

Casual stevedores work only on an as-needed basis, while regular longshoremen work a forty hour work week. Regular stevedores are utilized in tuna transshipment only if the Port can find no other work for them. Casual gangs are chosen for transshipment operations from those personnel who have accrued the least number of hours during the pay period (Cruz 1979). All gangs are rotated on a daily basis.

Support personnel include construction operators IV, crane and shoreside winch operators, and the cargo handling supervisor. A construction worker IV operates the hystainer and tractor as required to move, weigh, and store the containers. The crane operators run heavy cranes, moving full containers from dockside to waiting trailers, and position empty containers at dockside.

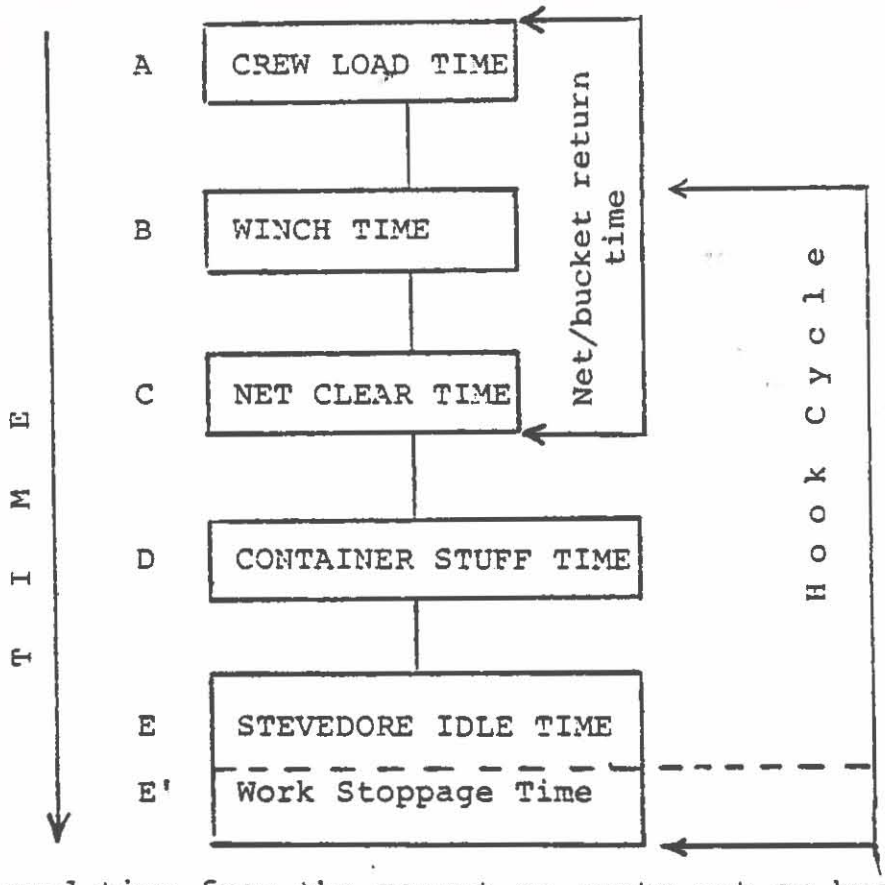
The winchman operates the dockside winch, when required, facilitating the discharge of tuna from the vessel to the container. Port employed winchmen are used when a vessel discharges cargo from two or more holds simultaneously and when the vessel's winch malfunctions. All Port personnel working in the tuna transshipping operation are under

the supervision of the cargo handling supervisor. He ensures that the gangs work harmoniously, that cargo is handled properly, and safety procedures are adhered to. He also maintains smooth relations between gangs, vessel crews, agents, and Port customers.

D. Labor Productivity During Discharge

In order to analyze labor productivity, the tuna discharge process was divided into several parts. Hook cycle is defined as the elapsed time from the moment a tuna filled net or bucket emerges from the vessel hold until it again emerges with another load. The hook cycle is divided into four parts: winch time, net clear time, container stuff time, and stevedore idle time. The time sequence of discharge operations is presented in figure 5-3.

Winch time, which initiates the hook cycle, consists of the time consumed in transporting a tuna filled net or bucket from the vessel hold to the dockside stuffing ramp. Net clear time represents the length of time taken by stevedores to open the net or bucket and clear it of fish. Container stuff time refers to the time taken by the stevedores to move the fish down the ramp and into the container. Stevedore idle time represents the period that stevedores are idle from the end of stuffing until the initiation of the next hook cycle. A component of stevedore idle time is work stoppage time. This type of interruption occurs when stevedores inside the container require more time to distribute the tuna within the reefer. Crew load time is defined as the time elapsed from the moment an empty net or bucket enters the hold until it emerges full of fish.



A; Elapsed time from the moment an empty net or bucket enters the hold until it emerges full of fish. Average time is 1.15 minutes per cycle.

B: Elapsed time consumed in transporting a tuna filled net or bucket from the vessel hold to the dockside stuffing ramp. Average time is 0.60 minutes per cycle.

C: Elapsed time taken to open the net or bucket and clear it of fish. Average time is 0.35 minutes per cycle.

D: Elapsed time needed to propel the fish down the container ramp and stuff them into the container. Average time is 0.44 minutes per cycle.

E: Elapsed time while stevedores wait for a new net or bucket of fish to emerge from the vessel hold. Average time is 1.06 minutes per cycle.

E': Elapsed time during interruption of the hook cycle, which occurs when stevedores inside the container require more time to distribute the tuna within the containers. Average time is 0.16 minutes per cycle.

Figure 5-3. Work components timed during tuna discharge operations at the Commercial Port of Guam.

From February through August, 1979, the discharge operations of eleven fishing and carrier vessels were observed. Components of the discharge process were measured for twenty-two containers holding 396 metric tons of tuna and encompassing 749 complete hook cycles.

Japanese crews were aboard five of the observed vessels, while Korean crews operated the remaining six vessels. Five of the observed vessels were purse seiners and six vessels were carriers. Tuna was discharged from two or more holds simultaneously by four of the observed vessels; the remaining seven vessels discharged fish from one hold. Thirty-eight percent of all gangs were comprised either totally or predominately of regular stevedores, while the remaining gangs were entirely or primarily composed of casual employees.

Table 5-6 provides a summary of data gathered from observations of tuna transshipment operations during the sample period. It should be noted that measurements for hook cycle and its components are on a per container basis. Average times per cycle are given in figure 5-3. Table 5-7 illustrates measures of association between selected variables and metric tons discharged per hour.

In an attempt to further isolate those variables which have the greatest impact upon discharge rates, as measured by metric tons of tuna discharged per hour, the following model was hypothesized:

$$MT = \beta_1 + \beta_2 GS + \beta_3 GC + \beta_4 NC + \beta_5 H + \beta_6 HC + e \qquad (1)$$

where,

TABLE 5-6

DESCRIPTIVE STATISTICS OF TUNA DISCHARGE OPERATIONS AT
GUAM COMMERCIAL PORT
FEBRUARY - AUGUST, 1979

	Units	Mean	Median	Maximum	Minimum	Std. Dev.	Coef. of Var.
Tons Transshipped per Ctr.	MT	18.03	18.36	21.84	10.44	2.44	0.14
Tons Discharged per Hour	MT	14.18	13.82	25.58	7.83	4.14	0.29
One Hold Operations	MT	12.69	13.16	15.48	7.83	2.47	0.19
Two Hold Operations	MT	15.98	14.64	25.58	8.29	5.08	0.32
Vessel Crew per Shift	persons	9.64	8.00	15.00	6.00	3.61	0.37
Stevedores per Gang	persons	8.87	9.00	11.00	5.00	1.22	0.14
No. Cycles per Ctr.	nets	34.05	35.00	47.00	23.00	5.36	0.16
Tons per Net/Bucket	MT	0.53	0.54	0.83	0.37	0.12	0.23
Hook Cycle*	hours	1.38	1.29	2.43	0.78	0.45	0.32
Vessel Crew Load Time	hours	0.62	0.42	2.06	0.11	0.53	0.88
Winch Time	hours	0.34	0.31	0.55	0.23	0.10	0.28
Net Clear Time	hours	0.20	0.11	0.29	0.12	0.05	0.26
Ctr. Stuff Time	hours	0.26	0.23	0.56	0.13	0.11	0.43
Stevedore Idle Time	hours	0.59	0.41	1.91	0.20	0.48	0.83
Work Stoppage Time	hours	0.09	0.08	0.36	0.00	0.11	1.22
Fish Spillage per Ctr.	fish	65.00	56.00	315.00	11.00	63.45	0.98

* Hook cycle and its component times are listed on a per container basis

TABLE 5-7

CORRELATION COEFFICIENTS OF SELECTED VARIABLES
ASSOCIATED WITH THE DISCHARGE VOLUME
AT GUAM COMMERCIAL PORT
FEBRUARY - AUGUST, 1979

	Correlation with Metric Tons Discharged per Hour
Stevedore Gang Size (GS)	-0.005
Vessel Crew Size (CS)	0.610*
Hook Cycle (HC)	-0.658*
Winch Time (W)	0.214
Net Clear Time (C)	-0.444*
Container Stuff Time (S)	-0.330
Stevedore Idle Time (I)	-0.659*
Crew Load Time (L)	-0.662*
Work Stoppage Time (WS)	-0.247

* Significant at the 0.05 level

MT = Discharge rates, measured in metric tons of tuna discharged per hour

GS = Stevedore gang size

NC = Dummy variable representing nationality of vessel crew

1 = Japanese

0 = Korean

H = Dummy variable representing number of hatches being discharged simulataneously

1 = Simulataneous discharge from two or more holds

0 = Discharge from a single hold

GC = Dummy variable representing composition of stevedore gang

1 = Casual

0 = Regular

HC = Hook cycle, measured in minutes

e = Error term, accounting for variation in MT explained by variables excluded from the model

Because of the abnormally low level of tuna transshipment activity during the sample period, sample size was smaller than anticipated. A high degree of collinearity was discovered among several potential independent variables. Specifically, purse seiners were associated with larger Japanese crews, casual stevedore gangs, and the practice of discharging from two or more vessel holds at a time. Carriers were highly associated with smaller Korean crews, regular stevedore gangs, and discharge from a single hold. As a result of these relationships, crew nationality, gang composition, and number of holds discharged could not be simultaneously used in estimating parameters for equation (1).

When crew nationality and number of holds are omitted from equation (1), the use of ordinary least squares estimation methods yields the following equation:

$$MT = \underset{}{16.75} + \underset{(0.312)}{0.168GS} + \underset{(1.940)}{2.66GC} - \underset{(-4.013)}{2.157HC} + e \qquad (1\text{-a})$$

$$R^2 = 0.5317$$

$$\bar{R}^2 = 0.4536$$

$$F = 6.8119$$

$$n = 22$$

Bracketed figures represent t-values associated with the coefficients.

The adjusted coefficient of determination ($\bar{R}^2$) indicates that 45.36 percent of the variation in production can be accounted for by those variables contained within equation (1-a). An F value of 6.81, significant at the 95 percent confidence level, indicates that these variables, as a group, do affect production. The remainder of the variation in MT may be attributed to items not included in this model.

In equation (1-a), the coefficient for gang size (GS) is not significantly different from zero at the 95 percent confidence level. This implies that variation in gang size, within the limits of those occurring during the sample period, has no appreciable effect upon metric tons discharged per hour (MT). It can be concluded that an increase or decrease of gang size by one or two persons will not affect the rate of discharge. At an average stevedore salary of $4.56 per hour, elimination of two gang members would result in a reduction in Port costs of $10.12 per transshipment hour.

The coefficient for gang composition (GC) in equation (1-a) is significantly different from zero at the 95 percent confidence level.

This finding implies that gangs composed primarily of casual stevedores positively influence metric tons discharged per hour (MT). All factors remaining the same, the use of casual stevedores results in an estimated discharge increase of 2.66 metric tons per hour over the use of regular stevedores.

At current Port tariff rates for the transshipment of tuna ($6.00 to $8.00 per short ton discharged), the utilization of casual stevedore gangs over regular stevedore gangs results in an estimated increase in Port revenues of $17.59 to $23.45 per transshipping hour.

In equation (1-a), the coefficient for hook cycle (HC) is negative and significantly different from zero at the 95 percent confidence level. This finding substantiates the expectation that slower hook cycles result in less metric tons discharged per hour. All factors remaining constant, it can be concluded that a one minute increase in the duration of the average hook cycle will result in 2.157 less tons being discharged per hour. At present tuna transshipment tariff rates ($6.00 to $8.00 per short ton discharged), a one minute increase in hook cycle duration represents a loss in Port revenues of $14.26 to $19.02 per transshipment hour.

E. Vessel Disbursements into the Island Economy

For the purposes of this study, disbursements are defined as all primary monetary expenditures entering the economy of Guam as a direct consequence of tuna transshipmenet. Disbursements are divided into two sectors, public and private.

Public sector expenditures include all payments to government agencies for stevedoring, overtime, cancellation, detention, penalty, equipment rental, special services, wharfage, entry, dockage, bunkerage, customs and public health. Private sector expenditures include payments for freight, container services, associated fees (expenditures for agents, communication, interpreters, petties), crew cash advances, crew transportation and accommodations, crew medical, crew supplies and provisions, fuel, vessel repairs and deck supplies, and tug and pilotage.

The tuna, which is purchased either by Star-Kist, Van Camp Seafoods, or Bumble Bee Tuna, does not legally change ownership at Guam. Contracts are written in such a manner that acceptance of cargo is conditional upon receipt and subsequent inspection of fish. The exact price paid for the tuna is not known, but it is estimated to be the current United States west coast price, less outbound freight and other charges billed by the agents to the tuna buying company.

From January 31 through August 31, 1979, data was collected on twenty-one transshipping vessels. These vessels discharged 6180.89 metric tons of tuna into 356 containers. During their stay at the Commercial Port, these vessels were responsible for 1.2 million in disbursements.

Table 5-8 illustrates the apportionment of these disbursements between the public and private sectors. Disbursements averaged $56,954 per transshipping vessel, $193 per metric ton discharged, and $3361 per container transshipped. The public sector received 8.5 percent of disbursements, while the private sector received 91.5 percent. Table 5-9 provides a summary of per vessel disbursement during the sample period.

In order to determine which variables may have an influence on disbursements, the following model is postulated:

$$D = \beta_1 + \beta_2 TD + \beta_3 C + \beta_4 DP + \beta_5 NC + \beta_6 N + e \qquad (2)$$

where,

D = Dollar disbursements per vessel

TD = Metric tons of tuna discharged per vessel

C = Vessel crew size (including captain)

DP = Vessel days spent in port

NC = Dummy variable, representing nationality of vessel crew:

1 = Japanese

0 = Others

N = Net ton rating of vessel

e = Error term, accounting for variations in D explained by variables not included in the model

Ordinary least squares estimation of equation (2) yields the following equation:

$$D = \underset{}{-46597.2} + \underset{(6.424)}{146.316TD} + \underset{(3.099)}{2291.52C} + \underset{(1.399)}{553.754DP} + \underset{(1.818)}{10082.2NC} + \underset{(1.382)}{61.31N} + e$$

$$R^2 = 0.8188$$

$$\bar{R}^2 = 0.7585$$

$$F = 13.552$$

$$n = 21$$

TABLE 5-8

DOLLAR DISBURSEMENTS FROM TUNA TRANSSHIPPED
AT GUAM COMMERCIAL PORT
JANUARY 31 - AUGUST 31, 1979

	Dollar* Disbursements	Percent Total	Disbursements Per Ton	Per Ctr.
Total Disbursements	$1,196,091	100.0	$193.32	$3361.06
Public Sector	101,967	8.5	16.48	286.42
Private Sector	1,094,571	91.5	176.84	3074.64
Public Sector	$ 101,967	100.0	$ 16.48	$ 286.42
Stevedoring	50,827	49.8	8.21	142.77
Overtime	3,988	3.9	0.64	11.20
Detention & Penalty	1,057	1.0	0.17	2.97
Cancellation	1,991	2.0	0.31	5.59
Equipment Rental	17,517	17.2	2.83	49.21
Special Services	8,017	7.9	1.30	22.52
Wharfage	8,281	8.1	1.34	23.26
Entry	168	0.2	0.03	0.47
Dockage	5,242	5.1	0.85	14.72
Water	346	0.4	0.06	0.97
Bunkerage	3,193	3.1	0.52	8.97
Cust. & Pub. Health	1,340	1.3	0.22	3.76
Private Sector	$1,094,571	100.0	$176.84	$3074.64
Freight	564,167	51.5	91.94	1584.74
Ctr. Services	17,229	1.6	2.78	48.40
Associated Fees	18,780	1.7	3.03	52.75
Crew Cash Advances	78,000	7.1	12.60	219.10

TABLE 5-8 CONTINUED

	Dollar* Disbursements	Percent Total	Disbursements Per Ton	Per Ctr.
Medical	$ 1,535	0.1	$ 0.25	$ 4.31
Supplies	41,434	3.8	6.69	116.39
Fuel	329,522	30.1	53.24	925.62
Repairs & Deck Supp.	19,291	1.8	3.12	54.19
Tug & Pilot	17,438	1.6	2.82	48.98

* Rounded off to the nearest dollar

TABLE 5-9

DOLLAR DISBURSEMENTS PER VESSEL ASSOCIATED WITH TUNA TRANSSHIPMENT
THROUGH THE COMMERCIAL PORT OF GUAM
JANUARY 31 - AUGUST 31, 1979

	Mean	Median	Maximum	Minimum	Std. Dev.	Coef. of Var.
Total Disbursements	56,954.08	53,462.77	103,353.11	28,555.06	22,333.09	0.39
Public Sector	4,873.83	4,306.30	13,312.35	954.79	2,681.08	0.55
Stevedoring	2,755.38	2,972.70	6,996.82	120.00	1,444.34	0.52
Equipment Rental	829.36	561.60	2,081.60	117.00	670.39	0.81
Wharfage	394.34	393.94	593.20	18.56	170.12	0.43
Private Sector	52,080.50	46,231.55	96,377.81	26,575.07	20,715.92	0.40
Freight	26,865.08	30,788.32	40,510.28	1,175.63	11,559.26	0.43
Fuel	15,691.52	16,231.90	35,497.61	0.00	9,714.96	0.62
Crew Cash Advances	3,714.29	2,000.00	10,058.00	0.00	3,261.06	0.88
Supplies	1,973.07	714.00	13,242.67	0.00	3,132.55	1.59

Bracketed figures represent t-values associated with the coefficients.

The adjusted coefficient of determination ($\bar{R}^2$) for equation (2) indicates that the variables included in this model account for 75.45 percent of the variation in dollar disbursements (D). The remaining 25.55 percent of the variation may be attributed to variables not included in this model.

The coefficient for metric tons of tuna discharged (TD) in equation (2) is positive and significantly different from zero at the 95 percent confidence level. This finding supports the expectation that as tons of tuna discharged increase, vessel disbursements will increase. It can be concluded that, all factors being equal, for each additional metric ton of tuna discharged, disbursements into the economy of Guam will increase by an estimated $146.

The coefficient for number of crew per vessel (C) in equation (2) is positive and significantly different from zero at the 95 percent confidence level. This finding implies that as crew size increases, disbursements into the economy increase. All else remaining the same, an additional crew member will generate an extra $2292 of vessel disbursements into the local economy.

The coefficient for days in port (DP) in equation (2) is not significantly different from zero at the 95 percent confidence level. This implies that the number of days spent in port by a vessel does not appreciably affect disbursements (D). A plausible explanation for this phenomenon is that the majority of disbursements are committed during the initial days spent in port; after that period, total disbursements increase at a decreasing rate.

The coefficient for nationality of vessel crew (NC) in equation (2) is significantly different from zero at the 95 percent confidence level. This finding implies that the existence of Japanese vessel crews has a positive influence on the amount of disbursements per vessel (D). The presence of a Japanese crew, all other factors being equal, results in an estimated increase of $10,082 in disbursements over the presence of other nationalities. Since there is a very high correlation between Japanese crews and Japanese flag vessels (see table 5-4) it can be concluded that the dummy variable NC is also a proxy for vessel flag.

Japanese crews appear to be more closely associated with fishing vessels rather than carriers. Their mission is the harvest of fish and not the transport of fish from port to port. Fishing vessels spend a longer time at sea than do carrier vessels. Because of this, fishing vessels tend to take on board greater quantities of supplies and fuel than carriers. When port calls are made, fishing vessel crews probably are allowed more liberty and tend to spend more money than do carrier crews.

The coefficient for vessel net tons (N) in equation (2) is not significantly different from zero at the 95 percent confidence level. This implies that variation in vessel net tonnage, within the range of those vessels transshipping tuna at the Commercial Port during the sample period, has no appreciable effect upon disbursements per vessel (D).

F. Costs of Transshipment to the Commercial Port

Costs of transshipment were estimated based upon discharge rates as calculated from observations of twenty-two container fillings encompassing 749 complete hook cycles. Costs of equipment, labor, and

utilities were derived through interpretation of data collected on all vessels discharging during the observation period. These cost estimates are presented in table 5-10.

Discharge and storage of a container until the departure of the first available outbound vessel costs the Commercial Port an average of $6.69 per metric ton, or $121 per container. If two holds are discharged simultaneously, the expense of Port supplied winch and operator must be added to costs (it should be noted that several maritime companies on Guam offer similar services and equipment, which may be procured for the operation at the option of the vessel owner or tuna buyer). However, two hold discharge operations yield higher rates of discharge (15.98 metric tons per hour on average). The net effect is to lower Port costs to $5.93 per metric ton and $110 per container.

Based upon transshipment fees as established by the Special Cargo Handling Services Contract, it appears that the Port may be losing money on each ton of tuna transshipped under present procedures.

Recommendations for reduction of Port costs will be presented later in this study; however, it may be of interest to note that the Commercial Port does not bill agents, vessels, or tuna buyers for electric power consumed by the tuna filled containers. The average reefer container remained in the Commercial Port's container yard for 8.57 days. An average twenty foot container consumed thirty-six kilowatt hours of electricity per day of its stay, while a forty foot reefer consumed 114 kilowatt hours (Pecon 1979c). In total, the 356 containers filled with tuna passing through the Commercial Port during the sample period consumed 125,736 kilowatt hours, at a cost of $7147 (Guam Power Authority 1979). This amounts to $1.17 per metric ton of tuna transshipped (see appendix A-6).

TABLE 5-10

AVERAGE ESTIMATED COSTS TO THE COMMERCIAL PORT
FOR TUNA TRANSSHIPMENT ACTIVITIES*

	Per Metric Ton	Per Container
Labor**		
Longshoremen	$2.81	$ 50.95
Longshoreman Leadingman	0.39	7.09
Cargo Handling Supv.	0.43	7.86
Crane Operator	0.11	1.91
Const. Operator IV	0.10	1.82
Equipment***		
Crane	$1.54	$ 27.84
Tractor	0.05	0.95
Electric Power****	$0.14	$ 2.54
Administrative Expenses*****	$1.12	$ 20.32
Total	$6.69	$121.28

* Assumes only one hold worked at a rate of 12.69 metric tons per hour during a regular eight hour day. An average container is assumed to contain 18.03 metric tons of tuna (see table 5-6)

** Based on an average of 8.87 persons per gang (see table 5-6). One of the members is a longshoreman leadingman. Wage rates based on composition of gangs and rates per labor classification (see appendix A-4)

*** Assuming that crane and tractor are used two hours per discharge day; costs listed in appendix A-5

**** Assuming power consumption as listed in appendix A-6

***** Calculated at 35 percent direct labor (Pecon 1979a)

G. Labor Absorption

As Previously mentioned, Rockland, in his study of the San Diego tuna industry (Rockland 1978), performed a regression relating employment to tuna landings. Rockland's results indicate that a ten ton increase in tuna landings will result in increased tuna related employment of one position.

Application of Rockland's concept to Guam transshipment during the seven month sample period results in the following least square estimate:

$$E = 16.57 + 0.13487TL + e \qquad (3)$$

$$R^2 = 0.92$$

$$n = 7$$

where,

E = Number of man days of stevedore employment per month

TL = Metric tons of tuna discharged per month

These results imply that under existing discharge procedures a ten metric ton per month growth in transshipment results in increased stevedore employment of 1.3 man days. The elasticity of employment with respect to metric tons discharged is 0.896. This implies that under present discharge procedures a 10.0 percent increase in transshipment will result in an 8.96 percent increase in man days of stevedore employment per month. If transshipment expands and procedures become more efficient over the next few years, it is realistic to expect an increase in total employment as well as a reduction in labor used per ton of tuna discharged.

H. Transfer Operations

During the research period, two operations involving the transfer of tuna occurred at the Commercial Port. A total of seven vessels, two motherships and five longliners, were involved. The tuna is transferred from ship to ship. In order to accomplish this, the participating vessels are moored parallel to one another. All tuna transferred to the motherships, in the observed instances, was destined for Japan.

Operations took place at night to preserve the quality of the sashimi grade tuna. Port employed stevedores and support personnel were not used in the operation because the transfer of tuna requires working in temperatures below -20 C and because the tuna never crosses the Port's docks. The transfer was accomplished by crews of the vessels involved.

Disbursements accrued during both operations totalled $71,484 (see table 5-11). Private sector expenditures appear comparable for both transfer and transshipment operations. Public sector disbursements are lower for transfer operations due to elimination of dockside activities.

TABLE 5-11

DOLLAR DISBURSEMENTS FROM TUNA TRANSFER OPERATIONS AT GUAM COMMERCIAL PORT FEBRUARY - AUGUST, 1979

	Dollar* Disbursements	Percent Total
Total Disbursements	$71,484	100.0
Public Sector	2,689	3.8
Private Sector	68,795	96.2
Public Sector	$ 2,689	100.0
Equipment Rental	25	0.9
Special Services	28	1.0
Entry	56	2.1
Dockage	2,275	84.6
Water	69	2.6
Bunkerage	25	0.9
Customs & Public Health	211	7.9
Private Sector	$68,795	100.0
Associated Fees	4,667	6.8
Crew Cash Advances	13,775	20.0
Transport. & Accom.	488	0.7
Crew Medical	1,091	1.6
Supplies	31,780	46.2
Fuel	2,315	3.4
Repair & Deck Supp.	10,177	14.8
Tug & Pilot	4,503	6.5

* Rounded off to the nearest dollar

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

Guam's transshipment commerce is currently generated from fish catches within United Nations Food and Agriculture Organization Area 71. Potential expansion of transshipment activities on Guam is largely dependent upon the availability and harvest of resources within the Area. Such harvest do not appear to be increasing greatly. Japanese catch per unit of effort is falling, and total catches by all nations in Area 71 averaged only a 0.67 percent annual increase between 1974 and 1977. Even though skipjack tuna is still classified as an underutilized species, there is evidence that total Pacific landings of tuna may soon approach maximum sustainable yield.

If the total Area 71 resource harvest cannot be expected to increase greatly, then Guam's potential growth as a transshipment center will depend upon its ability to attract an increasing segment of existing tuna product flows.

Since May, 1974, when substantive tuna transshipment began in Guam, 57,077 metric tons of tuna have been processed by Port. Although transshipments have averaged 892 metric tons per month, there have been great variations in monthly activity. This variation does not appear to be related to normal seasonal patterns of tuna abundance around Guam. During the past year transshipment volume has declined. It is too early to determine whether this decline will continue or whether it is a temporary phenomenon.

Tuna transshipments through Guam consist primarily of skipjack. These fish are destined for United States canneries in either Hawaii, Los Angeles, San Diego or Puerto Rico. The tuna arrives in Guam on carriers, the majority of which come from Palau or Papua New Guinea, or it is off-loaded by transient experimental seiners.

The need for skipjack by United States canneries has in the past been stimulated by Food and Drug Administration regulations which prescribe maximum allowable mercury levels in canned tuna. Skipjack meat typically has a lower mercury content than yellowfin; therefore, skipjack can be mixed with these other species in order to reduce mercury levels in the canned product. Recent relaxation of Food and Drug Administration mercury standards may have reduced the skipjack needs of United States canneries and contributed to decreased transshipment through Guam.

Fluctuations in transshipment may be associated with tuna price differentials between Japan and the United States. Exchange rate fluctuations, as well as relative fuel prices, may also have an impact. Further study of the effects of these variables is warranted.

Cannery operations are presently active in American Samoa, Fiji, Papua New Guinea, and the Solomon Islands (see appendix A-1). Canneries in the latter three areas were started in recent years and production capacities may be expected to expand. The transshipment of containerized frozen tuna between Guam and any of these locations is non-existent. As these processing operations grow, it can be expected to impact negatively on the flow of cannery destined tuna through Guam. Further negative impacts can be expected as containerization and shipping facilities proliferate throughout the Pacific Islands.

A large number of longline and pole-and-line vessels from Japan and Korea are entering Guam Commercial Port for fuel, provisions, and repairs. During the seven month sample period, 137 non-transshipping fishing and carrier vessels called at the Port. Although many of these vessels may carry frozen tuna, few of them are known to engage in transshipment at Guam. It is presumed that much of this fish is destined for the relatively sophisticated and high priced Japanese markets.

Such vessels appear to harbor the best opportunity for expansion by the Commercial Port into new tuna transshipment markets. Every effort should be made to isolate marketing factor sensitivities of the non-transshipping fishing vessels currently calling at the Commercial Port. Possible incentives, such as expanded and more efficient discharge operations; preferential allotments of fuel, dock space, and other Port services; and relaxation of customs regulations governing the shore liberty of foreign vessel crews should be explored.

Domestic markets for canned tuna in Japan are relatively small; however, Japanese exports of canned tuna are growing rapidly. It appears that Guam has not yet fully developed its sea and air transshipment potential with Japan.

Another hope for the growth of tuna transshipment in Guam lies in the development of United States and Japanese purse seining in the Western Pacific. Seiners supply skipjack and yellowfin of cannery quality. A major market for this fish would be United States canneries in Samoa, Hawaii, California, and Puerto Rico. There is every indication that more United States seining vessels are planning to fish in the Western Pacific. If Guam is to participate fully in this commerce, it must offer abundant and low priced fuel, dock and repair space, drydock

facilities for vessels over 2000 gross tons, and efficient, reliable transshipment capabilities.

Review of tuna discharge and containerization procedures at Guam Commercial Port indicates that presently used methods encompass single and multi-hold discharge operations. The majority of vessels transshipping tuna utilized the single hold discharge method, which results in an average hourly discharge rate of 12.69 metric tons. Under these conditions, it is costing the Port an average of $6.69 per metric ton to discharge and store tuna for transshipment. The Port's official rate for discharge and storage under normal circumstances is $6.00 per short ton. Thus, under average conditions using existing procedures, on a per ton basis it appears that these operations are not profitable for the Commercial Port.

It is felt, however, that implementation of the following recommendations can increase discharge rates by an estimated 25 to 35 percent and at the same time significantly reduce Port costs.

Labor is the major cost in the discharge process. Analysis indicates that reduction in stevedore gang size by several workers will not affect discharge volume per hour, but will significantly reduce Port costs. Reduction in stevedore gang size can be accomplished by pursuing the following three recommendations:

1. Initiate use of standard false-bottom buckets rather than nets for lifting fish dockside. Such buckets are much easier to clear than nets. Their use would allow faster hook cycles and reduce the need for stevedores atop the stuffing ramp.
2. Position containers on an incline so that fish naturally gravitate to the rear. This would allow elimination of load leveling

stevedores working inside the containers. Container weight tolerances could be maintained by installing a scale on winch hook. The weights of each hook cycle could easily be summed in order to determine when a container has reached its maximum weight. Elimination of work inside the container would significantly reduce work stoppage time and remove the most distasteful aspect of tuna discharge operations for stevedores. Under present conditions, work stoppage reduced discharge by an average of 1.28 metric tons per hour. This represents a loss in potential Port revenues of between $8.76 and $11.68 per hour of discharge.

3. Redesign the container stuffing ramps in order to reduce fish spillage and make maximum use of gravity feed of frozen fish into containers. Under present conditions, an average of 65 fish per container fall off the stuffing ramp and must be retrieved manually. This represents a cost in both labor time and product quality.

A conveyor system represents a capital intensive innovation which will be costly to perfect and difficult to maintain. Through its use, the discharge process would become more vulnerable to mechanical failure. It is recommended that development of a conveyor belt system proceed only after implementation of suggested improvements in the present system.

The profitability of the conveyor system is dependent upon several factors. These factors include:

1. Production specifications of the belt. Current discharge rates for one hold operations average 12.69 metric tons per hour. It is felt that implementation of recommendations aimed at improving

existing operations can result in discharge rates of between sixteen and twenty metric tons per hour. A conveyor belt should certainly possess the capacity to exceed these discharge rates.

2. Labor. Under a conveyor belt system the critical factor affecting discharge rates will be the efficiency of laborers working within the vessel holds. It is, therefore, recommended that the Port explore the possibility of providing stevedores to assist vessel crews. Stevedores assigned to vessel holds should be paid a wage differential approximating not less than 50 percent of their normal hourly wages. Additionally, proper equipment and clothing should be provided by the Port to facilitate performance of duties and ensure the safety of those employed.
3. Parts inventory. The Port must keep on hand an ample inventory of spare parts should the system breakdown.
4. Backup system. If the conveyor belt should malfunction, the Port must have a reliable, efficient backup discharge system than can be easily and quickly implemented.
5. Number of conveyors. Implementation of multi-hold discharge methods will necessitate the purchase of two or more conveyor belts.

Further analysis of existing operations indicates that because of their close association with multi-hold operations, casual stevedores are associated with higher discharge productivity than regular stevedores. Simultaneous discharge from two holds results in an increased discharge volume. Despite additional costs associated with such an operation, it was found that Port costs are $0.76 per metric

ton less than costs associated with the single hold discharge method. It can be concluded that greater reliance on casual stevedore gangs and multi-hold discharge methods will result in a more efficient operation, reduced costs, and greater revenues for the Port.

Port container storage facilities are constrained by existing reefer plug banks, which allow space for only 135 containers. At an average of 18.03 metric tons of tuna per container, and assuming that all plugs are always available for tuna filled containers, the Port can accommodate a maximum of 2434 metric tons of fish awaiting shipment. This lack of storage capacity may present a constraint to increased transshipment. Research into the feasibility of developing cold storage facilities proximal to the Port should be undertaken. Such facilities would appear to enhance the potential for Japanese oriented transshipment trade, while at the same time providing greater potential capacity for seiner discharge.

Benefits accruing to the economy from transshipment operations appear to be quite favorable. A review of twenty-one vessels transshipping tuna during the period from February through August, 1979 indicates that the average vessel spent $56,954 in the Guam economy on a variety of private and public goods and services. These expenditures averaged $193 per metric ton, or $3361 per container. The public sector (primarily the Commercial Port) received 8.5 percent of these expenditures while the private sector received 91.5 percent. It should be noted, however, that 75 percent of total vessel expenditures were paid to shipping firms for outbound container freight charges and to oil companies for fuel. Expenditures in these two areas probably have a very low multiplier effect within the economy of Guam.

It was discovered that expenditures per vessle are directly related to the amount of tuna discharged, as well as the size and nationality of the crew. Vessel size and number of days spent in Port do not appear to significantly affect the level of vessel expenditures.

Historically, transshipment operations have had a beneficial impact on island employment. Evidence collected over a seven month period indicates that a monthly increase in transshipment of ten metric tons will result in an additional man day of stevedore employment. Although recommendations for improved efficiency would reduce the size of dockside stevedore gangs, it is conceivable that utilization of stevedores inside the vessel holds would compensate for these reductions.

Wage rates are not, at the present time, a constraint to transshipment in Guam. However, it should be realized that stevedores in Guam make 2.23 time the hourly wages paid to stevedores in American Samoa. In one hour Guam stevedores earn 75 percent of the maximum daily wage rate paid to their counterparts in Papua New Guinea. Guam's relatively high wages can continue to be justified so long as labor productivity and Port efficiency improve.

Future transshipment study would be greatly facilitated by more detailed, consistent, and centralized record keeping. Transshipment data should be maintained on a per vessel basis. Data should consist of the vessel name and type; dates of discharge, arrival, and departure; flag, registry; tonnage; crew size and nationality; destination; last port of call; and tons discharged by species. This information should be kept in a central location along with all Port charges associated with that vessel.

Although tuna transshipment provides a positive contribution to the economy, its growth is limited and depends largely upon factors outside the control of Guam. Such factors include tuna resource abundance, the growth of competitive Pacific islands, tuna price and exchange rate fluctuations, technological innovations in harvesting methods, fuel availability, shipping route changes, container availability, etc. The major buyers and sellers of tuna are large multi-national corporations. Having little or no capital invested in Guam, they can easily shift transshipments through other ports should economic or political conditions change.

Even if transshipment were to increase by 200 percent over present volumes, the resulting economic benefits would be relatively minor when compared to tourism and military spending. Formulation of goals and long range objectives by the Government of Guam concerning the expansion of tuna transshipment operations and its related industries should be made with full recognition of the risks involved.

APPENDIX A-1

PACIFIC ISLAND TUNA CENTERS

This appendix is intended to provide an overview of conditions in Pacific island tuna centers other than Guam. These centers serve tuna fleets through canning, cold storage, or transshipment. The centers considered here are Papua New Guinea, New Hebrides, Palau, American Samoa, Solomon Islands, and Fiji.

All these states are members of the South Pacific Commission. The Commission encompasses in excess of 30 million square kilometers, of which 550,000 square kilometers is land and the remainder sea area (see figure A1-1). It should be noted that this region exported items valued at $1.4 billion, yet, fishery exports provided only 9 percent of this total (Sevele and Bollard 1979).

A. Papua New Guinea (PNG)

Papua New Guinea (PNG) has a population of 2.9 million persons. The island nation currently enjoys a positive balance of trade, with exports in excess of $630 million. Fishery products accounted for 4 percent of the total export trade in 1977 (Sevele and Bollard 1979).

Landings of fish by companies based in PNG rose dramatically from 2,439 metric tons in 1970 (Kearney 1977) to 33,035 metric tons in 1976. The 1976 catch was composed of 73.8 percent skipjack and 25.9 percent yellowfin (South Pacific Commission 1977). All fish caught is transshipped to overseas buyers. There are no restrictions on the

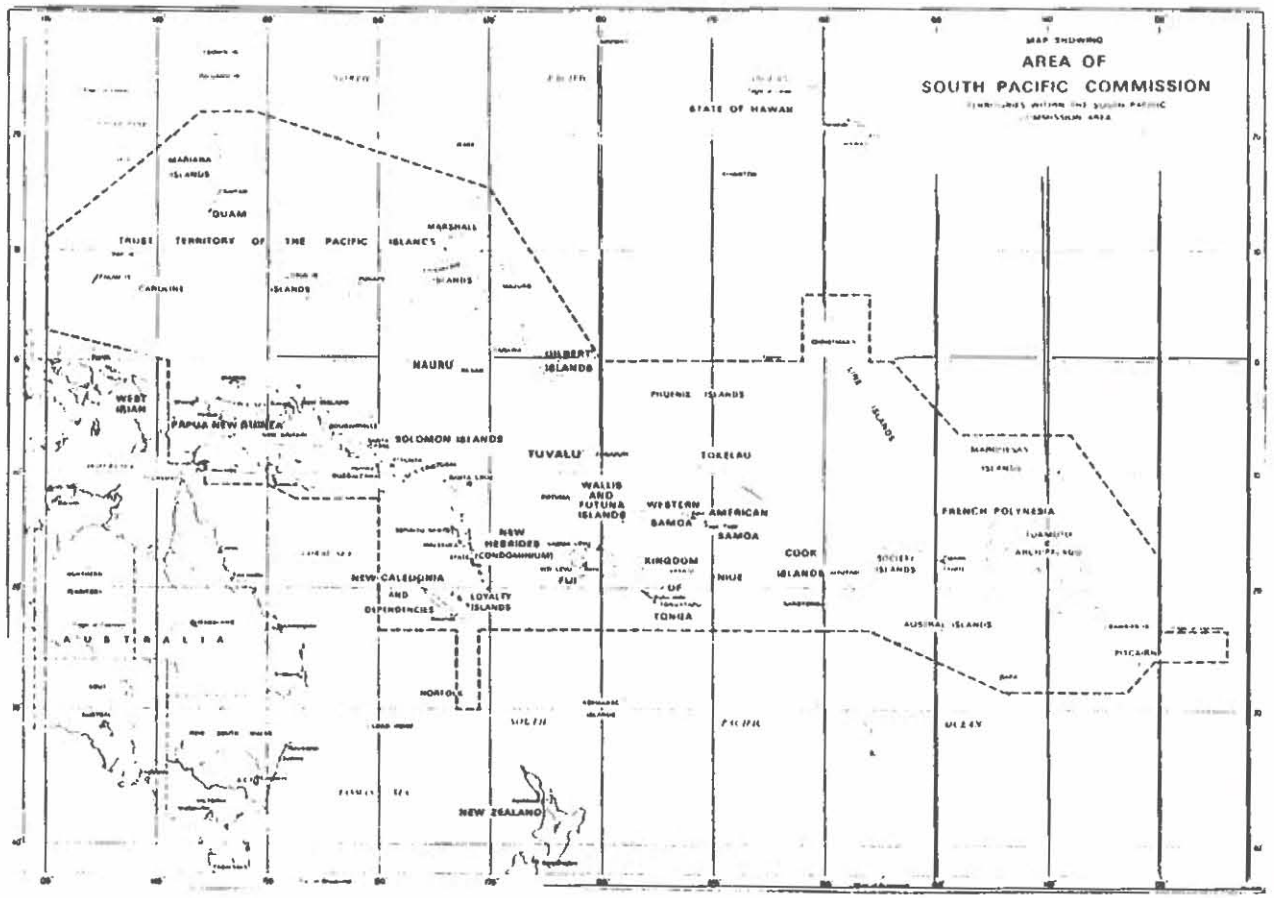


Figure A1-1. Pacific island tuna centers within the area of the South Pacific Commission.

Source: Feliti V. Sevele and Alan Bollard, South Pacific Economics: Statistical Summary, 3rd ed. (Noumea: S. P. C., 1979): figure 1.

loading and unloading of foreign flag vessels (Star-Kist PNG 1979).

Fishing vessels are operated through joint ventures, primarily with Japan. Gollon Kyokuyo Nuigini Pty., Ltd., which is 55 percent capitalized by the Japanese and 45 percent by concerns in PNG, landed 9000 metric tons of tuna in 1977 ("Skipjack tuna joint-venture..." 1973). This was accomplished through the use of twenty chartered Okinawan pole-and-line vessels and two motherships. The New Britain Fishing Industry, another Japanese joint venture, landed 8000 metric tons of tuna in 1977. Its fleet contains fifteen Okinawan pole-and-line vessels. Freezing is accomplished by a five hundred ton capacity shoreside facility. The corporation is 75 percent capitalized by the Japanese and 25 percent by PNG. Approximately 90 percent of the catch is exported to the United States. The remainder is shipped to Japan ("Skipjack tuna joint-venture ..." 1978).

Star-Kist, PNG is building a tuna processing operation at Mano (Kent 1978). Presently, the company purchases tuna from PNG's fleet for export to Star-Kist's United States canneries. A portion of that catch is shipped to Guam via reefer ships, and from there transshipped to the United States mainland (Star-Kist PNG 1979). The June, 1979 F. O. B. tuna prices equalled $678 per metric ton for all species in Papua New Guinea. Freight rates equal $205 per short ton for shipments from PNG to all the following destinations: Pago Pago, Puerto Rico, United States mainland, and to the United States mainland via Guam (Star-Kist PNG 1979).

All tuna caught in PNG's waters is transshipped from ship to ship without the aid of a shoreside dock. The pole-and-line vessels transfer their catch to motherships for frozen storage. When the

mothership is filled to capacity, its fish are transshipped to overseas carriers for export (Star-Kist PNG 1979).

Stevedoring is operated by the tuna companies themselves. Historically, stevedore gangs have received $4.00 per metric ton for moving the tuna from one ship to another. Papua New Guinea limits wage rates to an equivalent of $6.00 per day.

Transshipping is generally accomplished by twenty persons on the mothership and fifteen persons on the exporting vessel. On the mothership, ten laborers are working and ten resting, rotating on half hour shifts. Discharge rates necessarily vary from company to company. One American company averages 170 metric tons per ten hours utilizing twenty stevedores (Star-Kist PNG 1979).

The Government of Papua New Guinea imposes an export duty on tuna. The duty is 5 percent of the current PNG F. O. B. tuna price plus a 2.5 percent bait royalty to those coastal villages located in baiting areas. The Government also charges $0.30 per registered meter length per hour for dockage. Other revenues associated with the fishery include $1.50 per kiloliter for water and $20.00 per hour for tug services. Pilotage charges are $1.05 per meter of registered length for movement from sea to port and $42.00 for movements within the port (Government of Papua New Guinea 1975). Fuel charges for marine diesel as of June, 1979 were $163 ($33.93 per fifty-five gallon barrel).

B. New Hebrides

The island nation of New Hebrides is inhabited by 101,500 persons. The nation in 1977 had a trade deficit of $8.04 million;

exports totalled $33.06 million. Fishery products accounted for 42 percent of its export trade (Sevele and Bollard 1979).

In 1957, the New Hebrides entered into a joint venture agreement with Japan and the United States to form the South Pacific Fishing Company. The company was created to serve as a base for the transit and grading of fish (Doumenge 1966). The company is currently 90 percent capitalized by Japanese interests and 10 percent by local interests ("Skipjack tuna joint-venture..." 1978).

The base was originally served by Japanese longline vessels but has since converted to chartered Taiwanese vessels, due to Japanese disenchantment with declining yields in the area (Doumenge 1966). The South Pacific Fishing Company in 1977 accepted 10,000 metric tons of tuna from the fifty vessels under contract; 60 percent of this catch was albacore and 28 percent yellowfin ("Skipjack tuna joint-venture..." 1978). The bulk of the tuna is exported to the United States.

Shoreside facilities include three freezer plants with a combined capacity of 3500 tons, an arabushi processing plant, repair facilities, fuel storage, supply outlets, power plant, and fresh water (Doumenge 1966).

C. Palau Islands

Palau historically has been a center for skipjack pole-and-line fishing, reaching its peak during pre-World War II years with landings averaging 11,000 to 18,000 metric tons annually. In 1963 the Trust Territory Government and Van Camp Seafood Company, a wholly owned subsidiary of Ralston-Purina, negotiated an agreement which allowed Van Camp to build a 1500 ton freezer plant and locate a pole-and-line

fleet at Malakal Harbor (Rothschild 1966).

Van Camp stated that the purpose of basing its operations in Palau was to develop the fishery skills of the local population, increase the employment of Micronesians, and aid in the development of Micronesian fisheries through provision of technical and material assistance (Congress of Micronesia 1972). Van Camp's fishing fleet, which has ranged historically from a low of two vessels to a maximum of twenty, employs 108 fishermen, 78 percent of whom are Okinawan and 22 percent Micronesian. Shoreside facilities employ from forty-five to sixty persons, all of whom are Micronesian, except the general manager. In a joint agreement between the Trust Territory and Japan International Cooperation Agency, a project has been undertaken to teach local fishermen the most effective methods of pole-and-line fishing (U. S. Dept. of State 1978).

Landings during the 1977-78 season by pole-and-line vessels totalled 8,302 metric tons, consisting primarily of skipjack tuna (U. S. Dept. of State 1978). During this period, purse seine vessels off-loaded 3,151 metric tons. Because of its lack of processing facilities, prices paid for skipjack at Palau average $200 per metric ton less than that paid at American Samoa (U. S. Dept. of State 1978).

Virtually all the fish landed at Palau are shipped to Van Camp's canneries in American Samoa or California. A small portion of the catch is sold to Japan, Australia, and Puerto Rico (Congress of Micronesia 1972).

D. Solomon Islands

The Solomon Islands have a population of 214,000. Currently, they are experiencing a positive trade balance, with 1977

exports of $34 million. Fishery exports account for 27 percent of the total (Sevele and Bollard 1979), and are the nation's single most important export item (U. S. Dept. of Commerce 1978).

The Solomon-Taiyo Corporation, a Japanese joint venture, was established in 1972. The venture is 75 percent capitalized by the Japanese and 25 percent by the local government. The Solomon Islands Government, according to the agreement, will assume gradual control over a ten year period in the areas of fishery production, processing, and exports ("Japanese skipjack fishery..." 1974; "Skipjack tuna joint-venture..." 1978).

The company currently operates a cannery at Tulagi, which has a pack capacity of 1000 cases per day. The cannery is supplied by twenty-four skipjack pole-and-line vessels, four of which are company owned; the remaining vessels are Okinawan charters. In addition to the cannery, the company also operates two freezer plants which have a combined capacity of 1000 tons, and an arabushi processing plant. In 1977, the tuna fleet landed 13,000 metric tons in the Solomons for processing. The bulk of the processed tuna was exported to the United States, with the remainder going to Japan ("Skipjack tuna joint-venture..." 1978).

The most recent development in the Solomons is the formation of the Solomon Fishery Development Corporation. The Corporation, 25 percent capitalized by Solomon-Taiyo and 75 percent by the local government, proposes to expand the Solomon catch and to stimulate local involvement in fishing (U. S. Dept. of Commerce 1978). The fish landed would be processed or frozen at existing facilities. In 1977 the Asian Development bank loaned $3.6 million of the $5.9 million needed to finance the project. The company expects to own ten skipjack vessels

and twenty bait catchers. It is projected that tuna landings will reach 7800 metric tons annually from the operation (U. S. Dept of Commerce 1978).

E. Fiji Islands

Fiji had a population of 607,000 in 1976. In 1977 the country experienced a trade deficit of over $150 million (Sevele and Bollard 1979). The largest portion of the work force is concentrated in the agriculture and fisheries sectors. Exports reflect this emphasis, with 74 percent of the monetary value of exports resulting from agricultural products and 3 percent from fisheries (Sevele and Bollard 1979).

The tuna industry in Fiji is dominated by two corporations, the Pacific Fishing Company (PAFCO) and Ika Corporation. In 1963 PAFCO was formed - a result of a joint venture between Japan and Fiji. The operation was then 83 percent capitalized by the Japanese and 17 percent locally (Doumenge 1966). In 1974, the agreement was renegotiated so that Japanese interests held 70 percent, the Fiji Government 25 percent, and local Fijians 5 percent (Kent 1978). Prior to 1976, the company's mission was to provide for the cold storage and subsequent transshipment of tuna. In 1972, the base in Ovalu handled over 11,000 metric tons of tuna, comprised of 50 percent albacore and 28 percent yellowfin (South Pacific Commission 1973). In 1976, canning operations were begun. In 1977, 245,814 cases of tuna were processed at the cannery. As a by-product of the process, 305.2 tons of fish meal were produced (South Pacific Commission 1978).

In 1975 the Ika Corporation was established by the Fiji Government in response to a positive survey relating to the feasibility of a

skipjack fishery in the area (Ika Corporation 1978). The Ika Corporation entered into an agreement with PAFCO, whereby PAFCO would purchase tuna harvested by the corporation's vessels at prevailing world wholesale prices. In 1976, the company's two vessels landed 680 metric tons of skipjack. By 1977, the company retained a fleet of five pole-and-line vessels and had increased its landings to 1615 metric tons (Ika Corporation 1978).

Ika owns one of the five vessels it employs and charters the other four. In 1977, sales of tuna amounted to $824,602, of which $624,221 was paid to the Japanese Hatsutori Company for vessel charter fees. The Ika Corporation employs a total of 117 persons as crew members on the vessels, 63 percent of whom are Fijian and 37 percent Japanese (see table A1-1).

TABLE A1-1

IKA CORPORATION'S SKIPJACK
POLE-AND-LINE FLEET, 1977

	Gross Tons	Crew Size	
		Fijian	Japanese
Hatsutori Maru #1	192	12	9
Hatsutori Maru #5	250	25	11
Hatsutori Maru #2	79	15	8
Hatsutori Maru #6	59	5	15
Tui-ni-Wasaliwa	89	17	0

Source: Ika Corporation, Annual Report, 1977 (Lami: Ika Corp., 1978):6.

The company contributes further to the economy of Fiji through payment of wages, fuel, and other expenses totalling $118,420 and

administrative expenses of $15,282 (Ika Corporation 1978). Thus for every dollar of tuna sales made, the corporation generated $0.16 in revenue for the private sector of Fiji's economy. Remaining revenues were distributed among the Hatsutori Company (75.92 percent), the public sector (2.6 percent), and corporation profits (5.48 percent).

F. American Samoa

American Samoa's population in 1978 totalled 30,900. During the same year, the island had a positive trade balance of $30.82 million, with exports totalling $104.16 million (Government of American Samoa 1979). According to official statistics, the canning of tuna and processing of its by-products has generated on average 94.17 percent of American Samoa's yearly exports. Processed tuna is directly responsible for Samoa's positive trade balance each year from 1973 through 1978. During this period, tuna and tuna-related products have risen as a percentage of exports from 91 percent in 1973 to 99 percent in 1978 (Government of American Samoa 1979).

Although American Samoa reports a positive balance of trade, this is somewhat misleading because payments to foreign vessels for the raw tuna are not listed as imports.

American Samoa is host to two United States based canning companies, Van Camp and Star-Kist. Van Camp has been on the island since 1953 and Star-Kist since 1963 (Doumenge 1966). When the canneries began operation, they were served primarily by Japanese longline vessels. These vessels were eventually replaced by South Korean and Taiwanese vessels due to Japanese fishermen's displeasure at declining catch rates in the area (Doumenge 1971).

In 1979, 129 Korean and Taiwanese longline vessels were under contract to both canneries. Each vessel is estimated to make three to four voyages per year (Pereira 1979). Also calling on the canneries are carriers and purse seiners, which bring a large portion of the skipjack needed at the canneries. It is estimated that each longline vessel is operated by a crew of approximately fifteen and that the vessel remains in port from ten to fifteen days per visit (Pereira 1979).

Van Camp estimates that 40 percent of its tuna is supplied by longliners and 60 percent by carrier transshipments (Perez 1979). Star-Kist's fish originates primarily from longliners and purse seiners, while a portion, mainly skipjack, is transshipped from Papua New Guinea and the Solomon Islands (Stockwell 1979).

The yearly average of tuna packed in American Samoa is estimated at 63,520 metric tons per year. Star-Kist is responsible for 71 percent of the pack (Stockwell 1979). Virtually all the tuna products processed in American Samoa are shipped to the United States. Prevailing freight rates, exclusive of wharfage and handling, for the canned product are $90 per measured ton (Pereira 1979).

Although the precise species composition of the pack is confidential, Van Camp receives predominately skipjack, followed by albacore, yellowfin and bigeye (Perez 1979). Star-Kist accepts an average of 60 percent albacore and 40 percent skipjack and yellowfin (Stockwell 1978). Prices paid for skipjack at American Samoa are usually less than those paid for the same fish in the United States (see table A1-2). These price differentials are thought to reflect costs of acquiring fish from alternative sources.

TABLE A1-2

MONTHLY EXVESSEL PRICES PAID PER METRIC TON FOR SKIPJACK AND YELLOWFIN AT AMERICAN SAMOA, YAIZU, JAPAN AND THE UNITED STATES SEPTEMBER, 1977 - AUGUST, 1979

	American Samoa		Yaizu, Japan		United States	
	SK	YF	SK	YF	SK	YF
1977						
September	$639	$ 904	$1000	$ 988	$843	$904
October	639	904	931	1051	843	904
November	661	926	931	968	849	907
December	661	926	938	1012	855	912
1978						
January	$661	$ 926	$ 946	$ 917	$862	$918
February	678	948	937	1045	871	926
March	678	948	900	957	871	926
April	678	948	918	890	871	926
May	678	948	815	982	871	926
June	678	948	700	1023	871	926
July	678	948	710	920	871	926
August	678	948	884	868	871	926
September	678	948	910	1000	871	926
October	678	948	829	994	871	926
November	678	948	804	894	871	926
December	678	948	765	749	843	926
1979						
January	$678	$ 970	$ 937	$ 773	$843	$926
February	678	992	818	795	815	926
March	678	992	960	814	821	926
April	678	992	1055	861	827	937
May	678	992	1104	985	887	997
June	700	1014	976	1110	887	997
July	744	1080	1041	1180	887	997
August	785	1108	1041	1119	887	997

Sources: U. S. Dept. of Commerce, NOAA, NMFS, Foreign Fishery Information Release, 17 November 1977 to 14 October 1979.
U. S. Dept. of Commerce, NOAA, NMFS, Fishery Market News Report, 16 September 1977 to 7 September 1979.

Since 1973, the Star-Kist and Van Camp canneries have employed an average of 15.67 percent of the employed work force (see table A1-3). Caution must be used when interpreting cannery employment figures. It appears that included within American Samoa's cannery employment figures are laborers who are not legal residents of American Samoa. In 1979, the canneries employed 1790 persons. Of these employees, 51.7 percent were Western Samoan, 42.5 percent American Samoan, and 5.8 percent Tongan, Fijian, or residents of other South Pacific islands. Women comprised 58.4 percent of the workers; men represented the remaining 41.6 percent of cannery employees (Perez 1979; Stockwell 1979).

Stevedores, numbering 200 regular (full-time) and 150 casual (part-time) employees, work whenever the ships are in port. The stevedores work during the cannery's hours of operation, since the docks are owned by these firms. The canneries also employ the dockside equipment operators (Reid 1979). As of 1979, stevedores received the minimum hourly wage for their job classification, earning $1.95 per hour (Government of American Samoa 1979). Currently, 75 percent of the stevedores are from American Samoa and 25 percent from Western Samoa and outer islands (Reid 1979). The Economic Development Administration estimates that 40 percent of the earinings of workers other than American Samoans is sent off the island (Pereira 1979).

The stevedores work in gangs of approximately twenty persons per hold. Eighteen persons work on the vessel while two remain dockside. As many as three to four holds may be unloaded simultaneously. The stevedores discharge an average of two short tons per hour per hold into 1.5 short ton capacity buckets. These buckets are provided by the canneries and double as cold storage containers (Reid 1979).

TABLE A1-3

POPULATION AND LABOR PROFILE OF AMERICAN SAMOA
1973 - 1978*

	1973	1974	1975	1976	1977	1978
Total Population**	28,626	29,079	29,530	29,978	30,400	30,900
No. Households**	4,042	4,260	4,230	4,200	4,166	4,100
Available Work Force***	8,967	9,100	9,100	9,018	9,180	9,663
No. Employed	8,200	7,994	7,878	7,297	7,813	8,301
A. S. G.****	3,901	3,884	3,359	3,285	3,594	3,727
S. E.*****	3,082	3,410	3,219	2,798	2,888	3,121
Canneries	1,217	700	1,300	1,214	1,409	1,453
Percent Unemployed	8.6	12.2	13.4	19.1	14.9	14.0

Source: Government of American Samoa, Economic Development Administration, 1978 American Samoa Statistical Survey (Pago Pago: EDA, 1979):6,8,20,24; tables 4,9,10; figure 4.

* All figures in number of persons, unless otherwise noted
** Breakdown as to ethnicity unavailable
*** Age and sex breakdown unavailable
**** American Samoa Government
***** Non-cannery Secondary Economy

The stevedoring company charges $6.50 per short ton for discharging the fish, barring complications. If the fish are frozen together, an additional fee of $45 per hour is levied for each hour lost in separating the fish (Reid 1979).

Tug services are rendered at a rate of $200 per hour, while pilotage is charged at $100 per hour. The average vessel spends $600 for the combined services per visit to American Samoa. The American Samoa Government owns two dry docks, which can handle vessels up to 500 gross tons. About 150 persons (full-time) are employed at an average hourly wage rate of $2.00 per hour (Pereira 1979).

Another secondary industry arising out of canning operations is the off-loading of incidental catch not purchased by the canneries. The species considered incidental include outsized bigeye, swordfish, blue marlin, black marlin, striped marlin, spearfish, and sailfish. These species, which are handled by seven locally based agents, are exported to Japan, where they are sold. The canneries provide free cold storage of the fish before shipment to Japan ("American Samoa's miscellaneous fish industry..." 1978).

In 1977, 2452.05 metric tons of incidental catch was transshipped to Japan; in 1978, the figure increased to 3881.95 metric tons (Polynesian Shipping 1979). Wholesale exvessel prices paid in 1978 at Pago Pago ranged from $1000 to $1300 per metric ton for marlins and swordfish, $600 to $900 for bigeye, to $400 to $600 for sailfish and spearfish ("American Samoa's miscellaneous fish industry..." 1978).

It is estimated that the sale of incidental catch generates revenues of approximately $4 million annually. It is not known what percentage of these revenues remain in American Samoa. Some of the

incidental catch is sold to the local school lunch program. In 1977, only thirty-five metric tons of the incidental catch found its way into the local economy ("American Samoa's miscellaneous fish industry..." 1978).

Revenues to the American Samoa Government from cannery operations are limited, aside from payments for public utilities, lease payments, and federal corporation income taxes (U. S. Dept. of Commerce 1979a). The Government receives no royalties on tonnage off-loaded, nor on fuel taken aboard vessels. The Government receives no port revenues in terms of wharfage or dockage because the fish are unloaded at the private docks of the canneries instead of the commercial port. As a further business incentive, the Government imposes no export duties on canned fish (Pereira 1979).

(SEAL)

TREASURY DEPARTMENT
BUREAU OF CUSTOMS
WASHINGTON 25

June 12, 1953

In Reply Refer To
217.3
CIRCULAR: VES-7-EA

BUREAU OF CUSTOMS
MARINE CIRCULAR NO. 124

SUBJECT: Inapplicability to Guam and American Samoa of prohibition in section 251, title 46, United States Code, against a foreign-flag vessel engaged in certain fishery operations.

For your information, the following is the pertinent part of the Bureau's reply to an inquiry which included the question whether section 4311, Revised Statutes (46 U. S. C. 251), as amended by the Act of September 2, 1950 (64 Stat. 577), has application to Guam and American Samoa:

> You ask whether the Bureau has settled the question of the statute's application to Guam and American Samoa, and, if so, under what authority of law cited prohibits, except as permitted by treaty or convention, a foreign-flag vessel, whether documented as a cargo vessel or otherwise, from landing in a port of the United States its catch of fish taken on board on the high seas or fish products taken on board such vessel on the high seas from a vessel emgaged in fishing operations or in the processing of fish products.
>
> The Act of August 1, 1950 (ch. 512, 64 Stat. 384-393; 48 U. S. C. Supp. V, 1421-1424b.), declaring Guam to be an unincorporated territory of the United States and setting forth its form of government, also states that no law of the United States thereafter enacted shall have any force or effect within Guam unless specifically made applicable by act of the Congress, either by reference to Guam by name or by reference to "possessions." The Act of September 2, 1950 (64 Stat. 577), being a "law of the United States thereafter enacted," has no force or effect within Guam because the act is not specifically made applicable, either be reference to Guam by name or by reference to "possessions."
>
> American Samoa is an unorganized, unincorporated territory appurtenant to the United States. As such neither American Samoa itself nor any port or place therein is a "port of the United States" within the purview of section 4311 of the Revised Statutes, as amended, unless it can be made to appear that Congress intended otherwise. To this Bureau, it does not so appear.

The Bureau therefore is of the opinion that a foreign-flag vessel is not prohibited by section 4311 of the Revised Statutes, as amended, from landing in Guam or American Samoa its catch of fish or fish products taken on board such vessel on the high seas from a vessel engaged in fishing operations or in the processing of fish or fish products.

Collectors of customs and others concerned should be guided thereby when furnishing information in response to like inquiries.

/S/ L. B. Strubinger
Acting Commissioner of Customs

APPENDIX A-3

SPECIAL CARGO STEVEDORING SERVICES BETWEEN
STAR-KIST FOODS INC., AND ISLAND NAVIGATION CO., LTD.
AND COMMERCIAL PORT OF GUAM

Pursuant to the authority granted under Section II of Stevedoring Services of the Commercial Port Terminal Tariff, the COMMERCIAL PORT OF GUAM agrees to:

1. Provide stevedoring personnel, at the request of the vessel, vessel's agent, or owner's representative for the purpose of stevedorage of whole fish from the vessel to awaiting refrigerated containers.

2. Provide other services, equipment, personnel and/or facilities as may be requested by the vessel, vessel's agent, or owner's representative or as may be deem(ed) necessary by Port operations supervision for the most efficient stevedorage of such cargo.

3. Charge all wharfage charges applicable to all such charges to the outbound carrier.

STAR-KIST FOODS, INC., as owner, and ISLAND NAVIGATION CO., LTD., as agents, agree to:

1. Reimburse to the COMMERCIAL PORT OF GUAM for such services at the rate shown below on a complete 8-hour shift during operations or at the rate shown on "Schedule II, Exhibit I", attached herein, on less than 8-hour shift during operation:

Tonnage Stevedored Per Day	Rate
(a) 1 to 50 tons	$8.00 per short ton
(b) 50 to 80 tons	$7.00 per short ton
(c) 80 tons and up	$6.00 per short ton

2. Reimburse to the COMMERCIAL PORT OF GUAM the differential between the straight time charges and overtime charges for such personnel as may be assigned to such operations provided, however, that the number of personnel assigned shall not exceed that determined to be adequate by STAR-KIST FOODS, INC., or its representative.

3. Reimburse the COMMERCIAL PORT OF GUAM all charges as may be accrued for use of equipment in connection with such operations and that these charges shall be those set forth on page 17 of the Terminal Tariff.

4. Reimburse the COMMERCIAL PORT OF GUAM all charges for the movement of refrigerated containers to the vessel's hook and from the hook to the container yard at the rate of $11.70 per movement.

It is mutually agreed that this agreement is binding and shall continue until such time as accurate analyses can provide statistical data for an agreeable rate negotiation but that such tenure shall not exceed a period of six (6) calendar months from the date of the first operation covered under this agreement.

STAR-KIST FOODS, INC.

/S/

ISLAND NAVIGATION

/S/
PETE R. CALLAGBER

Date: 8/21/75

COMMERCIAL PORT OF GUAM

/S/
EUGENE D. RAMSEY
Acting Manager

/S/
JOAQUIN R. CRUZ
Chief of Operations

Date: 9/26/75

APPENDIX A-4

PAY RANGE SCHEDULE AND HOURLY WAGE RATES FOR PRINCIPAL DOCK EMPLOYEES ENGAGING IN THE TRANSSHIPMENT OF TUNA AT THE COMMERCIAL PORT

	Pay Range	Hourly Rate
Cargo Handling Supervisor	18	$4.83 - 6.17
Construction Equipment Operator IV	15	4.52 - 5.65
Crane Operator	17	4.72 - 5.99
Longshoreman Leadingman		
Regular	14	4.43 - 5.50
Casual	14(2)	4.52
Winch Operator	13	4.34 - 5.20
Longshoreman		
Regular	12(5) - 12(10)	4.61 - 5.20
Casual	12(2)	4.34

Sources: Government of Guam, Payrange Schedule, July 1, 1978. Port Authority of Guam, Personnel Division, "Position Descriptions," 1979b. (Mimeographed).

APPENDIX A-5

CONTAINER STATISTICS: DAYS SPENT IN PORT, POWER CONSUMPTION
AND COSTS ACCRUED BY SUCH USAGE BY REEFERS
FILLED WITH FROZEN TUNA
JANUARY 31 - AUGUST 31, 1979

Total No. Containers	356	Total Days in Port	3051
20 foot	318	Mean Days per Ctr.	8.57
40 foot	38	Std. Deviation	5.42
		Coef. of Var.	0.63

Power Consumed per Container
per day

20 foot	36 kwh
40 foot	114 kwh

Average kilowatt hours consumed per metric ton of tuna for duration of Port stay: 20.86 kwh at a cost of $1.17 per metric ton

	Container Days	Kilowatt Hours	Charges
January	5	180	$ 10.80
February	323	11784	703.87
March	1035	37476	1992.56
April	913	32868	1773.15
May	105	7836	452.42
June	171	11778	672.22
July	135	4860	302.91
August	364	18954	1239.34
Total	3051	125736	$7147.27

Sources: Guam Power Authority, Government Billing Summary-Commercial Port, Service Periods from Feb. 1, 1979 to August 31, 1979.
Bruce Pecon, Personal Communication, Port Authority of Guam, Cabras Island, 25 Sept., 1978.

APPENDIX A-6

COMMERCIAL PORT COSTS FOR EQUIPMENT

Cost of P & H 77

A.	Useful life	15 years
B.	Depreciation	$300 per month
C.	Maintan. & repair	$300 per month
D.	Use per week	10 hours

Cost of Manitowoc Crane

A.	Lease	$6956 per month
B.	Maintain. Labor	3 hours per month at $6.20 per hour
C.	Annual purchases	$10,000
D.	Use per week	20 to 30 hours
E.	Use per day of tuna discharge	2 hours

Cost of Tractor

A.	Useful life	7 years
B.	Depreciation	$4857.14 per year
C.	Use per week	30 to 40 hours
D.	Use per day of tuna discharge	2 hours

Source: Bruce Pecon, Personal Communication, Port Authority of Guam, Cabras Island, 18 May 1979.

REFERENCES

"American Samoa's miscellaneous fish industry: concerns and potential for the local economy." 1978. Pago Pago: American Samoa Gov't. (Mimeographed.)

Atkins-Kroll (Guam) Ltd. Steamship Division. 1973. ["Guam's position in respect to other Pacific ports and islands."]. (Mimeographed.)

Bell, Frederick W. 1978. Food from the sea: the economics and politics of ocean fisheries. Boulder: Westview Press.

Bell, Frederick W.; Nash, D. A.; Carlson, E. W.; Waugh, F. V.; Kinoshita, R. K.; and Fullembaum, R. F. 1970. The future of the world's fishery resources: forecasts of demand, supply and prices to the year 2000 with a discussion of implications for public policy. Working Paper 71-1. Wash. D. C.: NMFS Div. Econ. Research.

Bradford, Gershom. 1944. A glossary of sea terms. New York: Dodd, Mead & Co.

Bretschneider, Charles L. and Corwin, T. J. Jr. 1972. Master plan - Commercial Port of Guam phase I. Agana: Greenleaf/Telesca & Ahn.

Concepcion, Charo and Pecon, Bruce. 1979. Port Authority of Guam. Cabras Island, Guam. Interview. 18 May.

Congress of Micronesia. Office of the Legislative Counsel. 1972. Report on Van Camp fisheries operations in Palau District. Saipan: Fourth Congress of Micronesia, 2nd session.

Cruz, J. B. 1979. Port Authority of Guam. Cabras Island, Guam. Interview. 18 May.

Doumenge, F. 1966. The social and economic effects of tuna fishing in the South Pacific. South Pacific Commission Technical Paper No. 149. Noumea: S. P. C.

_____. 1971. Report on marine fisheries and aquaculture in the South Pacific Commission region. Noumea: S. P. C.

Fishery Conservation and Management Act of 1976. 1976. Statutes at Large, vol. 90. U. S. Code, vol. 16.

Government of American Samoa. Economic Development Administration. 1979. 1978 American Samoa statistical bulletin. Pago Pago: E. D. A.

Government of Guam. 1978. Payrãnge schedule. 1 July.

Government of Guam. Dept. of Commerce. Economic Research Center. 1979. Annual economic review. Agana: E. C. R.

Government of Papua New Guinea. 1975. Laws, statutes, etc. Merchant Shipping Act, 1975. Section 212.

Guam Legislature. 1963. An act to ammend Title XV of, and to enact a new Title XLIV to, the Government Code of Guam, relative to the separation of the Commercial Port and Department of Commerce, and for other purposes. 7th Legislature, 2nd session.

Guam Power Authority. 1979. "Government billing summary - Commercial Port." Service periods 2/01/79 to 8/31/79.

Ika Corp. 1978. Annual report, 1977. Lami: Ika Corp.

"Japanese skipjack tuna fishery development in foreign areas." 1974. Marine Fisheries Review 36 (Dec.):12-17.

Kearney, R. E. 1977. An estimation of Papua New Guinea's tuna fisheries potential. South Pacific Commission Occasional Paper No. 3. Noumea: S. P. C.

Kent, George. 1978. "Fisheries politics on the South Pacific." Essay based on South Pacific fisheries management by the same author. Univ. of Hawaii. (Mimeographed.)

Klawe, W. L. 1977. "What is a tuna?" Marine Fisheries Review 39 (Nov.):1-5.

_____. 1978a. Estimates of catches of tunas and billfishes by the Japanese, Korean and Taiwanese longliners from within the 200-mile economic zone of the member countries of the South Pacific Commission. S. P. C. Occasional Paper No. 10. Noumea: S. P. C.

_____. 1978b. World catches of tunas and tuna-like fishes in 1975. Internal Report No. 11. La Jolla: I. A. T. T. C.

Living Marine Resources. 1979. Pacific Tuna Development Foundation 1979 purse seine charter. Report No. 3. San Diego: L. M. R.

Marasco, Richard. 1974. "Food from the sea: an economic perspective of the seafood market." American Journal of Agricultural Economics 56 (May):1030-1037.

Matsumoto, Walter M. 1974. "The skipjack tuna, Katsuwonus pelamis, an underutilized resource." Marine Fisheries Review 36 (Aug.):26-33.

Merchant Marine Act, 1920 (Jones Act). 1920. Statutes at Large, vol. 39. U. S. Code, vol. 46.

Nicholson Act. 1950. Statutes at Large, vol. 64. U. S. Code, vol. 46.

Organic Act of Guam. 1950. Statutes at Large, vol. 64. U. S. Code, vol. 48.

Otsu, Tamio. 1976. Trip report: trip to Japan. Jan. 30 to Feb. 20, 1976. Honolulu: Southwest Fisheries Center.

Pecon, Bruce. 1979a. Memorandum on expenses related to and facilities available for tuna transshipment at Guam Commercial Port. Port Authority of Guam. 18 May.

_____. 1979b. Memorandum on stevedore wages and employment at Guam Commercial Port. Port Authority of Guam. 21 May.

_____. 1979c. Memorandum on tuna-filled container power consumption. Port Auhtority of Guam. 25 Sept.

Pereira, Joseph. 1979. Government of American Samoa. Economic Development Administration. Pago Pago, American Samoa. Interview. 28 June.

Perez, William. 1979. Van Camp American Samoa. Pago Pago, American Samoa. Interview. 27 June.

Polynesian Shipping. 1979. ["Annual report - incidental fish transshipped to Japan"]. Pago Pago. (Mimeographed.)

Port Authority of Guam. 1975. "Special cargo stevedoring services between Star-Kist Foods, Inc., and Island Navigation Co., Ltd. and Commercial Port of Guam." Agana.

_____. 1979a. "Tuna tonnage, [1975 - 1978]." (Mimeographed.)

Port Authority of Guam. Board of Directors. 1977. Terminal tariff. Agana: P. A. G.

Port Authority of Guam. Personnel Division. 1979b. "Position Descriptions." (Mimeographed.)

Reid, Peter. 1979. Peter Reid Stevedoring and Polynesian Shipping. Agana, Guam. Interview. 15 March.

Rockland, Steven. 1978. "The San Diego tuna industry and its employment impact on the local economy." Marine Fisheries Review 40 (July):5-11.

Rothschild, Brian J. 1966. "Skipjack tuna (Katsuwonus pelamis) resources of the Trust Territory of the Pacific Islands." Commercial Fisheries Review 28 (Feb.):6-8.

Rothschild, Brian J. and Uchida, Richard N. 1968. "The tuna resources of the oceanic regions of the Pacific Ocean." In: The future of the fishing industry in the United States. Univ. of Washington Publications in Fisheries, New Series, Vol. IV. Seattle: Univ. of Wash. Press.

Salia, Saul B. and Norton, Virgil J. 1974. Tuna: status, trends, and alternative management arrangements. RFF/PISFA Paper No. 6. Washington, D. C.: Resources for the Future, Inc.

Sevele, Feleti V. and Bollard, Alan. 1979. South Pacific economies: statistical summary. Third edition. Noumea: S. P. C.

"Skipjack tuna joint-venture operations are generally doing well." 1978. Suisan Shoho 825 (Mar.):44-49. Translated from the Japanese by Tamio Otsu, Southwest Fisheries Center, NOAA, NMFS, Honolulu, HI. August, 1978.

South Pacific Commission. 1973. "Fiji: fish processed at Levuka (Ovalu Island) freezing plant." South Pacific Islands Fisheries Newsletter 9 (July):31.

_____. 1977. "The skipjack tuna fishery in Papua New Guinea, 1976." Ninth Regional Techincal Meeting on Fisheries. Port Moresby: S. P. C.

_____. 1978. "Country statement - Fiji." Tenth Technical Meeting on Fisheries. Noumea: S. P. C.

Star-Kist Papua New Guinea Pty. Limited. 1979. Personal correspondence between T. A. Morgado, General Manager, and the writer, 8 May to 13 June.

State of Hawaii. Dept. of Planning and Economic Development. Economic Development Division. 1977. Hawaii tuna fishery development plan. Honolulu: Dept. Plan. and Econ. Dev.

Stockwell, Malcolm E. 1979. Star-Kist Tuna. Pago Pago, Amercian Samoa. Interview. 26 June.

Suda, Akira. 1972. "The skipjack fishery of the future." Gyosen 182 (Dec.):44-52. Translated from the Japanese by Tamio Otsu, Southwest Fisheries Center, NOAA, NMFS, Honolulu, HI. May, 1973.

United Nations. Food and Agriculture Organization. 1978. Yearbook of fishery statistics, 1977. Vol. 44. Rome: F. A. O.

U. S. Congress. House. 1976. Report of the committee of conference. Report 94-948 to accompany H. 200, 94th Cong., 2d session.

U. S. Dept. of Commerce. NOAA. 1976. A marine fisheries program for the nation. Washington, D. C. U. S. G. P. O.

U. S. Dept. of Commerce. NOAA. NMFS. 1973. Tuna 1947 - 1972. Current Fisheries Statistics No. 6130. Basic Economic Indicators. Washington, D. C.: Economic Research Laboratory.

_____. 1979a. Preliminary draft of the billfish FMP prepared for the Western Pacific Regional Fishery Management Council. Honolulu:NMFS.

_____. 1979b. Fishery Market News Report. 16 Sept. 1977 to 7 Sept. 1979.

_____. 1979c. Foreign Fishery Information Release. 17 Nov. 1977 14 Oct. 1979.

U. S. Dept. of Commerce. Southwest Fisheries Center - La Jolla. 1978. "The Solomon Islands skipjack fishery." Tuna Newsletter 63 (Nov. - Dec.:6.

U. S. Dept. of State. 1978. Trust Territory of the Pacific Islands. 31st Annual Report. Washington, D. C.: U. S. G. P. O.

U. S. Treasury Dept. Bureau of Customs. 1953. Marine Circular No. 124. 12 June.

Uyemae, Junichiro. 1975. "The economy of the tuna fishery in Japan." Bungei Shunju (Aug.):340-350. Translated from the Japanese by Tamio Otsu, Southwest Fisheries Center, NOAA, NMFS, Honolulu, HI. Feb., 1976.

Van Camp Guam. 1979. ["Van Camp tuna transshipped from Guam."]. May, 1974 - Jan., 1979. (Mimeographed.)

Yong, Marian Y. Y. and Wetherall, Jerry A. 1980. Estimates of the catch and effort by foreign tuna longliners and baitboats in the Fishery Conservation Zone of the central and western Pacific, 1965-77. Southwest Fisheries Center Administrative Report No. H-80-4. Honolulu: Southwest Fisheries Center.