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A DESCRIPTION AND ECONOMIC APPRAISAL OF CHARTER BOAT FISHING IN HAWAII

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A DESCRIPTION AND ECONOMIC APPRAISAL OF CHARTER BOAT FISHING IN HAWAII

FINAL REPORT

by

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April, 1984

PREFACE

This report was prepared under contract (82-ABC-00216) by Dr. Karl Samples of the University of Hawaii, College of Tropical Agriculture. The study was a joint undertaking of the Hawaii Institute of Tropical Agriculture and Human Resources (University of Hawaii) and the Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA. The objectives of the contract was to present the results and analyze a survey of charter boat operators in the State of Hawaii. The survey was designed to describe the charter boat fishery, identify factors important to its success, and provide information to estimate the impact of the industry on Hawaii's economy. The survey took place in 1983 and reports charter boat characteristics for the previous year.

Since this report was prepared under contract, its statements, findings, conclusions, and recommendations are those of Dr. Samples and his associates, and do not necessarily reflect the views of the National Marine Fisheries Service.

Samuel G. Pooley
Industry Economist

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EXECUTIVE SUMMARY

The purpose of this study is to describe Hawaii's charter boat fishing fleet in terms of its composition, and its biological and economic impacts. A mail questionnaire survey of charter boat owners was conducted in 1983, to collect data on 1982 operating characteristics of their vessels. The survey yielded 73 usable returns. A follow-up telephone survey of non-respondents confirmed that mail survey respondents were representative of the entire population.

Using results of mail and telephone surveys, the size of the charter fleet operating in 1982 was estimated to be 119 boats. The fleet operated out of ports located on all of the populated Hawaiian Islands (except Lanai and Nihoa), with a majority based on the islands of Oahu and Hawaii. The most prominent charter fishing home ports were determined to be Kewalo Basin (Oahu) and Honokohau (Hawaii).

During 1982, the fleet produced an estimated 73,780 passenger trips. The majority of trips were full-day private charters priced at $355 on average. Hawaii nonresidents were responsible for the bulk of charters.

The fleet generated an estimated $8.1 million in total revenue in 1982, mainly from sales of charter fishing trips and fish caught while charter fishing. Indirect and induced sales amounted to an additional $8 million. Estimated charter fishing direct sales compare closely with sales volumes estimated for the Hawaii surfshop industry of $9.1 million, and are about 20% higher than the $6.7 million in retail sales generated by Hawaii's diving industry. Compared to total 1982 sales made in the State of Hawaii ($20,722 million), direct charter sales represent about .03%.

The industry directly employed 203 people (full-time equivalent basis) in 1982, and indirectly created an additional 269 full-time positions as a result of purchases from other economic sectors. In terms of direct employment, charter fishing activities in the State created 240% more positions than the scuba industry that employed 84 people on a full-time basis. Out of a total 1982 statewide employment level of 442,350, the charter fishing industry was directly responsible for about .04%.

Total fish catch in 1982 by the charter fishing fleet, exclusive of fish landed while commercial fishing, was estimated to be about 2.2 million pounds. This quantity represents 15% of the total reported commercial fish landings for Hawaii in 1982. The importance of charter catches for certain specific fish species was more pronounced. For example, the estimated blue marlin catch by the fleet (803,250 lbs) was 180% higher than the total commercial blue marlin catch reported in 1981.

Taken together, these findings suggest that charter fishing is an economically and biologically significant commercial marine activity. Compared to total economic activity occurring in the State of Hawaii, however, the charter fishing industry is somewhat insignificant.

Individual vessels comprising the fleet appear to be heterogeneous in terms of vessel activity levels, construction characteristics and owner demographic characteristics. Both full-time and part-time operations were observed, of which about a half were owner-operator. Significant under-utilization of capacity was seen to exist, with many vessels operating less frequently than necessary to breakeven financially. As a result, the fleet, on average, realized a before-tax loss in 1982. However, it was also observed that low profitability is characteristic of charter fishing fleets operating in other areas of the United States.

1.0

INTRODUCTION

Although charter sport fishing is a prominent commercial marine activity in Hawaii, little attention has heretofore been devoted to examining the industry in detail. Only one earlier study, conducted for National Marine Fisheries Service, attempted to identify the characteristics of Hawaii's charter fleet and its economic and biological impacts (National Marine Fisheries Service, 1983). This 1976 study was limited in scope to examining charter boat operations in the Kailua-Kona area on the island of Hawaii, and no attempt was made to expand the results to a statewide basis. The goal of this particular research endeavor was to fill an informational void by illuminating the operating characteristics, social and biological impacts, and activities of the entire charter boat fleet operating in Hawaii. Specifically, the objectives of the study were:

1) To develop socioeconomic profiles of charter boat operators;
2) To estimate the expected costs and returns associated with charter fishing operations in Hawaii;
3) To measure the statewide economic and employment impacts of charter vessel operations.

This report of research findings is organized in the following manner. Data acquisition procedures are described in the next section with emphasis on sample design and survey procedures. In the third section, a statistical profile of Hawaii's charter fleet is presented. Readers will find this section to contain detailed descriptive information about the fishing boats, vessel owners and catch characteristics, as well as information on fishing activity levels. Costs and returns associated with charter fishing in Hawaii are addressed in the fourth section, and factors influencing vessel profitability are analyzed. For purposes of comparison with other charter fleets in the United States, the fifth section contains a discussion of vessel owner characteristics, charter fishing activity levels, fare structures and operating cost/returns for nine different areas in the United States, including Hawaii. A discussion of the direct and indirect employment, sales, and income impacts associated with Hawaii charter fishing in 1982 is presented in the sixth section. This section provides a perspective on the overall contribution which the charter fishing industry makes to the State's economy. Attitudes of charter boat owners about State management of their industry are described in the seventh section. Finally, the report concludes with remarks about the future prospects for charter boat fishing in Hawaii.

2.0

METHODS

2.1 Identification of Charter Boat Population

It is not a simple matter to distinguish the population of bona-fide charter boats from the remainder of approximately 14,500 boats registered in Hawaii. A preliminary list of names and addresses of charter fishing vessel owners was obtained from the "Hawaii Fishing Vessel Inventory," maintained by the National Marine Fisheries Service (NMFS), Southwest Fisheries Center Honolulu Laboratory, Honolulu, Hawaii. The "Hawaii Fishing Vessel Inventory" is the result of the efforts by NMFS, the State, and the Western Pacific Fishery Management Council to assemble registration information from the Hawaii Department of Transportation (Harbors Division) and the U.S. Coast Guard relating to all types of fishing vessels operating in Hawaii. Commercial vessels (fishing and non-fishing) under 5 tons displacement are registered with the Hawaii Harbors Division as "Registered Undocumented" (referred to hereafter simply as registered vessels). Commercial vessels greater than 5 tons displacement are licensed with the Coast Guard as "Documented" and will be referred to as such in this report. Two vessel sub-classifications: "charter-fishing" and "passenger-fishing," are used by the State of Hawaii Harbors Division and U.S. Coast Guard, respectively. It is the combination of these two sub-classifications which constitutes the NMFS vessel inventory of charter fishing vessels. From this inventory of 214 documented and registered "charter fishing" boats, information was obtained about the owner's name, address, boat description and vessel identification number.

Dependence on the NMFS vessel inventory as a preliminary means of identifying charter vessels operating in Hawaii was based on the apparent inclusiveness of the inventory listing. Owners of registered and documented vessels are required by the Harbors Division and Coast Guard to annually license their vessels according to principal boat use or service. While it cannot be assured that all boats which are even remotely involved in commercial charter fishing are categorized as such, incentives to be classified as a charter fishing vessel are quite high. Bona-fide charter fishermen, for example, enjoy a tax advantage of being able to deduct costs of fishing. This of course is also true for vessels that are used for commercial fishing purposes. However, there is a difference in the fact that vessels which are categorized as "commercial fishing" cannot legally be used for any other marine commercial service. Furthermore, documented vessels listed under any category other than "passenger fishing" cannot legally engage in charter fishing. In contrast, a "passenger fishing" categorization affords a vessel owner the option to engage in commercial fishing, charter fishing, charter

tours, or simply pleasure boating. Thus the incentive for charter fishermen to identify their boats as passenger-fishing for registration purposes is great because this listing offers the greatest degree of flexibility in commercial vessel uses.

The disincentives in licensing a vessel as commercial-fishing or charter fishing are about equal. A tax is imposed by the Hawaii State Harbors Division on all boats holding a commercial permit (including charter fishing vessels). All such vessels are required, on a monthly basis, to pay the State a user fee equal to either twice the monthly slippage fee, or 2% (1.5% in 1982) of their gross monthly income, whichever is greater.

A physical search through vessel documentation records revealed six additional boats not included in the NMFS inventory due to their recent transfer of ownership. Using a combined list of boats, it was determined that there were nine owners with two boats listed under their names and one owner with three boats. One of the boats on the combined list had been repossessed by a finance company, thus bringing the maximum potential size of charter fishing boat owners in Hawaii to 208 (220-9-2-1). These 208 boat owners comprised the target population for a mail questionnaire survey.

2.2 Mail Questionnaire Development and Fielding

The principal source of data used in this study was charter fishing vessel owners' responses to a mail questionnaire survey. A questionnaire instrument was drafted, reviewed internally, and then circulated for comment to sixteen pre-selected reviewers representing the charter fish industry, government agencies, and other interested groups. The instrument was subsequently revised to accommodate reviewers' comments. The final version included six sections containing questions for boat owners about 1) their attitudes about public policy issues confronting the industry; 2) their 1982 fish catch and the perceived importance of catching certain fish to charter customers; 3) the costs and returns associated with their charter fishing operations in 1982; 4) types of fishing and other commercial boating activities engaged in during 1982; 5) fishing activity at fish aggregating devices, and 6) their socioeconomic background. A copy of the final questionnaire is reproduced in Appendix A. For aesthetic reasons, the questionnaire was printed on blue colored paper and assembled in a 5.5" x 8.5" booklet format.

The survey process began with an advance letter on January 13, 1983. The letter explained the goals of the study, informed respondents to expect the forthcoming questionnaire, and encouraged participation in the study. Owners of more than one boat received a similar letter with the added request that they aggregate the data on their boats and report the aggregate amount in their questionnaire booklets. Within a week after the advance

letter mailing, a packet containing the questionnaire, an accompanying letter, and a self-addressed stamped return envelope was sent to each of the 208 fishing vessel owners. Owners were promised that the information they supplied would be held in strict confidence and would be reported in aggregate form only. Boat owners were assigned an identification number and questionnaires were numbered to correspond with the owner's assigned number. Identification of questionnaires allowed the return response rate to be fully monitored and served to identify owners who were unresponsive.

After the first mailing, an updated version of the NMFS vessel inventory listing was obtained. The new list indicated that four boats on the original NMFS vessel inventory had been sold. Since two of the boats sold belonged to multiple owners, it increased the number of boat owners by two. Concurrently, a listing of charter boats became available from the Hawaii International Billfish Association (HIBA). Names of 15 owners not on the original NMFS inventory were found. Cross-referencing the HIBA and NMFS listings by vessel registration numbers disclosed that 2 of the 15 new names were associated with boats already on the NMFS inventory, but under different owners. A packet containing material identical to that which was mailed to the original 208 boat owners was mailed to 19 additional people. Although a total of 227 (208+4+15) people received the questionnaire, the maximum number of possible boat owners was only 223 (208+2+13). The difference stemmed from the fact that 4 of the boats included in the 227 are associated with 2 different owners and hence 4 owners had to be subtracted from the total to reflect 1 rather than 2 owners per boat.

Based on respondents' comments, returned questionnaires were classified as either charter fishing or non-charter fishing operations (i.e. sailboats, commercial fishing boats, pleasure boats, dive boats, etc.). Respondents who indicated they owned charter fishing boats but did not engage in charter fishing in 1982 were classified as non-charter for purposes of survey management. A number of questionnaires were returned either partially completed or blank and were not used for purposes of further study. Some owners removed the identification number from their questionnaire and were classified as unidentifiable. Several of the questionnaires also proved to be undeliverable by mail.

After one week, all boat owners were sent a postcard to remind them to return the questionnaires promptly. A second wave of questionnaire packets was put into the field eight weeks after the first. The second wave comprised 154 packets; with each packet containing the original questionnaire, a different accompanying letter, and a self-addressed stamped envelope.

The third and final wave of questionnaires was sent out by certified mail in order to convey the importance of the study to

those boat owners who had not yet returned their questionnaires. The third wave consisted of 132 certified mail packets; with each packet containing the questionnaire, a different accompanying letter, and a self-addressed stamped envelope. The third wave was put into the field five weeks after the second wave. In Figure 2.1, a cumulative frequency histogram of returned questionnaires (i.e., charter, non-charter, partials, and blanks) illustrates returns over an 18-week fielding period. In Table 2.1, the response for various questionnaire mailings is summarized, and Table 2.2 shows questionnaire response by island. The overall response to the three waves of questionnaires yielded: 72 confirmed charter boat owners, 44 non-charter owners, 6 partial or blank questionnaires, 25 undeliverable (due either to owners leaving the State or changes of addresses), and 77 non-responding boat owners. The overall response rate for the questionnaire was therefore 55% [(72 + 44 + 6)/223].

2.3 Follow-up Telephone Survey

Given that a significant percentage of the survey population did not respond to repeated questionnaire mailings, a method was sought to determine: 1) the actual proportion of non-respondents who were bona-fide charter fishing boat owners, and 2) whether or not the data collected by the mail survey reflected a representative sample of the actual population of charter boat owners in the State.

A separate follow-up telephone survey was conducted involving a sample of those individuals who did not respond to the mail questionnaire survey. The number of questions asked in the telephone survey was reduced, but question overlap with mail survey was substantial. Statistical comparisons could therefore then be drawn between the responses observed for the two survey groups. Such a comparison would provide the necessary information to confirm or refute the hypothesis that mail respondents comprised a representative sample of Hawaii charter fishing boat owners. A copy of the telephone survey instrument is provided in Appendix B.

The phone survey procedure consisted of calling telephone numbers of a selected sample of individuals who did not respond to mail questionnaire survey. The sample was stratified according to island of the non-respondents' residences (see Table 2.3). The survey was conducted over the time period between May 18 to May 26, 1983. A total of 26 boat owners were contacted. This represents approximately 12% of the original population (223) and 34% of all those individuals (from that same population) who did not respond to the mail survey.

The majority of boat owners reached by this survey required several calls before finally being contacted. This held especially true for those who were found to be charter boat

Figure 2.1 Cumulative Survey Response by Week

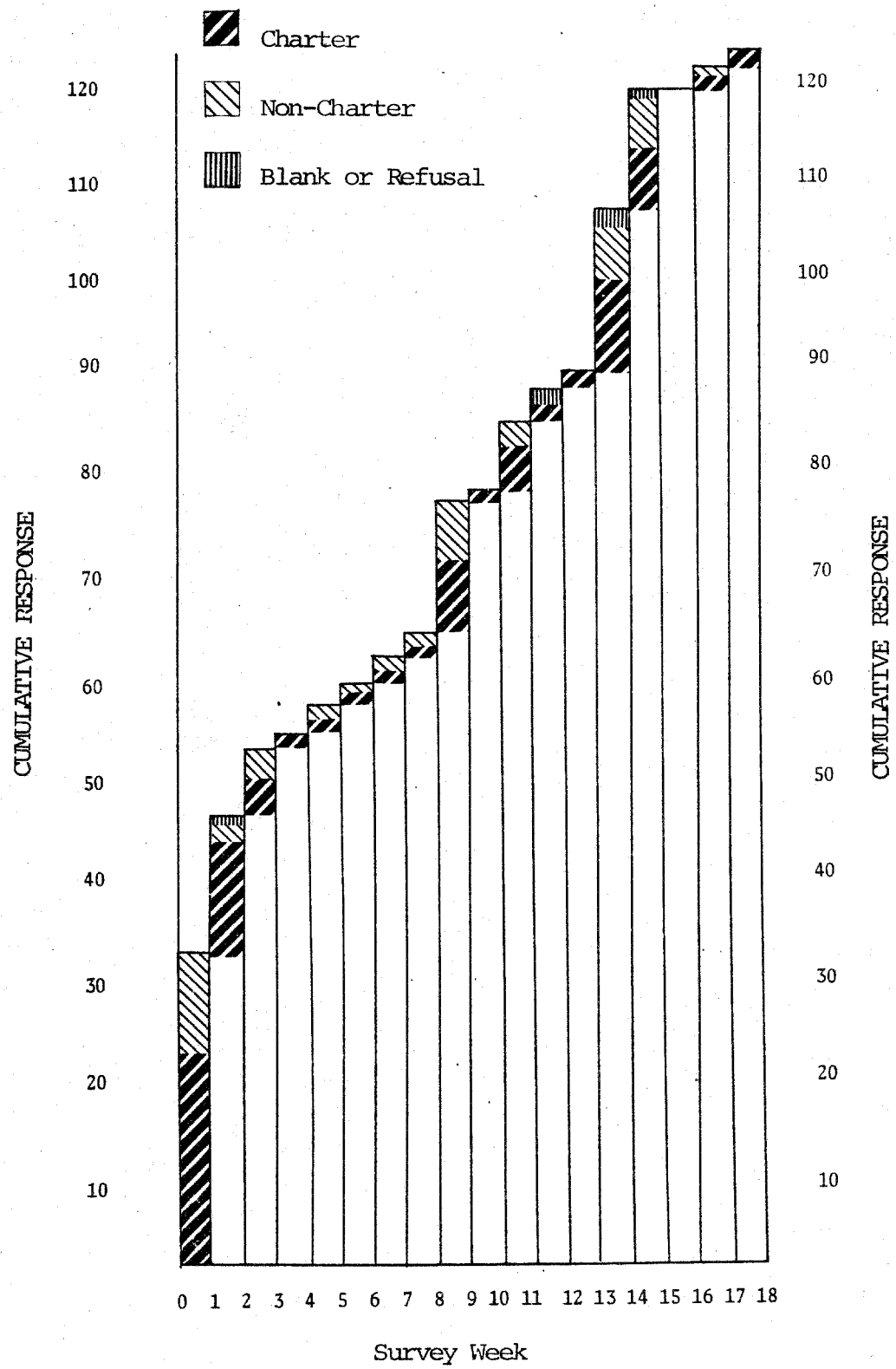


Table 2.1 Response of Survey Participants for Different Mailings

Mailing	Charter	Non-Charter	Blank	Undeliverable	Total
First Wave	40	23	1	12	76
Second Wave	14	9	2	0	25
Third Wave	18	12	3	13	46
TOTAL	72	44	6	25	147

Table 2.2 Response of Survey Participants: By Island of Owner's Residence

Island	Charter	Non-Charter	Blank	Undeliverable	Total
Oahu	24(a)	21	3	6	54
Hawaii	30	15	1	10	56
Maui	12	7	1	5	25
Molokai	2	0	0	0	2
Kauai	3	0	0	2	5
Lanai	0	1	0	1	2
Mainland	0	0	0	1	1
Unidentified	1	0	1	0	2
TOTAL	72	44	6	25	147

(a) Includes one owner with two boats. Hence 25 boats were accounted for.

Table 2.3 Geographic Distribution of Survey Participants: By Island of Owner's Residence

	Mail Survey Population		Mail Survey Non-Respondents		Telephone Survey Sample	
Island	Number	Percent	Number	Percent	Number	Percent
Oahu	89	40	36	46	12	46
Hawaii	86	39	30	38	9	35
Maui	35	16	10	13	4	15
Molokai	2	1	0	0	0	0
Kauai	8	4	3	4	1	4
Lanai	2	1	0	0	0	0
Mainland	1	(b)	0	0	0	0
TOTAL	223	101(a)	79(c)	101(a)	26	100

(a) Deviation from 100 due to rounding error.

(b) Less than 1%.

(c) Includes two respondents who could not be identified. Actual number of non-respondents is 77.

fishermen. If after repeated attempts, a boat owner could not be reached, the owner was dropped from the sample and replaced with another randomly selected individual. This sampling method may have tended to introduce a bias against contacting charter boat owners. There was no a priori reason to suspect, however, that non-charter boat owners were on average more susceptible to being intercepted by telephone compared to charter boat owners, especially when calls were placed throughout the day and evening hours.

As might be expected, a large percentage (69%) of those finally contacted by telephone were non-charter boat owners. This finding suggests that the majority of the population of charter boat owners did respond to the mail survey. The remaining 31% of the telephone survey sample consisted of charter boat owners (see Table 2.4).

Table 2.4 Charter/Non-Charter Composition of Survey Respondents

	Mail Survey		Telephone Survey	
	Number	Percent	Number	Percent
Charter	72	62	8	31
Non-Charter	44	38	18	69
TOTAL	116(a)	100	26	100

(a) Includes only those respondents who were positively identified as charter or non-charter.

3.0

STATISTICAL PROFILE OF CHARTER FISHING BOAT INDUSTRY

Results of the mail and telephone surveys were used to develop a statistical profile of Hawaii's charter fishing industry as it existed in 1982. First, an estimate of the number of vessels comprising the fleet was obtained as follows. First, a count was made of the number of boats owned by individuals responding to the mail survey. Two respondents owned two boats in 1982, so a total of 74 (72 + 2) charter fishing boats were initially accounted for. Close inspection and cross-referencing of partially completed and non-deliverable questionnaires revealed an additional 21 boats which operated in 1982. As a final measure, the proportion of charter boat owners identified in the telephone survey (31%) was used as a multiplicative factor for the group of non-responding boat owners in the mail survey (N = 77) to arrive at an estimated 24 additional bona-fide charter boat owners. Since it was already known from vessel records that all non-respondents owned only a single boat (whether charter or not), this added 24 boats to the total for an estimated fleet size of 119 (74 + 21 + 24). Of this total, detailed information was collected on 73 (61%) separate charter fishing vessels through the mail questionnaire survey.

The survey generated responses by charter boat owners residing on the islands of Hawaii, Oahu, Maui, Molokai and Kauai. Response from Molokai and Kauai was low, amounting to only five returned surveys altogether. Due to the need to preserve the confidentiality of responses supplied by these five boat owners, data for Kauai and Molokai are not reported below on an individual island basis. These data are, however, reflected in statewide figures.

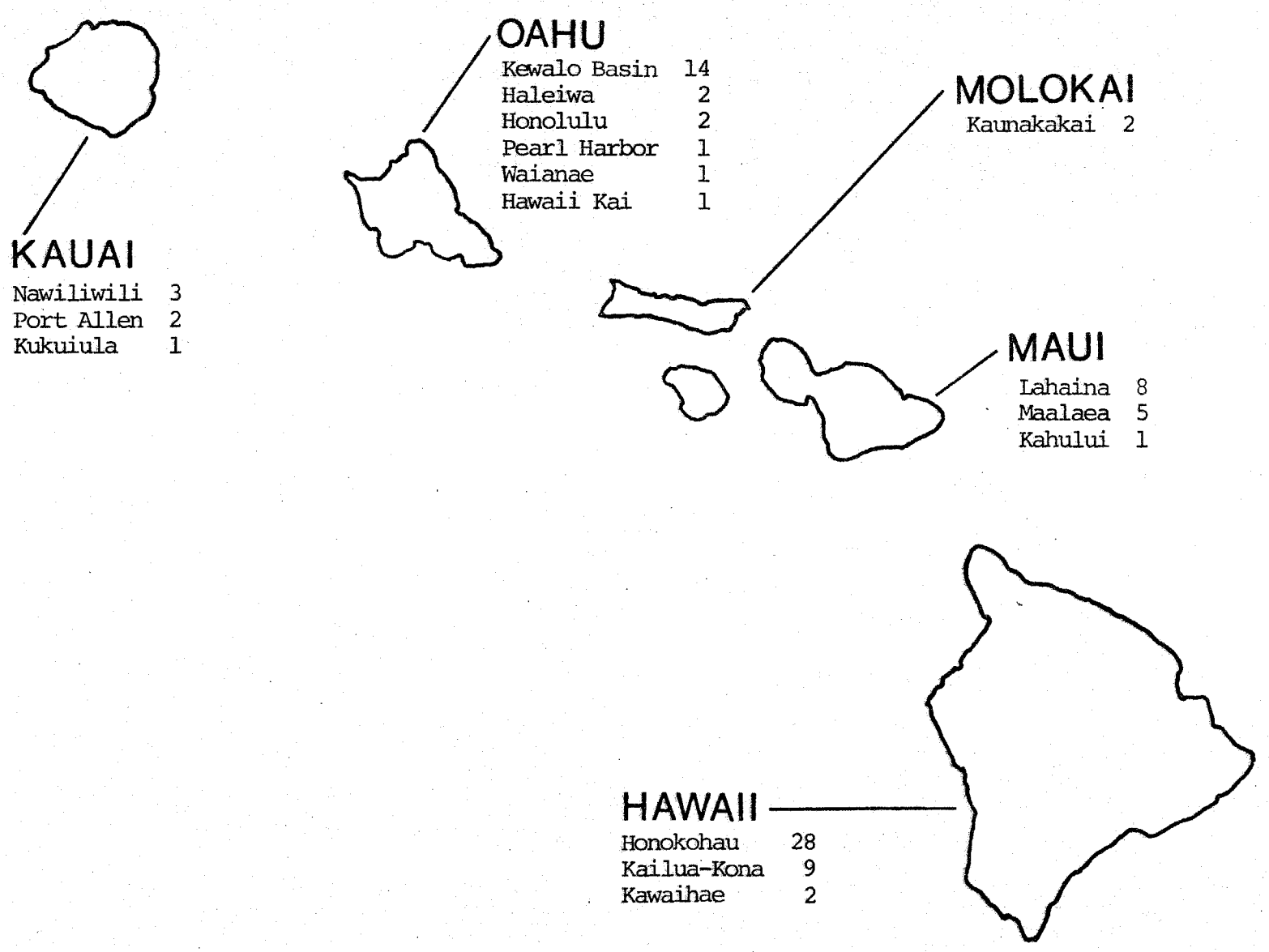
3.1 Vessel Characteristics

3.1.1 Location and Ports Used

The geographic distribution of ports used by the 73 vessels for which data were obtained is depicted in Figure 3.1. The island of Hawaii appears to be the most popular island to base a charter fishing operation. Just under half (48%) of the survey group indicated that the ports of Honokohau, Kailua-Kona or Kawaihae, all located on the island of Hawaii, were home ports for the charter vessels they owned.

Oahu was indicated to be the next most popular island to base a charter fishing business. Overall, the island of Oahu was chosen by 27% of the survey respondents as the island on which their home port was located. For the island of Oahu, Kewalo Basin, located in Honolulu, was used most often as a base port

Figure 3.1 Number of Charter Boat Owners Reporting Various Ports as Bases of Operation: By Island



(18% of the time).

The islands of Maui and Kauai were found to be the third and fourth most commonly chosen islands as bases for a charter fishing business in Hawaii. Maui and Kauai were chosen by 17% and 8% of the survey respondents, respectively, as the island on which their base port was located. The most popular ports for Maui were Lahaina and Maalaea Harbor which were used by 10% and 6% of respondents, respectively. In Kauai, Nawiliwili and Port Allen harbors which were used as home ports for 4% and 3% of the total survey group, respectively. Finally, the island of Molokai served as a base of operation for two charter boat owners. No respondents indicated that the island of Lanai was a base port location.

3.1.2 Vessel Size, Age and Propulsion

The length of vessels comprising Hawaii's charter fleet in 1982 ranged from 20 to 59 feet. The median length was 40 feet, and the overall statewide average for the 62 vessels for which length data were available was 36 feet. As shown in Table 3.1, average vessel lengths were greatest on the island of Oahu (43 feet) and smallest on Maui (32 feet).

In terms of vessel age, charter boats comprising Hawaii's fleet ranged from 2 to 35 years of age assuming 1982 as the base year for age calculation purposes. The median vessel age was determined to be 4 years, and the overall statewide average age was 11 years. In Table 3.1, average vessel age is shown to be highest for Oahu (13 years) and lowest on Maui (9 years).

It is evident from Table 3.1 that the dominant form of propulsion used by Hawaii charter fishing boats is diesel or gas motors. The proportion of diesel to gas driven boats ranges from 33% on Kauai to 100% on Oahu. On a statewide basis, 88% of charter boats are diesel motor driven while 12% use gas engines.

3.1.3 Vessel Cost, Market Value and Remaining Useful Life

The reported purchase price of charter fishing boats ranged from $750 to $275,000. The median value was $35,000 and the overall statewide average vessel cost was determined to be just under $82,000 (see Table 3.2). As shown in Table 3.3, a majority of boat owners had purchased their boats from sellers in Hawaii, but this proportion varied considerably from island to island.

Owners generally reported that the market value of their boats had appreciated since purchase. This could be caused by a variety of conditions such as significant vessel improvements, increased market demand combined with a limited supply of suitable boats, or general price inflation. Maui-based fishing

Table 3.1 Characteristics of a Typical 1982 Charter Fishing Boat: By Island and Statewide

Characteristic	Statewide	Hawaii	Oahu	Maui
Avg. Length (feet)	36	34	43	32
Median Year Built	1971	1972	1969	1974
Propulsion				
Diesel	88%	96%	100%	67%
Gas	12%	4%	0%	33%

Table 3.2 Average Purchase Price, 1982 Market Value, and Remaining Operating Life of Hawaii Charter Fishing Boats: By Island and Statewide

	Statewide	Hawaii	Oahu	Maui
Purchase Price ($)	80,878	81,617	86,702	67,818
1982 Market Value ($)	94,681	93,633	106,722	74,091
Remaining Operation Life (years)	12	14	13	9

Table 3.3 Percent of Respondents Indicating They Purchased Their Charter Boat Within the State of Hawaii: By Island and Statewide

Vessel Purchased in Hawaii?	Statewide	Hawaii	Oahu	Maui
Yes	60%	37%	80%	75%
No	36	63	20	17
No Response	4	0	0	8
TOTAL	100%	100%	100%	100%
N	73	30	25	12

boats were viewed by their owners to have experienced the lowest rate of appreciation (approximately 9% of initial cost), from a purchase price of $67,818 to a 1982 market value of $74,091. There was a consistent trend for the higher priced boats to experience more rapid rates of appreciation. For example, Oahu boat owners reported the highest purchase price, $86,702, and reported the highest average rate of appreciation as well, 23% of the initial price of the vessel from $86,702 to a 1982 market value of $106,722.

Vessel remaining operating life, as viewed by the boat owner, ranged from 1 to 50 years. Boats operating out of the island of Maui were considered to have the shortest remaining operating life of 9 years. Big Island (Hawaii) boats were viewed by their owners to have the longest remaining operating life of 14 years. On a statewide basis, the average charter fishing vessel had a remaining operating life of 12 years in 1982.

3.2 Owner Characteristics

A total of 72 charter boat owners responded to the mail survey. The number of owners (72) is less than the number of boats (73) due to the fact that one owner provided information on 2 separate boats.

3.2.1 Demographic Characteristics

Demographic profiles of the 72 charter boat owners responding to the mail survey showed that the largest share of boat owners (41%) were found to live on the island of Hawaii. The island of Oahu was the second most prominent island on which charter boat owners resided (33% of respondents). Kauai and Molokai were the islands of residence for the fewest boat owners (4% and 3%, respectively). There were no respondents who lived on the islands of Lanai or Nihoa.

Socioeconomic characteristics of charter boat owners such as age, sex, education level and years of charter fishing experience were obtained by the survey to produce a more vivid picture of the "typical" Hawaii charter boat owner (Table 3.4). Age of owners ranged from 27 to 77 years. The median age was 40 and the overall statewide average age was determined to be 49 years. On an island basis, average age of owners was observed to vary between 40 years on Maui to 50 years on Hawaii and Oahu. For all islands, at least 91% of the owners responding to the mail survey indicated they were male. All survey respondents were high school graduates and approximately 13% of the survey group reported they had earned advanced graduate degrees.

Owners reported a wide range in the number of years they had been engaged in the charter fishing business. The average length

Table 3.4 Characteristics of an Average Charter Boat Owner in 1982: By Island and Statewide

Characteristic	Statewide	Hawaii	Oahu	Maui
Age (Years)	49	50	50	44
Charter Experience (Years)	10	9	12	10
Sex (% Male)	97%	97%	100%	91%
Education (Years)	13	13	13	13

of experience was 10 years, and this average did not vary much across individual islands (Table 3.4). A more detailed breakdown of reported years of experience is given in Table 3.5.

Taken together, these findings suggest the following portrait of a charter boat owner in Hawaii. Typically, he is male, about 49 years old, has some college education and has been engaged in the charter fishing business for about 10 years. Furthermore, only slight differences exist in this profile between island groups. Hawaii and Oahu boat owners are slightly older, and those of Oahu are, in addition, slightly more experienced and all are male. There are slightly more women charter boat owners on Maui and in general Maui boat owners are younger than average too.

3.2.2 Motivations

The survey inquired about the motivations underlying Hawaii charter boat owners' participation in the charter fishing business. Respondents were asked to identify which of the following factors were primary motivators: "enjoy the life-style," "profitable," "enjoy meeting people," "only work I know," "tax shelter," "friends in business," and "other." The percentage of times a particular motivating factor was selected by respondents is summarized in Table 3.6. Looking first at the statewide results, it is clear that the typical Hawaii charter boat owner is most often motivated by the life-style associated with charter fishing as a primary reason for their participation in the industry. The second and third most often selected motives were "enjoyment of meeting people," and the "tax shelter" characteristics of a charter fishing business. Only 16% of the charter boat owners indicated that "profitability" was a primary reason for their participation in charter boat fishing. Lack of a strong profit motive in charter fishing is consistent with the finding that only 21% of the survey group claimed they were charter fishing for "tax shelter" advantages. The remaining motivational factors: "only work I know" and "friends in business," were deemed influential only by only a small fraction (3%) of the survey respondents.

Charter boat owners on different islands appear to be motivated by somewhat different factors. Of the survey respondents, owners residing on Maui least frequently indicated that enjoyment of the life-style associated with charter fishing was a reason for their participation in the business. For Oahu and Hawaii, enjoyment of life-style was mentioned 88% and 90% of the time by the charter boat owners residing on these islands, respectively.

The "enjoyment of meeting people" was the next most popular reason for being involved with the charter fishing industry. Again, Maui had the lowest percentage of respondents (25%)

Table 3.5 Years of Experience in the Charter Fishing Business as of 1982

Years of Experience	Number	Percent
1 to 3	14	19%
4 to 7	22	31
8 to 10	8	11
11 to 15	14	19
16 to 20	6	8
21 to 30	4	6
31 to 40	1	1
No Response	3	4
TOTAL	72	99(a)

(a) Deviation from 100% due to rounding error.

Table 3.6 Primary Motivating Factors for Participating in a Charter Fishing Business: By Island and Statewide

Motivating Factor	Statewide	Hawaii	Oahu	Maui
"Enjoy Life-Style"	85%	90%	88%	58%
"It's Profitable"	16	13	20	17
"Enjoy Meeting People"	55	73	44	25
"Only Work I Know"	3	3	0	8
"It's a Tax Shelter"	21	27	16	17
"Friends Are in Same Business"	3	3	4	0
"Other"	21%	10%	24%	25%
N	72	30	24	12

motivated by this otherwise popular factor. Owners from the islands of Oahu and Hawaii indicated this reason as a primary motive for their participation in charter fishing 44% and 73% of the time, respectively.

The remaining two motivating factors: "the only work I know" and "friends in same business," were viewed as important by only a very small percentage of charter boat owners.

The catch-all category of "other" reasons for being a participant in a Hawaii charter fishing business was indicated by a significant percentage of the charter boat owners for each island group. The most common unsolicited reasons supplied by the respondents were: "a way to make fishing affordable," and "establishing a business for a retirement occupation." Other motivating factors mentioned included: "owning a sporting goods store," "helps tourism," "born and raised in charter fishing," and one respondent simply stated "...it's a living."

3.3 Catch Characteristics

3.3.1 Catch Composition

The survey asked charter boat owners to identify the types and number of fish caught while charter fishing in 1982. The reasons for this were twofold. If fishery managers are to best manage Hawaii's marine resources, it is vital to have current data on the impacts which different user groups, in this case charter boat fishermen, have on various fish stocks. Information on catch was also needed to determine charter fishing revenues. Average catches for various fish species are reported in Table 3.7. Values for the average number of fish landed are drawn directly from catch data supplied by 57 respondents, while values for average landings in terms of weight are calculated using average fish poundage figures supplied by the National Marine Fisheries Service Honolulu Laboratory.

On average, vessels comprising Hawaii's charter fishing fleet landed 402 fish in 1982 weighing an estimated 18,516 pounds. In terms of numbers, two varieties of tuna, aku (*Katsuwonus pelamis*) and ahi (*Thunnus albacares*), dominated the Hawaii charter boat fish-catch. The most prominent is the aku, or skipjack tuna. A typical Hawaii charter boat landed 161 aku in 1982 out of a total of 402 fish caught for the year. Other prominent fish types landed were: mahimahi (*Coryphaena hippurus*), blue marlin (*Makaira nigricans*), ono (*Acanthocybium solandri*), and bottomfish. Also caught, but to a lesser degree, were shortbill spearfish (*Tetrapterus angustirostis*), striped marlin (*Tetrapterus audax*), shark (*Carcharodon*), ulua (*Caranx Spp.*), black marlin (*Makaira indica*), and barracuda (*Sphyraena barracuda*). The average Hawaii charter boat landed between 2 and 8 of these different fish types in 1982.

Table 3.7 Average Number and Weight of Various Types of Fish Reportedly Caught During 1982 While Charter Fishing

Fish Type	Average Number(a)	Estimated Average Poundage(a) (b)
Aku	161	1,127
Ahi	53	5,009
Mahimahi	44	572
Ono	28	518
Ulua	4	42
Black Marlin	2	550
Blue Marlin	30	6,750
Sailfish	(c)	188
Shortbill Spearfish	8	212
Striped Marlin	8	564
Barracuda	2	10
Shark	8	2,920
Bottomfish	54	54(d)
TOTAL	402	18,516

(a) N = 57

(b) Average fish weight data obtained from statistics on charter vessel catches published by Hawaii Fishing News. Data represent simple averages of weights observed for the 1979 and 1980 fishing season.

(c) Less than 1 fish.

(d) Estimated to weigh 1 pound each.

In terms of weight, about 70% of the average vessel's catch is comprised of aku, ahi and blue marlin. Due to their smaller average weights, mahimahi are relatively less significant in terms of total catch poundage as they are in terms of total numbers of fish caught.

In grouping charter boat owners by their island of residence, those located on the island of Maui (N=7) had the overall largest number of fish caught (Table 3.8). Aku and ahi dominated the catch for Maui charterers. The remaining charter boat owners located on the islands of Hawaii and Oahu reported similar catch compositions as the statewide average and landed an average of 391 and 316 fish per boat in 1982, respectively.

The utility attributed to catching a particular game fish varies with the type and size of the fish being landed. Marlin have earned a reputation among sportfishermen as an excellent fighting fish. Attraction of sportfishermen to the challenge of landing a large marlin could go a long way in explaining why the island of Hawaii is the home of the bulk of the charter fishing fleet. As can be seen in Table 3.9, the island of Hawaii was the leader in marlin landings during 1982. This finding supports the general perception that the Kona coast is an excellent location for landing one of the most prized big game fish, the billfish.

An estimate of the magnitude of Hawaii's 1982 charter boat landings can be obtained in the following manner. By taking the average total number and poundage of fish caught by a typical charter boat in 1982 and multiplying it by the estimated size of charter fishing fleet (119), it is estimated that a total of 47,838 fish weighing 2.2 million pounds were caught by charter fishing patrons in 1982. This does not include any fish that were landed by charter fishing boats while commercial fishing without any paying passengers aboard. The 2.2 million pounds represents 15% of the total reported commercial fish landings for Hawaii in 1982 (USDC, 1983). The importance of charter catches for certain specific fish species is more pronounced. For example, the estimated blue marlin catch by the fleet (803,250 lbs) is 180% higher than the total commercial blue marlin catch reported in 1981 (DPED, 1982).

3.3.2 Desirability of Fish Types

Survey respondents were queried as to their perception of customer preferences for catching different types of fish. Their responses, tabulated on an island and statewide basis, are presented in Table 3.9. For each fish, respondents were asked to rank its particular level of desirability to charter patrons according to the scale: "Highly Desirable," "Somewhat Desirable," "Somewhat Undesirable," and "Very Undesirable." As

Table 3.8 Average Number of Various Fish Reportedly Caught During 1982 While Charter Fishing: By Island

Fish Type	Hawaii	Oahu	Maui
Aku	222	77	207
Ahi	36	42	130
Mahimahi	26	64	86
Ono	27	21	56
Ulua	(a)	2	8
Black Marlin	2	1	1
Blue Marlin	40	21	29
Sailfish	(a)	(a)	(a)
Shortbill Spearfish	9	5	10
Striped Marlin	7	8	8
Barracuda	2	2	2
Shark	6	2	30
Bottomfish	14	71	73
TOTAL	391	316	640
N	28	17	7

(a) Less than 1 fish.

Table 3.9 Charter Boat Owners' Perceptions About Their Customers' Preferences for Catching Different Types of Fish: By Island and Statewide

Fish Type	Highly Desirable	Somewhat Desirable	Somewhat Undesir-able	Very Undesir-able	No Response	Sample Size
Aku						
Statewide	14%	62%	11%	3%	11%	72
Hawaii	23	70	0	7	0	30
Oahu	4	64	16	0	16	24
Maui	0	67	17	0	17	12
Ahi						
Statewide	84	8	0	0	8	72
Hawaii	93	7	0	0	0	30
Oahu	80	8	0	0	12	24
Maui	75	17	0	0	8	12
Mahimahi						
Statewide	80	12	0	0	8	72
Hawaii	73	27	0	0	0	30
Oahu	88	0	0	0	12	24
Maui	83	8	0	0	8	12
Ono						
Statewide	58	30	1	1	9	72
Hawaii	63	30	3	3	0	30
Oahu	44	40	0	0	16	24
Maui	83	8	0	0	8	12
Ulua						
Statewide	21	43	8	6	23	72
Hawaii	17	53	8	10	13	30
Oahu	20	28	16	0	36	24
Maui	42	50	0	0	8	12
Black Marlin						
Statewide	82	4	0	0	14	72
Hawaii	97	3	0	0	0	30
Oahu	76	4	0	0	20	24
Maui	75	8	0	0	17	12
Blue Marlin						
Statewide	90	0	0	0	10	72
Hawaii	100	0	0	0	0	30
Oahu	84	0	0	0	16	24
Maui	92	0	0	0	8	12

Table 3.9 Charter Boat Owners' Perceptions About Their Customers' Preferences for Catching Different Types of Fish: By Island and Statewide (continued)

Fish Type	Highly Desirable	Somewhat Desirable	Somewhat Undesir-able	Very Undesir-able	No Response	Sample Size
Sailfish						
Statewide	73%	6%	1%	0%	21%	72
Hawaii	10	83	3	0	0	30
Oahu	64	8	0	0	28	24
Maui	83	0	0	0	17	12
Shortbill Spearfish						
Statewide	48	36	4	0	12	72
Hawaii	53	37	7	0	3	30
Oahu	36	40	4	0	20	24
Maui	75	17	0	0	8	12
Striped Marlin						
Statewide	81	7	1	0	11	72
Hawaii	83	10	3	0	3	30
Oahu	76	8	0	0	16	24
Maui	92	0	0	0	8	12
Barracuda						
Statewide	5	38	25	14	18	72
Hawaii	7	40	23	27	3	30
Oahu	4	36	28	4	28	24
Maui	8	50	25	0	17	12
Shark						
Statewide	0	29	25	29	18	72
Hawaii	0	40	23	33	3	30
Oahu	0	24	24	24	28	24
Maui	0	25	25	33	17	12
Bottomfish						
Statewide	3	37	21	19	21	72
Hawaii	0	40	30	20	10	30
Oahu	4	28	20	16	32	24
Maui	8	58	0	17	17	12

indicated in the previous section, aku and ahi were identified as the fish most frequently landed by charter boats in 1982. Both of these types of tuna also happened to be considered desirable game fish by a majority of charter fishermen (Table 3.9). However, ahi was the more preferred of the two, with the majority of respondents indicating it was a "Highly Desirable" fish. No one indicated it was at all undesirable. Aku, while being considered desirable by most boat owners was viewed by majority of respondents to be only "Somewhat Desirable". A total of 14% of responding charter boat owners indicated that aku possess some undesirable characteristics. A possible explanation for this is the fact that the average ahi is a considerably larger fish than the average aku.

Fish types identified as being the most desirable to charter patrons were the various billfish. Most varieties of marlins were indicated as being "Highly Desirable" fish by more than 80% of the survey respondents and had no undesirable characteristics. The two exceptions to this were the sailfish and shortnose spearfish. The blue marlin was indicated to be the most desirable fish of all those listed.

Other fish types which were indicated to be desirable, but to a lesser degree than those previously mentioned, were ono and ulua. The two fish types which were considered to be more marginal in their desirability to patrons were bottomfish and barracuda. Taking the respective summed percentages of the desirable and undesirable categories, barracuda was indicated to be desirable by 43% and undesirable by 39% of the respondents. Sharks were observed to have the lowest desirability rating of any fish type listed. Summing the "undesirable" classification percentages obtained for sharks indicates that 54% of the charter boat owners perceived sharks to be an undesirable catch. Only 29% of all respondents indicated sharks as being "Somewhat Desirable." Sharks were the only fish type for which no respondents indicated it was "Highly Desirable."

In summary, the blue marlin is perceived by Hawaii charter boat owners to be the species most desired by their customers. The ranking order of fish types perceived to be the next most desirable are, in order of preference: ahi, black marlin, striped marlin, mahimahi, and the sailfin marlin. Of all the fish types listed in Table 3.9, sharks were considered to be the most undesirable.

3.4 Fishing Activity

3.4.1 Annual Trips and Passenger Loads

In the Hawaii charter fishing industry, four basic kinds of fishing trips are booked. Distinctions are made between

"private" and "share" charters, and between "full-day" and "half-day" charters. Private charters are booked in advance for parties ranging from one to six persons. A flat fee is charged for using the boat, which the contracting party is responsible for paying. Share charters, by comparison, involve groups of one to six unrelated persons who each pay a separate fee to go fishing. Since share charters are based on a per person fee arrangement, a minimum party size of three individuals is usually observed. Average party size observed for both half-day and full-day trips was 4 passengers. The difference between full-day and half-day charters lies in the duration of the fishing trip, and consequently in the areas fished. Both types of trips usually entail leaving port by 8:00 a.m. On a half-day trip, the customer is back in port by 1:00 p.m., while a full-day trip will extend to perhaps 5:00 p.m. Factors such as weather, port of departure, customers' fishing experience, and skipper preferences also influence the duration of charter trips.

Not all charter boats are engaged in both private and share charters, nor do all boats book both full-day and half-day fishing expeditions. On an average, however, it is estimated that in 1982 a representative charter vessel engaged in various charter fishing activities as shown in Table 3.10. Typically, 155 trips were provided in 1982. Due to the fact a portion was half-day trips, this trip load represented an average of 133 days of actual fishing activity. By far the bulk of activity was for full-day trips charters. This was also consistently observed on all islands. The difference between the number of share versus private charters was less distinct, but private charters definitely represented a majority of the average vessel's business.

In terms of customers serviced in 1982, it is estimated that the average vessel produced 620 passenger trips (155 trips x 4 passengers per trip). Expanding this to the entire fleet implies a total industry passenger trip output of 73,780 in 1982. As shown in Table 3.11, a large majority of these passenger trips were purchased by nonresidents of Hawaii.

Only on the island of Oahu was a sizable percentage of charter patrons residents of Hawaii. It was further determined that the bulk of charter boat business did not come from repeat customers (Table 3.12). This phenomenon was particularly evident for charter business operating out of tourist centers on Oahu and Maui.

In an attempt to estimate capacity utilization, vessel owners were asked how many additional days they were both willing and able to use their boat for charter fishing. The results, tabulated in Table 3.13, indicate that significant capacity under-utilization existed in 1982. On a statewide basis, total capacity is estimated to be 262 days of which only 51% was utilized. Capacity utilization ranged from a low of 41% on Oahu

Table 3.10 Average Number of Charter Fishing Trips Sold in 1982: By Trip Type

Trip Type	Average Number of Trips in 1982 (a)
Full-day Private	75
Half-day Private	23
Full-day Share	39
Half-day Share	18
TOTAL	155

(a) N = 35

Table 3.11 Percentage of Charter Fishing Passengers That Were Nonresidents of Hawaii: By Island and Statewide

Percent Nonresident	Statewide	Hawaii	Oahu	Maui
Less than 25	8%	0%	16%	0%
25 - 49	1	0	4	0
50 - 74	4	7	4	0
75 - 99	71	83	68	58
100%	10	10	0	25
No Response	6	0	8	17
TOTAL	100%	100%	100%	100%
N	73	30	25	12

Table 3.12 Percentage of Charter Fishing Business From Repeat Customers in 1982: By Island and Statewide

Percent	Statewide	Hawaii	Oahu	Maui
0 - 24	48%	43%	52%	58%
25 - 49	25	27	24	25
50 - 74	16	20	16	0
75 - 99	1	3	0	0
100	0	0	0	0
No Response	10	7	8	17
TOTAL	100%	100%	100%	100%
N	73	30	25	12

Table 3.13 Average Number of Days Charter Fished, and Number of Additional Days Willing to Charter Fish in 1982: By Island and Statewide

	Statewide	Hawaii	Oahu	Maui
Days fished	133	128	104	182
Additional days willing to fish	129	129	150	96
Excess Capacity	49%	50%	59%	35%
N	51	26	16	8

to a high of 65% on Maui.

3.4.2 Services Provided

The basic service provided in any charter fishing trip is the fishing experience itself. However, additional services are provided by various charter operations. The type and number of additional services depend upon the policy of each such operation.

Among the more common services provided are the fish handling services. Whereas charter operators do not perform the actual taxidermy, they provide the service of transporting fish to taxidermists. Fish cleaning is another frequently reported service offered by most charter operations. The least common service, in contrast, is providing free lunches or snacks to customers as part of the charter fishing trip. Table 3.14 displays the percentage of charter operations that provide various ancillary services.

3.4.3 Other Commercial Activities

In addition to deep-sea sport charter fishing, many of Hawaii's charter boat owners utilized their boats for commercial fishing purposes in 1982. As seen in Table 3.15, a majority of owners indicated they fished commercially in 1982. The proportion of vessels used for commercial fishing was greatest for the island of Oahu.

Table 3.16 describes levels of commercial activity other than commercial fishing undertaken by Hawaii's charter fleet in 1982. On a statewide basis, 53% of the respondents did not use their boat for anything beside fishing. The most frequent usage of boats for purposes other than fishing was party trips, which 18% of respondents confirmed having provided.

3.5 Employment

The average level of employment per charter boat based on 53 respondents, is given in Table 3.17. The average boat employed 1.21 persons full-time, 0.39 persons half-time, and 0.23 persons on a quarter-time basis. The average operation also employed on shore: 0.15 persons full-time, 0.06 persons half-time, and 0.25 persons quarter time. Converting these data into full-time equivalents reveals that the average charter operation employed about 1.7 persons full-time in 1982. Expanding this to the industry as a whole results in an estimated full-time work force of 203 workers. The actual number of people involved in the industry is of course higher than 203 workers because many employees work on a less than full-time basis.

Table 3.14 Percentage of Charter Fishing Operations Providing Specific Services to Their Customers: By Island and Statewide

Services	Statewide	Hawaii	Oahu	Maui
Fish cleaning	73%	90%	56%	67%
Transfer of fish to taxidermist	70	83	52	75
Fish cold storage	30	37	16	50
Free parking	38	63	16	25
Hotel pickup/ dropoff	43	77	20	8
Free lunch or snacks	7	7	4	8
Free beverage	18	23	12	17
N	73	30	25	12

Table 3.15 Extent of Commercial Fishing Activities by Charter Fishing Boats: By Island and Statewide

	Statewide	Hawaii	Oahu	Maui
Fished commercially	51%	40%	68%	33%
Average number of days	36	25	33	19
Did not fish commercially	42%	58%	24%	50%
No response	7%	3%	8%	17%
TOTAL	100%	101%(a)	100%	100%
N	73	30	25	12

(a) Deviation from 100% due to rounding error.

Table 3.16 Percentage of Vessels Engaged in Marine Commercial Activities Other Than Commercial Fishing in 1982: By Island and Statewide

Activity	Statewide	Hawaii	Oahu	Maui
Tours	8%	3%	16%	0%
Research trips	5	13	0	0
Whale watching	7	3	4	25
Non-fishing party trips	18	7	32	25
Other	14	17	16	8
Boat not used for other activities	53	70	36	50
No response	14	0	20	17
N	73	30	25	12

Table 3.17 Average Number of Employees Per Charter Boat Operation in 1982

Worker Class	On Boat(a)	On Shore(a)
Full-time (100%)	1.21	.15
Part-time (50%)	.39	.06
Part-time (25%)	.23	.25

(a) N = 53

3.6 Use of Fish Aggregating Devices

In the spring of 1981, the Hawaii Department of Land and Natural Resources (D.L.N.R.) deployed 26 "pentasphere" buoys around the eight main Hawaiian islands to act as fish aggregation devices (FADs). These buoys were deployed to replace the original "tire"-design FADs which were anchored in 1980 when the FAD deployment program was first initiated. Since that time, many user groups have utilized FADs as fishing locations and reportedly have enjoyed considerable fishing success around them. Approximately 900,000 pounds of game fish: aku, ahi, mahimahi, and billfish were documented as having been caught around FADs between April 1980 and April 1982 (Department of Land and Natural Resources, 1982). Given the general indication that FADs may provide benefits to user groups in the form of increased catches or decreased fishing costs, inquiries were made to determine the utilization of FADs by charter boat operators, and the benefits that these fishermen receive as a result of fishing near FADs.

The results from the mail survey suggested that FAD's are commonly used by Hawaii's charter fishing fleet. However, most (75%) charter boat operators visited FADs on less than 50% of their charter trips (see Table 3.18). There was one individual who indicated that 100% of his charter trips involved fishing within one-half mile of a FAD.

The percentage of total catch in 1982 that was caught within one-half mile of a FAD appears proportional to the level of fishing effort (number of trips taken) expended at these areas. It can be seen in Table 3.19 that, on a statewide basis, over 80% of the responding charter boat owners indicated that less than 50% of their catch was landed within one-half mile of a FAD. A majority (55%) indicated that a 0-24% of their catch was caught in areas adjacent to FADs.

Charter boat owners were asked to indicate which of their operating costs had been reduced due to utilization of FADs. Respondents were also asked to estimate the amount by which certain costs were reduced. The respondents used percentages to indicate the perceived reduction in cost for each item listed. The provided cost categories provided were: fuel and oil, labor, repair, gear, ice, and bait. Survey results for these questions are summarized in Table 3.20.

A total of 80% of the survey respondents indicated that their business did indeed experience a reduction in total costs as a result of fishing near FADs. On an average, reported total cost reductions were determined to be around 9%. The cost item which was identified most frequently as an expense that underwent reduction as a result of FAD fishing was fuel and oil. Fuel and oil savings were reported by over 50% of the survey respondents.

Table 3.18 Percentage of Charter Trips Taken in 1982 That Involved Fishing Within 1/2 Mile of a FAD

Percent of Trips	Number	Percent
0 to 24%	32	44%
25 to 49	23	32
50 to 74	7	10
75 to 99	2	3
100	1	1
No response	8	11
TOTAL	73	101(a)

(a) Deviation from 100% due to rounding error.

Table 3.19 Percentage of Total Catch in 1982 That was Caught Within 1/2 Mile of a FAD

Percent of Catch	Number	Percent
0 to 24%	40	55%
25 to 49	19	26
50 to 74	5	7
75 to 99	0	0
100		
No response	9	12
TOTAL	73	100%

Table 3.20 Cost Reduction Reported as a Result of Fishing at FADs

Cost Item	Percent of Respondents Reporting a Reduction(a)	Average Percentage Reduction Reported
Fuel and Oil	53%	18.5%
Labor	4	.6
Repair	18	5.6
Gear	12	6.3
Ice	3	1.4
Bait	15	8.7
Total Costs	80	9.2

(a) N = 73

On an island basis, fuel savings were mentioned by as many as 80% of the respondents, for example on the island of Hawaii. The average reduction in costs for fuel and oil which can be attributed to utilization of FADs by a typical Hawaii charter boat operation was 19%. This factor alone amounts to approximately $1,600 in annual savings for the average charter boat owner in Hawaii.

Expenditures for repairs were also commonly thought to be reduced due to the utilization of FADs. Eighteen percent of the survey respondents indicated a reduction in this cost item. On average, the degree by which repairs were reduced was 6%.

A third cost item thought to be reduced as a result of FAD fishing was bait purchases. Due to the behavioral characteristic of many baitfish to aggregate around flotsam, the reduced expenditure on bait was one which was anticipated. The indication of savings in bait cost was to some degree, predictable, however, the average percentage reduction for a typical charter operation was not. The statewide average was a 9% reduction in bait expenditures. On an island basis, it ranged from 5% for the island of Hawaii, up to a high of 15% for the average Oahu-based charter fishing operation.

Another way that FAD deployment might have provided benefits to charter fishing businesses is in somehow increasing demand for the services of charter fishing boats. To determine this, charter boat owners were asked to identify any increase in the number of customers over the past three years (length of FAD project) as a result of fishing near FADs. Approximately 23% of the survey respondents, on a statewide basis, indicated that they did indeed perceive such a change (Table 3.21). The owners who indicated that their business experienced an increase in charter customers reported an average increase of slightly greater than 10% (Table 3.22).

3.7 Comparison of Mail and Telephone Survey Responses

As previously noted, the characteristics of charter boats and owners described above were based on questionnaire responses of a sample of the relevant population. Whether characteristics of the sample are in fact representative of the entire population depends on characteristics of non-responding boat owners. To evaluate the representativeness of the 73 responding owners, a follow-up telephone survey of non-respondents was conducted during May, 1983. A new independent sample of thirty individuals was randomly selected from the ranks of mail questionnaire non-respondents, and surveyed by telephone. The telephone survey solicited information about owner and vessel characteristics, as well as about charter and non-charter fishing activity levels. Questions were worded in such a way as to replicate formats used in the mail survey.

Table 3.21 Change in Annual Number of Customers Over Last Three Years as a Result of Fishing Near FADs

Customer Numbers Increased?	Number	Percent
Yes	45	62%
No	17	23%
No response	11	15%
TOTAL	73	100%

Table 3.22 Percentage Increase in Annual Number of Customers Over Last Three Years as a Result of Fishing Near FADs

Percent Increase	Number	Percent
0	10	14%
1 to 10%	7	10
11 to 20	3	4
21 to 30	2	3
31 to 40	0	0
41 to 50	0	0
51 to 60	0	0
61 to 70	0	0
71 to 80	1	1
81 to 90	0	0
91 to 100	0	0
No response	50	68
TOTAL	73	100%

Overall Mean Percent (N = 23): 11%

Responses to seven questions included in both the mail and telephone survey groups were statistically compared by testing a series of hypotheses that the mean responses obtained for the two sample groups were identical. If the null hypotheses could not be rejected at a reasonable confidence level, then results obtained in the mail survey could be interpreted as being representative of the Hawaii charter fishing population. Results of seven pairwise t-tests are given in Table 3.23. In all tests, the null hypothesis that the mean values were the same across sample groups could not be rejected at a significance level less than 95 percent. The statistical difference between sample groups was detected to be most pronounced in the case of vessel age. The hypothesis that mean values were the same for vessel age could be rejected at the 90 percent significance level. However, the proportional difference in mean vessel ages was less than 10%. A large disparity, although statistically insignificant, was detected in average days of commercial fishing undertaken by the separate survey groups. These differences notwithstanding, the statistical test results generally support the outlook that the sample of charter boat operations under study here are reasonably representative of the entire Hawaii charter industry as it existed in 1982.

Table 3.23 Statistical Comparisons of Mean Values Observed for Selected Variables in Mail and Telephone Surveys

Variable	MAIL SURVEY Mean Value Observed(a) $\bar{X}1$	MAIL SURVEY Standard Deviation S1	TELEPHONE SURVEY Mean Value Observed $\bar{X}2$	TELEPHONE SURVEY Standard Deviation S2	Calculated T-Value(b) Ho:$\bar{X}1=\bar{X}2$
Length of Vessel (feet)	36.4(67)	7.97	39.0(22)	10.47	-1.2307
Year Vessel Built	1971.1(66)	7.06	1967.32(22)	13.59	1.7052
Days of Commercial Fishing	37.81(31)	47.67	13.00(2)	9.90	0.7245
Years of Experience	10.21(70)	8.51	11.38(8)	8.75	-0.3643
Owner's Age	48.74	11.78	48.75(8)	16.08	-0.0030
Vessel Market Value($)	93,289.69(68)	62,340.38	115,714.29(7)	58,197.12	-0.9110
Vessel Purchase Price ($)	79,672.37(67)	59,193.40	87,666.67(6)	41,745.26	-0.3227

(a) Number in parentheses indicates the number of observations used to calculate mean values.

(b) $T = \left[(\bar{X}1 - \bar{X}2) \,/\, \sqrt{[(N1-1)(S1^2) + (N2-1)(S2^2)]}\right] * \left[\sqrt{[(N1*N2)(N1+N2-2)]/(N1+N2)}\right]$

4.0

CHARTER FISHING REVENUES AND COSTS

Measurements of annual revenues and expenses reported here are based on data collected by means of the mail questionnaire survey. In Table 4.1, estimates of revenues and expenses experienced by a typical charter operation in 1982 are given. These figures represent average values and consequently do not reflect variability in vessel costs and returns as it exists in the charter fishing population. A more detailed account of the charter fishing financial picture is as follows.

4.1 Operating Revenues

Charter fishing business operations generated revenues principally by the passenger fare structure imposed upon their customers. However, revenue was also generated by sales of fish caught while charter and commercial fishing, and by charging for services other than fishing trips.

4.1.1 Charter Fishing Revenues

Income received by charter boat owners as a result of providing various types of charter fishing trips is presented in Table 4.2, and is broken down into four service categories: half-day and full-day, share and private trips. The survey instrument provided data relating to the number of people taking a specific type of trip (i.e., half-day share, half-day private, full-day share, full-day private). The average number of trips (first column of Table 4.2) was derived by calculating for each boat the total number of people taking full-day or half-day trips. The resulting sums of people taking these two types of trips were divided by four, then divided by the number of respondents per island who provided charter activity data. By weighting the average number of full-day and half-day trips per island by the percentage of people that took share and private trips, it was possible to arrive at estimates of the average number of trips and type of trips per boat. For example, 14 respondents from the island of Hawaii yielded the following data: sum of people taking full-day private trips (ΣFDP) = 2838; sum of people taking full-day share trips (ΣFDS) = 1182. Thus the average number of trips full-day charter trips taken by boats on the island of Hawaii was determined to be: [(2838 + 1182)/4]/14 = 72. The average number of full-day private trips was calculated as: [2838/(2838 + 1182)] X 72 = 51. Similar calculations produced the estimated values for number of trips reported in Table 4.2.

Estimates of charter fishing trip prices were likewise

Table 4.1 1982 Average Costs and Returns for Hawaii Charter Fishing Boats: By Island and Statewide

	Statewide	Oahu	Hawaii	Maui
REVENUE				
1/2 day trips	$ 9,739	$ 3,645	$ 9,180	$ 24,471
Full day trips	39,066	53,746	25,992	42,780
Trips other than fishing	232	598	71	265
Sales from commercial catch	1,525	2,649	513	341
Sales from charter catch	17,703	21,238	16,006	34,688
TOTAL REVENUE	$68,265	$81,876	$51,762	$102,545
VARIABLE COST				
Fuel	$ 7,990	$10,183	$ 4,866	$ 12,590
Oil	401	550	236	430
Ice	980	1,783	409	751
Bait	375	459	303	671
Food	1,092	3,409	422	1,076
Beverage	756	1,478	534	1,075
Terminal tackle	1,027	797	1,378	1,612
Automobile	1,686	1,100	2,054	1,278
Repair (vessel & equipment)	4,786	5,408	4,177	5,804
Commission	2,709	2,215	2,950	3,791
Wages	17,660	19,295	15,949	21,089
Catch share	9,321	11,446	8,257	18,695
TOTAL VARIABLE COST	$48,782	$58,123	$41,535	$ 68,862
FIXED COST				
Depreciation:				
vessel	$ 4,758	$ 4,563	$ 4,296	$ 5,217
equipment	5,063	4,099	6,439	6,081
Insurance	2,572	2,769	2,328	2,399
Moorage	1,268	1,703	964	1,301
Haul-out	1,491	2,351	1,053	1,199
Booth rental	30	91	0	0
Advertising	1,304	1,379	1,413	959
Telephone	538	302	664	769
Utilities	234	195	146	573
Professional service	563	516	744	423
Association dues	50	14	90	20
License & Fees	147	30	224	255
Other expense	824	344	470	1,854
TOTAL FIXED COST	$18,842	$18,356	$18,831	$ 21,050
NET OPERATING INCOME	$ 640	$ 5,397	($ 8,591)	$ 12,633
Interest expense	$ 2,194	$ 2,418	$ 1,517	$ 2,697
PROFIT/(LOSS) BEFORE TAXES	($ 1,554)	$ 2,979	($10,108)	$ 9,936

Table 4.2 Average Revenues Generated by Charter Fishing Activity: By Island and Statewide

Type of Service (a)	Number of Trips	Price Per Trip	Revenue Per Boat	Revenue from Half-Day Trips	Revenue from Full-Day Trips
Statewide (n=35)					
HDP	23	$245	$ 5,635	$ 9,739	
HDS	18	228	4,104		
FDP	75	355	26,625		$39,066
FDS	39	319	12,441		
Oahu (n=13)					
HDP	15	$243	$ 3,645	$ 3,645	
HDS	0	120	0		
FDP	111	346	38,406		$53,746
FDS	59	260	15,340		
Hawaii (n=14)					
HDP	20	$247	$ 4,940	$ 9,180	
HDS	16	265	4,240		
FDP	51	354	18,054		$25,992
FDS	21	378	7,938		
Maui (n=6)					
HDP	48	$248	$11,940	$24,471	
HDS	59	213	12,567		
FDP	78	381	29,718		$42,780
FDS	42	311	13,062		

(a) HDP = Half-day Private; HDS = Half-day Share; FDP = Full-day Private; and FDS = Full-day Share.

extracted from the data collected on charter fares (Table 4.3). Prices for private charters were collected on a per trip basis, and prices of share charters were collected on a per person basis. The average share price per trip was obtained by multiplying the prices reported by four (again, based on the assumption of four passengers per trip). Estimated yearly revenues generated by the various types of trips are presented in Table 4.2, and appear as the first two revenue items on Table 4.1.

4.1.2 Fish Sales

Sales of fish caught while charter and commercial fishing were two other sources of revenue for charter operators. Estimates of revenues generated by charter catches, based on catch data, are presented in Table 3.7. The figures assume 100% catch retention by the charter boat (Table 4.4).

Revenue attributable to commercial fishing activity was estimated to be $1,525 per charter boat in 1982. The estimate was derived by determining the proportion of charter operators that also fished commercially (51% statewide). Commercial catch averaged $2,990 for boats that actually fished commercially. This figure was revised in order to estimate sales of commercial catch for a typical (or average) charter boat: $2,990 x .51 = $1,525 per charter boat. Average values for commercial catch across islands were calculated in a similar manner.

4.1.3 Other Revenue

Just under half (49%) of the vessel owners surveyed reported receiving revenues in 1982 due to performance of services other than charter or commercial fishing. This includes revenues earned by providing tours, selling food and beverages, and the like. Questionnaire data yielded a total revenue figure of $16,930 for 73 responding owners. Allocating this sum amongst the group resulted in an estimated $232 per boat on a statewide basis.

4.2 Fixed costs

The fixed costs of charter fishing operation are defined as those costs that are incurred regardless of whether the vessel is used for commercial advantage, or not. Variable costs, in contrast, are incurred only as charter fishing or other commercial activity takes place. A breakdown of fixed cost estimates is given in Table 4.1. These figures represent industrial averages for 1982 and were derived as follows. The single largest fixed cost was depreciation, a non-cash expense. Straightline depreciation was used to calculate the cost of

Table 4.3 Average Prices Received for Full- and Half-Day Charter Fishing Trips, Both Share and Private Charters: By Island and Statewide

Type of Service	Statewide	Hawaii	Oahu	Maui
Full-day Share ($)	80	94	65	78
Half-day Share ($)	57	66	30	53
Half-day Private ($)	245	247	243	248
Full-day Private ($)	355	354	346	381
N	66	30	22	9

Table 4.4 Average Revenues Generated by Sales of Various Types of Fish Caught While Charter Fishing: By Island and Statewide

Fish Type	Statewide(a)	Hawaii(a)	Oahu(a)	Maui(a)
Aku	$ 1,045	$ 1,432	$ 493	$ 1,330
Ahi	7,513	5,117	5,897	18,442
Mahi	1,438	839	2,108	2,842
Ono	1,157	1,120	8,382	2,277
Ulua	49	9	18	98
Black Marlin	210	252	186	133
Blue Marlin	3,948	5,270	2,775	3,890
Sailfish	19	23	14	14
Shortbill Spearfish	210	250	143	272
Striped Marlin	772	691	809	760
Barracuda (b)	7	6	9	7
Shark	1,281	983	333	4,550
Bottomfish (c)	54	14	71	73
TOTAL	$17,703	$16,006	$21,238	$34,688

(a) Valuation based upon average weight of fish (Table 3.7); price per pound is ex-vessel price in 1980 (Hawaii Department of Aquatic Resources 1980 Catch Report) CPI adjusted to 1982 dollars (U.S. Department of Commerce, 1982).

(b) Average weight unavailable. Estimated to be 5 pounds per fish.

(c) Average weight and price unavailable. Estimated to weigh 1 pound per fish with price of $1 per pound.

vessel depreciation. The average purchase price of a boat (and assuming no salvage value) was divided by the average useful life, in order to derive the annual depreciation costs. In fact, this represents an overstatement of actual depreciation due to the recent escalation of boat market prices. As noted in Section 3.1.5, most vessels have reportedly increased in value. Depreciation cost estimates for equipment were based on the assumption that the value of equipment assets is maintained at a constant level. Thus, it was assumed that reported purchases of new equipment represent a proxy measure for equipment depreciation as old equipment is replaced by new, so as to maintain capital investment in equipment intact.

Estimates of other fixed costs, unless otherwise stated, were obtained directly from survey data. The largest reported fixed cost item was vessel insurance. Average costs of insurance were similar across the state. Moorage fees ranged from an estimated low of $964 in Hawaii to a high of $1,703 on Oahu.

Estimated annual haul out cost was similar for Hawaii and Maui, but it was twice as much for Oahu. Closeness to dry dock facilities may prompt Oahu charter boat owners to haul out boats more frequently. Boats operating on islands other than Oahu may service their boats less frequently due to the distance of dry dock facilities.

Advertising costs were the next significant fixed cost. Estimates of average annual advertising expense ranged from a low of $959 on Maui to a high of $1,413 on Oahu. Interestingly, the relationship between the amount spent on advertising and the amount of revenue generated by charter trips on Oahu, Hawaii, and Maui appears to be negative.

Rental fees for booth space to house shore-based sales persons were a cost reported only on the island of Oahu. Telephone expense ranged from an estimated high of $769 per year on Maui to a low of $302 on Oahu. Utility costs were much higher on Maui in comparison with the other islands. The cost of accounting, legal, and other professional services ranged from $744 on Hawaii to $423 on Maui.

The cost of association dues were rather insignificant in 1982 ranging from $3 to $90 per year. Costs of licenses and fees varied from island to island. The average charter operation on Oahu spent $30 on licenses and fees, while Maui and Hawaii operations ranged between $220 to $260.

4.3 Variable Costs

The rationale for segmenting fixed and variable costs in the manner depicted in Table 4.1, was to report as variable those costs that vary with the frequency of fishing vessel operations.

All variable cost estimates, unless otherwise stated, were obtained from survey data. Fuel and oil costs were the second largest costs incurred by charter boat operators. The island of Maui had the highest estimated combined fuel and oil expense of $13,020 per year. Overall, estimated fuel cost varied directly with the type and frequency of trips.

Estimated cost of ice for the average charter operation was highest at $1,783 per year on Oahu and lowest at $409 per year for Hawaii. Estimated annual bait cost was highest for Maui-based boats and lowest at $303 for Hawaii.

The cost of fishing line and lures (terminal tackle) varied from a low estimate of $797 for Oahu to $1,612 for Maui.

Variable costs for automobiles included fuel, repairs, and insurance for those charter operations that claimed an automobile as a business expense. The estimated cost ranged from a high of $2,054 on Hawaii to a low of $1,100 on Oahu.

Charter boat operations paid commissions to travel agencies, hotel activity centers, and other businesses that served as intermediaries in soliciting charter fishing patrons. Estimates of average commissions paid per charter boat ranged from a high of $3,791 on Maui to a low of $2,215 on Maui. Estimates of commission expenses were consistent with the magnitudes of revenue generated by charter trips on Maui and Kauai. However, the relationship between charter fishing activity and commissions paid for the average Oahu operation versus the average Hawaii operations was not consistent.

Payments to hired labor in the form of salaries, commissions and bonuses are depicted in Table 4.1 as "Wages." More specific data pertaining to statewide average labor expense are given in Table 4.5. The average total payroll per charter boat was calculated to be $17,660. This figure accounted for all wages paid to captains, crew members and salespersons in the form of salaries, commissions, and bonuses.

The average labor payments as reported in Table 4.5 represent an average for both owner-operated and absentee-owned charter fishing operations. Owner-operated charter boats are those operations which did not report wages paid to captains. Absentee-owned operations are charter operations that reported payroll expenses for captains' salaries, commissions and/or bonuses. Fourteen of the fifty respondents were determined to be owner-operated fishing boats. The average payroll expense for owner-operated boats was $6,156.28. Of this amount, $5,224.14 was paid to crew member No. 1, $89.29 to crew member No. 2, and $842.85 to a salesperson. The average payroll expense for absentee-owner operations was $21,657.67, of which $13,636.25 was attributable to the captain's salaries. The average salary received by crew member No. 1 in this type of operation was

Table 4.5 Average Labor Expenses in 1982

Employee	Salary Paid (a)	Commission Paid (a)	Bonuses Paid (a)	Gross Income (a)
Captain	$ 8,249	$1,059	$510	$ 9,818
Crew member 1	5,305	875	424	6,604
Crew member 2	166	30	3	199
Crew member 3	46	95	0	141
Crew member 4	0	2	0	2
Salesperson 1	344	434	3	781
Salesperson 2	60	54	1	115
TOTAL	$14,170	$2,549	$941	$17,660

(a) N = 50

$6,674.30; crew member No. 2 received $236.86; crew member No. 3 received $196.33; crew member No. 4 received $2.83; salesperson No. 1 received $752.77; and salesperson No. 2 received $158.33. It is apparent, based on the average wages received by crew and salespersons, that the bulk of such workers are part time and must supplement their income via outside sources.

A portion of the sales value of fish caught on charter trips was often allocated to employees and served as compensation above regular wages. "Catch Share," the last item under variable cost in Table 4.1, was determined by means of utilizing charter catch revenue data found in Table 4.4 and making adjustments to reflect catch allocation proportions as indicated by the survey data. Data from the island of Maui is used to illustrate the procedure of estimating catch share as an expense to the charter operation. The data indicate that 60% of the charter operations on Maui were absentee-owned in 1982 (i.e., the captain was not the owner and was paid to run the boat). The remainder of boats (40%) were owner-operated. The allocation of catch by absentee-owned boats was 30.33% each to captain and crew. The allocation by owner operated boats was 43.75% to crew and the remainder to the owner/captain. Thus the calculated catch share expense for Maui was: .6(2 x .3033 x $34,688) + .4(.4375 x $34,688) = $18,695. The average estimated catch share expense was highest for Maui at $18,695 and lowest for Hawaii at $8,257.

4.4 Net Returns

On average, charter fishing vessels in Hawaii incurred an excess of operating revenues over operating costs in 1982. This excess amounted to $640, or about 1% of total revenues. However, after deducting interest expenses, the typical charter operation incurred an estimated loss (before taxes) of $1,554 in 1982. Vessels operating out of Maui reportedly generated the highest average profits in 1982 , while Hawaii-based boats incurred the largest estimated average losses. Of those islands where boats were determined to be profitable on average, Oahu-based boats earned 3.6% on sales of $81,876, and boats operating out of Maui earned 9.7% on sales of $102,545.

Several factors were further investigated to help explain differences in average profit levels between islands, and between individual boats across the State. The first factor is the amount of days spent charter fishing in 1982. The influence of charter fishing activity levels on vessel profitability is most evident when comparing average charter revenues in Maui to those realized on Hawaii. The second factor is the form of vessel ownership. Whether the boat is owned and operated by the same person, or owned by an absentee owner can dramatically influence a boat's annual payroll.

A total of 51 respondents reported the actual number of days

spent charter fishing in 1982. The average value for this subsample was 133 days. As seen in Figure 4.1, however, the distribution of reported charter fishing trip activity appears to be bimodal. Given this apparent difference, the subsample was divided into two groups depending on whether reported trips were greater than or less than 133. The estimated mean value for the group (N=24) taking more than 133 trips was 208 trips. The other group (N=27) averaged only 67 trips in 1982. A difference between means t-test was conducted, and the hypothesis that the average number of trips taken by the two groups were identical was rejected at the 95% significance level. Using average statewide revenue and cost data, it was further determined that the breakeven number of charter trips was equal to 128. Hence, it appears that approximately half the charter boats under study here were averaging less than the required charter trips needed to financially breakeven. An average charter frequency of 67 trips yields a loss of $9,045 per year. By comparison, averaging 208 trips yields a calculated profit of $11,588.

Averaging part-time and full-time boats together for purposes of estimating average profits is therefore somewhat misleading in the following sense. Although, all boats on average may be suffering losses, over half of the boats which are operated on a full-time basis may be making positive net returns. This in part helps explain the differences in average financial performance observed between islands.

Aside from variations in charter activity levels, sizable differences in reported wage payments were observed between charter boats. Out of a total of 50 respondents who supplied information on wage payments made in 1982, 36 (72%) indicated that wage payments were made to a captain or vessel skipper. By this fact, it was concluded that these vessels were not owner-operated. The remaining 14 (28%) owners did not make payments to a skipper, hence these individuals were classified as owner-operators. On average, absentee owners paid $21,657 in total wages, commissions and bonuses, compared to $6,156 for the typical owner-operator. Payments made to captains (averaging $13,636) in large part explained the difference. Hence, all other things being equal, an owner-operator would expectedly save $13,636 in costs compared to an average absentee-owner.

A simple cross tabulation was conducted to determine the geographic distribution of owner-operators and absentee-owners. The results are summarized in Figure 4.2. As expected, a direct relationship exists between average amount of wage outlays and proportion of vessels that are absentee-owned. However, the data suggests that despite higher wage costs, vessels owned by absentee owners sometimes fared better financially than owner-operated boats. For example, boats on Oahu were predominately owned by absentee owners. Yet compared to other islands (except Maui), Oahu-based boats exhibited relatively good financial performances on average in 1982. The opposite holds

Figure 4.1 Number of Charter Boats Engaged in Different Levels of Charter Fishing Activity

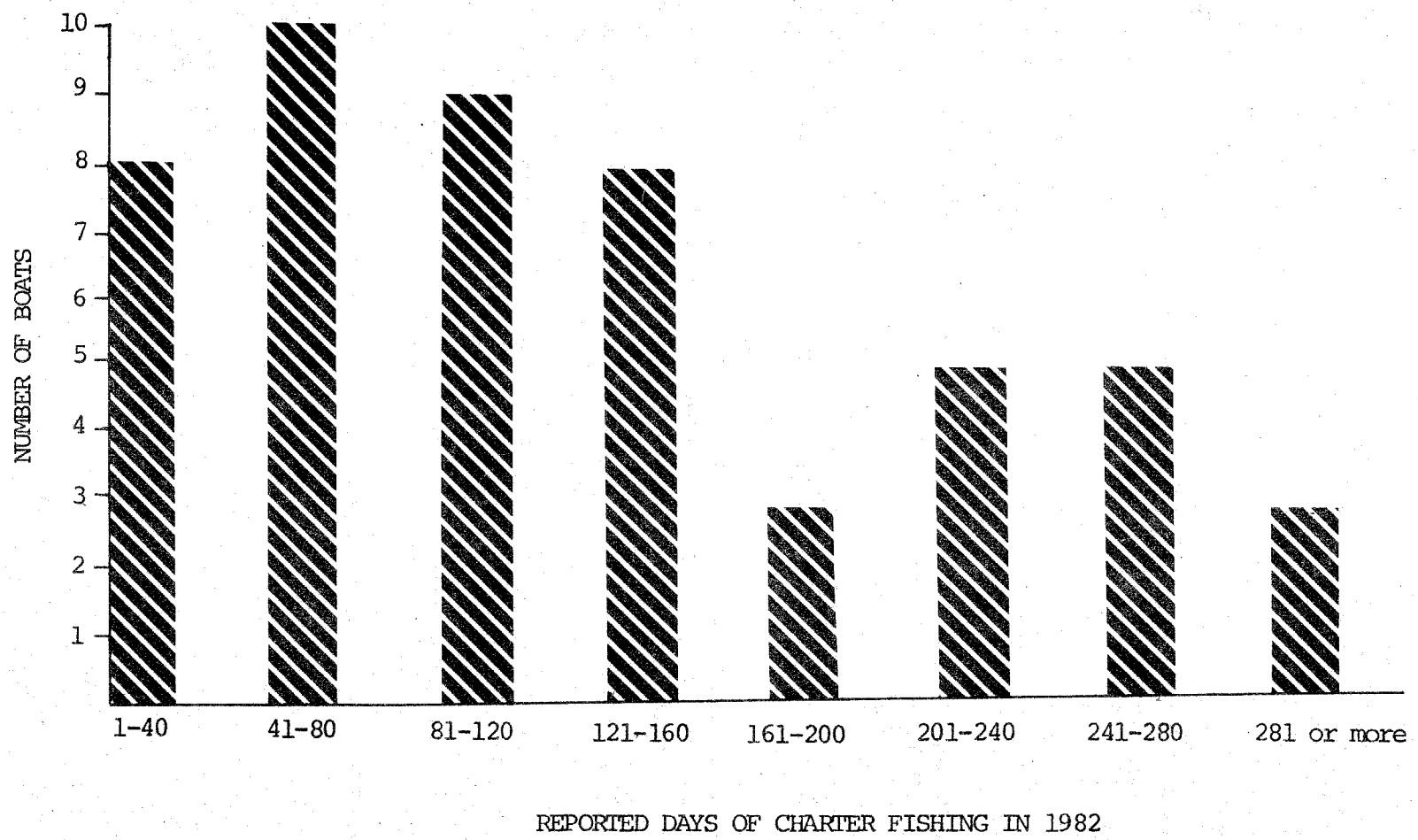
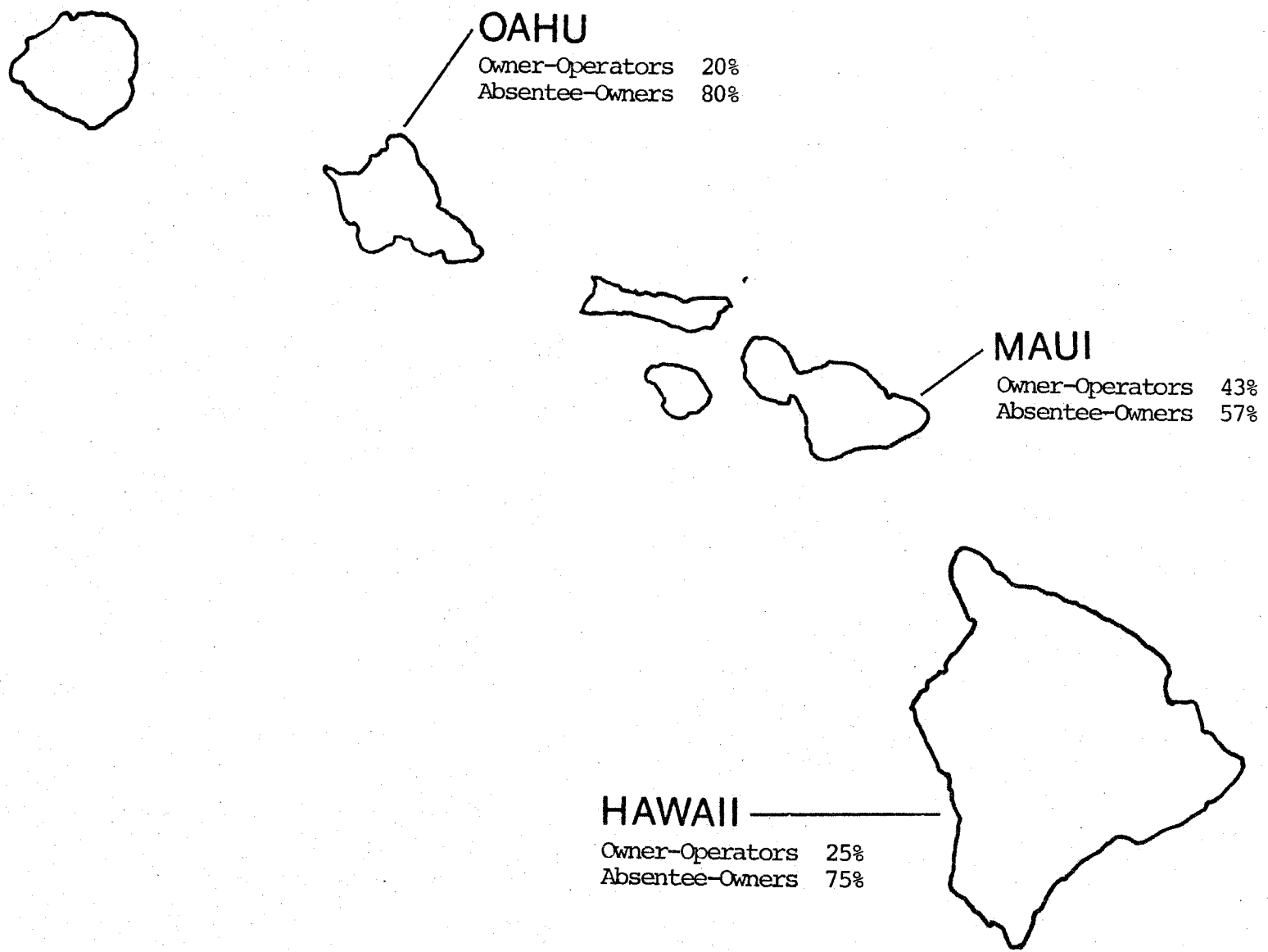


Figure 4.2 Observed Frequency of Absentee Owners and Owner-Operators: By Island



true for Hawaii, where a large proportion (75%) of boats were determined to be absentee-owned.

The frequency of charter fishing trips undertaken in 1982 is reported for owner-operators and absentee owners in Table 4.6. From these data it was determined that 69% of owner-operated boats are operating at less than breakeven trip levels, compared to 41% of the absentee-owned boats across the State. Thus, one may speculate that absentee-owned boats may tend to be operated more as serious business ventures compared to owner-operator vessels, but this certainly is not always the case.

Table 4.6 Frequency of Charter Fishing Trips Taken by Owner-Operators and Absentee Owners

Number of Trips Taken in 1982	Owner-Operators		Absentee Owners	
	Number	Percent	Number	Percent
1- 40	0	0%	3	10%
41- 80	6	46	4	14
81-120	3	23	5	17
121-160	0	0	7	24
161-200	0	0	1	3
201-240	1	8	4	14
240+	3	23	5	17
TOTAL	13	100%	29	99%(a)

(a) Deviation from 100% due to rounding error.

5.0

COMPARISON WITH OTHER STUDIES OF CHARTER FISHING

It has been estimated elsewhere that in 1972, 2251 charter fishing boats (6 passengers or less) operated along the coasts of the United States (Centaur Management Consultants, Inc., 1977). During the same year, the industry created 1460 man years of employment and generated $10.6 million in wages and incomes. What are the characteristics of this industry in terms of representative vessels and operations? How similar is the Hawaii charter fishing fleet to those that exist elsewhere? To answer these questions, a review of published studies on charter fishing was conducted. A search of the literature revealed seven separate studies conducted since 1970. These include investigations of charter fishing in Florida (Taylor, Prochaska and Cato, 1982), North Carolina (Manooch, Abbas and Ross, 1981), Washington (Crutchfield and Schelle, 1977), Texas (Ditton, Jarman and Woods, 1978), Georgia (Brown and Holemo, 1975), Wisconsin (Ditton, Strang and Dittrich, 1975), and Connecticut (Thursland, Altobello and Bender, 1983). Data for average or typical vessels reported in each of these studies are summarized in Table 5.1. All financial data have been adjusted to 1982 dollars using appropriate consumer price indices.

The similarities across the seven study areas including Hawaii, are remarkable. Average vessel ages are characteristically less than sixteen years. Most vessels are 30-45 feet in length and are manned by one full-time skipper and one part-time mate. Variation exists in average vessel value, but most are valued at less than $100,000. Overall average vessel value is close to $74,000. In terms of charter fishing activity levels, it would appear that many charter vessels are operated on a part-time basis, fishing less than 120 days per year. Operations in Hawaii and Florida benefit from moderate year round climates, and thereby charter 155 and 205 trips on average, respectively.

In terms of annual average financial performance, charter fishing operations nationwide appear to generate modest net returns. Operating revenues of less than $50,000 along with high expenses for fuel, payroll, and insurance combine to keep average annual net returns below $20,000. In short, the typical charter fishing operations appear to be small businesses, operated on a part-time basis and generating small profits.

Sizable cost differences were observed among fleets in different states. Contributing to cost differentials are differences in distances traveled to fishing areas, vessel and engine size, number of trips taken annually, age and make of the hull. This explains, for example, why fuel costs in Texas are 46% higher than those incurred by a typical charter boat in

Table 5.1 Overview of Characteristics of Charter Fishing Operations in the U.S.

	Florida (b) N = 19	North Carolina (c) N = 112	Washington (d) N = 200	Texas (e) N = 41	Georgia (f) N = 11	Wisconsin (g) N = 50	Connecticut (h) N = 25	Hawaii (i) N = 73
VESSEL CHARACTERISTICS: (a)								
Age (years)	13	16	8	(j)	(j)	(j)	13	11
Length (feet)	41	(j)	42	31	(j)	(j)	38	38
Crew Size (full-time)	(j)	(j)	1.3	1.6	(j)	(j)	2	1.9
Cost	$71,062	(j)	(j)	(j)	(j)	(j)	$66,284	$80,878
Market Value	(j)	$49,117	$102,155	$30,124	$66,525	(j)	$99,426	$94,681
ACTIVITY LEVELS:								
Annual Half-Day Trips	156	63 (k)	119 (k)	90 (k)	(j)	(j)	(j)	114
Annual Full-Day Trips	49				(j)	(j)	(j)	41
Party Size	(j)	(j)	(j)	4	(j)	(j)	4.5	4
ANNUAL COST/RETURN CHARACTERISTICS: (a)								
Operating revenues	$53,849	$27,169	$45,152	$24,175	$40,828	$14,813	$40,709	$68,265
Fuel Costs	9,124	4,300 (l)	3,914	3,050	6,233	2,196 (l)	6,699	8,391 (l)
Moorage Costs	3,871	745	770	963	2,825	544	663	1,268
Commissions	1,375		4,960	59	1,274			2,709
Insurance Costs	1,767	1,450	1,855	988		728	1,856	2,572
Payroll	8,442	3,830	2,504	2,606	3,115	1,071	4,487	26,981
Other (m)	12,982	7,501	11,433	4,394	6,668	3,479	7,193	15,883
Net Return Before Depreciation, Taxes and Interest	16,288	9,343	19,716	12,115	20,713	6,795	19,811	10,461
OWNER/OPERATOR CHARACTERISTICS:								
Age (years)	(j)	(j)	(j)	45		40	(j)	49
Sex (percent male)	(j)	(j)	(j)	(j)		100	(j)	97
Experience (years)	(j)	(j)	(j)	11.5		4	15	10

(a) All dollar amounts expressed in terms of 1982 (CPI adjusted) dollars, (U.S. Department of Commerce (1974-1982)).
(b) Taylor, Prochaska, and Cato (1982).
(c) Manooch, Abbas and Ross (1981).
(d) Crutchfield and Schelle (1977).
(e) Ditton, Jarman and Woods (1978); Ditton, Mertens and Schwartz (1978).
(f) Brown and Holemo (1975).
(g) Ditton, Strang and Dittrich (1975).
(h) Thursland, Altobello and Bender (1983).
(i) Based on mail survey results.
(j) Not available.
(k) Includes half-day trips.
(l) Includes oil costs.
(m) Includes expenses for repairs, ice, bait, food, advertising, property taxes, etc.

Hawaii. Other cost differences, for example in wage payments, result from structural differences in the way that charter businesses are typically organized. Relatively high wage payments in Hawaii stem from the fact that about half of the fleet is not owner-operated; compared to Texas and Wisconsin where almost all boats are owned and operated by the same individual or group of individuals. Other cost differentials can be attributed to differences in input costs between localities. Moorage is simply more expensive per foot in Hawaii than in Washington, for example. Finally, differences in observed outlays for such items as commissions and insurance are due to structural differences at the industry level. In Hawaii, charter sales are generated through a marketing network of hotel desks, tour organizers and charter boat associations. Hence, commissions are routinely paid to middlemen. By comparison, in Texas, charter referrals are given and received with little or no payment made.

While generalities about typical vessel characteristics are easy to make, it is equally important to note the large variances in vessel financial performance reported in each of the published studies. For example in Florida, charter fishing revenues for 19 boats averaged just under $54,000. However, actual annual revenues ranged from $0 to $186,797. Similar wide variations in annual costs and net revenues exist in Florida, as well as elsewhere. Overall, profitability seems to be influenced by: 1) the distance charter boats must travel before beginning fishing; 2) proportion of clients who are repeat customers; 3) rate structure; and 4) frequency of trips taken each year. This large variability in financial performance levels raises doubts as to whether mean values correctly reflect the characteristics of the U.S. charter fleet. In fact, annual cost/return characteristics may be distributed bimodally. In North Carolina, for example, annual profitability of charter vessels is highly sensitive to home port. As a result, two distinct classes of charter vessels emerge. Similarly, in Florida, differences between part-time and full-time operators create statistically significant differences in the financial performance of the two groups.

Nevertheless, available average data on charter fishing operations elsewhere corroborate findings obtained in this Hawaii charter boat study. Available data suggest that there are more similarities than differences between charter fleets across the United States. Notable differences can be observed in operating costs and revenues, components and charter fishing activity levels. Important similarities exist in the size of the business in terms of sales, crew characteristics, vessel size and value, operator characteristics and motivations, and degree of profitability.

6.0

ECONOMIC IMPACT ANALYSIS

6.1 Overview of Measurement Techniques

In order to discuss economic impacts of charter boat fishing, one must first begin with the concept of Hawaii's economy as a system of producing and distributing wealth. A simplified model of such a system would have households supplying inputs to firms in the form of labor, and at the same time demanding goods and services produced by firms. Conversely, firms demand labor, while supplying goods and services. Thus, there arises a pattern of economic activity within Hawaii's island community.

Any change in an economy affects the patterns of economic activity, which in turn may have economic welfare implications. It is sometimes desirable to be able to determine the effects that certain economic activities have on various industries or on households. Estimating these effects is commonly referred to as economic impact analysis.

6.1.1 Input-Output Analysis

Economic impact analysis generally requires the construction of an Input-Output (I-O) model. A brief technical description of the modeling process is given in Appendix C. Essentially, an I-O model is a static representation of an economic region (for example, the State of Hawaii) at equilibrium. It depicts endogenous production and processing industries, as well as exogenous sectors that create final demands. Two basic components of an I-O model are the transaction or interindustry table and the technical coefficient table. Construction of I-O tables is based on three basic assumptions:

1) There is only one method used in producing each group of commodities and each sector has one homogeneous output,

2) Production relationships are linear in inputs and exhibit constant returns to scale over the relevant range of outputs for each sector,

3) There exist no external economies or diseconomies.

There are a number of alternative measures of economic impacts. The three typically discussed relate to impacts in terms of levels of output (sales), employment, and income. Each of these economic impacts are generally further measured in terms of Type I and Type II multipliers (Table 6.1).

In the case of measuring output or sales impacts, multiplier

Table 6.1 Alternative Economic Impact Measures

Economic Impact	Multiplier Name	Effect Measured	Value
Output (sales)	Simple (Type I)	direct + indirect	>1.00
	Total (Type II)	direct + indirect + induced	>Type I
Employment	Simple (Type I)	direct + indirect	>1.00
	Total (Type II)	direct + indirect + induced	>Type I
Income (wages)	Simple (Type I)	direct + indirect	>1.00
	Total (Type II)	direct + indirect + induced	>Type I

effects occur because of the high interdependence between industries and households in an economy. An industry, such as charter boat fishing, buys inputs which are required to produce an output: charter fishing trips. At the same time, it may supply goods and/or services which other industries require for their own productive activity. A plethora of interindustry transactions give rise to the simple (Type I) output multiplier. The rationale behind the existence of a Type I output multiplier for charter fishing is similar. If demand for charter fishing were to increase, charter boat owners would require inputs such as fuel, bait and ice from other industries to meet the new demand. Hypothetically, if there were a $1 increase in the charter fishing sales, charter boat operators may have to increase their purchases from the retail section by $.20 and from the manufacturing sector by $.30 in order to meet this new demand. If the retail sector has to in turn increase its purchases from the manufacturing sector by $.40 in order to meet the new demand placed on it due to the $1 increase in charter fishing, the following multiple sales effect results: $1 + (.3($1) + .2 ($1)) + (.2($1).4) = $1.62. Thus, a $1 increase in charter fishing sales eventually may give rise to a $1.62 increase in sales through Hawaii's economy. The simple output multiplier in this case would be 1.62 and it measures the direct and indirect effects of a change in the demand for charter fishing. Multipliers can be viewed in two ways. On one hand, they measure the increased (multiplied) sales that would be generated within the whole economy due to an increase in demand for charter fishing. Alternatively, they represent the multiplied loss of sales that would be incurred due to a decrease in the demand for charter fishing.

Simple (Type I) output multipliers are calculated with households considered as exogenous sectors. Simple multipliers do not take into account the added requirement of labor needed in order to meet the new demand. When households are considered as endogenous to the system, a larger multiplier called a total or Type II multiplier is derived. In addition to measuring the direct and indirect effects, the Type II accounts for induced economic effects. Induced effects arise because industries also require additional labor to meet an increase in final demand. Accompanying any increased labor purchases is additional economic activity as wages are respent on goods and services. Type II multipliers will always be larger than corresponding Type I multipliers.

Employment is another economic impact which will be studied. The total employment multiplier is the change in the total employment in an economy resulting from a one unit change in employment of a particular sector. For example, if the Type II employment multiplier associated with charter fishing is 1.2, it would imply that by hiring one more person, the charter fishing industry generates an additional .2 jobs within the whole economy due to indirect and induced effects. The mechanics of

calculating this multiplier are similar to output multiplier calculations.

In addition to changes in output and employment, there may be interest in changes in household income that would result from changes in demand for charter vessel services. Total changes in income, like output, can be calculated in two ways. The first method takes into account both the direct and indirect effects. The multiplier estimated is called the Type I income multiplier (the analog of the simple output multiplier). Type II income multipliers are more realistic because they account for the induced changes in income resulting from increased consumer spending (Miernyk, 1965).

Computation of the Type I income multiplier requires data of direct, as well as direct-plus-indirect income changes. A direct income change is that portion of income that goes directly to households as wages, salaries and dividends due to an increase in output of a particular industrial sector. The Type II income multiplier is simply the Type I multiplier plus the induced effect created by treating the household sector as endogenous.

6.1.2 Alternative Approaches

Estimating total output, employment, and income impacts associated with charter fishing activity in Hawaii can be approached from several ways. For example, the economic impact of recreational fishing in Hawaii, both onshore and offshore, has been studied by Hoffman and Yamauchi (1972). In this study, the economic impact of recreational fishing was evaluated in terms of a Keynesian income multiplier rather than using I-O calculations. Their procedure involved using published data to construct a fishing expenditure function which explicitly accounted for import leakages. A modified income multiplier (modified because it corrected for input leakages) was then calculated from published data. Specifically, the income multiplier used by Hoffman and Yamauchi was expressed as follows:

$$\text{Total income increase} = A/(1-BC)$$

where A = angler expenditures remaining in local area
B = marginal propensity to spend disposable income locally
C = proportion of expenditures that accrues as local income.

The term 1/(1-B) is the familiar Keynesian multiplier, and the parameters A and C are included to adjust for leakages. Calculation of the income multiplier depended upon the values of parameters B and C. A value for B (.77) was obtained from an empirical study published in 1971 (Ghali and Renaud, 1971). A value of C (0.5), was obtained from a 1960 study (FHB, 1960). Thus an income multiplier of 1/(1 - (0.77)(0.5)) = 1.63 was

calculated.

Total increase in income due to recreational fishing expenditures was calculated as A x 1.63. The functional value of A was derived from the 1960 FHB study as:

$$A = .419t + .498v + .419f$$

where t = total transportation cost
v = total additional living costs
f = total cost of fishing equipment

Values for t, v, and f were obtained by means of a mail survey. Substituting the estimated values into the formula for A yielded a total economic impact of $11.5 million.

Numerous other studies relating to economic impacts of fishing have been conducted outside of Hawaii. Callaghan and Comerford (1978), for example, measured the economic impacts of commercial fishing on the State of Rhode Island during 1975. Their methodology involved constructing a regional I-O model. The types of fishing industries represented in the interindustry transactions matrix of their model included: fin-fish catching; lobster catching; mollusk catching; fish handling, packing, and processing; non-Rhode Island vessels; and a sector called "other economic activity." Data for the transaction table necessary for I-O analysis was derived from various sources. Survey data obtained from a questionnaire addressed to fishermen supplied the bulk of the information. Total output multipliers were calculated from each type of fishing industry. A multiplier of 4.24 was calculated to represent the overall commercial fishing impact on the economy of Rhode Island. Type I and Type II income multipliers were also calculated for each type of fishing industry.

An alternative method of assessing economic impact for fishing activity was conducted by Reiling, Cook, and Taylor (1982) in an investigation of recreational ice fishing in Maine using a questionnaire survey. Ice fishermen's expenditures were calculated from a questionnaire survey and then were allocated to three sectors - wholesale and retail trade, transportation, and services. Output multipliers for each of these sectors were obtained from the Regional Economic Analysis Division, U.S. Department of Commerce. Direct impact was reported as the actual expenditures spent in the three sectors. Indirect impact was calculated as being the direct impact multiplied by the corresponding adjusted sector specific gross output multipliers minus one. A total impact of $20 million was reported as the sum of the direct and indirect impacts. Analysis of economic impacts in terms of employment and income was not reported.

6.2 Procedure Adopted

The decision to base the present charter fishing economic impact study on a methodology other than that utilized by Hoffman and Yamauchi hinges on the lack of necessary data. The relevancy and applicability of data over 10 years old to this present study is highly questionable. Another factor is that the Hoffman and Yamauchi study expressed the income multiplier as a function of expenditures of fishermen. The present charter fishing study considers this relationship, but also accounts for the fact that charter fishing vessels supply intermediate goods to the economy in terms of fish landings. Also, charter boats sell a service which directly impacts the State's economy while recreational fishing does not. The rationale for rejecting the Maine ice fishing economic impact assessment methodology is based on similar difficulties.

The Rhode Island commercial fishing study derived multipliers by way of I-O analysis. The investigators constructed an interindustry transaction table which represented purchases and sales between the various industries. Manipulation of the table allowed calculations of the various multipliers. Since the charter fishing industry purchases its inputs from other industries and sells its output (charter services and the fish caught) to other economic sectors, a methodology similar to the Rhode Island fishing study was employed for purposes of this study.

The Department of Planning and Economic Development (DPED), State of Hawaii, maintains an interindustry I-O model of the State's economy. The model is derived from National I-O studies, and surveys of Hawaii's firms conducted by the DPED and the University of Hawaii. For modeling purposes, the economy of the State is disaggregated into 20 industries each of which is represented in the interindustry transaction matrix of the model. Since charter fishing is a small industry, it is not represented as a separate sector. Consequently, it is not possible to obtain multipliers for charter fishing activities directly from DPED reports.

The present study involved modifying the State's model to include an additional industry -- charter boat fishing. Thus, a modified 21 industry I-O model was created. The task was accomplished by separating charter fishing activities out of one of the industries defined in DPED model. After discussions with DPED economists, consensus was reached that charter fishing had been included in the industry titled "OTHER AGRICULTURE" in the DPED model. It then became a matter of determining charter fishing purchases and sales and subtracting that amount from the amount reported in "OTHER AGRICULTURE," thereby preserving the overall production interdependency of industries implied in the model.

Estimates of charter fishing purchases and sales were developed based on primary data collected by the survey. Table 4.1 presents estimated purchases and sales of a representative charter boat in Hawaii. These data were expanded to accommodate the 119 charter boats (as estimated by the survey) in order to derive estimates for sales and purchases of the entire fleet. Industry-wide sales and purchase figures were then allocated into existing industries as specified in the DPED I-O model. Table 6.2 represents the allocation after two major adjustments were made based on 1) the final demand sector of the National Bureau of Economic Analysis I-O model which yields coefficients for industry of origin (Regional Economic Analysis Division, 1977), and 2) estimated import coefficients for Hawaii. These modifications, using data provided by the DPED, did not affect the total amount of sales and purchases by various sectors, but merely redistributed sales and purchases among the industries and sectors in the model so as to reflect as accurately as possible the transactions between industries and leakages from the system. The reallocation procedure might best be illustrated with an example. Fuel and oil were major purchases made by the charter fishing industry, but are not specific industry categories in the State's I-O model. The reallocation process involved allocating fuel and oil purchases according to percentages that typical industries consume petroleum products. The Bureau of Economic Analysis coefficients for industry of origin indicate, for example, that 61% of fuel and oil purchases are attributable to the miscellaneous manufacturing industry, 3% to the transportation and warehouse industry, 21% to the wholesale, and 15% to the retail industry. Similar adjustments for other charter fishing purchases were made. The import coefficients were utilized in order to adjust purchases to account for the fact that not all goods and services were manufactured locally and their value implicitly has imported "value added" included in them. Survey data revealed that the charter fishing industry imported an estimated $285,838 worth of goods and services directly. After making necessary adjustments to reflect ultimate origins of purchased goods, the estimated amount of imports became about $1 million and the estimated amount of local purchases was necessarily decreased by an identical amount. The fully modified interindustry transaction table and technical coefficient table are given in Appendix D.

6.3 Multiplier Estimates

6.3.1 Sales Multipliers

The Type I sales multiplier for the charter fishing industry was estimated to be 1.46. This implies that, because of interindustry linkages between charter activity and other industry activities, every $1.00 sales in charter fishing industry is associated with $1.46 worth of sales or output in the entire economy. The direct effect of $1 sales in the charter

Table 6.2 Estimated Industry-Wide Purchases and Sales by the Charter Fishing Fleet

Sales to:		
Food Processing	$ 762,711	
Eating & Drinking	762,711	
Personal Consumption	1,929,791	
Tourist	4,668,322	
		$8,123,535
Purchases from:		
Other Agriculture	$ 57,820	
Other Food Process	116,620	
Miscellaneous Manufacturing	575,650	
Transp./Warehs.	341,798	
Communication	64,022	
Elect., Gas, & Sanit.	27,846	
Wholesale Trade	126,554	
Retail Trade	98,306	
Banking & Finance	639,744	
Health and Prof.	222,173	
Other Services	615,468	
Household	3,210,739	
Other Value Added	967,946	
Imports	1,058,849	
		$8,123,535

fishing industry is a $1 increase in the State's economy. The indirect effect is the additional $.46 that arises because of the recurrent spending generated as a result of interindustry linkages or dependency.

Type I sales multipliers are discussed less frequently than Type II multipliers. Type II multipliers, because they include the household sector as a contributing element in the economy, present a more realistic synopsis of input and output relationships. The charter fishing industry Type II sales multiplier was calculated to be 2.3423. This Type II multiplier includes the same effects at the Type I multiplier plus the additional effect which is induced when wages are received by households then recirculated in the economy.

Thus the direct impact on the State of Hawaii in terms of sales or output is the $8,123,535 estimated to have been generated by the charter fishing industry in 1982. Due to indirect impacts arising from interindustry linkages, it is calculated that charter fishing generates $11,860,361 (8,123,535 x 1.46) in direct and indirect sales. The direct plus indirect plus induced effect of charter fishing sales is estimated to be $19,035,067 (8,123,535 x 2.3432).

6.3.2 Income Multipliers

The Type I income multiplier ((direct + indirect income change)/direct income change) is the direct and indirect income generated by $1 additional direct income. In the case of charter fishing, the Type I income multiplier is 1.406 (.55572/.39524). The direct income impact of charter fishing is $3,210,739, the amount paid out in the form of wages and compensation for labor to households. The direct and indirect impact on the economy is $4,514,299 ($3,210,739 x 1.406), this being attributable to interindustry linkages and the additional jobs charter fishing supports indirectly.

The Type II income multipliers ((direct + indirect + induced income change)/direct income change) is similar to the Type I multiplier but includes the additional induced effect of household respending. The charter fishing Type II income multiplier was calculated to be 2.2688 (.89672/.39524). The economic impact based on the Type II income multiplier is $7,284,525 (3,210,739 x 2.2688).

6.3.3 Employment Multipliers

Direct employment attributable to charter fishing is estimated to be 203 workers (119 boats x 1.705 person per boat). Employment multipliers were calculated using an estimate of the average wage paid per employee and the direct, indirect and

induced income effects expressed above. Data relating average wage paid per employee in Hawaii was not available. Using the DPED's 1981 average wage of $14,471 and inflating it by 5% (a conservative estimate based on historic increases of wages), the average in 1982 wage becomes $15,195.

Charter fishing's indirect income effect is $1,303,560 (4,514,299 - 3,210,739) implying that charter fishing supports $1,303,560 worth of wages in industries other than itself. This figure divided by the estimated average wage per worker in 1982 yields an estimate of the number of people indirectly being employed due to charter operations. Thus charter fishing supports 85 workers indirectly along with 203 workers directly involved in the business, implying a Type I employment multiplier of 1.4236 ((203 + 85)/203).

The Type II employment multiplier is calculated in a similar manner. The indirect and induced income effect of charter fishing is $4,073,786 ($7,284,525 - $3,210,739). Dividing the indirect and induced income by the average income per worker in 1982 yields an estimated 268 workers employed. The Type II employment multiplier is calculated to be 2.32 ((203 + 268)/203).

The Type I multiplier expresses the direct and indirect employment generated for each additional job in the charter industry. The Type II multiplier encompasses a similar reasoning but with the added induced effect. Note that $40,017 ($8,123,535/203) of charter sales are implied to support 1 job in the charter fishing industry, the inverse of this number is the technical requirements' coefficient for workers in the charter industry (i.e., every $1 of sales it requires .000024989 workers).

6.3.4 Summary of Economic Impacts

Table 6.3 presents a summary of the various multipliers, and estimated impacts based on survey data. These data represent a relationship between charter fishing and the entire economy. An illustration may perhaps serve to highlight the significance of this relationship. Suppose there had been a $100,000 increase in sales in the charter fishing industry. This increase might have been generated in a variety of ways. For example, suppose more fish were caught or perhaps more tourists took charter trips. While charter fishing industry itself would have increased its sales by $100,000 directly, total sales output for the entire State's economy would be augmented by $146,000 (100,000 x 1.46) because of interindustry sales linkages. When the induced effect of household activity is included, an additional $100,000 in charter fishing sales translates into $234,230 ($100,000 x 2.342) worth of output to the State.

Likewise, this increased sales imply $39,524 ($100,000 x

Table 6.3 Summary of Economic Impact Multiplier for Charter Fishery in Hawaii

Economic Impact	Direct Impact	Direct + Indirect Impact(a)	Direct + Indirect + Induced Impact (a)
Sales	$8,123,535	$11,860,036(1.46)	$19,009,072(2.34)
Income	$3,210,739	$4,514,299(1.406)	$7,288,377(2.27)
Employment	203 workers	288 workers(1.423)	471 workers(2.32)

(a) Numbers in parenthesis are estimated multiplier values.

.39524) of additional wages paid to labor as more workers are brought into the market in order to meet the increased demand. Based on the direct and indirect effect, this income figure inflates to $55,571 (39,524 x 1.406). The total effect on the State as calculated by the Type II income multiplier is $89,672 (39,524 x 2.2688) worth of wages and salaries paid to households in the State due to a $100,000 increase in charter fishing sales.

The impact of $100,000 increase in charter fishing sales on employment can be traced in a similar manner. There would be a direct increase in employment of 2.5 (100,000 x .000024989) workers. The direct and indirect effect on the State's employment would be 3.56 (2.5 x 1.4236) jobs created, but because there is also an induced effect, the total impact would be 5.8 (2.5 x 2.32) jobs created in the entire economy.

It is also illustrative to compare the economic impact of charter fishing in Hawaii with other marine industries, and with the total State economy. The fleet generated an estimated $8.1 million in total revenue in 1982, mainly from sales of charter fishing trips and commercially caught fish. Indirect and induced sales amounted to an additional $8 million. Estimated charter fishing direct sales compare closely with sales volumes estimated for the surfshop industry in Hawaii of $9.1 million (Miller, 1984) and are about 20% higher than the $6.7 million of retail sales generated by Hawaii's diving industry (van Poollen, 1983). Compared to total 1982 sales made in the State of Hawaii ($20,722 million), direct charter sales represent about .03% (DPED, 1983).

The industry directly employed 203 people (full-time basis) in 1982, and indirectly created an additional 269 full-time positions as a result of purchases from other economic sectors. In terms of direct employment, charter fishing activities in the State created 240% more positions than the scuba industry that employed 84 people on a full-time basis (van Poollen, 1983). Out of a total 1982 statewide employment level of 442,350, the charter fishing industry was directly responsible for about .04%.

7.0

ATTITUDES OF CHARTER FISHING VESSEL OWNERS

Charter fishing--like most other industries--has its share of bottlenecks and other problems that limit the profitability of individual operations, and constrain industrial expansion. Most charter boat owners have formed diverse personal opinions about what the major problems facing the industry are, and how the State and Federal governments can constructively assist industrial expansion. It is possible, however, to obtain a general idea about what owners think has enhanced or retarded growth of charter fishing in the State. With this goal in mind, survey respondents were polled about their attitudes concerning a range of potentially relevant issues. The results of the poll, discussed below, represent the opinions of active members of Hawaii's 1982 charter fishing fleet. Unrepresented are the views of inactive members, charter fishing operation that have previously failed, and those that began operations since 1982.

7.1 Management Concerns

Respondents were asked to identify the single greatest problem facing Hawaii's charter fishing industry. Respondents were given a list of five problems to chose from. Survey results are tabulated in Table 7.1. First, all boat owners responding to this series of questions agreed that there are definite problems besetting the industry. This conclusion is suggested by the failure of any respondents to select the response "no problems" on their questionnaires. On a statewide basis, respondents most frequently indicated that "operating costs too high" as the single most important problem. In view of the relatively poor financial performance of the industry in terms of profitability, this outlook is understandable. Existence of high operating costs was most often viewed as problematic on most islands, except on Molokai and Hawaii, where "inadequate facilities" was more frequently mentioned.

Lack of adequate harbor facilities was another popularly perceived problem. However, as can be seen in Table 7.2, the majority of boat owners believed that harbor facilities have not deteriorated. Apparently, they must think that port facilities have never been satisfactory. Harbor improvements were most commonly noted on Hawaii, and harbor facility degradation was reported most often on Molokai. This disparity in outlooks reflects the geographic distribution of harbor improvement activities by the U.S. Army Corp of Engineers and the Hawaii Department of Transportation over the past two decades. A further glimpse of the harbor facility problem is evident in Table 7.4, with particular reference to the inquiry about lack of berthing space. Overwhelmingly, boat owners agreed that lack of

Table 7.1 Respondents' Attitudes About the Single Greatest Problem Facing the Charter Fishing Industry in Hawaii: By Island and Statewide

Problem (a)	Statewide	Hawaii	Oahu	Maui
Inadequate Facilities	16%	20%	4%	17%
Lacking Government Support	15	13	16	25
Insufficient Effort in Advertising/Marketing	10	20	4	0
Insufficient Promotion for Tourism	12	13	16	8
Operating Cost Too High	23	7	32	33
Other	7	7	4	17
No Problems	0	0	0	0
No Response	16	20	24	0
TOTAL	99%(b)	100%	100%	100%
N	72	30	24	12

(a) This list of potential problems was suggested to respondents.

(b) Deviation from 100% due to rounding error.

Table 7.2 Respondents' Attitudes About How Harbor Facilities for Charter Fishing Have Changed During the Past 5 Years: By Island and Statewide

Option	Statewide	Hawaii	Oahu	Maui
Improved	27%	50%	16%	8%
Unchanged	38	37	40	50
Worsened	33	13	44	33
No Response	1	0	0	8
TOTAL	99%(a)	100%	100%	99%(a)
N	72	30	24	12

(a) Deviation from 100% due to rounding error.

berthing space creates limits on the growth of charter fishing. This is consistent with other reports that have identified berthing space limitations as a bottleneck to commercial fisheries expansion in Hawaii (e.g., see Department of Land and Natural Resources, 1979).

A third commonly perceived problem was "lack of government support." This outlook is consistent with the owners' majority opinion that the State government has done little to encourage growth of the industry (Table 7.3). In fact, a slight majority of owners shared the attitude that the Government had discouraged growth. The negative image assigned to the State government is not directly interpretable from survey data. However, some clues can be found in Table 7.4. One way that the State influences the industry is through fish stock management. By far the majority of owners on a statewide and island basis (except Molokai) viewed fisheries management from a positive perspective. Thus, the State's role in fisheries management is probably not the problem, nor is the State's installation of FADs view as a problem. Evidence presented above, as well as findings pertaining to owners' views on FADs (Table 7.4) all support the conclusion that FADs are popular with charter boats. Therefore, it is suspected that the owners' opinions about the State government are based primarily on the failure of the State to live up to the industry's expectations concerning harbor infrastructure development and improvement.

7.2 Informational Needs

Over 90% of boat owners on all islands identified at least one informational need. As can be seen in Table 7.5, information relating to industry catches, vessel insurance, and marketing and advertising was most frequently deemed to be needed. Informational needs tended to vary considerably between islands.

With the exception of Oahu, a majority of anglers on other islands indicated that a statewide charter fishing association would be useful (Table 7.6). Furthermore, willingness to join and pay annual dues to such an organization was relatively high (Table 7.7). A potential benefit of participation would be increased recognition for the industry and as improved information exchange.

Table 7.3 Respondents' Attitudes About Hawaii State Government's Policy Toward Growth of Hawaii's Charter Fishing Industry: By Island and Statewide

Option	Statewide	Hawaii	Oahu	Maui
Encourages Growth	8%	10%	12%	0%
Indifferent	44	43	36	50
Discourages Growth	45	47	48	42
No response	3	0	4	8
TOTAL	100%	100%	100%	100%
N	72	30	24	12

Table 7.4 Respondents' Attitudes About Specific Management Issues Relating to Charter Fishing: By Island and Statewide (a)

Statement	Strongly Disagree	Probably Disagree	Probably Agree	Strongly Agree	No Response	N
Lack of berthing space creates limits on the growth of charter fishing in Hawaii.						
Statewide	8%	12%	48%	29%	3%	72
Hawaii	10	20	47	20	3	30
Oahu	8	4	32	52	4	24
Maui	8	17	67	8	0	12
Management of offshore fish resources in Hawaii is more likely to help my charter fishing business than hurt it.						
Statewide	4%	7%	58%	29%	3%	72
Hawaii	10	3	60	23	3	30
Oahu	0	8	48	40	4	24
Maui	0	8	67	25	0	12
Often there are too many boats at good fishing locations to allow for successful trolling.						
Statewide	19%	33%	22%	25%	1%	72
Hawaii	30	27	23	20	0	30
Oahu	4	40	24	28	4	24
Maui	17	33	8	42	0	12
Commercial fishing by others does not significantly reduce my annual catch.						
Statewide	19%	18%	22%	38%	3%	72
Hawaii	17	23	17	40	3	30
Oahu	24	12	28	32	4	24
Maui	17	8	17	58	0	12

Table 7.4 Continued

Statement	Strongly Disagree	Probably Disagree	Probably Agree	Strongly Agree	No Response	N
If on average my boat caught one less fish per month, it would not significantly lower demand for my charter fishing services.						
Statewide	16%	12%	30%	38%	3%	72
Hawaii	13	23	33	27	3	30
Oahu	12	8	32	44	4	24
Maui	25	0	25	50	0	12
Even if my customers do not catch any game fish, they still seem to enjoy the experience of fishing.						
Statewide	1%	14%	25%	59%	1%	72
Hawaii	0	7	30	63	0	30
Oahu	4	24	16	52	4	24
Maui	0	17	17	67	0	12
My customers prefer fishing around Fish Aggregating Buoys compared to fishing in the open ocean away from buoys.						
Statewide	4%	30%	34%	27%	4%	72
Hawaii	7	17	53	20	3	30
Oahu	0	48	16	32	4	24
Maui	0	33	33	25	8	12
Often congestion from other boats around Fish Aggregating Buoys is so bad that it reduces chances of catching fish.						
Statewide	16%	16%	23%	42%	1%	72
Hawaii	23	17	20	40	0	30
Oahu	12	8	32	44	4	24
Maui	8	33	17	42	0	12

Table 7.4 Continued

Statement	Strongly Disagree	Probably Disagree	Probably Agree	Strongly Agree	No Response	N
I experience more gear loss around Fish Aggregating Buoys than when I fish away from buoys.						
Statewide	41%	30%	10%	18%	1%	72
Hawaii	50	27	17	7	0	30
Oahu	32	20	8	36	4	24
Maui	33	58	0	8	0	12

(a) Phrasing of the question was: "How do you personally feel about each of the statements below? For each statement, circle the response which is closest to the way you feel." The percentages reported on this table represent the frequency that a particular response was observed.

Table 7.5 Types of Published Business Information Reported to be Useful to Charter Boat Owners: By Island and Statewide

Types of Information	Statewide	Hawaii	Oahu	Maui
Catch Data	62%	67%	64%	42%
Marketing/Advertising	66	73	60	67
Other Charter Operations	37	43	28	33
Dollar Value of Charter Fishing to Community	51	70	40	33
Dollar Value of Charter Fishing to State	38	57	28	25
Cost of Typical Operation	52	57	44	50
Vessel Insurance	70	77	56	67
Marine Safety	41	43	44	25
Other	3	3	4	0
Not Interested in Any	4%	3%	8%	0%
N	72	30	24	212

Table 7.6 Respondents' Attitudes About the Usefulness of a Statewide Charter Fishing Association: By Island and Statewide

Useful	Statewide	Hawaii	Oahu	Maui
Yes	58%	67%	32%	83%
No	38	33	56	17
No Response	4	0	12	0
TOTAL	100%	100%	100%	100%
N	72	30	24	12

Table 7.7 Respondents' Reported Willingness to Join and Pay Annual Dues to a Charter Fishing Association in Return for Representation and Information: By Island and Statewide

Willing to Join?	Statewide	Hawaii	Oahu	Maui
Yes	54%	63%	32%	75%
No	16	20	20	0
No Response	30	17	48	25
TOTAL	100%	100%	100%	100%
N	72	30	24	12

8.0

CONCLUDING REMARKS

This report has explored the physical and operating characteristics of Hawaii's charter boat fishing industry as it existed in 1982. However, information assembled here can also be used to predict the expected financial viability of the industry over the next decade.

Financial prospects for the charter boat fishing industry in Hawaii hinge closely on future demand and supply circumstances. Consider first the demand outlook. Survey data suggest that charter boat clientele are predominantly nonresidents of Hawaii. A reasonable assumption is that the size of this particular group is positively related to the total amount of visitors coming to Hawaii. Historically, visitor arrivals (both eastbound and westbound) have increased at an average annual rate of 6% (DPED, 1982). It can therefore be anticipated that nonresidents' demand for charter boat services will grow somewhat accordingly. The exact relationship, of course, depends on the demographic profile of new visitors in terms of disposable income and ethnic origin. It also depends on their preferences for offshore sport fishing experiences, and on their knowledge about the quality of charter boat fishing in Hawaii.

Quite likely demand for charter fishing trips by Hawaii residents will similarly increase over time. Assuming no change in per capita demand (for example, due to changes in income or changes in recreational fishing preferences), total demand by residents should increase roughly in accordance with the average annual population growth rate of about 1.5% (DPED, 1982). Use of more effective advertising could probably stimulate this growth rate even higher.

While the demand outlook appears promising, the supply situation, is less encouraging. A primary source of concern is the overwhelming over-capacity of the existing fleet. Currently, an estimated 119 boats comprise the fleet. Many are operated on a part-time basis, at less than 50% capacity utilization. This phenomenon extends to all islands, even those with burgeoning numbers of out-of-state visitors. If a 49% average excess capacity estimate is used, this implies that the existing fleet is capable of delivering twice as many charter fishing trips as it currently does. Yet, given the slow growth rate in the total market (6 percent or less), an effective doubling of demand will take decades to occur. Hence, excess capacity will exist far into the future, even if no additional boats join the fleet. However, this raises another issue. Namely, as long as entry into the fleet is relatively unrestricted, it is doubtful that the fleet size will remain constant in response to growing demand. It is possible that additional capacity will be

forthcoming at a rate that leaves total capacity utilization at its current relatively low level. This outlook is supported by three observations. First, it is evident that charter fishing businessmen are not strongly profit-oriented. They engage in the activity for other personal, non-financial reasons. Thus low profits cannot be expected to discourage potential entrants. Second, investment requirements are relatively low, and do not serve to effectively limit participation in the industry. Finally, no other significant barriers exist to entry such as trade associations, strict industrial marketing controls, or direct government controls on fleet size. The only effective constraint is berthing shortages, and ironically the industry as a whole would like to see this constraint relaxed!

Taken together, supply and demand projections indicate fairly steady growth in sales by the charter fishing industry as a whole in response to increased demand by both resident and nonresident anglers. Accompanying this growth in the total market will be increments to the total fleet size. This, in turn, will create additional jobs, income, and indirect sales impacts. Yet, all this will occur in a financial environment that leaves the average boat still barely able to make a before-tax profit.

9.0

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APPENDIX A

MAIL QUESTIONNAIRE SURVEY INSTRUMENT

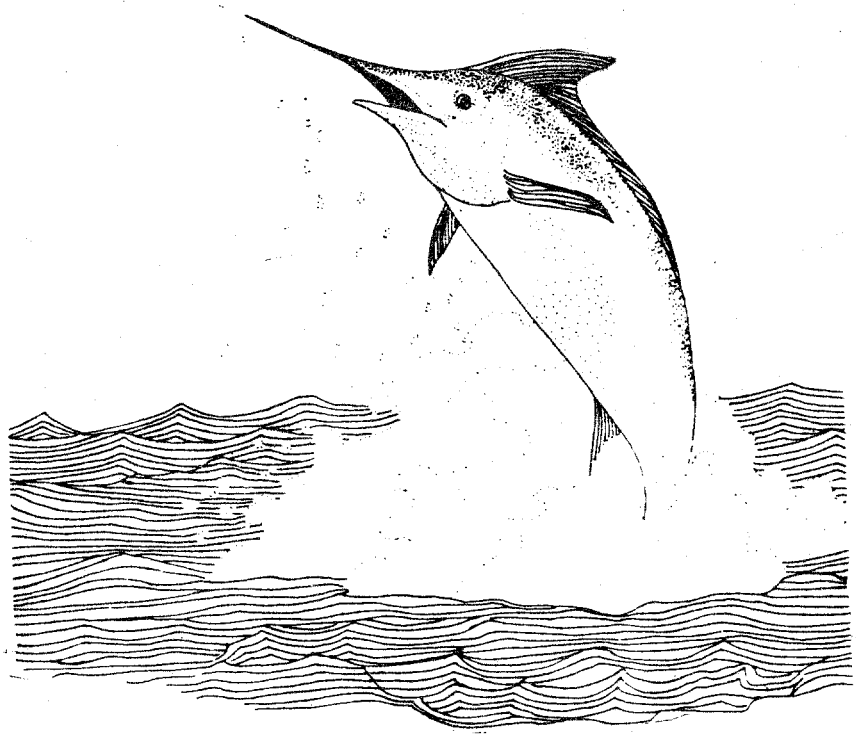
SPECIAL HAWAII CHARTER FISHING SURVEY

IT IS IMPORTANT THAT THIS QUESTIONNAIRE BE FILLED OUT BY THE PERSON TO WHOM IT IS ADDRESSED.

PLEASE TRY TO ANSWER EACH QUESTION SINCE A SINGLE MISSING ANSWER WILL DECREASE THE VALUE OF ALL YOUR OTHER ANSWERS. ANSWER WHAT YOU BELIEVE IS TRUE FOR YOU. THE BEST ANSWER IS THE ONE WHICH MOST CLOSELY REFLECTS YOUR OWN FEELINGS OR WHAT YOU ACTUALLY DID.

WE REALIZE THAT YOUR CHARTER FISHING BUSINESS MAY HAVE BEEN QUITE ACTIVE IN 1982, AND YOU MAY FIND IT DIFFICULT TO REMEMBER EXACT DETAILS ABOUT THE 1982 CHARTER FISHING SEASON. THESE DETAILS, HOWEVER, ARE VERY IMPORTANT TO THE SUCCESS OF THE SURVEY. PLEASE TAKE THE TIME TO THINK BACK OR CHECK YOUR RECORDS. FOR CERTAIN QUESTIONS, YOU MAY WANT TO ASK YOUR SKIPPER OR CREW TO GET THE CORRECT INFORMATION. TRY YOUR BEST TO ANSWER ALL QUESTIONS AS ACCURATELY AS POSSIBLE.

THE QUESTIONNAIRE HAS BEEN DIVIDED INTO SECTIONS TO MAKE IT EASIER FOR YOU TO COMPLETE.



THANK YOU FOR YOUR HELP

IN THIS SECTION WE ARE INTERESTED IN LEARNING HOW YOU PERSONALLY FEEL ABOUT A VARIETY OF ISSUES RELATING TO CHARTER FISHING. WE STRESS THAT ALL OF YOUR ANSWERS ARE STRICTLY CONFIDENTIAL.

1. Do you believe local harbor facilities for charter fishing have changed in any way during the last 5 years? (CHOOSE ONE)

   _____ Local harbor facilities for charter fishing have improved over the past 5 years.

   _____ Local harbor facilities for charter fishing have neither improved nor gotten worse over the past 5 years.

   _____ Local harbor facilities for charter fishing have gotten worse over the past 5 years.

2. In your opinion, what is the Hawaii government's policy towards the growth of Hawaii's charter fishing industry?

   _____ The Hawaii government has encouraged the growth of the charter fishing industry.

   _____ The Hawaii government has discouraged the growth of the charter fishing industry.

   _____ The Hawaii government has neither encouraged nor discouraged the growth of the charter fishing industry.

3. The primary reason(s) I am in the charter fishing business is because: (CHECK ALL ANSWERS THAT ARE TRUE FOR YOU)

   _____ I enjoy the life-style.

   _____ It is profitable.

   _____ I enjoy meeting a variety of people.

   _____ It is the only work I know.

   _____ It is a tax shelter.

   _____ My friends are in the same business.

   _____ Other (please specify).

   _____

4. How do you personally feel about each of the statements below? For each statement, CIRCLE THE RESPONSE WHICH IS CLOSEST TO THE WAY YOU FEEL.

SD-Strongly Disagree
pd-probably disagree

SA-Strongly Agree
pa-probably agree

Lack of berthing space creates limits on the growth of charter fishing in Hawaii.	SD	pd	pa	SA
Management of offshore fish resources in Hawaii is more likely to help my charter fishing business than hurt it.	SD	pd	pa	SA
Often there are too many boats at good fishing locations to allow for successful trolling.	SD	pd	pa	SA
Commercial fishing by others does not significantly reduce my annual catch.	SD	pd	pa	SA
If on average my boat caught one less fish per month, it would not significantly lower demand for my charter fishing services.	SD	pd	pa	SA
Even if my customers do not catch any game fish, they still seem to enjoy the experience of fishing.	SD	pd	pa	SA
My customers prefer fishing around Fish Aggregating Buoys compared to fishing in the open ocean away from Buoys.	SD	pd	pa	SA
Often congestion from other boats around Fish Aggregating Buoys is so bad that it reduces chances of catching fish.	SD	pd	pa	SA
I experience more gear loss around Fish Aggregating Buoys than when I fish away from Buoys.	SD	pd	pa	SA

5. What types of published information on Hawaii's charter fishing fleet would you find useful to your business? (CHECK ALL ANSWERS THAT ARE TRUE FOR YOU)

_____Catch data.

_____Marketing/advertising.

_____Charter operations in Hawaii ports other than mine.

_____Dollar value of charter fishing to my community.

_____Dollar value of charter fishing to the state.

_____Costs of typical charter operations.

_____Vessel/charter insurance.

_____Marine safety.

_____Other (Specify) _____

_____I am not interested in information on Hawaii's charter fishing fleet.

6. Do you think a statewide charter fishing association would help you business?

_____YES _____NO

If yes, would you join the association and pay annual dues in return for representation and information?

_____YES _____NO

7. What is the single greatest problem for the charter fishing industry in Hawaii? (CHOOSE ONLY ONE)

_____Lack of facilities (slips, scales, etc.).

_____Lack of government support for the charter industry.

_____Not enough advertising/marketing effort.

_____Not enough tourist industry promotion.

_____Operating costs too high.

_____Other (Please specify)

_____

_____There are no problems facing Hawaii's charter fishing industry.

IN THIS SECTION WE ARE INTERESTED IN LEARNING ABOUT THE AMOUNT AND TYPES OF FISH WHICH YOUR CHARTER FISHING BOAT LANDED IN 1982.

1. For each of the kinds of fish given below, please give the total number of fish which your boat landed while charter fishing in 1982. Do not include any fish which were landed while commercial fishing (no customers aboard) or while fishing only for fun. (FILL IN THE BLANKS WITH THE CORRECT AMOUNTS)

	Number of fish caught while charter fishing in 1982
AKU	_____
AHI	_____
MAHI	_____
ONO	_____
ULUA	_____
BLACK MARLIN	_____
BLUE MARLIN	_____
SAILFIN MARLIN	_____
SHORTNOSE MARLIN	_____
STRIPED MARLIN	_____
BARRACUDA	_____
SHARK	_____
BOTTOMFISH	_____

2. Your charter customers probably enjoy catching some kinds of fish more than others. For each of the kinds of fish listed below, please indicate what your customers think about catching this type of fish while charter fishing on your boat. (CIRCLE ONE ANSWER FOR EACH TYPE OF FISH)

HD-Highly Desirable
sd-somewhat desirable
su-somewhat undesirable
VU-Very Undesirable

AKU	HD	sd	su	VU
AHI	HD	sd	su	VU
MAHI	HD	sd	su	VU
ONO	HD	sd	su	VU
ULUA	HD	sd	su	VU
BLACK MARLIN	HD	sd	su	VU
BLUE MARLIN	HD	sd	su	VU
SAILFIN MARLIN	HD	sd	su	VU
BARRACUDA	HD	sd	su	VU
SHARK	HD	sd	su	VU
BOTTOMFISH	HD	sd	su	VU
SHORTNOSE MARLIN	HD	sd	su	VU
STRIPED MARLIN	HD	sd	su	VU

IN THIS SECTION WE ARE INTERESTED IN LEARNING HOW MONEY PASSES THROUGH THE CHARTER FISHING INDUSTRY INTO HAWAII'S ECONOMY. PLEASE SUPPLY INFORMATION FOR THE YEAR 1982. AGAIN, WE REASSURE YOU THAT YOUR RESPONSES WILL BE HELD IN THE STRICTEST OF CONFIDENCE.

1. Sometimes fishermen purchase equipment, supplies, and materials from out of state sources. This would involve direct mail orders, transactions through friends on the Mainland, or any other transaction that do not go through local merchants. How much did you spend in 1982 on items purchased directly from supply sources outside of Hawaii?

   $_____ was spent in 1982 on outside purchases.

THE REST OF THE QUESTIONS IN THIS SECTION DEAL WITH LOCAL PURCHASES ONLY.

To help you remember your operating costs, we have divided this question according to per trip, monthly, and yearly basis. Please check your records for exact amounts whenever possible, or give your best estimate for each category. Enter a zero "0" if the item was not an expense in 1982. PLEASE DO NOT INCLUDE OUT OF STATE PURCHASES.

2. PER TRIP COSTS FOR 1982

   What were your average expenses for the following items on a typical full day versus a typical half day trip in 1982? Please fill in the blanks with the average amount of money spent. Place a zero "0" in the blank if an item was not purchased in 1982.

EXPENSE ITEM	AVERAGE AMOUNT SPENT PER TRIP IN 1982	
Fuel	$_____per full day trip	$_____ per half day trip
Oil	$_____per full day trip	$_____per half day trip
Ice	$_____per full day trip	$_____per half day trip
Bait	$_____per full day trip	$_____per half day trip
Food	$_____per full day trip	$_____per half day trip
Beverage	$_____per full day trip	$_____per half day trip

3. MONTHLY COSTS FOR 1982

Please report your expenditures per month in 1982 for the following cost items. Enter a zero "0" if the item was not an expense in 1982.

MONTHLY EXPENSE ITEM	AMOUNT SPENT PER MONTH IN 1982
Payment on boat	$_____ per month
Lures	$_____ per month
Fishing line	$_____ per month
Moorage	$_____ per month
Advertising (phone book, printing, etc.)	$_____ per month
Telephone	$_____ per month
Utilities	$_____ per month
Auto Expenses (if auto considered a business expense):	
Fuel	$_____ per month
Repairs	$_____ per month
Auto payments	$_____ per month
Insurance	$_____ per month
Rental of on-shore booths	$_____ per month
Other (Please Specify)	$_____ per month

_____

_____

4. COSTS PER YEAR FOR 1982

Please report the amount you spent in 1982 in order to meet the following expenses or make the following purchases. Enter a zero "0" if the item was not an expense in 1982.

YEARLY EXPENSE ITEM	AMOUNT SPENT IN 1982
Boat insurance	$_____ in 1982
Licenses & fees (Coast Guard, commercial, etc.)	$_____ in 1982
Legal & professional service (accountants, lawyers, etc.)	$_____ in 1982
Association dues	$_____ in 1982
Fishing equipment	
Nets	$_____ in 1982
Rods	$_____ in 1982
Gaffs	$_____ in 1982
Reels	$_____ in 1982
Coolers	$_____ in 1982
Vessel Improvements	
Boat covers	$_____ in 1982
Safety equipment	$_____ in 1982
Communication equipment	$_____ in 1982
Navigation equipment	$_____ in 1982
Cold storage installation	$_____ in 1982
Engine Repair (including rebuilding)	$_____ in 1982
Electronic equipment repair	$_____ in 1982
Fishing tackle repair	$_____ in 1982
Other maintenance & repair (excluding haul-out)	$_____ in 1982
Tournament fees	$_____ in 1982

6. We are also interested in the level of employment by the Charter Fishing Industry. Please report the number of people your charter business employed in 1982. If you shared dock-side reservations or a sales booth with other boats, please report that portion to the salespersons service which you actually paid for.

	Number of Employees in 1982	
	On Boat	On Shore
Full-time (100%)		
Part-time (50%)		
Part-time (25%)		

7. In what year did you purchase the boat you used in 1982 for charter fishing?

   The boat was purchased in the year _____.

8. Did you purchase the boat in Hawaii? Please check one.

   _____YES

   _____NO

9. Please indicate the price you paid for your charter fishing boat.

   I paid $_____ for my boat when I purchased it.

10. In your opinion, what was the market value of your boat in 1982?

    The market value of my boat in 1982 was $_____.

11. How many more years could your boat be used for charter fishing?

    _____ years.

YEARLY EXPENSE ITEM	AMOUNT SPENT IN 1982
Commissions (to travel agency, hotel activity centers, airlines, etc.)	$_____ in 1982
Marine hardware	$_____ in 1982
Tools	$_____ in 1982
Haul-out to repair hull	$_____ in 1982
Other	$_____ in 1982

5. Labor is one of the costs incurred in running a business. Please give the amount you paid in 1982 to meet labor expenses. Enter a zero "0" if the item was not an expense in 1982.

Employee:	Salary Paid in 1982	Commission Paid in 1982	Bonuses Paid in 1982
Captain			
Crew member 1			
Crew member 2			
Crew member 3			
Crew member 4			
Crew member 5			
Crew member 6			
Salesperson 1			
Salesperson 2			

IN THIS SECTION WE ARE INTERESTED IN LEARNING ABOUT YOUR CHARTER FISHING ACTIVITIES DURING 1982.

1. During 1982, what port(s) did you operate your charter fishing business out of? (FILL IN THE BLANKS WITH THE NAME OF YOUR HOME PORT(S))

   _____ Port #1

   _____ Port #2

   _____ Port #3

2. During 1982, how many people took full-day and half-day private charters aboard your fishing boat? (FILL IN THE BLANKS WITH THE CORRECT AMOUNTS)

   A total of _____ people took full-day private charters aboard my charter boat in 1982.

   A total of _____ people took half-day private charters aboard my charter boat in 1982.

3. During 1982, how many people took full-day and half-day share charters aboard your fishing boat? (FILL IN THE BLANKS WITH THE CORRECT AMOUNTS)

   A total of _____ people took full-day share charters aboard my charter boat in 1982.

   A total of _____ people took half-day share charters aboard my charter boat in 1982.

4. How many days did you use your boat for charter fishing in 1982? (FILL IN THE BLANK WITH THE CORRECT AMOUNT)

   _____ Days

5. How many additional days would you have been willing and able to use your boat for charter fishing if you had more customers in 1982? (FILL IN THE BLANK WITH YOUR ESTIMATE)

   _____ Additional Days

6. What share of the people who took charter fishing trips with you in 1982 were non-residents of Hawaii? (CHOOSE THE ANSWER THAT IS MOST TRUE FOR YOU)

_____ All of my charter passengers in 1982 were non-residents.

_____ 75% to 99%

_____ 50% to 74%

_____ 25% to 49%

_____ Less than 25%

7. What do you typically charge for a private and share full-day and half-day of charter fishing? (FILL IN THE BLANKS WITH THE CORRECT AMOUNT)

$_____ is my typical full-day charge per person for share charter fishing.

$_____ is my typical half-day charge per person for share charter fishing.

$_____ is my half-day charge for private charters.

$_____ is my full-day charge for private charters.

8. During 1982, fish that were landed by your charter fishing boat were either kept by your customers and crew, or were sold. On average, what share of your total fish landings was kept by your customers and crew and not sold by you. (CHOOSE THE ANSWER THAT IS MOST TRUE FOR YOU)

_____ Between 75% and 100% of my boat's 1982 fish landins were kept by customers or crew and not sold by me.

_____ Between 50% and 74%

_____ Between 25% and 49%

_____ Between 0% and 24%

9. When you sell fish which are caught during charter fishing trips, how are the fish sales revenues distributed between owner, skipper and crew? (FILL IN THE BLANKS WITH THE CORRECT AMOUNTS)

_____% of fish sales revenues went to the boat skipper in 1982.

_____% of fish sales revenues went to the crew in 1982.

_____% of fish sales revenues went to the vessel owner in 1982.

_____ I did not sell any of the fish caught while charter fishing.

10. Did you use your boat for commercial fishing in addition to charter fishing in 1982? (CHOOSE ONE)

_____ Yes, I used my boat for commercial fishing in 1982.

If yes, approximate number of days fished in 1982 _____.

_____ No, I did not use my boat for commercial fishing in 1982.

11. What were your total revenues in 1982 from commercial fish sales? DO NOT INCLUDE SALES OF FISH THAT WERE CAUGHT WHILE CHARTER FISHING. (FILL IN THE BLANK WITH THE CORRECT AMOUNT)

$_____ of commercial fish sales were made in 1982.

_____ I did not use my boat for commercial fishing in 1982.

12. What commercial activities, other than charter and commercial fishing, was your boat used for in 1982? (CHECK ALL ANSWERS THAT HOLD TRUE FOR YOU)

_____ Tours

_____ Research trips

_____ Whale watching

_____ Party trips (non-fishing)

_____ Other (please specify)

_____

_____

_____ I did not use my boat for other commercial activities.

13. What income did you receive in 1982 from use of your boat for commercial activities other than charter and commercial fishing? (FILL IN THE BLANK WITH THE CORRECT AMOUNT)

$_____ was received in 1982 for use of my boat for purposes other than charter and commercial fishing.

_____ I did not use by boat for commercial activities other than charter fishing.

14. What share of your charter fishing business in 1982 came from repeat customers. (CHOOSE ONE)

_____ All of my charter fishing business in 1982 came from repeat customers.

_____ 75% to 99%

_____ 50% to 74%

_____ 25% to 49%

_____ 0% to 24%

15. What services did you provide to your charter fishing customers in 1982? (CHECK ALL ANSWERS TTHAT ARE TRUE FOR YOU)

_____ Hotel pick-up/drop-off

_____ Free beverages on board

_____ Free lunch or snacks on board

_____ Fish cleaning

_____ Fish cold storage

_____ Transfer of fish to taxidermist

_____ Free parking

IN THIS SECTION, WE ARE INTERESTED IN SPECIFIC INFORMATION RELATED TO YOUR FISH CATCHES AROUND FISH AGGREGATING BUOYS.

1. Please indicate the share of your total catch in 1982 that was caught within ½ mile of a Fish Aggregating Buoy (FAD). (CHOOSE ONE)

   _____ All of my 1982 catch was caught within ½ mile of Fish Aggregating Buoys.

   _____ 75% to 99% _____ 25% to 49%

   _____ 50% to 74% _____ 0 to 24%

2. What share of your charter trips involved fishing within ½ mile of a Fish Aggregating Buoy (FAD) in 1982? (CHOOSE ONE)

   _____ All of my charter trips involved fishing near Fish Aggregating Buoys.

   _____ 75% to 99% _____ 25% to 49%

   _____ 50% to 74% _____ 0% to 24%

3. Which of your costs have been reduced as a result of fishing near Fish Aggregating Buoys. (CHECK ALL ANSWERS THAT ARE TRUE FOR YOU)

   _____ Fuel and Oil Costs Reduced by _____%

   _____ Labor Costs Reduced by _____%

   _____ Repair Costs Reduced by _____%

   _____ Gear Costs Reduced by _____%

   _____ Ice Costs Reduced by _____%

   _____ Bait Costs Reduced by _____%

   _____ TOTAL COSTS REDUCED BY _____%

4. Do you think your annual number of customers increased over the last three years as a result of fishing near Fish Aggregating Buoys?

   _____YES Increased by _____%

   _____NO

IN THIS FINAL SECTION WE WOULD LIKE TO ASK YOU SOME QUESTIONS ABOUT YOUR BACKGROUND WHICH WILL HELP US COMPARE YOUR ANSWERS TO THOSE OF OTHER CHARTER FISHING VESSEL OWNERS. WE STRESS THAT ALL OF YOUR ANSWERS ARE STRICTLY CONFIDENTIAL.

1. How old are you? _____ years old

2. How many years have you been in the charter fishing business?

   _____ years

3. Are you _____ male ? _____ female ?

4. How many years of school have you completed?

   ____1 ____2 ____3 ____4 ____5 ____6 ____7 ____8 ____9

   ____10 ____11 ____12 ____some college ____B.A. or equivalent

   ____M.A. or equivalent ____ Advanced degree (M.D., Ph.D., etc.)

WE HOPE THAT YOU FOUND THIS QUESTIONNAIRE TO BE AN INTERESTING AND ENJOYABLE EXPERIENCE.

PLEASE RETURN YOUR COMPLETED

QUESTIONNAIRE AT YOUR EARLIEST

CONVENIENCE IN THE ENCLOSED

SELF-ADDRESSED STAMPED ENVELOPE.

THANK YOU AGAIN
FOR YOUR
HELP
AND
COOPERATION.

CONFIDENTIAL!

CONFIDENTIAL!

CONFIDENTIAL!

CONFIDENTIAL!

APPENDIX B

FOLLOW-UP TELEPHONE SURVEY INSTRUMENT

SURVEY I.D. NO. _____

VESSEL I.D. NO. _____

REG. OWNERS NAME _____

ISLAND LOCATION _____

May I speak with (owner's name)?

This is JOHN SPROUL from the University of Hawaii, Dept. of Agriculture and Resource Economics. I'm doing a personal follow-up on our Charter Fishing Survey we recently mailed out to you. Do you recall receiving it?

I would like to ask you a few very short questions concerning your charter fishing business so as to save you the inconvenience of filling out the questionnaire.

Do you offer charter fishing services?
YES NO

Did you use your boat for commercial fishing in 1982?
YES NO

If yes, how many days? _____

Do you consider yourself a full-time or part-time charter boat operator?

Full-time Part-time

What is your home port from which you base your charter business?

_____

How long have you been a charter fisherman? _____

What is your present age? _____

How many charter trips did you take in 1982? _____

What percent of those trips taken in 1982 included fishing within 1/2 mile of an FAD? _____

What was the approximate number of fish caught by your charter business in 1982? _____

What types of fish did you mostly catch? _____

In your opinion, what was the market value of your charter fishing boat in 1982? _____

When did you purchase your charter boat? _____

What was the price you paid for your charter boat? _____

How many more years could your boat be used for charter fishing? _____

What was your total gross revenues which you earned from your charter boat business? _____

Finally, what was the main reason for not responding to the mail questionnaire we sent you? _____

Thank you for your participation and willingness to help us out with this charter fishing survey. If you have any questions concerning the validity of this survey or perhaps comments that you would like to make, you can contact the project's principal investigator Dr. Karl Samples at the University of Hawaii at 948-8360.

Thanks again for your help.

APPENDIX C

A BRIEF TECHNICAL DESCRIPTION OF INPUT-OUTPUT (I-O) MODELING

Interested readers will find a complete discussion of input-output analysis in a standard reference written by Miernyk. The essence of input-output (I-O) modeling is that sectors in an economy are related in an explicit sense. Firms purchase goods and services from other firms, and in turn use these goods as inputs in the production of intermediate and final products. Final or finished products are sold to households, or exported from the region. This interaction between firms is expressed mathematically as:

$$x_{11} + x_{12} + \ldots\ldots x_{1n} + y_1 = X_1$$

$$x_{21} + x_{22} + \ldots\ldots x_{2n} + y_2 = X_2$$

$$x_{n1} + x_{n2} + \ldots\ldots x_{nn} + y_n = X_n$$

where: x_{ij} = sales from sector i to sector j

$(i=1, \ldots, n;\ j=1, \ldots, n)$

y_i = final demand for products of sector i

$(i=1, \ldots, n)$

X_1 = total output of sector i

$(i=1, \ldots, N)$.

In modeling I-O relationships, it is assumed that sectors utilize linear production technologies. That is, production functions are assumed to be homogeneous of degree one, hence there are no economies or diseconomies of scale. Thus it is possible to define the production activity for each sector in terms of input-output (or technical) coefficients:

$$a_{ij} = \frac{X_{ij}}{X_j}$$

where X_j = total input requirements for sector j.

Using technical coefficients the equation system given above may be rewritten so as to express the interdependencies of the various sectors:

$$a_{11}X_1 + a_{12}X_2 + \ldots + a_{1n}X_n + y_1 = X_1$$

$$a_{21}X_1 + a_{22}X_2 + \ldots + a_{2n}X_n + y_2 = X_2$$

$$a_{n1}X_1 + a_{n2}X_2 + \ldots + a_{nn}X_n + y_n = X_n$$

In matrix notation this is expressed as:

$$AX + y = X$$

where: X = n x 1 vector of sector outputs
y = n x 1 vector of final demand
A = n x n matrix of input-output coefficients (also called the technical coefficient table).

Since it is of interest to determine the level of output as a function of final demand, the equation system is rearranged as:

$$AX + y = X$$

$$y = X - AX$$

$$y = X(I-A)$$

$$X = (I-A)^{-1}$$

where: I = identity matrix

$(I-A)^{-1}$ = interdependency table

This equation system is the heart of input-output analysis. It expresses the vector of sector outputs as a linear function of final demands. Consequently, if changes in final demand are assumed to occur, subsequent changes in sector outputs can be determined.

Input-output analysis relies on the multiplier concept. The sales of output multiplier is defined as:

$$s = [(I-A)^{-1}]'*j$$

where: s = n x 1 vector of output multipliers
j = n x 1 sum vector

Sales multipliers (one for each industry) are therefore the column sums of the matrix $(I-A)^{-1}$. The interpretation of the output multiplier is that if final demand for output of sector j were to change by one unit, the output in the entire economy would change by the magnitude of section j's output multiplier.

The following is an illustration of a simplified model. The starting point in any I-O modelling process is construction of the transaction table. The transaction table (see Table C.1) summarizes economic activity that occurs within a given region. The columns of the table represents <u>sales from</u> the various row industries; the rows represent <u>sales to</u> the various column industries. For example, by reading down the first column of Table C.1, it becomes evident that industry A purchases $2 worth of goods and services from itself, $3 from industry B, $1 from industry C, it paid $3 in wages to households, and spent $1 on imports (which is a leakage since it is an outflow of money from

Appendix Table C.1 Hypothetical Transaction Table

Purchasing Sectors / Producing Sectors	Industry A	Industry B	Industry C	Final Demand: Households	Final Demand: Other	Total Output
Industry A	2	4	1	1	2	10
Industry B	3	10	2	10	15	40
Industry C	1	2	4	23	20	50
Households	3	19	30	0	1	53
Imports	1	5	13	0	0	19
Total Input	10	40	50	34	38	172

a region). Reading across the top row reveals that industry A sold $2 worth of goods and services to itself, $4 to B, $1 to C, $1 to households, and $2 to other final demand. Note that total industry sales (total inputs) must equal total industry sales (total outputs). The transaction table identifies where industries buy and sell and presents a static picture of interindustry sales within a regional economy.

The technical coefficient table (see Table C.2) is developed next. Each element in this table is the ratio of an industry's purchases from specific industries divided by its total purchases. The table shows the direct dollar purchases required from each row industry for each dollar sales in each column industry. For example, for every $1 worth of sales that industry A makes, it had to purchase $.2 worth of goods from itself, $.3 worth from industry B, and $.1 from industry C. Since industry B requires purchases of various inputs to support its sale to A there arises, as mentioned earlier, repeated rounds of respending occur and thus a multiplier phenomenon is observed.

Table C.3 is the interdependence table. It is derived by performing the required matrix algebra on the technical coefficient table. The table shows the direct and indirect effect of a dollar's sales by each column industry after repeated rounds of spending have occurred. The interdependence table shows that each $1 sales by industry A, B, and C respectively increases total regional economic production by $2.03, $1.68, and $1.20. These numbers are referred to as the Type I output or sales multipliers. Type II multipliers are devised by including households and the effects of their respending in the interdependence table.

Appendix Table C.2 Hypothetical Technical Coefficient Table (A)

	Industry A	Industry B	Industry C
Industry A	.2	.1	.02
Industry B	.3	.25	.04
Industry C	.1	.05	.08

Appendix Table C.3 Hypothetical Interdependence Table

	Industry A	Industry B	Industry C
Industry A	1.32155	.17834	.0364963
Industry B	.537841	1.40991	.0729927
Industry C	.172877	.0960431	1.09489
Type I Multiplier	2.03227	1.6846	1.20438

APPENDIX D

ESTIMATED INPUT-OUTPUT TABLES FOR CHARTER BOAT FISHING

Appendix Table D.1 Interindustry Transaction Table

PURCHASING INDUSTRY
(SEE LEFT FOR TITLE)

SELLING INDUSTRY

**	INDUSTRY	1	2	3	4	5	6	7	8	9	10
1	CHARTERFISHING	0	0	0	0	0	0	762.71	0	0	0
2	SUGARCANE	0	0	0	0	385100	0	0	0	0	0
3	PINEAPPLE	0	0	0	0	0	42256	721.73	0	0	0
4	OTHER AGRICULTURE	57.82	75.562	146.06	6445.1	0	597.55	80829	212.07	1744.7	22.132
5	SUGAR PROCESSING	0	0	0	44.162	0	2726.1	9314	0	0	0
6	PINEAPPLE CANNING	0	0	0	1714.8	0	62.484	1751.6	9.7831	0	0
7	OTHER FOOD PROCESS.	116.62	0	0	18258	0	941.37	31695	164.71	1.4826	95.629
8	MISC. MANUFACTURING	575.65	26985	5557	6651.9	7595.6	38371	31512	71416	201774	152542
9	CONSTRUCTION	0	769.2	69.767	139.43	1432.4	317.48	1041.7	15153	7187.8	3039.7
10	TRANSP. AND WAREHSNG.	341.8	4012.9	650.48	924.7	20984	7023.9	10465	60335	35199	111635
11	COMMUNICATION	64.022	1032.7	97.653	179.21	1018.9	487.72	2526.3	8597.1	5489	9066.4
12	ELECT. GAS SANIT.	27.846	10161	169.74	456	1424.6	1198	3521.9	15965	2571.5	5388.5
13	WHOLESALE TRADE	126.55	10385	1845	3939.2	5811.4	9821.9	22060	32193	66050	11593
14	RETAIL TRADE	98.306	0	162.26	487.34	151.33	38.42	202.96	669.83	51264	2966.6
15	EATING AND DRINKING	0	118.33	13.683	0	533.12	221.48	979.14	6838.5	7051.6	4913.1
16	BANKING AND FINANCE	639.74	11431	1009.1	3049.4	3724.7	1481.3	4595.5	23815	18833	36471
17	HOTELS	0	60.685	7.5735	43.223	542.27	25.358	91.57	2865.4	209.74	477.62
18	HEALTH AND PROF. SERV.	222.17	16043	2697.6	4339.2	2023.2	295.69	2140.7	8216	81411	7140.4
19	OTHER SERVICES	615.47	2612.5	194.53	63.002	3389.1	1972.8	11027	22266	13891	25362
20	GOVT. ENTERPRISE	0	45.037	26.583	15.521	519.42	116.6	466.9	2879.7	623.24	1967.5
21	OTHER INDUSTRIES	0	0	0	0	0	0	0	0	0	0
22	TOTAL LOCAL PURCHASES	2885	84434	12667	46751	434251	107955	215704	271697	493321	372582
23	HOUSEHOLDS	3210.7	116000	46634	86124	77800	42000	75848	218145	550365	451609
24	OTHER VALUE ADDED	967.95	145473	9443.2	23912	65142	19454	42985	256574	240179	350660
25	IMPORTS	1058.8	39193	7855.6	39189	16907	22791	135946	932341	518611	223859
26	CORRECTION ROW	0	-.020296	-.0094432	1314.6	.31704	-2.91048E-11	1307.3	-2.3283E-10	-.032598	224.74
27	TOTAL PRIMARY INPUTS	5237.5	300666	63933	152540	159849	84245	256086	1409060	1309154	1026563
28	TOTAL PURCHASES	8123.5	385100	76600	199291	594100	192200	471780	1680757	1802475	1399145

SELLING INDUSTRY

***	INDUSTRY	11	12	13	14	15	16	17	18	19	20	21
1	CHARTERFISHING	0	0	0	0	762.71	0	0	0	0	0	0
2	SUGARCANE	0	0	0	0	0	0	0	0	0	0	0
3	PINEAPPLE	0	0	0	11.917	1512.5	0	18.269	0	0	0	0
4	OTHER AGRICULTURE	0	14.892	35.631	0	18985	448.72	704.61	2187.4	433.37	0	0
5	SUGAR PROCESSING	0	0	0	0	1766.7	0	148.53	79.016	0	0	0
6	PINEAPPLE CANNING	0	0	6.5209	2.3158	2902	0	4.107	0	0	0	0
7	OTHER FOOD PROCESS.	.72226	.53658	143.73	36.142	108747	183.79	1215.9	5873.4	90.526	0	0
8	MISC. MANUFACTURING	2889.4	38412	15802	19854	12841	33836	27218	21321	21850	1952.7	0
9	CONSTRUCTION	1014.2	1498.4	1855.4	4898.5	4184.9	97328	20191	10891	6781.8	2303.6	0
10	TRANSP. AND WAREHSNG.	1107.2	5424.6	12577	2878.3	15939	7527.3	41950	11122	8909.1	5505.7	0
11	COMMUNICATION	5239.5	3338.8	15845	13389	6233.2	34843	7834.4	12478	12469	530.56	0
12	ELECT. GAS SANIT.	2681.8	46998	6450.3	24826	22379	25205	48994	17489	7049.6	2115.2	0
13	WHOLESALE TRADE	601.55	4817.3	13254	6132.2	80714	9197.7	8422.7	13335	20519	557.63	0
14	RETAIL TRADE	123.94	394.57	2493.8	1701.2	58.078	4695.7	3302.1	1231	3624.8	96.434	0
15	EATING AND DRINKING	1380.8	1614.4	13236	4353.3	0	24399	4073	13674	7193.4	248.55	0
16	BANKING AND FINANCE	10064	11567	23449	68265	60517	470116	131777	62942	43405	2315.3	0
17	HOTELS	553.18	357.63	2387.4	732.22	550.35	3366.2	1309.2	3634.4	1505.1	23.946	0
18	HEALTH AND PROF. SERV.	2232.9	3587	11647	7571.9	11047	43331	8208.6	39097	10457	445.58	0
19	OTHER SERVICES	15235	8134.6	36305	35612	36250	60958	50637	29360	41688	1621.6	0
20	GOVT. ENTERPRISE	931.83	2300.3	2137.2	4082.2	1971.6	10347	3917.7	5983.9	2608.3	90.718	0
21	OTHER INDUSTRIES	0	0	0	0	0	0	0	0	0	0	0
22	TOTAL LOCAL PURCHASES	44056	128459	157624	194347	387462	825793	359926	248599	188784	17608	0
23	HOUSEHOLDS	183950	69000	345058	560561	308731	1284119	385777	740553	338058	69123	2150435
24	OTHER VALUE ADDED	80007	191901	210418	263777	268833	1272972	209833	150764	119887	7738.8	0
25	IMPORTS	18558	113254	24705	22843	374837	82073	78040	80151	145840	4710.5	0
26	CORRECTION ROW	9020.5	147.81	6174.1	5238	-1293.9	0	11783	832.24	5750.4	4644.5	4.3443
27	TOTAL PRIMARY INPUTS	291536	374302	585354	852820	951107	2539164	685434	972300	609536	85267	2150439
28	TOTAL PURCHASES	335592	502762	743979	1047166	1338569	3464986	1045359	1220999	798320	104075	2150439

Appendix Table D.1, continued

PURCHASING INDUSTRY

SELLING INDUSTRY

***	INDUSTRY	TOTAL INDUSTRY DEMAND	PERSONAL CONSUMPTION	TOURIST PURCHASES	PRIVATE INVESTMENT	STATE & LOCAL GOVT.	FED. (def.)	FED. (civ.)	EXPORTS	TOTAL FINAL DEMAND	TOTAL SALES
1	CHARTERFISHING	1525.4	1929.8	4668.3	0	0	0	0	0	6598.1	8123.5
2	SUGARCANE	385100	0	0	0	0	0	0	0	0	385100
3	PINEAPPLE	44520	1000	5821.6	0	200	0	0	25058	32080	76600
4	OTHER AGRICULTURE	112941	24115	2718.5	.2	1995.3	.92	7.34	57512	85350	199291
5	SUGAR PROCESSING	14079	6279.6	1426.5	0	212.61	0	.82	572102	580021	594100
6	PINEAPPLE CANNING	6453.7	8000	746.22	0	290.17	0	6.69	176703	185746	192200
7	OTHER FOOD PROCESS.	165566	185895	38576	0	10260	7.2	103.61	71382	306224	471790
8	MISC. MANUFACTURING	738956	154442	64759	26408	31365	282985	1153.3	380689	941601	1680757
9	CONSTRUCTION	180098	0	0	1138700	359490	117289	6898.2	0	1622377	1802475
10	TRANSP. AND WAREHSNG.	364511	274789	708757	8562	23577	3310.4	702.27	14936	1034634	1399145
11	COMMUNICATION	140850	147162	5362.4	14977	16814	8275.6	466.26	1675	194732	335592
12	ELECT. GAS SANIT.	245773	171542	0	0	37733	47473	241.64	0	256989	502762
13	WHOLESALE TRADE	321376	247198	75365	55736	22385	1293.1	624.73	20000	422602	743979
14	RETAIL TRADE	73703	677463	275779	19366	857.25	0	-1.59	0	973463	1047166
15	EATING AND DRINKING	90841	591366	659087	0	-3282.4	408.07	148.7	0	1247727	1338569
16	BANKING AND FINANCE	989568	2420012	33.09	0	43693	235.72	1274.9	10140	2475389	3464956
17	HOTELS	16743	116717	904985	0	3956	698.23	250.27	0	1026616	1045359
18	HEALTH AND PROF. SERV.	22155	810439	14560	0	119269	1606.9	2968.2	10000	958843	1220999
19	OTHER SERVICES	397404	190906	169286	1728.7	26701	1891.5	870.96	9531.7	400915	798320
20	GOVT. ENTERPRISE	41031	37092	14924	37.59	9771.8	753.75	399.36	64.21	63044	104075
21	OTHER INDUSTRIES	0	11032	0	0	883616	1161524	94268	0	2150439	2150439
22	TOTAL LOCAL PURCHASES	4595205	6077379	2946855	1265516	1588913	1627752	110384	1349794	14966592	19561797
23	HOUSEHOLDS	8105502	0	0	0	0	0	0	0	0	8105502
24	OTHER VALUE ADDED	3933169	0	0	0	0	0	0	0	0	3933169
25	IMPORTS	2882774	1759500	391066	508781	179200	76882	9636	0	2925066	5807839
26	CORRECTION ROW	45148	0	0	0	0	0	0	0	0	45148
27	TOTAL PRIMARY INPUTS	14966593	1759500	391066	508781	179200	76882	9636	0	2925066	17891659
28	TOTAL PURCHASES	19561798	7836879	3337921	1774297	1768113	1704634	120020	1349794	17891658	37453455

Appendix Table D.2 Technical Coefficients Table

PURCHASING INDUSTRY
(SEE LEFT FOR TITLE)

SELLING INDUSTRY

***	INDUSTRY	1	2	3	4	5	6	7	8	9	10
1	CHARTERFISHING	0	0	0	0	0	0	.0016166	0	0	0
2	SUGARCANE	0	0	0	0	.64821	0	0	0	0	0
3	PINEAPPLE	0	0	0	0	0	.21985	.0015298	0	0	0
4	OTHER AGRICULTURE	.0071176	1.5622E-4	.0019068	.03234	0	.003109	.17132	1.2618E-4	9.6793E-4	1.5818E-5
5	SUGAR PROCESSING	0	0	0	2.216E-4	0	.014183	.019742	0	0	0
6	PINEAPPLE CANNING	0	0	0	.0046047	0	3.251E-4	.0037127	5.8206E-6	0	0
7	OTHER FOOD PROCESS.	.014356	0	0	.091617	0	.0048979	.067181	9.7995E-5	8.2255E-7	6.9063E-5
8	MISC. MANUFACTURING	.070862	.070073	.07254[illegible]	.033376	.012787	.19964	.066791	.04249	.11194	.10903
9	CONSTRUCTION	0	.0019974	9.1079E-4	6.9951E-4	.012411	.0016518	.002208	.0090157	.0039877	.0021726
10	TRANSP. AND WAREHSNG.	.042075	.01042	.0084919	.00464	.03532	.036545	.022181	.035897	.019528	.079768
11	COMMUNICATION	.0078811	.0026818	.0012748	8.9923E-4	.001715	.0025376	.0053547	.0051745	.0030453	.00648
12	ELECT. GAS SANIT.	.0034278	.028203	.002216	.0022881	.0023979	.006233	.0074651	.0094989	.0014367	.0038513
13	WHOLESALE TRADE	.015579	.026959	.024085	.019766	.0097818	.051103	.046757	.019154	.036644	.0032855
14	RETAIL TRADE	.012101	0	.0023794	.0024454	2.5472E-4	1.999E-4	4.3018E-4	3.9853E-4	.028452	.0023488
15	EATING AND DRINKING	0	3.0726E-4	1.7163E-4	0	8.9735E-4	.0011523	.0020754	.0040687	.0031822	.0035115
16	BANKING AND FINANCE	.078752	.029683	.013174	.015301	.0062695	.0077071	.0097406	.014169	.010448	.026367
17	HOTELS	0	1.5758E-4	9.8871E-5	2.1689E-4	9.1276E-4	1.3194E-4	1.9409E-4	.0017048	1.1636E-4	3.4137E-4
18	HEALTH AND PROF. SERV.	.027349	.041661	.035216	.021773	.0034054	.0015385	.0045374	.0048883	.045166	.0051034
19	OTHER SERVICES	.075764	.0067838	.0025396	3.1613E-4	.0057045	.010265	.023373	.013248	.0077066	.01[illegible]27
20	GOVT. ENTERPRISE	0	1.1695E-4	3.4703E-4	7.7883E-5	8.7429E-4	6.0666E-4	9.8964E-4	.0017134	3.4577E-4	.0014362
21	OTHER INDUSTRIES	0	0	0	0	0	0	0	0	0	0
22	TOTAL LOCAL PURCHASES	.35526	.21925	.16537	.23459	.73094	.56168	.4572	.16165	.27369	.36629
23	HOUSEHOLDS	.39524	.30122	.6088	.44219	.13095	.21852	.16077	.12979	.30534	.32278
24	OTHER VALUE ADDED	.11915	.37775	.12328	.11999	.10965	.10122	.09111	.15384	.13325	.25077
25	IMPORTS	.13034	.10177	.10255	.19664	.028458	.11858	.28815	.55471	.28772	.16
26	CORRECTION ROW	0	-5.2703E-8	-1.2328E-7	.0065964	5.3366E-7	-1.5142E-16	.002771	-1.3853E-16	-1.8085E-8	1.6063E-4
27	TOTAL PRIMARY INPUTS	.64474	.78075	.83463	.76541	.26906	.43832	.5428	.83835	.72631	.73371
28	TOTAL PURCHASES	1	1	1	1	1	1	1	1	1	1

SELLING INDUSTRY

***	INDUSTRY	11	12	13	14	15	16	17	18	19	20	21
1	CHARTERFISHING	0	0	0	0	5.698E-4	0	0	0	0	0	0
2	SUGARCANE	0	0	0	0	0	0	0	0	0	0	0
3	PINEAPPLE	0	0	0	1.1381E-5	.0011299	0	1.7477E-5	0	0	0	0
4	OTHER AGRICULTURE	0	2.952E-5	4.7892E-5	0	.014184	1.295E-4	6.7403E-4	.0017915	5.4285E-4	0	0
5	SUGAR PROCESSING	0	0	0	0	.0013199	0	1.4208E-4	6.4714E-5	0	0	0
6	PINEAPPLE CANNING	0	0	8.7649E-6	2.2115E-6	.002168	0	3.9288E-6	0	0	0	0
7	OTHER FOOD PROCESS.	2.1522E-6	1.0673E-6	1.9319E-4	3.4514E-5	.081241	5.3044E-5	.0011631	.0031723	1.134E-4	0	0
8	MISC. MANUFACTURING	.00851	.076401	.021239	.018959	.0095932	.0097652	.026037	.017462	.02737	.018763	0
9	CONSTRUCTION	.0030222	.0029803	.0024939	.0046778	.0031264	.028089	.019315	.0089198	.0084951	.022134	0
10	TRANSP. AND WAREHSNG.	.0032993	.01079	.016904	.0027485	.011908	.0021724	.040129	.0091085	.01116	.052902	0
11	COMMUNICATION	.015613	.0066409	.021298	.012785	.0046567	.010056	.0074945	.01022	.015619	.0050979	0
12	ELECT. GAS SANIT.	.0079912	.093479	.00867	.023708	.016719	.0072744	.046868	.014324	.0088305	.020324	0
13	WHOLESALE TRADE	.0017925	.0095816	.017815	.005856	.060298	.0026545	.0080572	.010922	.025703	.005358	0
14	RETAIL TRADE	3.6931E-4	7.848E-4	.003352	.0016246	4.3388E-5	.0013552	.0031589	.0010082	.0045406	9.2659E-4	0
15	EATING AND DRINKING	.0041145	.0032111	.01779	.0041573	0	.0070416	.0038963	.011199	.0090107	.0023921	0
16	BANKING AND FINANCE	.029988	.023008	.031518	.065191	.045285	.13568	.12606	.051549	.054371	.022247	0
17	HOTELS	.0016484	7.1133E-4	.0032089	6.9924E-4	4.1115E-4	9.7151E-4	.0012524	.0029766	.0018854	2.3068E-4	0
18	HEALTH AND PROF. SERV.	.0066536	.0071347	.015655	.0072309	.008253	.012506	.0078524	.032021	.013098	.0042813	0
19	OTHER SERVICES	.045398	.01618	.048798	.034008	.027081	.017596	.048439	.024046	.05247	.015582	0
20	GOVT. ENTERPRISE	.0027767	.0045753	.0028727	.0038983	.0014729	.0029862	.0037477	.0049008	.0032672	8.7166E-4	0
21	OTHER INDUSTRIES	0	0	0	0	0	0	0	0	0	0	0
22	TOTAL LOCAL PURCHASES	.13128	.25551	.21187	.18559	.28946	.23833	.34431	.20368	.23648	.17111	0
23	HOUSEHOLDS	.54814	.13724	.4638	.53569	.23064	.3706	.36904	.60651	.42346	.66417	1
24	OTHER VALUE ADDED	.23841	.38169	.28283	.2519	.20084	.36738	.20073	.12348	.15017	.074839	0
25	IMPORTS	.0553	.22526	.033206	.021815	.28003	.023687	.074654	.065644	.18258	.04526	0
26	CORRECTION ROW	.026879	2.94E-4	.0082988	.005002	-9.6666E-4	0	.011272	6.8161E-4	.0072031	.044626	2.0202E-6
27	TOTAL PRIMARY INPUTS	.85872	.74449	.78813	.81441	.71054	.76167	.65569	.79532	.76352	.82889	1
28	TOTAL PURCHASES	1	1	1	1	1	1	1	1	1	1	1

Appendix Table D.3 Interdependence Table: Direct and Indirect

PURCHASING INDUSTRY
(SEE LEFT FOR TITLE)

SELLING INDUSTRY

***	INDUSTRY	1	2	3	4	5	6	7	8	9	10
1	CHARTERFISHING	1	2.0003E-6	1.8154E-6	1.6838E-4	2.4574E-6	1.2363E-5	.0017673	4.1126E-6	5.0359E-6	4.0057E-6
2	SUGARCANE	2.2246E-4	1	1.0217E-5	.0015662	.64822	.0092816	.014053	1.37E-5	1.9346E-5	1.2999E-5
3	PINEAPPLE	6.4614E-5	5.7006E-6	1	.0022363	6.809E-6	.21996	.0029349	1.2297E-5	1.5453E-5	1.0662E-5
4	OTHER AGRICULTURE	.010525	4.2649E-4	.0021792	1.0519	3.513E-4	.0048878	.19344	3.7249E-4	.0013796	2.6159E-4
5	SUGAR PROCESSING	3.4319E-4	1.4612E-5	1.5762E-5	.0024161	1	.014319	.021681	2.1135E-5	2.9846E-5	2.0053E-5
6	PINEAPPLE CANNING	1.6044E-4	1.1006E-5	2.513E-5	.0094428	1.2002E-5	1.0004	.0057301	2.3605E-5	3.0046E-5	1.6662E-5
7	OTHER FOOD PROCESS.	.016836	4.1916E-4	5.1208E-4	.1036	4.4035E-4	.0061679	1.0916	6.5291E-4	8.8475E-4	6.1615E-4
8	MISC. MANUFACTURING	.087919	.080769	.079987	.049911	.071682	.23719	.094339	1.0531	.12474	.12747
9	CONSTRUCTION	.0051838	.0047195	.0028156	.002605	.0062482	.0054686	.0050097	.010702	1.0068	.0050934
10	TRANSP. AND WAREHSNG.	.052114	.016389	.013618	.011406	.050392	.053954	.034513	.042542	.028132	1.0929
11	COMMUNICATION	.012475	.0053058	.0032191	.0032476	.0061363	.0068282	.0093649	.0070797	.0063353	.0091735
12	ELECT. GAS SANIT.	.0081065	.033674	.0046349	.005336	.02534	.012024	.012792	.012265	.0055486	.007137
13	WHOLESALE TRADE	.022569	.030833	.027226	.0285	.031235	.064697	.060742	.022451	.041977	.013229
14	RETAIL TRADE	.01311	4.994E-4	.0027282	.0029441	8.6177E-4	.0014802	.0016566	.0010308	.029109	.0026733
15	EATING AND DRINKING	.0030323	.0023213	.0017331	.0015641	.0030635	.0041406	.0046333	.0053652	.0063279	.0052819
16	BANKING AND FINANCE	.10481	.042241	.021383	.024864	.037882	.024002	.025631	.022365	.023614	.038818
17	HOTELS	6.4952E-4	6.3623E-4	4.8768E-4	5.5993E-4	.0014569	9.2957E-4	8.0294E-4	.0019873	7.1324E-4	7.6812E-4
18	HEALTH AND PROF. SERV.	.032733	.045305	.037955	.02574	.033849	.013757	.01321	.0071723	.04936	.0079063
19	OTHER SERVICES	.08794	.013135	.007279	.0070155	.016809	.021033	.034322	.018272	.016028	.025232
20	GOVT. ENTERPRISE	.0012	9.3751E-4	9.0272E-4	6.5107E-4	.0017179	.0016719	.0018627	.0021918	.0012574	.0021138
21	OTHER INDUSTRIES	0	0	0	0	0	0	0	0	0	0
22	TYPE I MULTIPLIER	1.46	1.2777	1.2067	1.3358	1.9857	1.7022	1.63	1.2077	1.3423	1.3387

SELLING INDUSTRY

***	INDUSTRY	11	12	13	14	15	16	17	18	19	20	21
1	CHARTERFISHING	3.8451E-6	3.6085E-6	1.4567E-5	4.2379E-6	7.1754E-4	6.739E-6	7.0591E-6	1.5431E-5	8.4783E-6	2.6439E-6	0
2	SUGARCANE	1.1947E-5	1.1382E-5	4.5347E-5	1.3424E-5	.0020458	2.1435E-5	1.2495E-4	1.1958E-4	2.7514E-5	8.2679E-6	0
3	PINEAPPLE	1.0183E-5	9.7117E-6	4.0089E-5	2.3051E-5	.0018817	1.7957E-5	3.6333E-5	3.8402E-5	2.3261E-5	7.0644E-6	0
4	OTHER AGRICULTURE	2.2927E-4	2.5137E-4	7.9404E-4	2.577E-4	.030798	5.4503E-4	.0012673	.0030342	.0010501	1.7773E-4	0
5	SUGAR PROCESSING	1.8431E-5	1.7559E-5	6.9958E-5	2.071E-5	.0031562	3.3068E-5	1.9277E-4	1.8448E-4	4.2447E-5	1.2755E-5	0
6	PINEAPPLE CANNING	1.5452E-5	1.5333E-5	6.6356E-5	1.9314E-5	.0027763	2.8136E-5	3.7162E-5	7.3025E-5	3.8573E-5	1.0964E-5	0
7	OTHER FOOD PROCESS.	5.262E-4	5.0707E-4	.0020852	6.1009E-4	.090447	9.7648E-4	.0020256	.0049705	.0012871	3.6936E-4	0
8	MISC. MANUFACTURING	.013576	.092766	.030097	.026445	.026701	.018871	.044536	.026171	.037011	.032615	0
9	CONSTRUCTION	.0050541	.0056956	.0051953	.0079906	.0062042	.03357	.025363	.012101	.011999	.023959	0
10	TRANSP. AND WAREHSNG.	.005644	.017907	.021986	.0059274	.019258	.0053827	.048572	.013394	.01623	.060291	0
11	COMMUNICATION	1.0175	.0092962	.024309	.015246	.0086224	.013005	.01173	.012816	.019017	.0069488	0
12	ELECT. GAS SANIT.	.010442	1.1054	.012397	.028221	.021721	.010693	.055161	.018456	.012705	.023942	0
13	WHOLESALE TRADE	.0043896	.014161	1.0225	.0089504	.069241	.0064302	.013709	.014959	.03048	.0087057	0
14	RETAIL TRADE	8.6563E-4	.0013283	.0040183	1.0022	9.2678E-4	.0027261	.0046065	.0017567	.0054679	.001945	0
15	EATING AND DRINKING	.0052553	.0048944	.019549	.0057067	1.0027	.0090566	.0066419	.012979	.011228	.0035921	0
16	BANKING AND FINANCE	.040628	.035118	.046408	.081627	.062225	1.1624	.15637	.067744	.072628	.031735	0
17	HOTELS	.0018919	.0011254	.0036159	.0010132	9.178E-4	.0013232	1.0018	.003354	.0023438	4.5994E-4	0
18	HEALTH AND PROF. SERV.	.0087786	.010128	.018955	.010169	.013063	.017452	.013476	1.0359	.017058	.0071365	0
19	OTHER SERVICES	.050818	.022995	.057267	.040274	.037773	.024318	.058917	.030793	1.0615	.020438	0
20	GOVT. ENTERPRISE	.0032707	.0055616	.003628	.0046027	.0023537	.0038244	.0049919	.0056593	.0041092	1.0014	0
21	OTHER INDUSTRIES	0	0	0	0	0	0	0	0	0	0	1
22	TYPE I MULTIPLIER	1.169	1.3272	1.2731	1.2394	1.4035	1.3107	1.4495	1.2645	1.3043	1.2237	1

Appendix Table D.4 Interdependence Table: Direct, Indirect and Induced

PURCHASING INDUSTRY
(SEE LEFT FOR TITLE)

SELLING INDUSTRY

***	INDUSTRY	1	2	3	4	5	6	7	8	9	10
1	CHARTERFISHING	1.0003	2.1425E-4	3.6953E-4	4.6332E-4	2.304E-4	2.7027E-4	.0015667	1.0962E-4	2.3353E-4	2.3067E-4
2	SUGARCANE	.0011301	1.0006	.0011162	.0024533	.6489	.010057	.014653	3.3104E-4	7.0658E-4	6.9475E-4
3	PINEAPPLE	5.7232E-4	3.6281E-4	1.0006	.0027326	3.9032E-4	.22039	.0032705	1.8981E-4	3.9983E-4	3.9202E-4
4	OTHER AGRICULTURE	.019852	.0069873	.013546	1.061	.0073972	.01286	.1996	.0036338	.0064424	.0072679
5	SUGAR PROCESSING	.0017434	9.9948E-4	.001722	.0037847	1.0011	.015516	.022606	5.107E-4	.0010901	.0010718
6	PINEAPPLE CANNING	.0013907	8.7635E-4	.0015243	.010645	9.4132E-4	1.0015	.0065433	4.5376E-4	9.6159E-4	9.4097E-4
7	OTHER FOOD PROCESS.	.0464	.021214	.036539	.1325	.022773	.031456	1.1111	.01099	.023271	.022823
8	MISC. MANUFACTURING	.12757	.10866	.12831	.088668	.10164	.27108	.12055	1.067	.15476	.15725
9	CONSTRUCTION	.017731	.013545	.018106	.014869	.015726	.016193	.013304	.015089	1.0163	.014518
10	TRANSP. AND WAREHSNG.	.093456	.045497	.064046	.051855	.081651	.089323	.061668	.057011	.059467	1.124
11	COMMUNICATION	.037416	.022849	.033612	.027626	.024976	.028145	.025851	.0158	.02522	.027908
12	ELECT. GAS SANIT.	.03946	.055727	.042842	.035982	.049024	.038821	.033517	.023228	.029289	.030688
13	WHOLESALE TRADE	.06219	.058703	.075508	.067327	.061165	.098561	.085932	.036304	.071978	.042981
14	RETAIL TRADE	.089653	.054338	.096002	.077759	.058581	.0669	.052252	.027794	.067067	.060168
15	EATING AND DRINKING	.074058	.05228	.088284	.070986	.056715	.064845	.051582	.030199	.060108	.058633
16	BANKING AND FINANCE	.44079	.27856	.4308	.35325	.29167	.31115	.24771	.13984	.27801	.29118
17	HOTELS	.014656	.010488	.017555	.01425	.012037	.0129	.010061	.0068844	.011318	.011289
18	HEALTH AND PROF. SERV.	.13407	.11658	.16144	.12479	.11039	.10036	.080193	.042603	.12609	.084022
19	OTHER SERVICES	.13065	.043176	.059323	.04876	.04907	.057536	.062553	.033205	.048367	.057312
20	GOVT. ENTERPRISE	.0078936	.0056457	.00905 94	.0071935	.0067741	.0073928	.0062872	.0045322	.0063257	.0071417
21	OTHER INDUSTRIES	.0012205	8.5847E-4	.0014873	.0011929	9.2193E-4	.0010431	8.0675E-4	4.2674E-4	9.2414E-4	9.1676E-4
22	HOUSEHOLDS	.89672	.63074	1.0927	.87647	.67737	.76641	.59274	.31354	.67899	.67357
23	SUM OF ROWS	3.239	2.5289	3.3745	3.0746	3.2795	3.2227	2.806	1.8297	2.6893	2.675
24	TYPE II MULTIPLIER	2.3423	1.8982	2.2818	2.1981	2.6022	2.4563	2.2132	1.5161	2.0103	2.0014

SELLING INDUSTRY

***	INDUSTRY	11	12	13	14	15	16	17	18	19	20	21
1	CHARTERFISHING	3.367E-4	1.2197E-4	3.219E-4	3.4064E-4	9.1479E-4	2.6998E-4	2.8867E-4	3.9853E-4	2.9986E-4	4.013E-4	5.43E-4
2	SUGARCANE	.0010131	3.6739E-4	9.6971E-4	.0010252	.0026391	8.1303E-4	9.7196E-4	.0012718	9.039E-4	.0012073	.0016332
3	PINEAPPLE	5.7021E-4	2.0885E-4	5.5717E-4	5.8904E-4	.0022135	4.6077E-4	5.1014E-4	6.8295E-4	5.135E-4	6.7779E-4	9.1359E-4
4	OTHER AGRICULTURE	.010518	.00391	.010294	.010656	.036895	.0085802	.009972	.014876	.010057	.0125	.016784
5	SUGAR PROCESSING	.0015629	5.6677E-4	.001495	.0015816	.0040714	.0012543	.0014995	.0019521	.0013945	.0018625	.0025195
6	PINEAPPLE CANNING	.0013725	4.979E-4	.0013193	.0013908	.0035804	.0011011	.0011853	.0016349	.0012266	.0016363	.0022138
7	OTHER FOOD PROCESS.	.033137	.012104	.032196	.033569	.10977	.026762	.029516	.042504	.029835	.039427	.0532
8	MISC. MANUFACTURING	.057315	.10832	.070481	.07065	.052621	.053455	.081541	.076511	.075299	.085	.071352
9	CONSTRUCTION	.018895	.010617	.017974	.021979	.014406	.044513	.037073	.028031	.024115	.040535	.022578
10	TRANSP. AND WAREHSNG.	.051291	.034139	.064132	.052061	.046309	.041476	.087191	.065931	.056169	.1145	.074466
11	COMMUNICATION	1.045	.019079	.04971	.04305	.024926	.034758	.035006	.04448	.0431	.039898	.04488
12	ELECT. GAS SANIT.	.045026	1.1177	.04433	.063174	.042216	.038038	.084421	.058261	.042981	.065363	.056419
13	WHOLESALE TRADE	.048094	.029702	1.0629	.053121	.095141	.040987	.050685	.06526	.068739	.061049	.071297
14	RETAIL TRADE	.085295	.031352	.081974	1.0876	.05095	.069485	.076039	.098931	.079378	.10307	.13774
15	EATING AND DRINKING	.083601	.032754	.091987	.084887	1.0491	.071004	.072926	.10315	.079811	.097424	.12781
16	BANKING AND FINANCE	.41123	.1669	.38859	.45617	.28184	1.4554	.46991	.49428	.39705	.47559	.60457
17	HOTELS	.017341	.0066192	.01788	.016627	.010073	.013539	1.0148	.021135	.015868	.018953	.025203
18	HEALTH AND PROF. SERV.	.12055	.049876	.12216	.12314	.079301	.10583	.10804	1.1645	.11491	.14101	.18234
19	OTHER SERVICES	.097928	.039747	.10076	.087886	.06569	.061567	.098774	.085013	1.1028	.07665	.076852
20	GOVT. ENTERPRISE	.010654	.0081872	.010445	.012065	.006729	.0095624	.011239	.014157	.010573	1.0102	.012045
21	OTHER INDUSTRIES	.0013463	4.7873E-4	.001243	.0013606	7.977E-4	.0010645	.001139	.0015494	.0011785	.0016124	1.0022
22	HOUSEHOLDS	.98913	.35173	.91327	.99957	.58616	.78209	.83685	1.1384	.85588	1.1847	1.6136
23	SUM OF ROWS	3.1313	2.025	3.085	3.2226	2.5663	2.8622	3.1097	3.523	3.022	3.5739	4.2012
24	TYPE II MULTIPLIER	2.1421	1.6732	2.1717	2.2229	1.9802	2.0801	2.2729	2.3845	2.1562	2.3893	2.5876