PACIFIC ISLANDS FISHERIES SCIENCE CENTER

Economic Analysis of Bottomfish Fishing Vessels Operating in the Northwestern Hawaiian Islands in 2003

By

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and

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Administrative Report H-06-03

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INTRODUCTION

The Northwestern Hawaiian Islands (NWHI) bottomfish fishery is a federally managed fishery. More than 10 years have passed since the last in-depth economic study (Hamilton, 1994) of the NWHI bottomfish fleet. The main objectives of this study were to update cost-earnings information from the fleet, examine the economic health of the fleet, and assess vessel operations and activities relevant to vessel economic returns of the fleet. This analysis, using both primary and secondary data, provides the baseline information needed to support effective management of the NWHI bottomfish fishery.

During May−August 2004, face-to-face interviews with owners and/or captains of all NWHI bottomfish vessels were conducted to collect primary information on costs of fishing operations in 2003. Information on physical characteristics of the vessels, motivation of fishermen, and other topics was also collected. Follow-up interviews were conducted in September 2004 and March−April 2005 to collect data missed during the first interviews.

Data on fishing effort and ex-vessel revenue used in this analysis come from two secondary data sources provided through the NWHI bottomfish fishery monitoring program of the State of Hawai`i Division of Aquatic Resources (HDAR). The first source is the bottomfish vessel logbook introduced to the fishery by HDAR in October 2002. Fishermen are required to report in the logs their daily catch, fishing effort, and operational details, such as gear used. The second source is the sales reports wholesale fish dealers are required to submit to HDAR on all fish sale transactions, including information on number of fish sold, their weight, and purchase price. Fleet activities, price, and revenue information of the bottomfish fleet in 2003 were generated from these two HDAR data sources. (Information on fishing costs, e.g., trip expenditures and fixed expenditures, was not available from state data sources.)

BACKGROUND INFORMATION ON THE NWHI BOTTOMFISH FLEET

Limited-entry Programs

In 1988, the NWHI was divided into two management areas (Fig. 1): the Ho`omalu Zone and the Mau Zone. Initially, different fishery management regulations were implemented in these zones. A limited-entry regime was first established for the Ho`omalu Zone in 1989, while the Mau Zone remained open access. About 10 years later, in May 1999, a limited-entry program was also implemented in the Mau Zone. Table 1 summarizes the limited-entry program in these two areas. Vessels with a Ho`omalu Zone limited-entry permit are not allowed to fish in the Mau Zone (Kawamoto, 1993). Likewise, when the limited-entry program was established in the Mau Zone, only the Mau Zone permit holders were allowed to fish there. However, all vessels are allowed access to the main Hawaiian Islands (MHI), where most areas are open for bottomfish fishing.

Under the limited-entry program, access to the Ho`omalu Zone and Mau Zone is limited to 7 permit holders and 10 permit holders, respectively. Vessel owners renew their permits annually through the National Marine Fisheries Service (NMFS) Pacific Islands Regional Office. Owners who wish to renew their permit must meet minimum landing requirements annually. To qualify for renewal of a Ho`omalu Zone permit, the vessel must have made a minimum of three trips in the previous year, where each trip landed at least 2500 pounds of NWHI bottomfish management unit species (BMUS) (Appendix A) or at least 2500 pounds of NWHI fish that were at least 50% (by weight) bottomfish (WPRFMC, 1988). For renewal of a Mau Zone permit, a vessel must have completed a minimum of five trips with 500 pounds of BMUS landed on each trip (WPRFMC, 1998).

Participation Over Time

During 1988−2003, the number of active bottomfish vessels fishing in the NWHI was around 13, on average (Table 2). Although the number of vessels engaged in the fishery fluctuated over time, it was down to nine vessels in the most recent 2 years. Prior to the limited-entry program, more vessels were active in the Ho`omalu Zone than in the Mau Zone. For example, in 1988 there were 12 vessels fishing in the Ho`omalu Zone and 4 in the Mau Zone. However, the order reversed in 1990 when only 5 were vessels fishing in Ho`omalu Zone while the Mau Zone recorded 14 vessels. Since then, the number of vessels fishing in the Mau Zone has remained higher than in the Ho`omalu Zone. When the Mau Zone limited-entry program was established in 1999, seven vessels were active there; that number has slowly declined. In 2003, a total of nine vessels with NWHI fishing permits were active; four vessels in the Ho`omalu Zone and five in the Mau Zone.

Despite the declining number of active NWHI bottomfish vessels, in recent years there has been interest by new vessels in entering the fishery. According to the current "use it or lose it" rule, a NWHI permit holder would lose the permit if minimum annual landing conditions were not met. There is a mechanism providing for new entrants to the Ho'omalu Zone fishery, but not the Mau Zone fishery, which may be partly responsible for the decline in number of participants. The Western Pacific Regional Fishery Management Council proposed to NMFS a regulatory amendment to the Bottomfish and Seamount Groundfish Fishery Management Plan that would allow additional entrants to the Mau Zone. Consideration of this measure was stalled in 2001 when former President Clinton's Executive Order 13196 established the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve. Likewise, no action has been taken on a more recent Council proposal to NMFS, a regulatory adjustment that would change the criteria for permit renewals in the NWHI bottomfish fishery (WPRFMC, 2005).

FLEET ACTIVITIES in 2003

Vessel Characteristics in 2003

Seven of the nine active vessels participating in the cost survey provided complete information on their 2003 fishing operations; three of four from the Ho`omalu Zone and four of five from the Mau Zone. Table 3 lists their main characteristics. Vessel characteristics for the entire 2003 NWHI fleet of nine active vessels are presented in Appendix B.

The average age of the seven fully responding vessels was about 23 years. The average vessel length was 40.8 feet. The appraised value of a NWHI vessel was about $146,000, on average. The fuel capacity for a vessel was about 1400 gallons, and the holding capacity of bottomfish for each vessel was 8429 pounds. On average, the Ho`omalu Zone vessels were larger (44.6 feet) and appraised higher ($193,333) than vessels that fished in the Mau Zone (38.0 feet, $110,500).

Fleet Operation Activities in 2003

In 2003, the four vessels with Ho`omalu Zone permits made 30 trips, whereas the five vessels with Mau Zone permits made 89 trips, including the trips made in the MHI. Of the total of 119 trips, 78 trips were made within the NWHI and the other 41 trips in the MHI. Vessels in the NWHI fleet were usually equipped with two types of gear, bottomfish gear and troll gear. Some vessels also used pelagic handline gear. The trips can be grouped into three types based on the gear type used: (1) bottomfish fishing, (2) trolling, and (3) pelagic handline. It is a common practice for bottomfish fishermen to troll on their way out to the NWHI from their home port, during their return to port, and while traveling between banks during a bottomfish trip.

Trips on which both bottomfish fishing and trolling occurred were counted as bottomfish trips. Most bottomfish trips included some days spent trolling. A trip is considered a trolling trip in this study only if trolling gear was used exclusively for the entire trip. Likewise, a trip is considered a pelagic handline trip only if pelagic handline gear was used for the entire trip. Eighty-two percent of the total trips were bottomfish trips while the other 18% were trolling and pelagic handline trips which mainly targeted pelagic species (Table 4).

Table 5 compares the fishing activities of bottomfish vessels within the Ho`omalu Zone and the Mau Zone during 2003. Vessels with Ho`omalu Zone permits took 30 bottomfish fishing trips and fished exclusively within the NWHI. Vessels with Mau Zone permits made 45 bottomfish fishing trips and 3 trolling trips within the NWHI, and also recorded 41 fishing trips in the MHI open access area (22 bottomfishing, 15 trolling, and 4 pelagic handline trips.)

Based on the NWHI bottomfish trip daily logs, the NWHI vessels harvested bottomfish in three areas (Ho`omalu Zone, Mau Zone, and MHI), conducted trolling trips only in the Mau Zone and the MHI, and took pelagic handline trips only in the MHI. Table 6 describes characteristics of each trip type (e.g., trip length, travel days, fishing days) and the distribution of fishing effort by trip type within each management zone.

In general, a fishing trip in the Ho`omalu Zone was longer than a trip in the Mau Zone, and a bottomfish trip was longer than a trolling trip. On average, bottomfish trips in the Ho`omalu Zone lasted 23.6 days with about half of the time (11.8 days) spent traveling to and from the fishing ground. In comparison, the average trip length for a bottomfish trip in the Mau Zone was 8.6 days (only 36% of the average trip length for Ho`omalu Zone vessels) with 1.4 days spent traveling out to the grounds and 1.6 days coming back in. Therefore, the average number of fishing days per bottomfish trip in the Mau Zone was 5.6 days (after deducting 3 days for travel). A trolling trip usually took 3.7 days in the Mau Zone and 1.3 days in the MHI. During Mau Zone bottomfish trips, about 22.2% of fishing days were spent trolling. Vessels with Mau Zone permits conducted multiple-day trips when fishing for bottomfish in the MHI, with the average trip lasting about 3.5 days, including 1 day spent traveling and 2.5 days spent fishing.

As previously mentioned, days involving bottomfish fishing and trolling were counted as bottomfishing days. If only trolling gear was used during the day, then the day was counted as a trolling day. Although most of the bottomfish trips included some days spent trolling, some of the vessels may have trolled more than others during a trip. Bottomfish trips in the Mau Zone involved more trolling days than trips in the Ho`omalu Zone. Therefore, the catch composition (bottomfish and pelagic species) for a bottomfish trip could be different between these two zones. Fishermen sometimes trolled during a bottomfish trip, but the trolling time for a vessel that fished in the Ho`omalu Zone was less than 10% of the total fishing time.

Landings and Ex-vessel Revenues in 2003

The NWHI bottomfish fleet landed a total of approximately 350,000 pounds of fish with a composition of 75% BMUS and 24% Pelagic Management Unit Species (PMUS) (Table 7). WPRFMC (1986) defines a “management unit” as a species or group of species affected or exploited by the same fishery or fisheries. Lists of BMUS and PMUS are provided in Appendix A.

Most of the fish caught on bottomfish trips were BMUS; a portion consisted of PMUS. On average, a bottomfish trip in the NWHI caught 86% BMUS, 13% PMUS, and 1% miscellaneous species. In contrast, when a bottomfish trip occurred in the MHI, BMUS composed only 28% of the total landings, while PMUS made up 64% and miscellaneous species, 8%. Trolling trips and pelagic handline trips by the NWHI bottomfish fleet caught 100% PMUS.

The NWHI bottomfish fleet generated more than $1 million in revenue in 2003. Revenue in this study refers to ex-vessel revenue, computed as the product of ex-vessel price per pound (usually round weight) and the weight of fish landed. Table 8 presents the revenue generated from different species groups and trip types. Approximately 83% of the total revenue by the NWHI bottomfish fleet came from BMUS. Revenue from PMUS, however, was a meaningful contributor (16%). Although BMUS contributed as much as 91% to the total revenue for NWHI bottomfish trips, they accounted for only 36% of total revenue for bottomfish trips in the MHI. PMUS contributed 57% of the total revenue from MHI bottomfish trips.

PRICE AND MARKET

Market Channels

Several market channels exist in Hawaii for the NWHI bottomfish vessels to sell their catch. The market channels used by bottomfish fishermen in 2003 were the United Fishing Agency (UFA) fish auction and several wholesale fish distributors. Vessels with Ho`omalu Zone permits sold all their catches at UFA, while vessels with Mau Zone permits sold their fish at UFA and to the wholesale distributors.

The United Fishing Agency fish auction is located in Honolulu. UFA charges the seller a 10% commission on all sales regardless of volume. This commission has remained unchanged since 1952.[1] Vessels dock at the pier and off-load fish at the auction located on the pier. On one hand, wholesale fish distributors do not charge the seller a commission on sales. On the other hand, the seller must pay for the cost of transporting the fish to the distributor's warehouse.

Bottomfish Price by Species in 2003

The average ex-vessel price of BMUS harvested from the NWHI and MHI by NWHI permit holders in 2003 was $3.26 per pound. Average ex-vessel prices, landings by species, and revenue by species are presented in Table 9. Opakapaka yielded the highest average price among BMUS at $5.15 per pound. Onaga yielded the second highest price at $4.77 per

[1] Pacific Ocean Producers. Honolulu Fish Auction: Selling at the Auction. http://www.pop-hawaii.com/whats_new/hon_auction.htm.

pound and generated the greatest revenue, about $253,000. Although uku yielded the second lowest price at $2.30 per pound, it accounted for almost twice as much sales volume (about 102,400 pounds) as onaga (about 53,000 pounds). Therefore, sales from uku generated the second highest revenue, about $235,000.

Price Trend

The nominal ex-vessel price of locally harvested bottomfish (including fish harvested from the NWHI and the MHI) has shown an increasing price trend since 1970 (Fig. 2). However, the increase of the nominal price did not take into account the inflation rate after 1991. Accordingly, the price data were adjusted for inflation using 1982–1984 data as a basis. Based on its movement, the inflation-adjusted price trend was divided into three periods: 1970−1976, 1977−1990, and 1991−2003. The adjusted price increased substantially during 1970−1976, from $3.33 to $4.11 per pound. It stabilized around $4.00 per pound during the 1977−1990 period, and peaked at $4.42 per pound in 1989. During the 1991−2003 period, the inflation-adjusted price slightly declined with an average price of $3.72 per pound. Previous economic research (Pooley, 1987) showed a strong inverse relationship between monthly and weekly price and landings, but this relationship appeared weaker in the 1990s, perhaps as a result of increased imports of bottomfish from Pacific island nations. Imports to the Hawaii bottomfish market are discussed in the next section.

Bottomfish Imports to Hawaii

Imports of snappers and groupers have increased in recent years in terms of volume, value, and points of origin. Table 10 shows historical data on the volume of imported fresh bottomfish to Honolulu. Based on U.S. customs data, there were no imports of fresh bottomfish to Honolulu prior to 1991, when about 122,000 pounds of fresh bottomfish fish, mainly snappers and groupers, were imported. Since then, imports have increased. In 2003, trade statistics indicate that 896,000 pounds worth $2.5 million ($2.76 per pound) were imported. Table 10 and Figure 3 show the total fresh bottomfish supply to the Hawaii market. Since 2001, the amount of imports has exceeded domestic supply. Ninety percent of the bottomfish imports were snappers; the rest were groupers. Australia, Tonga, and New Zealand were the primary sources of imported fresh snappers and groupers, supplying 42%, 33%, and 21% of the total imports, respectively. The remaining imports came from Fiji and Indonesia.

COST-EARNINGS ANALYSIS IN 2003

Table 11 presents the cost-earnings status of the NWHI fleet based on their fishing operations in 2003. Data on the operations and associated costs of individual vessels were obtained through face-to-face interviews with owners and/or captains of the seven fully responding vessels (out of nine vessels active in 2003). Using a predesigned survey form (Appendix C), most interviews were conducted in 2004, while follow-up interviews to collect missing data were conducted in 2005. Most of the interviews were conducted at the dock where fishermen keep their boats or unload their catches.

Total costs, determined through the interviews, included variable costs, trip expenditures (in most cases), and annual fixed costs. The variable cost component included expenditures for fuel, ice, bait and chum, food, and water bought for the fishing trip, trip-based supplies (weights, line, swivels, hooks, gloves, etc.), and maintenance.

Fixed costs included annual expenditures for repairs, major maintenance, mooring fees, bookkeeping, vessel insurance, and miscellaneous costs (such as satellite phone). As in Hamilton's (1994) study, depreciation was not taken into consideration as a fixed cost because it was observed that, if a vessel is adequately maintained, its useful life is virtually unlimited. According to interview data for the seven fully responding vessels, the average appraisal price ($146,000) was similar to the average purchase price ($150,000). Another item included in fixed costs is the amount spent for services. Some service costs, such as dry dock or engine overhaul, are not incurred every year. For those items, the annual cost was calculated as the cost of the most recent instance of service divided by the typical interval (years) between two services.

In previous cost-earnings studies (e.g., Hamilton, 1994; Hamilton et al., 1996), payments to captains and crews were classified as a component of costs to the vessel. In this study, payments to captains and crews from catch revenues are not listed as costs; instead, they are listed under the category "net revenue and distribution." Most captains and crews were paid by share (received certain percentages of net revenue) although in some cases crews got a fixed allowance each month. In the owner-operated vessels, payments to captains (owners themselves) were actually part of the income to vessel owners. In the NWHI bottomfish fleet, two thirds of the vessels were captained by their owners. Therefore, in this study the income distribution among crew, captain, and owners is listed in a separated category from costs to allow a clear description of the income status for the fleet.

This study found that the incomes to crews, captains, and owners were positive in 2003 (Table 11). For the seven fully responding NWHI bottomfish vessels, the average gross revenue was about $140,000 in 2003 and the net revenue available for income distribution was $61,449 per vessel. The average net income to the owner was $17,069, while the average net income to the captain was $25,366. The average net income distributed to crew was $18,922. The average income per crew member was $15,547, since average crew size was about 1.2 persons per vessel. In this fishery, six out of nine vessels active in 2003 were operated by the owners themselves. Therefore, the income to an owner-operator was the income earned by the owner (as an investor or owner of the capital) plus income owed to the captain. If a vessel was owner operated, this combined income was $43,341, on average.

Considerable variability in income to fishery participants was documented, caused by variations in revenue and costs among vessels. Among vessels, higher revenue was not necessarily associated with higher costs. For example, in 2003 the minimum return to an owner within the fleet was about $700 while the maximum was $62,000. The minimum income to a captain was $3,000 while the maximum was $65,000. As a result of such disparities, the between-vessel variability in income to captains, owners, and crew was greater than variability in costs and revenue, as reflected in higher coefficients of variation (Table 11).

In the previous cost-earnings study by Hamilton (1993), capital investment was considered as one of the elements of fixed costs. The capital investment was computed as the purchase price of a vessel multiplied by the current long-term U.S. Treasury bond rate, which, for Hamilton's study, was 6.55% in June 1993. This was considered an "opportunity cost," representing the potential return on the investment amount that was foregone as a consequence of using the funds to purchase and improve the vessel.

In our study we did not include such an "opportunity cost" as a component of fixed costs, for two reasons. First, most vessels in the NWHI bottomfish fleet were purchased through loans, so the foregone investment was limited to the amount used as the loan down payment. Second, if a vessel carried a loan, the monthly payment (including premium and interest) was included in our accounting as a fixed cost. If both monthly payments and capital costs had been considered as fixed costs, the investment cost would have been included twice. In addition, according to the 2003 survey, all NWHI bottomfish vessel owner-operators have paid off their loans. Therefore, instead of subtracting "opportunity cost" from the revenue to calculate an owner's "final profit," we calculated the rate of return on investment for the owner-operators of the bottomfish fleet. The return rate equals the profit divided by the amount of investment (initial purchase price of a vessel). This approach allows us to compare the investment in the NWHI bottomfish industry to other industries. Our study shows that the average return rate to the NWHI bottomfish vessel owner-operators was 11%, which is considerably higher than the long-term U.S. Treasury bond rate of 4.96% in 2003.[2]

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[2] Federal Reserve Statistical Release, H.15. Selected Interest Rates: Historical Data. http://www.federalreserve.gov/Releases/H15/data/a/tcm20y.txt.

The average annual total cost for all seven surveyed NWHI bottomfish vessels, including sales costs, variable costs, and fixed costs, was $78,191 per vessel (Table 11). Variable costs comprised about half (52%) of the total costs, while fixed costs accounted for about 30% and sale costs (auction handling fee and transportation fee) about 18% of the total. Table 12 presents the same set of cost-earnings statistics separately for the Mau Zone and Ho`omalu Zone. In 2003, income to the vessel owner was higher for Mau Zone vessels ($22,026) than Ho`omalu Zone vessels ($10,460). However, vessel captains in the Ho`omalu Zone received slightly higher income ($28,879) than Mau Zone captains ($22,731), on average. The average net income to owner-operators (there were six such cases) was higher for vessels in the Mau Zone ($44,756) than those in the Ho`omalu Zone ($39,339). On the other hand, the average vessel purchase price was lower for Mau Zone vessels ($115,000) than for Ho`omalu Zone vessels ($196,667). As a result, the return rate on investment for the Mau Zone vessels was 19%, much higher than the 5% return rate for the Ho`omalu Zone vessels.

The net revenue distribution among crew, captains, and owners was direct income. However, the net revenue does not reflect all the benefits to NWHI bottomfish fishery participants. For example, foods consumed at sea were included as expenses of fishing, but they could be viewed as a source of non-cash income to captain and crew. In addition, some vessel owners lived on their vessels and saved the expenses of having a house on land. This topic is discussed further in the next section.

DEMOGRAPHICS, MOTIVATIONS, AND VALUES

Demographics

Demographic data and information regarding profitability was collected from captains and owners of all nine NWHI bottomfish vessels involved in the interviews (Appendix C), including six owner-operators, two hired captains, and one owner who hired a captain but sometimes operated the vessel himself. A summary of information from the interview responses is presented in Tables 14 through 18.

Fishermen participating in the NWHI bottomfish fishery have the same general commercial fishing experience, 29 years, on average, regardless of the management zone in which they work (Table 13). The Mau Zone vessel operators are slightly older than those in the Ho`omalu Zone. In terms of ethnicity, two of the nine NWHI bottomfish vessel operators are Hawaiian or part-Hawaiian and one is of Japanese ethnicity (Table 14). The rest are of Caucasian ethnicity, derived from English, French, German, Irish, or Scottish origins. Although most operators are not of Hawaiian ethnicity, almost half of the fishermen with Mau Zone permits grew up in Hawaii with close relatives who were commercial fishermen (Table 15). Half of the Ho`omalu Zone operators grew up in Hawaii, but none of them had close relatives who were commercial fishermen.

Table 16 presents information on profitability and other aspects of the fishing business for the NWHI bottomfish fleet. For ease of comparing our study with the 1993 study of Hamilton (1994), interview responses from the Ho`omalu Zone owner-operators and hired captains were combined and tabulated in the same column. For the Mau Zone, responses from the owner-operators and hired captain were calculated separately. However, only one hired captain in the Mau Zone was interviewed in 2003. To maintain confidentiality, data from this interview are not given; only the owner-operator information is shown.

For vessels in the Mau Zone, satisfaction toward the fishing business has increased since the 1993 survey. In the 1993 cost-earnings study, about 60% of vessel owner-operators were unsatisfied with the returns they were achieving and 20% did not show a profit on their 1992 income tax return (Hamilton, 1994). In our study, surveyed Mau Zone owner-operators indicated general satisfaction with economic returns achieved in recent years and all showed a profit on their 2003 tax returns (Table 16).

For vessels in the Ho`omalu Zone, responses in our survey indicated that satisfaction with economic returns was generally the same as in 1993. However, even though the 2003 cost-earnings survey showed a positive average return for the fleet, 75% of respondents reported no profit on their income tax returns compared with only 25% in Hamilton's 1993 study. One reason for such inconsistent information is that variability in returns to individual vessels within the fleet was substantial in 2003. Also, in the cost-earnings statistics (Table 12), annual costs of major repairs and dry dock services were averaged for the economic analysis and do not indicate actual cash flow. In reality, the vessel owner chose to pay these costs up-front, directly, or over a certain period of time through a loan. The benefit of having a baseline average is that the cost statement can be used for annual economic monitoring; annual inflation-adjusted costs may be deducted from the current annual gross revenue to yield an updated annual return. In addition to the economic returns from fishing presented in this study, only one owner-operator, with a Mau Zone permit, reported other sources of income (organic farming).

For both the Mau Zone and Ho`omalu Zone, 100% of vessel operators affirmed that their vessels are currently paid off. In 1993, no respondents in the Ho`omalu Zone and only 60% in the Mau Zone reported that their vessels were paid off (Hamilton, 1994). For the Ho`omalu Zone, 50% of operators reported that they do not live in a house or apartment on land.

Motivations and Values

During the person-to-person interviews, the bottomfish fishermen were asked to fill out a worksheet regarding their fishing motivations and lifestyle values (Appendix D) and eight fishermen responded. Table 17 summarizes the self-reported motivations of six owner-operators. Responses of hired captains were not combined with those of the owner-operators because their motivations may be different. The motivations of the two hired captains are not revealed here to maintain confidentiality.

On the survey forms, owner-operators were asked to consider lists of economic and social factors possibly motivating them to operate the fishing vessel and indicate which ones were primary motivational factors and which one was most important. As in the 1993 study (Hamilton, 1994), the economic factor most frequently identified as "most important" was that the vessel provides a primary source of income. Nevertheless, social factors (e.g., lifestyle and love of fishing) appear to influence an owner-operator's choice to operate a vessel. The statistics on economic and social motivations in Table 17 support this contention. For example, 100% of the owner-operators indicated that enjoyment of the work itself was a primary motivating factor and 83% said being out at sea was a primary factor. A large percentage of the operators (67%) said that seclusion, being their own boss, and supplying fish to the Hawaii market were primary motivating factors.

Owner-operators were also asked to describe in their own words the inherent values of a Hawaii bottomfish fisherman's lifestyle. Four owner-operators provided responses (Table 18) These lifestyle values extend beyond owner-operators to owners who hire captains for their vessels. One owner asserted that the primary reason he continues his fishing business is for the men operating his vessel who love the ocean and fishing. The owner's altruism reflects the nature and values of the fishery participants that often can be overlooked in traditional economic assessments of the fishery.

Most of the bottomfish fishermen do not feel that the traditional economic valuation (such as cost-earnings analysis) approach of measuring individual social welfare as the total net revenue is a sufficient measure to accurately reflect the value of bottomfish fishing to the individuals involved. As illustrated in Table 17, the benefits of fishing were not limited to financial returns but include less tangible social benefits. Economic rationalism does not well accommodate those social values. To a certain extent, this may be attributed to the difficulty of quantifying these social factors in economic terms (Kearney, 2002). As a final question, owner-operators were also asked if they felt a comprehensive non-market valuation examining the value of lifestyle and social motivations is necessary to help clarify and measure fishery value. Seven out of nine respondents from active bottomfish vessels answered yes.

CONCLUSIONS

This study found that there was a positive economic return to NWHI fishermen (including vessel owners and captains) in 2003. The average return to an owner was about $17,000 in 2003, while the combined income to owner-operators was $43,341. There was considerable variation among vessels in terms of vessel activities, revenue, and costs. Fishermen with Mau Zone permits had higher returns than those with Ho`omalu Zone permits, on average. While most NWHI vessel owners and captains stated that bottomfish fishing was their major source of income, other benefits to commercial fishermen in the fishery may exist besides monetary returns. The supply of bottomfish from the local industry has generally declined since 1994. However, an increase in importation of fresh bottomfish from foreign counties has kept the total supply of fresh bottomfish in the Hawaii market constant; hence, the price of bottomfish has also been stable in recent years.

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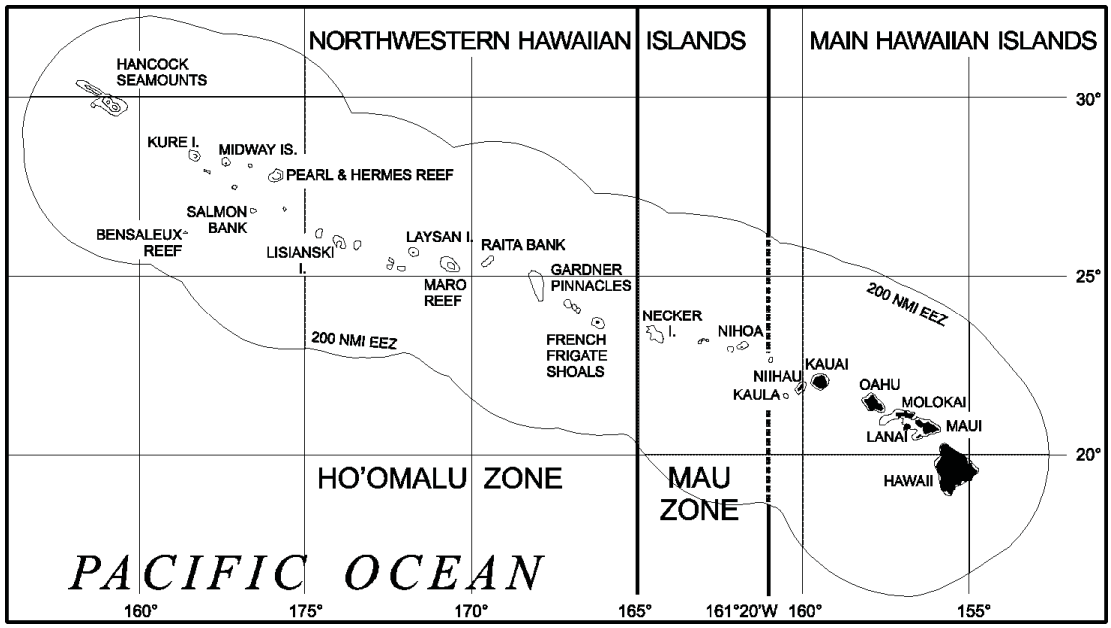
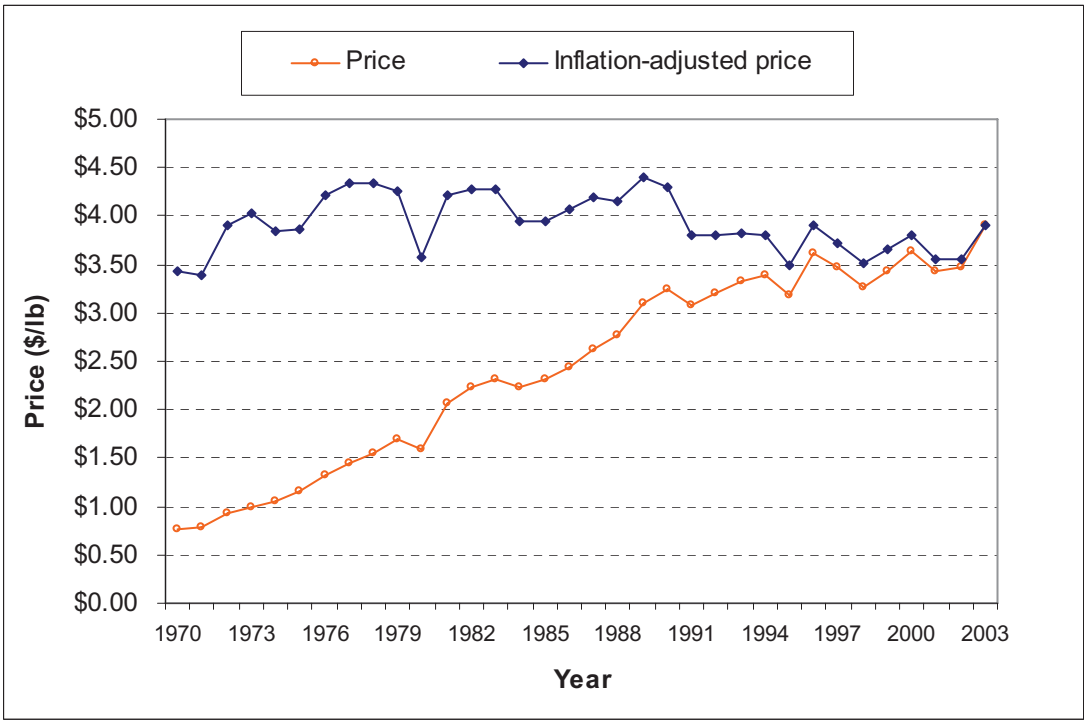
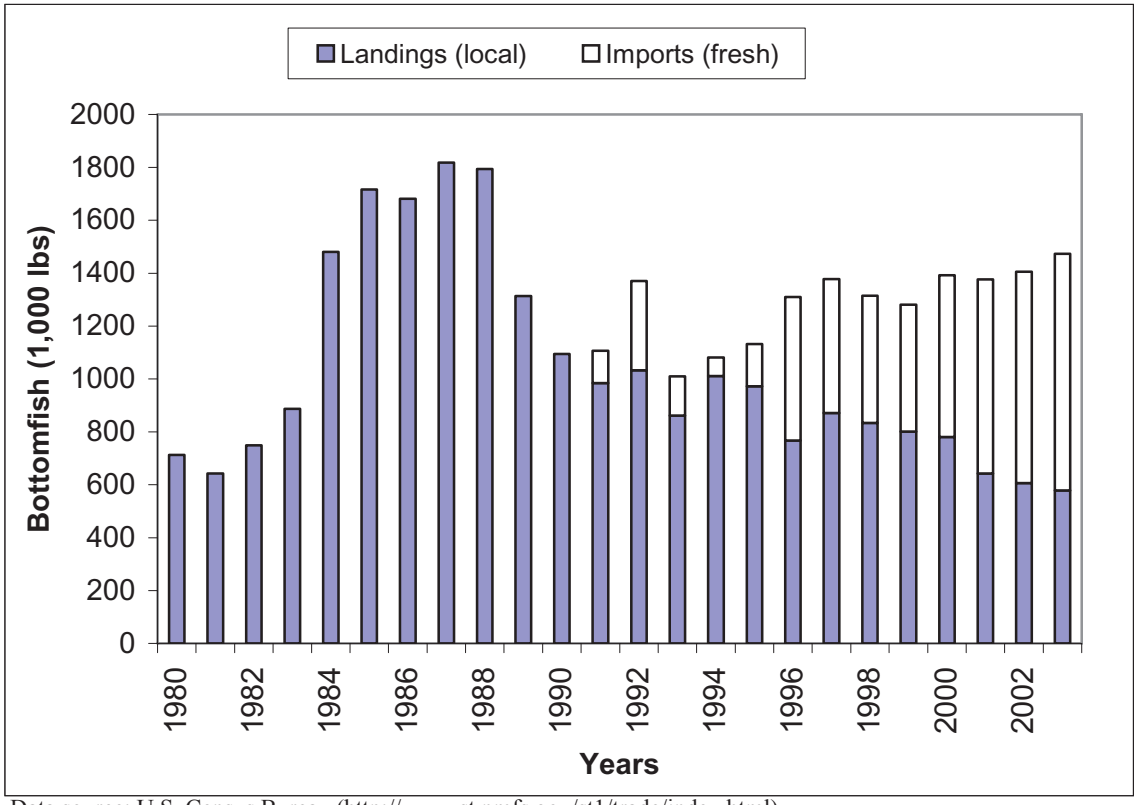


Figure 1. Bottomfish management zones in the NWHI.



Data sources: Hawaii Division of Aquatic Resources (HDAR) fishermen's report.

Figure 2. Nominal ex-vessel price and inflation adjusted ex-vessel price of locally-caught bottomfish in the Hawaii market.



Data source: U.S. Census Bureau (http://www.st.nmfs.gov/st1/trade/index.html).

Figure 3. Total fresh bottomfish supply in Hawaii markets (1000 pounds).

Table 1. The number of permits allowed in the NWHI bottomfish management zones, permit renewal conditions, and number of active vessels in 2003.

	Mau Zone	Ho`omalu Zone
Permit holders allowed	10	7
Permit renewal conditions	5 trips completed in previous year with at least 500 lbs landed in each trip	3 trips completed in previous year with at least 2,500 lbs landed in each trip
Active vessels in 2003	5	4

Data source: Hawaii Division of Aquatic Resources (HDAR) NWHI bottomfish trip daily logs.

Table 2. Number of active bottomfish vessels in the NWHI, 1988–2003.

Year	Mau Zone	Ho`omalu Zone	Total (NWHI)
1988	4	12	16
1989	5	5	10
1990	14	5	19
1991	14	4	18
1992	8	5	13
1993	8	4	12
1994	12	5	17
1995	10	5	15
1996	13	3	16
1997	9	6	15
1998	7	7	14
1999	7	6	13
2000	6	5	11
2001	6	5	11
2002	5	4	9
2003	5	4	9
Average	8	5	13
Number of permits allowed	10	7	17

Data source: WPRFMC (2004) Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region, 2003 Annual Report.

Table 3. Physical characteristics and appraised value of the seven NWHI bottomfish vessels active in 2003 and providing complete responses to the cost survey.

Characteristic	Mean	St. dev.
NWHI fleet (7 vessels)		
Vessel age (yrs)	23	17.0
Vessel Length (ft)	40.8	5.1
Appraised Value ($)	146,000	61,158
Fuel Capacity (gal)	1,403.6	771.2
Fish Hold Capacity (lbs)	8,428.6	4,353.4
Main Engine Horsepower	517.1	286.9
Mau Zone (4 vessels)		
Vessel age (yrs)	23.5	23.0
Vessel Length (ft)	38.0	5.0
Appraised Value ($)	110,500	48,177
Fuel Capacity (gal)	956.3	383.2
Fish Hold Capacity (lbs)	6,000.0	3,366.5
Main Engine Horsepower	542.5	321.7
Ho`omalu Zone (3 vessels)		
Vessel age (yrs)	21.7	8.1
Vessel Length (ft)	44.6	1.8
Appraised Value ($)	193,333	43,108
Fuel Capacity (gal)	2,000.0	793.7
Fish Hold Capacity (lbs)	11,666.7	3,511.9
Main Engine Horsepower	483.3	297.7

Data source: Person-to-person interviews with fishermen from the current survey study.

Table 4. Trip types and effort distribution of NWHI bottomfish vessels in 2003.

Type of trip	No. of trips	% of trips
Bottomfish	97	82
Trolling	18	15
Pelagic handline	4	3
Total	119	100

Data source: Hawaii Division of Aquatic Resources (HDAR) the NWHI bottomfish trip daily logs.

Table 5. Fishing activities of the NWHI bottomfish fleet during 2003.

	Ho`omalu Zone vessels	Mau Zone vessels
Number of vessels	4	5
Number of trips	30	89
Number of days at sea	709	483
Number of days fishing	354	326
Days bottomfishing	328	236
Days trolling	26	90
Trips/vessel	7.5	17.8
Days at sea/trip (trip length)	23.6	5.4
Days fishing/trip	11.8	3.7
Vessels fishing in the NWHI	4	5
Number of trips in the NWHI	30	48
Bottomfish trips	30	45
Trolling trips	0	3
Vessels fishing in the MHI	0	5
Number of trips in the MHI	0	41
Bottomfish trips	0	22
Trolling trips	0	15
Pelagic handline trips	0	4

Data source: Hawaii Division of Aquatic Resources (HDAR) the NWHI bottomfish trip daily logs.

Table 6. Characteristics of fishing trips by type of trip and management zone in 2003.

Trip Type and Zone	Number of trips in 2003	Mean trip length (days)	Mean days traveling/trip			Mean days fishing/trip		
			Total	Days out	Days in	Total	Days bottomfish	Days trolling
Bottomfish trips								
Ho`omalu Zone	30	23.6	11.8	5.8	6.0	11.8	10.9	0.9
Mau Zone	45	8.6	3.0	1.4	1.6	5.6	4.3	1.2
MHI	22	3.5	1.0	0.5	0.5	2.5	2.2	0.3
Trolling trips								
Mau Zone	3	3.7	0.7	0.7	0	3.0	0	3.0
MHI	15	1.3	0.3	0.2	0.1	1.1	0	1.1
Pelagic handline trips								
MHI	4	7.0	2.8	1.0	1.8	4.3	0	0

Data source: Hawaii Division of Aquatic Resources (HDAR) NWHI bottomfish trip daily logs.

Table 7. Species composition of landings by the NWHI bottomfish fleet in 2003.

Area and trip type	Total landings (lbs)	Bottomfish (BMUS)		Pelagic (PMUS)		Misc. species	
		landings (lbs)	%	landings (lbs)	%	landings (lbs)	%
NWHI							
bottomfish	301,617	259,477	86	40,422	13	1,718	1
trolling	5,055	0	0	5,037	100	19	0
MHI							
bottomfish	16,816	4,677	28	10,746	64	1,393	8
trolling	6,691	0	0	6,630	99	61	1
pelagic handline	22,527	0	0	22,527	100	0	0
Total	352,705	264,154	75	85,361	24	3,190	1

Data source: Hawaii Division of Aquatic Resources (HDAR) the NWHI bottomfish trip daily logs.

Table 8. Revenue of NWHI bottomfish vessels in 2003, by area and trip type.

Area and trip type	Total revenue ($)	Bottomfish (BMUS)		Pelagic (PMUS)		Misc. species	
		revenue ($)	%	revenue ($)	%	revenue ($)	%
NWHI							
bottomfish	936,278	847,818	90.6	85,270	9.1	3,191	0.3
trolling	11,485	0	0	11,466	99.8	19	0.2
MHI							
bottomfish	39,465	14,011	35.5	22,666	57.4	2,788	7.1
trolling	14,980	0	0	14,914	99.6	66	0.4
pelagic handline	36,304	0	0	36,304	100	0	0
Total	1,038,511	881,828	83.0	170,620	15.5	6,063	0.6

Data sources: Hawaii Division of Aquatic Resources (HDAR) the NWHI bottomfish the dealer report and trip daily logs.

Table 9. Landings, average ex-vessel prices, and revenue of BMUS species caught in the NWHI and MHI (combined) in 2003.

Species	Price ($/lb)	Landings (lbs)	Revenue ($)
Butaguchi	1.98	26,888	53,111
Ehu	2.49	11,147	27,737
Hapu`upu`u	3.83	39,323	150,571
Onaga	4.77	52,956	252,802
Opakapaka	5.15	24,310	125,100
Uku	2.30	102,431	235,372
Other BMUS	2.41	7,100	17,134
Total BMUS	3.26	264,154	861,828

Table 10. Total supply of fresh bottomfish in Hawaii markets (thousand pounds).

Year	Harvested locally	Imported (fresh)[1]	Total supply (local+imports)
1980	713	N/A	713
1981	643	N/A	643
1982	750	N/A	750
1983	887	N/A	887
1984	1,481	N/A	1,481
1985	1,717	N/A	1,717
1986	1,682	N/A	1,682
1987	1,819	N/A	1,819
1988	1,794	N/A	1,794
1989	1,314	0	1,314
1990	1,094	0	1,094
1991	984	122	1,106
1992	1,033	337	1,370
1993	862	148	1,010
1994	1,011	70	1,081
1995	972	160	1,132
1996	768	542	1,310
1997	872	506	1,378
1998	834	481	1,315
1999	801	479	1,280
2000	781	612	1,393
2001	643	733	1,376
2002	607	798	1,405
2003	579	895	1,474

Data source: U.S. Census Bureau (http://www.st.nmfs.gov/st1/trade/index.html).

Table 11. Costs, earnings, and other characteristics of NWHI bottomfish vessels in 2003 based on all seven interviewed permit holders (Mau Zone and Ho`omalu Zone combined).

	Mean	St. dev.	C.V.
Vessel information			
Year purchased	1993	2	
Year built	1987	7	
Purchase price ($)	150,000	66,771	
Annual nominal fishing effort per vessel			
No. of trips	15	9	
No. trip days (days at sea)	155	93	
No. fishing days	84	44	
Annual revenue per vessel ($)	**139,639**	**96,097**	**0.69**
Annual sales costs per vessel ($)	**14,257**	**8,469**	**0.59**
Auction fee	12,214	10,274	
Others (air freight and others)	2,043	3,485	
Annual variable costs per vessel ($)	**40,558**	**20,446**	**0.50**
Fuel	15,438	6,319	
Ice	3,062	2,427	
Bait and chum	6,049	2,867	
Provisions (food & water)	5,974	4,967	
Supplies	5,948	5,108	
Maintenance (trip based)	4,088	1,739	
Annual fixed costs per vessel ($)	**23,376**	**12,796**	**0.55**
Annual repairs	4,067	2,218	
Major repairs and maintenance (costs of dry dock, engine overhaul, etc.)	6,395	5,272	
Mooring fee	2,803	1,483	
Bookkeeping	833	1,329	
Insurance	9,950	8,730	
Miscellaneous (communications, phone, etc.)	637	1,076	
Net revenue & distribution per vessel ($)	**61,449**	**56,623**	**0.92**
Income to crew (average crew size 1.2 persons per vessel)	18,922	17,160	0.91
Income to captain (payment to captain)	25,366	20,770	0.82
Income to vessel owner (profit to boat owner)	17,069	20,817	1.22
Net income to an owner-operator (based on 6 vessels) ($)	**43,341**	**38,204**	0.88
Return rate on investment per vessel	11%	10%	

Data source: Person-to-person interviews with fishermen from the current survey study.

Table 12. Average costs, earnings, and other characteristics of NWHI bottomfish vessels in 2003 based on interviewed permit holders, by management zone.

	Mau Zone	Ho`omalu Zone
Number of vessels surveyed	4	3
Vessel information		
Year purchased	1993	1993
Year built	1992	1982
Purchase price ($)	115,000	196,667
Annual nominal fishing effort per vessel		
No. of trips	20	9
No. trip days (days at sea)	111	214
No. fishing days	77	93
Annual revenue per vessel ($)	**122,729**	**162,187**
Annual sales costs per vessel ($)	**12,786**	**16,219**
Auction fee	9,211	16,219
Others (air freight and others)	3,575	—
Annual variable costs per vessel ($)	**32,652**	**51,100**
Fuel	12,641	19,167
Ice	2,859	3,333
Bait and chum	5,061	7,367
Provisions (food & water)	4,554	7,867
Supplies	4,196	8,283
Maintenance (trip based)	3,341	5,083
Annual fixed costs per vessel ($)	**16,103**	**33,072**
Annual repairs	4,100	4,023
Major repairs and maintenance (costs of dry dock, engine overhaul, etc.)	4,654	8,717
Mooring fee	2,031	3,832
Bookkeeping	667	1,000
Insurance	5,400	14,500
Miscellaneous (communications, phone, etc.)	365	1,000
Net revenue & distribution per vessel ($)	**61,301**	**61,796**
Income to crew (average crew size 1.2 persons per vessel)	16,545	22,458
Income to captain (payment to captain)	22,731	28,879
Income to vessel owner (profit to boat owner)	22,026	10,460
Net income to an owner-operator (based on 6 vessels) ($)	**44,756**	**39,339**
Return rate on investment per vessel	19%	5%

Data source: Person-to-person interviews with fishermen from the current survey study.

Table 13. Average age and commercial fishing experience of NWHI bottomfish fishers.

	Mau Zone (*N* = 5)	Ho`omalu Zone (*N* = 4)
Age	58	54
No. of years of commercial fishing	29	29

Table 14. Ethnicity of NWHI bottomfish fishers.

	Mau Zone (*N* = 5)	Ho'omalu Zone (*N* = 4)
Caucasian	4	2
Hawaiian	1	0
Part-Hawaiian	0	1
Japanese	0	1

Table 15. Geographic origins and family commercial fishing experience of NWHI bottomfish fishers.

	Mau Zone (*N* = 5)	Ho'omalu Zone (*N* = 4)
Question asked: "Did you grow up in Hawaii?"		
Yes	40%	50%
No	60%	50%
Question asked: "Were any of your close relatives a commercial fisher?"		
Yes	40%	
No	60%	100%

Table 16. Information about profitability and other aspects of the fishing business provided by NWHI bottomfish vessel owners and captains.

	Mau Zone (N = 4 owner operators)	Ho'omalu Zone (N = 4 owner operator and captains)
Question asked:	*"Do you feel that you are making a decent living operating this vessel?"*	
Yes	75%	25%
No	25%	25%
No answer		50%
Question asked:	*"Did the owner show a profit on the 2003 tax return?"*	
Yes	100%	25%
No		75%
Question asked:	*"Does the owner have other sources of income?"*	
Yes	25%	
No	75%	100%
Question asked:	*"Is this vessel paid off?"*	
Yes	100%	100%
No		
Question asked:	*"Do you live in a house or apartment on land?"*	
Yes	100%	50%
No		50%

Table 17. Factors motivating NWHI bottomfish vessel owner-operators in 2003.

	Importance indicated by owner-operators ($N = 6$)	
	Most important	Of primary importance
Economic Motivations		
Primary source of income	67%	33%
Source of additional income		
Long-term investment goals		50%
No other source of income	17%	50%
Tax write off		33%
Plan to operate it myself		50%
Cover a portion of fixed costs		33%
Other		
Social Motivations		
Seclusion		67%
Being your own boss	33%	67%
Being out at sea	17%	83%
Enjoy the work itself		100%
Long-term family tradition	17%	33%
Religious (Spiritual)		
Supplying HI fish demand		67%
Other		17%

Table 18. Lifestyle values of the 2003 NWHI bottomfish vessel owner-operators.

Question asked: "Please describe the values which you feel are the inherent values of a bottomfish fisherman's lifestyle in Hawaii?"

Responses of owner-operators ($N = 4$)

(1) Freedom from the rules of the land. Obeisance to the rules of nature. Love the fishing. Love the catching even more. Enjoy bringing back fish to share, no matter how much or whether sell or give. It's being employed, but almost not employed.

(2) To fish for the love of fishing and also there's income to it.

(3) Values of being able to provide home and food for family.

(4) Pride of what I do.

Appendix A. Bottomfish and Pelagic Management Unit Species Names

Scientific	English Common	Hawaii
BMUS:		
Aphareus rutilans	red snapper/silvermouth	lehi
Aprion virescens	gray snapper/jobfish	uku
Caranx ignobilis	giant trevally/jack	white ulua/pau`u
C. lugubris	black trevally/jack	black ulua
Epinephelus quernus	sea bass	hapu`upu`u
Etelis carbunculus	red snapper	ehu
E. coruscans	red snapper	onaga
Lutjanus kasmira	blueline snapper	ta`ape
Pristipomoides auricilla	yellowtail snapper	yellowtail kalekale
P. filamentosus	pink snapper	opakapaka
P. flavipinnis	yelloweye snapper	yelloweye opakapaka
P. seiboldi	pink snapper	kalekale
P. zonatus	snapper	gindai
Pseudocaranx dentex	thicklip trevally	butaguchi/pig ulua
Seriola dumerili	amberjack	kahala
PMUS:		
Acanthocybium solandri	wahoo	ono
Allothunus spp	other tuna	
Alopias pelagicus	pelagic thresher shark	mano
A. superciliosus	bigeye thresher shark	mano
A. vulpinus	common thresher shark	mano
Auxis spp	other tuna	
Bramidae spp	pomfret	monchong
Carcharhinus falciformis	silky shark	mano
C. longimanus	oceanic whitetip shark	mano
Coryphaena spp	dolphinfishes	mahimahi
Euthynnus affinis	kawakawa	kawakawa
Gempylidae spp	oilfishes	walu, escolar
Isitophorus platypterus	sailfish	a`u lepe
Isurus oxyrinchus	shortfin mako shark	mano
I. paucus	longfin mako shark	mano
Katsuwonus pelamis	skipjack tuna	aku
Lamna ditropis	salmon shark	mano
Lampris spp	moonfish	opah
Makaira indica	black marlin	a`u/kajiki
M. mazara	Indo-Pacific blue marlin	a`u/kajiki
Prionace glauca	blue shark	mano
Tetrapturus angustirostris	shortbill spearfish	hebi
T. audax	striped marlin	nairagi
Thunnus alalunga	albacore	`ahi palaha/tombo
T. albacares	yellowfin tuna	`ahi shibi
T. obesus	bigeye tuna	`ahi po`onui/mabachi
T. thynnus	northern bluefin tuna	maguro
Xiphias gladius	swordfish	a`u ku/broadbill/shutome

Data sources: WPRFMC (2005) Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region, 2004 Annual Report and WPRFMC (2005) Pelagic Fisheries of the Western Pacific Region, 2004 Annual Report.

Appendix B. The NWHI Bottomfish Vessel Characteristics for the Nine Active Vessels, 2003.

	Minimum	Average	Maximum
Vessel Length (ft)	31	40	46
Trips per year	3	13	33
Revenue[3] (index)	0.01	0.36	1.00
Vessel value ($)	50,000	133,000	240,000
Vessel age (years)	11	24	58
Holding capacity (fish pounds)	2,000	8,375	15,000
Crew size (excluding captain) (person)	0.5	1.2	2

[3]As an index between 0 and 1.00 where 0 indicates no revenue and 1.00 indicates the maximum revenue of any participant.

Appendix C. 2003 Costs Questionnaire for the NWHI Bottomfish Fleet

Vessel Name: _____

Fishing Zone: _____

Person Interviewed: _____

Indicate position - Hired Captain / Operator / Owner: _____

Interview dates: _____

VESSEL CHARACTERISTICS

1. Year purchased: _____

2. Year vessel was built: _____

3. If you built your vessel, what was the cost of materials to build it? $ _____

   What was the cost of labor? $ _____

4. Purchase price of vessel: $_____

5. Startup costs – what was added and cost:

_____ $ _____

_____ $ _____

_____ $ _____

_____ $ _____

6. Cost of major additions (not replacements) since purchase (e.g., Ice makers, electronics, bigger engine, bait shack, etc.):
   $_____ total since purchased

7. Insured value of the vessel in 2003? $ _____

   If no insurance, what is appraised value of the vessel in 2003? $_____

8. Hold capacity: How many pounds of fish with ice can your vessel hold?

   Bottomfish _____lbs

   Total fish _____lbs

9. Vessel length: _____ft

10. Fuel capacity: _____gal

11. Main engine horsepower (total): _____

12. Physical and operating characteristics per trip type:

Characteristics	NWHI	MHI	NWHI Troll	MHI Troll
Avg Fuel (gal)				
Avg Trip length (days)				
Avg # of fishing days				
Avg # of travel days				

13. Ownership of boat:

☐ Sole owner (may include immediate family)

☐ Partnership (with someone outside immediate family)

☐ Corporate ownership (with outside stockholders)

☐ Leased from another owner

14. Is this vessel completely paid off? ☐ Yes ☐ No

If you had or have a loan, what was the original amount borrowed? $ _____

What was the original length of the loan? _____

What are the monthly loan payments? $ _____

How much time is remaining? _____

Where is the loan from? (ex. Local bank/credit assn., mainland bank/credit assn., family, government agency)

_____

15. Do you own any other fishing vessels? ☐ Yes ☐ No

If YES, how many are commercial fishing vessels? _____

16. Do you captain this vessel only? ☐ Yes No

If NO, what other vessels do you captain? _____

17. For how long have you captained this vessel? _____

18. How many crew members do you usually take including yourself? _____

VARIABLE COSTS

1. Please complete the following trip cost tables. Use an approximate average per trip for the year 2003.

Costs	***NWHI Mixed Trip Avg. Total Cost***	***MHI Mixed Trip Avg. Total Cost***	***NWHI Troll Only Avg. Total Cost***	***MHI Troll Only Avg. Total Cost***
Fuel				
Ice				
Do you catch your Chum (Palu)?		☐ Yes	☐ No	
Bait				
Provisions				
Gear re-supply				
Daily Maintenance				

2. Which expenses above deviate according to the amount of time bottomfishing, trolling, or traveling for NWHI and MHI trips? How much do they deviate?

Expense	**NWHI High / Low Estimate**	**MHI High/Low Estimate**	**NWHI Troll Only High/Low Estimate**	**MHI Troll Only High/Low Estimate**

3. How are income and costs divided between owner, captain, and crew? (Draw tree diagram)

4. How were the captain and crewmembers paid per trip? Please fill in the following table.

Captain	$	or	%
Crewmember 1	$	or	%
Crewmember 2	$	or	%
Crewmember 3	$	or	%

SALE COSTS

1. Where did you sell your fish in 2003? (please check all that apply)

   UFA_____

   Directly to restaurants_____

   Fish brokers (please name) _____

   Other_____

2. When you sold your fish was there an auction or consignment fee?

   ☐ Yes ☐ No

   If yes, how much did they charge? $ _____

3. Where there any other sale costs you had to pay in 2003?

   ☐ Yes ☐ No

   If yes, what were the charges and how much were they?

   _____ $ _____

FIXED COSTS

1. Mooring fees/month: $ _____

2. Bookkeeping / accounting costs in 2003:

   $_____ per month or year (please circle)

3. Insurance costs per month in 2003:

   $_____

This includes (please check):

Vessel only _____

Vessel and liability _____

Liability only_____

Health (specify who is covered) _____

Vessel, liability, and health _____

4. What repairs were done in 2003? What were the costs? How many yrs between repairs?

(Please list: e.g., engine overhaul) _____ $_____ yrs_____

_____ $ _____ yrs_____

_____ $ _____ yrs_____

_____ $ _____ yrs_____

Total cost of repairs: $_____

5. What other gear or equipment did you replace as needed in 2003? How often were they replaced and what were the costs?

Supplies: _____ $ _____ yrs_____

_____ $ _____ yrs_____

_____ $ _____ yrs_____

_____ $ _____ yrs_____

_____ $ _____ yrs_____

6. Did you dry dock in 2003? ☐ Yes ☐ No

When did you last dry dock your vessel? _____

When will you dry dock again? _____

What were the costs? _____

How often do you dry dock? _____ yrs

7. Are there any other vessel costs which I haven't included? ☐ Yes ☐ No

   If yes, please list: communications (sat phone, email, etc) $_____

   _____ $_____

   _____ $_____

   _____ $ _____

PART II.

1. Do you provide other services other than commercial bottomfishing using this vessel?

   ☐ Yes ☐ No If YES, What other service so you provide using this vessel?

   If YES, What percentage of your personal income does other services using this vessel provide? _____%

2. Do you have another job or sources of income other than commercial fishing? ☐ Yes ☐ No

   If YES, what is the job(s)? _____

   How many hours a week on average do you work at the other job? _____

   What percentage of your personal income does the other job(s) provide?_____%

3. Did you used to have another job other than commercial fishing? ☐ Yes ☐ No

   IF YES, what was the job? _____

   Also, when was the last year you did that kind of work? _____

   Do you receive retirement pension from your previous job? ☐ Yes ☐ No

   If YES, how much per month? _____

4. Did the owner show a profit in 2003 from this vessel on his/her tax return? ☐ Yes ☐ No

5. Would you say that you are making a decent living operating this fishing vessel?

   ☐ Yes ☐ No

6. Would you rather fish in another zone? ☐ Yes ☐ No

☐ the Mau Zone bottomfish fishery

☐ the Ho'omalu Zone bottomfish fishery

☐ another Hawaii fishery

7. How many years have you been involved with fishing? _____

8. How many years have you been fishing commercially? _____

9. Do you live in a house or apartment on land? ☐ Yes ☐ No

DEMOGRAPHICS

1. What year were you born? _____

2. Did you grow up in Hawaii? ☐ Yes ☐ No

If NO, did you grow up in a seacoast area? ☐ Yes ☐ No

3. Were any of your close relatives a commercial fisher? ☐ Yes ☐ No

4. What is your ethnic background? _____