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NORTHWESTERN HAWAIIAN ISLANDS BOTTOMFISH FISHERY, 1991

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OVERVIEW OF THE FISHERY

Since the implementation of the 1989 Federal limited entry plan for the Northwestern Hawaiian Islands (NWHI) (Fig. 1) by the Western Pacific Regional Fishery Management Council (WPRFMC), the level of effort directed toward bottomfishing in the *Ho'omalau* zone (the limited access area) has remained stable. Fishing effort in the *Mau* zone (open access area) appears to be increasing. The data indicate that the total NWHI catch as well as those of the bottomfish management unit species (BMUS; see Table 1 for a listing of common and scientific names) continues to decline. Interviews with most of the captains confirm this trend. The decline in the *Mau* zone is such that some of the participants have requested that it too become a limited access area.

The high volume of uku (grey snapper) landings recorded in the MHI during 1988-89, and subsequently recorded in the *Mau* and *Ho'omalau* zones in 1990, has decreased in the *Mau* zone but increased in the *Ho'omalau* zone. This represents an interesting trend of high volume uku landings progressing northwestward up the archipelago.

Predation of hooked fish by sharks, as reported anecdotally in previous years, continues to plague fishing operations. Predation by dolphins, primarily *Tursiops* sp., was reported to be on par with sharks this year. Losses to these efficient predators were substantial at times and may have contributed to reduced catch rates. Incidences of predation by monk seals, *Monachus schauinslandi*, during fishing operations were less frequently reported. The areas with reported predation and interactions are widespread throughout the NWHI but occur mainly in areas that are heavily fished. In 1991 the Southwest Region, National Marine Fisheries Service (NMFS), fielded observers on three bottomfish vessels to document interactions between bottomfishing activities and protected species. The summary report will be available from the NMFS, Pacific Area Office (PAO) later this year.

FLEET OPERATIONS IN THE NWHI

General NWHI

In 1991 36 NWHI permits were issued with 17 active vessels compared to 23 permits and 16 vessels in 1990 (Fig. 2). There were 6 *Ho'omalau* permits issued out of which 4 vessels fished (4 permits and 4 active vessels in 1990). Thirty permits, of which 14 vessels were active, were issued for the *Mau* zone.

The NWHI fleet operations are jointly monitored in Honolulu by personnel of the Fishery Management and Economics Program (FMPEP) of the NMFS Honolulu Laboratory and the State of Hawaii Division of Aquatic Resources (HDAR). State of Hawaii commercial landing reports are separately submitted to the HDAR. There are two sets of 1991 NWHI vessel activity and catch per trip information listed in Table 2. The first 1991 column (1991^a) is based on a consistent NMFS sample of the fleet which more accurately reflects the status of the Oahu based fleet. The second set of 1991 data (1991^b) is based on a combination of NMFS and HDAR data, which reflects a more complete data base including vessels from Kauai that had not been included in the past NMFS samples. A similar combination of NMFS and HDAR data for previous years (1984-1990) will be investigated later this year.

There were 131 trips made by 17 individual vessels (Figure 2). This represents an increase in number of trips as well as in the number of participants. The fleet averaged 7 trips per vessel while the number of trips for an individual vessel ranged from 1 to 14. The areas fished ranged from Nihoa Island to Lisianski Island. The average trip length, based on NMFS monitoring, was 13.4 days with 6.9 days of fishing, N = 38 trips, compared to 12.5 days with 6.5 days of fishing, N = 36 trips, in 1990.

Comparisons of trip operations and landings by management areas for 1990-1991 are shown in Table 3. These results were based only on NMFS monitored data for consistency. Table 4 compares the 1991 NMFS and the combined NMFS-HDAR extrapolated data sets. The results indicate similar trends of decreased landings when compared to 1990 data. A similar estimate of NMFS and NMFS-HDAR data for 1990 landings has not yet been completed.

Of the 17 active vessels, 7 fished on a regular basis, compared to 7 of 16 vessels in 1990. Four of these vessels fished in the *Mau* zone and 3 in the *Ho'omalau* zone. Four *Mau* zone vessels concurrently held a longline permit while 1 *Ho'omalau* vessel held a lobster permit. During the course of the year 3 of the vessels that had regularly fished the *Mau* zone dropped out of the fishery--1 sank, 1 returned to the U.S. west coast, and 1 entered the *Ho'omalau* fishery.

Ho'omalau Zone

The number of trips, average trip length, and days fished (Table 3) in the *Ho'omalau* zone have increased, while the number of vessels has remained the same. Effort in terms of days fished increased 44% (NMFS monitored data). BMUS catch and revenue per trip remained stable.

Although there were four permitted vessels that fished the *Ho'omalau* zone only three fished regularly. There were 47 trips

made with an average of 11 trips per vessel (Table 4, based on NMFS-HDAR data). The areas fished ranged from French Frigate Shoals to Lisianski island. The majority of the fishing activities were centered in the French Frigate Shoals to Maro reef area. The average trip lasted 17.1 days with 8 days of fishing (N = 19 NMFS-monitored trips).

Mau Zone

Fourteen vessels made 84 trips (NMFS-HDAR data) within the Mau zone. In combining the NMFS-HDAR data sets it was discovered that there were a number of trips from a few Kauai vessels that had not previously been monitored. These vessels, home-ported on Kauai, made trips of shorter duration compared to those home-ported in Honolulu. These short, low volume trips accentuate the decreased landings per trip, but the overall averages still reflect the trend of lower catches that are listed in Tables 3 and 4.

Fishing effort (days fished) decreased 33% within the Mau zone (Table 3) for the Oahu vessels. Fishing trips to the Mau zone averaged 9.8 days in length, with 5.9 days of fishing (N = 19, NMFS-monitored trips). The fishing area ranged from Nihoa Island to Twin banks.

BOTTOM FISH LANDINGS DATA

General NWHI

The total bottomfish landings for the NWHI decreased 8% (Table 5). The average NWHI landings for all species per trip (NMFS-monitored trips) in 1991 was 4,104 pounds, 310 pounds less than in 1990 (Table 2). The BMUS accounted for 88% of the total landings, which is slightly lower than the 91% in 1990. BMUS landings per trip averaged 3,644 pounds.

Species composition for the NWHI is provided in Table 6. The top 5 BMUS accounted for 76% of the BMUS landings (Fig. 4). Opakapaka landings were the highest, followed by butaguchi, uku, and hapuupuu. Onaga, other BMUS, and ehu made up the remainder of the landings, respectively.

The catches of uku were up 15.0% overall for 1991. Mau zone uku landings dropped by 67.0% while the Ho'omaluu zone landings increased 64.0%. BMUS catch per trip in the Mau zone dropped 65.1%, while Ho'omaluu zone catches have increased 8.0%. Uku were caught by both troll and bottomfish methods but primarily by bottomfishing.

Butaguchi landings decreased 26.4% in 1991. The majority of the decrease occurred in the Mau zone where the landings dropped

70.5% overall and 75.3% per trip. *Ho'omalua* zone landings increased 48.3% while remaining essentially unchanged per trip.

Based on NMFS estimates, the bottomfish landings have decreased for the NWHI (Figure 3). The decrease in the landings volume coupled with the stable prices has consequently decreased the revenue (Fig. 7).

***Ho'omalua* Zone Landings**

Ho'omalua zone landings were up 63.6%. BMUS landings were 88.4% by weight. Opakapaka landings were the highest (Fig. 5B), followed by butaguchi, uku, onaga, hapuupuu, other BMUS, and ehu. The *Ho'omalua* zone average landings per trip were 6,638 pounds with 5,873 pounds (88.5%) of BMUS (Table 4, NMFS-HDAR data). The average landings per trip increased 16.2%, while average BMUS per trip increased by 8.6%. The majority of the increases in catch can be attributed to onaga and uku.

Mau Zone Landings

The *Mau* zone landings decreased 58.6%. Bottomfish landings per trip averaged 1,366 pounds with 1,201 pounds (87.9%) of BMUS. The BMUS catch per trip decreased 65.1%. The overall catch per trip decreased by 64.2%. The landings were led by uku (Fig. 5A) followed by butaguchi, hapuupuu, ehu, opakapaka, onaga, and other BMUS.

BOTTOMFISH PRICES

The 1991 bottomfish prices have decreased from 1990 levels (Table 7, Figure 6A). The average price for NWHI bottomfish remained nearly stable; however, opakapaka prices dropped somewhat while onaga increased compared to 1990 levels (Figure 6B). The MHI prices posted an overall drop (Figure 6C). Total Hawaii bottomfish revenue fell in 1991 to \$3.2 million, as did the overall market revenue (Table 5, Fig. 7).

Bottomfish imports to Hawaii have decreased from 1990 levels (Fig. 8). The volume and low price of the imports have somewhat stabilized the ex-vessel bottomfish prices at the marketplace. The large fluctuations in the high end price have been virtually eliminated except in special circumstances; i.e., high seasonal holiday demand.

RECOMMENDATIONS

The mandatory NMFS Southwest Region observer program currently in place provides data on protected species interactions and also some detailed fisheries data. The catch and effort data collected reflect actual commercial fishing

operations and can be used in producing a commercial fishing baseline research data set, provided that observer coverage of the fleet continues.

Difficulty in monitoring the fishery has increased because of vessels selling outside the regularly monitored source. This has decreased the quality and quantity of data collected. A mandatory bottomfish logbook program would provide comprehensive long-term data on area fished and catch and effort needed for more efficient management. The potential benefits of a mandatory logbook program are great.

The observer program could provide the Honolulu Laboratory with additional information on bottomfish stocks by measuring and tagging fish that are released. The number of fish released by fishermen is substantial at times. Some fishermen have voiced their support for this kind of program because they are interested in the biology and movements of the fish. They indicate a genuine concern for the stocks of commercially valuable species. The observers, although busy at times, could institute such a program on a limited basis.

Table 1.--List of common and scientific names of frequently caught species (BMUS = bottomfish management unit species).

Common name	Scientific name
BMUS	
Onaga	<i>Etelis coruscans</i>
Opakapaka	<i>Pristipomoides filamentosus</i>
Ehu	<i>E. carbunculus</i>
Kalekale	<i>P. seiboldii</i>
Gindai	<i>P. zonatus</i>
Uku	<i>Aprion virescens</i>
Lehi	<i>Aphareus rutilans</i>
Yellowtail kalekale	<i>P. auricilla</i>
Hapuupuu	<i>Epinephelus quernus</i>
Butaguchi	<i>Pseudocaranx dentex</i>
White ulua	<i>Caranx ignobilis</i>
Black ulua	<i>C. lugubris</i>
Kahala	<i>Seriola dumerili</i>
Taape	<i>Lutjanus kasmira</i>
Other Bottomfish	
Papa ulua	<i>Carangoides orthogrammus</i>
Omilu	<i>Caranx melampygus</i>
Hogo	<i>Pontinus macrocephalus</i>
Miscellaneous bottomfish	

Table 2.--Activity of the bottomfish fleet in the Northwestern Hawaiian Islands, 1987-91^a
 (BMUS = bottomfish management unit species). Data for 1987-91 are based on a
 consistent sample, by the NMFS, of the fleet in each year. Data from 1991^b comes
 from a combined NMFS-HDAR data set.

	1987	1988	1989	1990	1991 ^a	1991 ^b
Vessels (No.)	28	13	10	16	14	17
Trips (No.)	134	93	50	80	73	131
Trips/vessel (No.)	5	7	5	5	5	7
Days at sea	2,211	1,441	740	990	978	NA
Days fished	938	660	335	530	503	NA
Days/trip	16	15.5	15	12	13	NA
BMUS/trip (lb)	6,145	5,502	5,036	4,053	3,644	2,878
Total catch/trip (lb)	7,303	6,842	6,054	4,414	4,104	3,258
BMUS/fishing day (lb)	877	786	763	611	525	NA
Total catch/fishing day (lb)	1,043	977	917	666	591	NA
Revenue/trip (US\$)	17,462	16,400	14,994	11,126	10,045	8,532
Revenue/vessel (US\$)	83,571	117,324	74,971	55,634	52,381	65,753

^aData from NMFS monitored trips only.

^bData from combined NMFS and HDAR data set.

Table 3.--Activity of the bottomfish fleet in the Northwestern Hawaiian Islands by management areas (*Mau* and *Ho'omalu* Zones), 1990-91 (BMUS = bottomfish management unit species). Data are from NMFS-monitored trips only and may not match those in Table 1 due to rounding and extrapolation.

	1990		1991	
	<i>Mau</i>	<i>Ho'omalu</i>	<i>Mau</i>	<i>Ho'omalu</i>
Vessels (No.)	14	5	11	4
Trips (No.)	55	25	37	36
Trips/vessel (No.)	4	5	4	9
Days at sea	577.5	412.5	362.6	615.6
Days fished	330	200	218	288
Days/trip	10.5	16.5	9.8	17.1
BMUS/trip (lb)	3,438	5,406	1,976	5,368
Total catch/trip (lb)	3,820	5,715	2,151	6,112
BMUS/fishing day (lb)	573	675	333	671
Total catch/fishing day (lb)	636	714	364	764
Revenue/trip (US\$)	9,650	14,374	5,732	14,479
Revenue/vessel (US\$)	37,911	71,874	19,281	130,311

Table 4.--Activity of the bottomfish fleet in the Northwestern Hawaiian Islands by management areas (*Mau* and *Ho'omalu* Zones) for 1991 comparing NMFS data (1991a) and a combination of NMFS and HDAR extrapolated data set (1991b).

	1991a		1991b	
	<i>Mau</i>	<i>Ho'omalu</i>	<i>Mau</i>	<i>Ho'omalu</i>
Vessels (No.)	11	4	14	4
Trips (No.)	37	36	84	47
Trips/vessel (No.)	4	9	6	11
Days at sea	362.6	615.6	NA	NA
Days fished	218	288	NA	NA
Days/trip	9.8	17.1	NA	NA
BMUS/trip (lb)	1,976	5,368	1,201	5,873
Total catch/trip (lb)	2,151	6,112	1,366	6,638
BMUS/fishing day (lb)	333	671	NA	NA
Total catch/fishing day (lb)	364	764	NA	NA
Revenue/trip (US\$)	5,732	14,479	3,817	16,960
Revenue/vessel (US\$)	19,281	130,311	21,377	199,286

Table 5.--Hawaii's market for bottomfish caught in the Northwestern Hawaiian Islands (NWHI) and the main Hawaiian Islands (MHI), based on market expansion estimates by the National Marine Fisheries Service, 1985-91. Columns may not total because of rounding and landings not enumerated by source.

Source	1985	1986	1987	1988	1989	1990	1991
	Landings (in 1,000 lb)						
Hawaii	1,649	1,693	1,884	2,276	1,543	1,260	1,121
NWHI	922	869	1,015	625	303	421	387
MHI	727	824	869	1,651	1,234	830	734 ^a
Imports	264	319	472	334	564	620	477
Total bottomfish	1,913	2,012	2,356	2,610	2,107	1,881	1,598
	Revenue (in US\$1,000)						
Hawaii	--	4,500	5,300	6,000	4,622	4,373	3,200
NWHI	1,800	1,900	2,300	1,500	756	1,070	1,000
MHI	--	2,600	3,000	4,500	3,861	3,300	2,200
Imports	--	760	1,140	790	1,644	1,130	1,000
Total bottomfish	--	5,260	6,440	6,790	6,266	5,503	4,200

^aPreliminary data.

^bData from NMFS Market News.

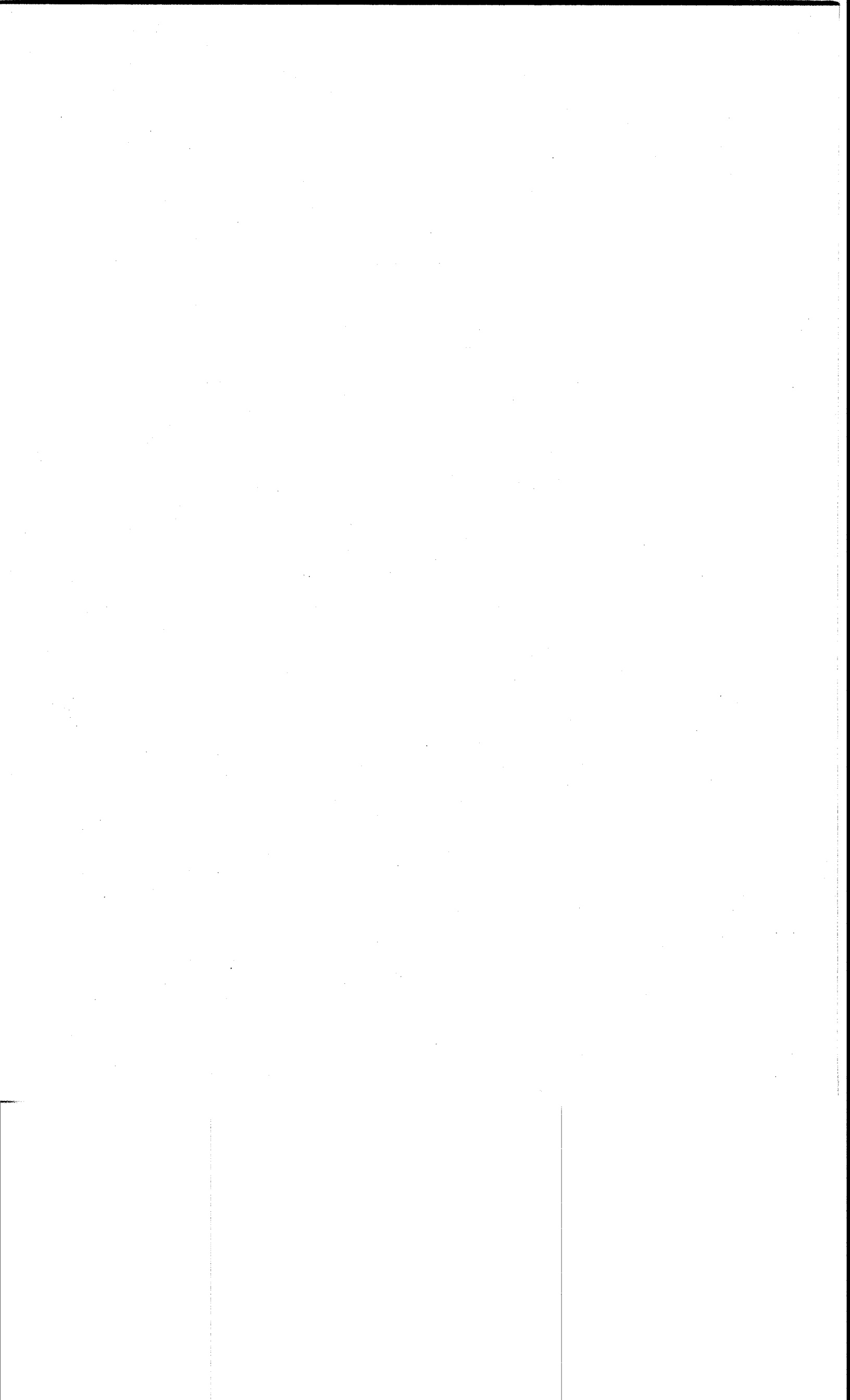
Table 6.--Species composition of bottomfish landings in the Northwestern Hawaiian Islands, 1986-91 (BMUS = bottomfish management unit species).

Species	Catch (x 1,000 lb)					
	1986	1987	1988	1989	1990	1991 ^a
Opakapaka	297	370	154	112	79	86
Onaga	106	77	80	13	21	46
Ehu	30	40	45	9	25	20
Hapuupuu	210	223	156	66	85	59
Butaguchi	160	217	111	57	103	75
Uku	7	2	6	5	60	69
Other BMUS	25	72	69	39	42	22
Total BMUS	835	1001	621	302	413	377
Other bottomfish	35	14	5	1	8	10
Total bottomfish	870	1015	626	303	421	387

^aData from combination NMFS and HDAR extrapolated data set.

Table 7.--Hawaii's bottomfish prices (US\$/lb) by capture location, and Hawaii's bottomfish market prices by species and source, 1988-91 (NWHI = Northwestern Hawaiian Islands, MHI = main Hawaiian Islands).

Species	Market	1988		1989		
		NWHI	MHI	Market	NWHI	MHI
Opakapaka	3.51	3.54	3.55	3.58	3.78	3.51
Onaga	3.19	3.30	5.06	4.81	3.23	4.92
Ehu	2.82	2.01	3.80	3.36	1.85	3.71
Hapuupuu	1.96	1.84	2.99	2.86	2.61	3.64
Butaguchi	1.21	1.05	2.54	1.85	1.31	3.16
Other BMUS				2.42	1.20	2.52
Other bottomfish	1.96	2.23	1.19	2.08	1.52	2.16
Imports	2.37			2.97		
Total bottomfish	2.71	2.37	2.90	3.12	2.61	3.26
		1990		1991		
Opakapaka	4.81	4.19	5.07	3.89	3.53	4.08
Onaga	5.88	3.82	6.10	5.06	4.47	5.26
Ehu	3.96	2.65	4.73	3.00	2.71	3.17
Hapuupuu	2.83	2.65	3.44	2.72	2.50	3.38
Butaguchi	1.66	1.39	3.38	1.46	1.19	2.16
Other BMUS	2.69	2.57	2.62	2.59	2.50	2.32
Other bottomfish	2.27	1.22	2.48	2.11	1.31	2.17
Imports	2.05			2.11		
Total bottomfish	3.11	2.65	4.09	2.80	2.68	3.39



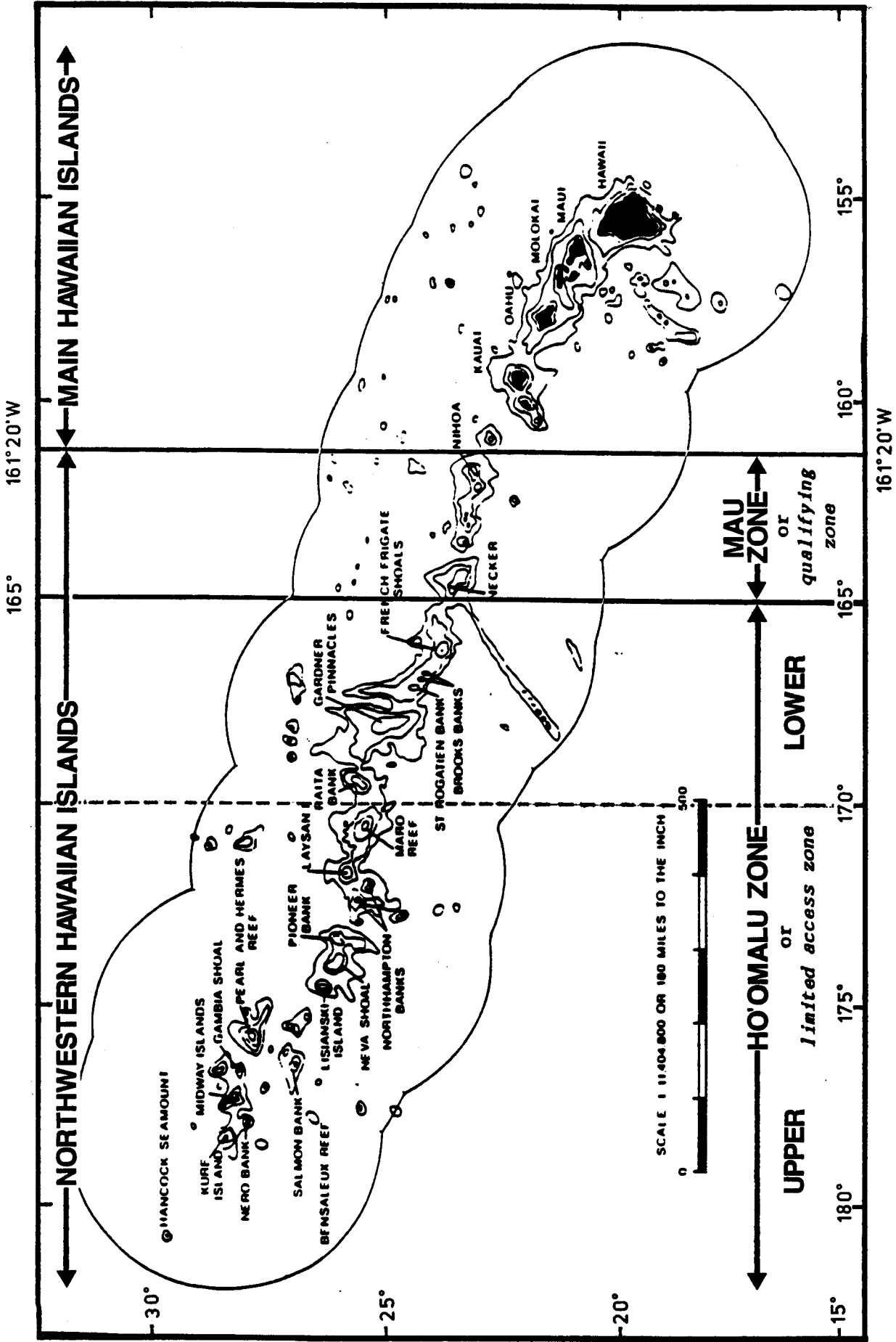


Figure 1.--Map of the Northwestern Hawaiian Islands.

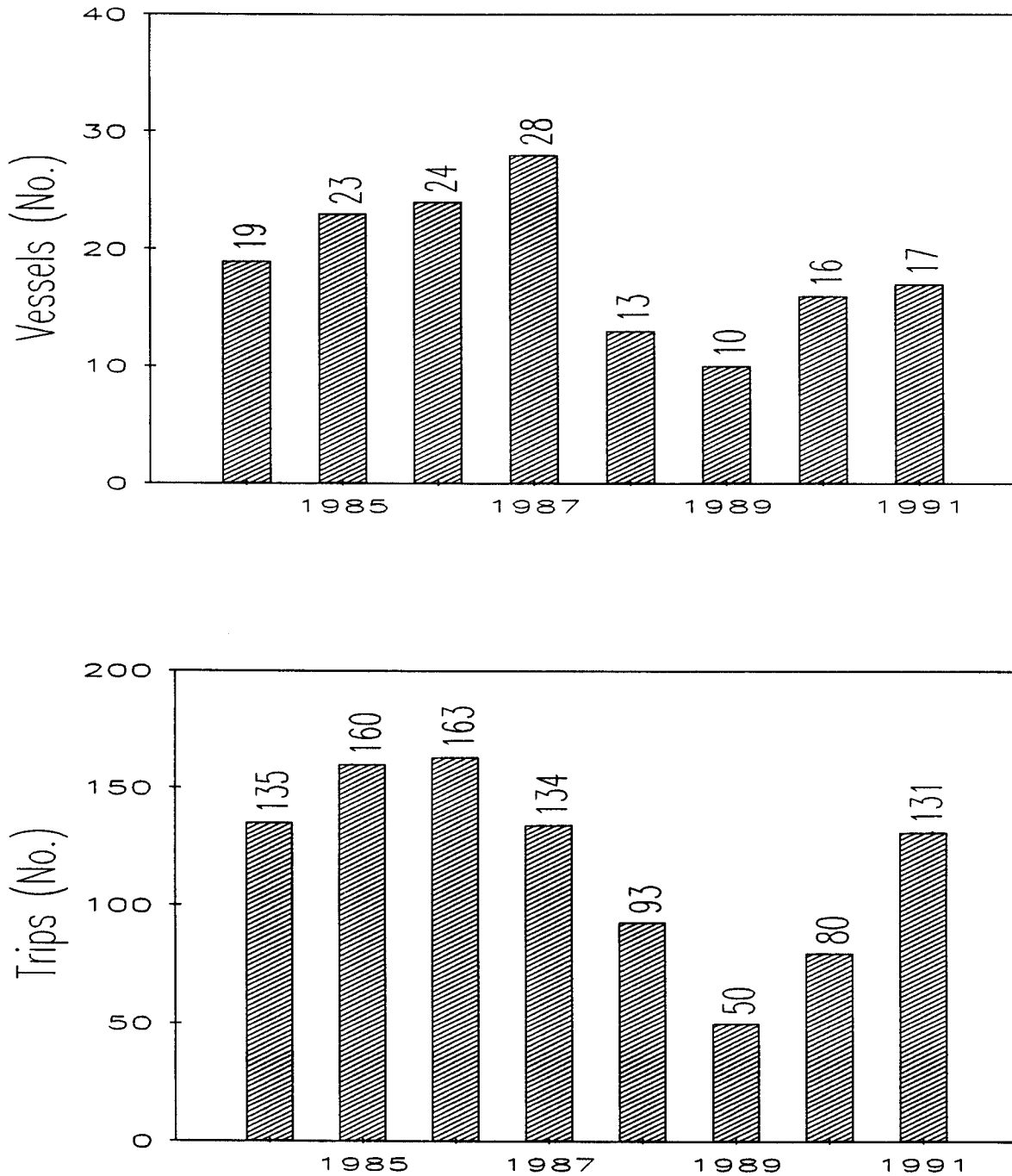


Figure 2.--The bottomfish fleet in the Northwestern Hawaiian Islands, 1984-91: (A) number of vessels and (B) trips. Data for 1984-90 are from the monitoring program of the National Marine Fisheries Service. Data for 1991 are from the combined NMFS-HDAR data set.

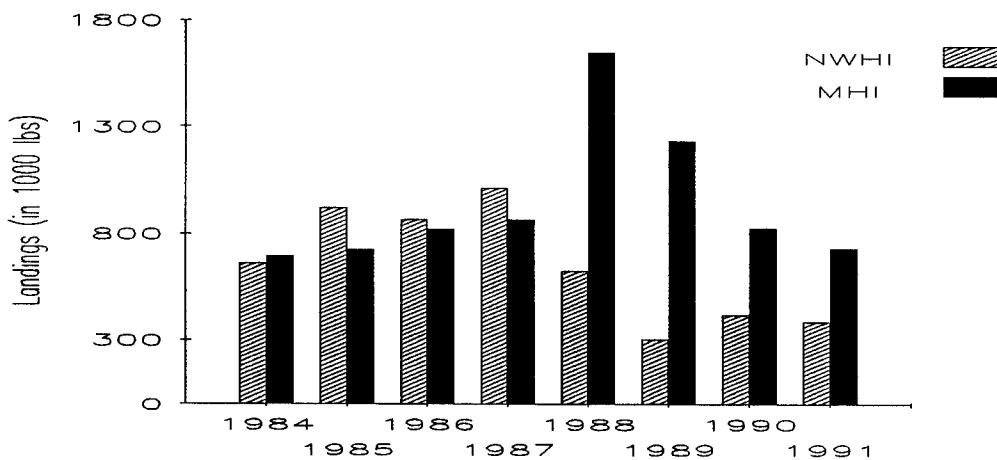


Figure 3.--Hawaii's bottomfish landings, 1984-90, based on estimates made by the National Marine Fisheries Service (NWHI = Northwestern Hawaiian Islands, MHI = Main Hawaiian Islands).

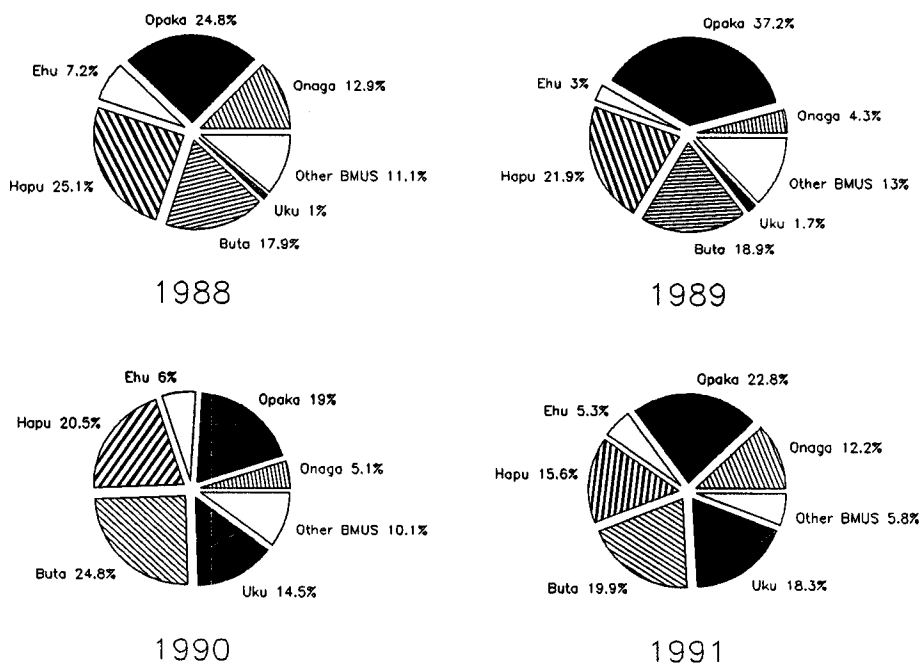


Figure 4.--Composition of landings (by weight) of bottomfish management unit species by the bottomfish fleet in the Northwestern Hawaiian Islands, 1988-91.

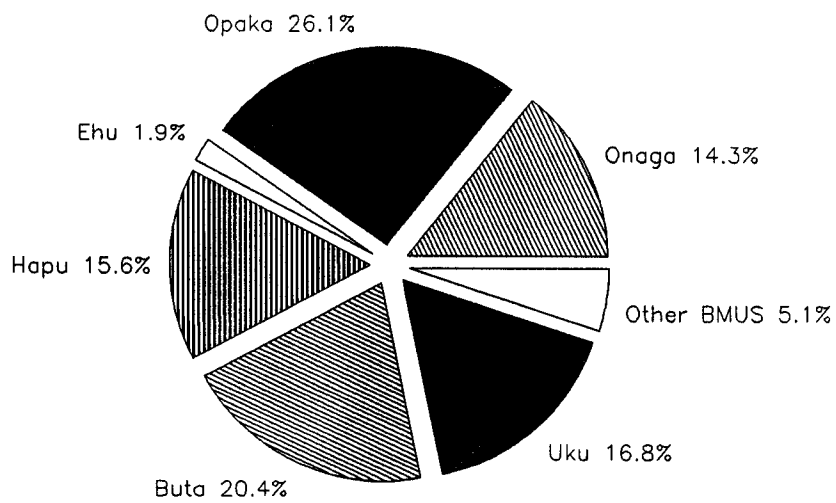
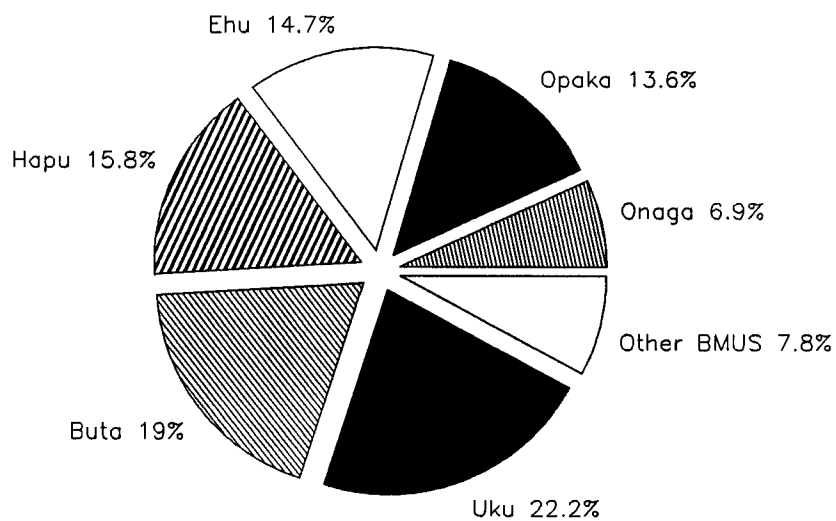


Figure 5.--Species Composition of landings (by weight) of bottomfish and species landed in (A) the Mau Zone and (B) the Ho'omalau Zone in 1991.

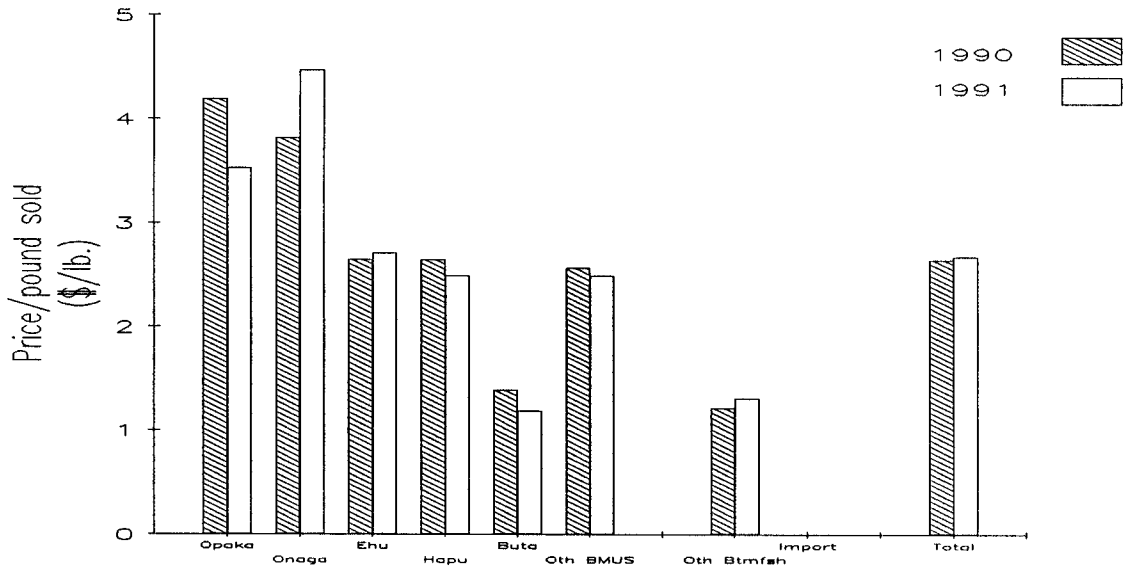
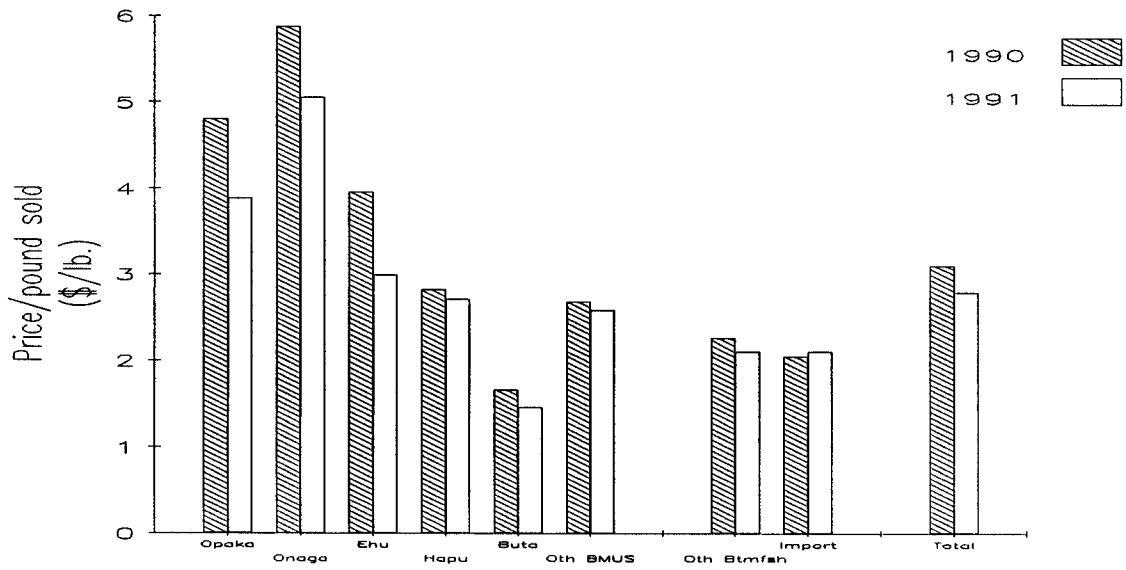


Figure 6.--Hawaii's 1990-91 market prices for bottomfish: (A) NWHI and MHI combined (NWHI = Northwestern Hawaiian Islands, MHI = main Hawaiian Islands) and (B) NWHI.

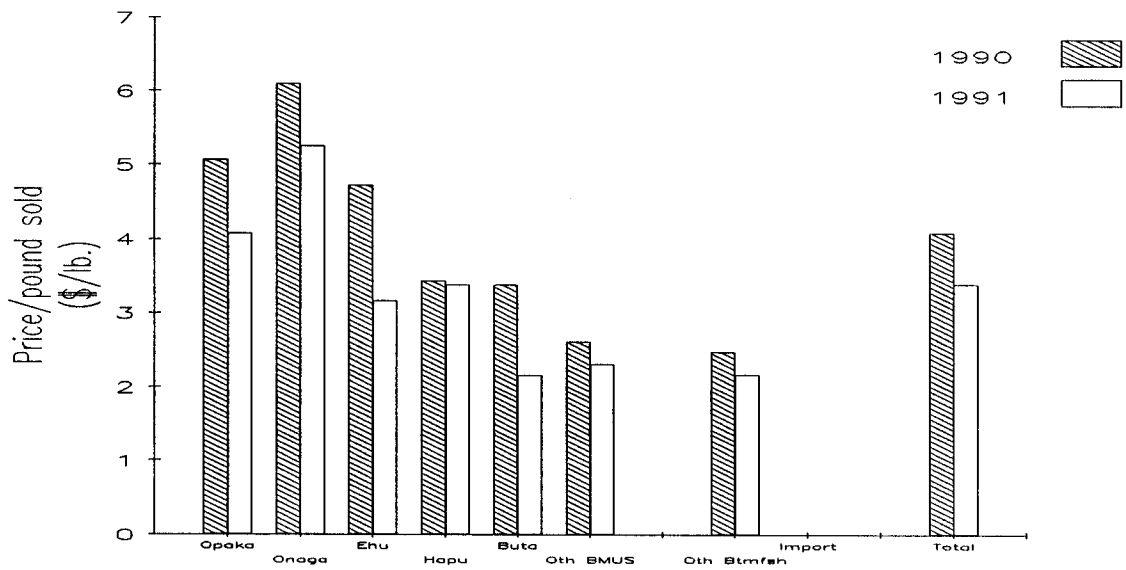


Figure 6.-Continued. (C) MHI.

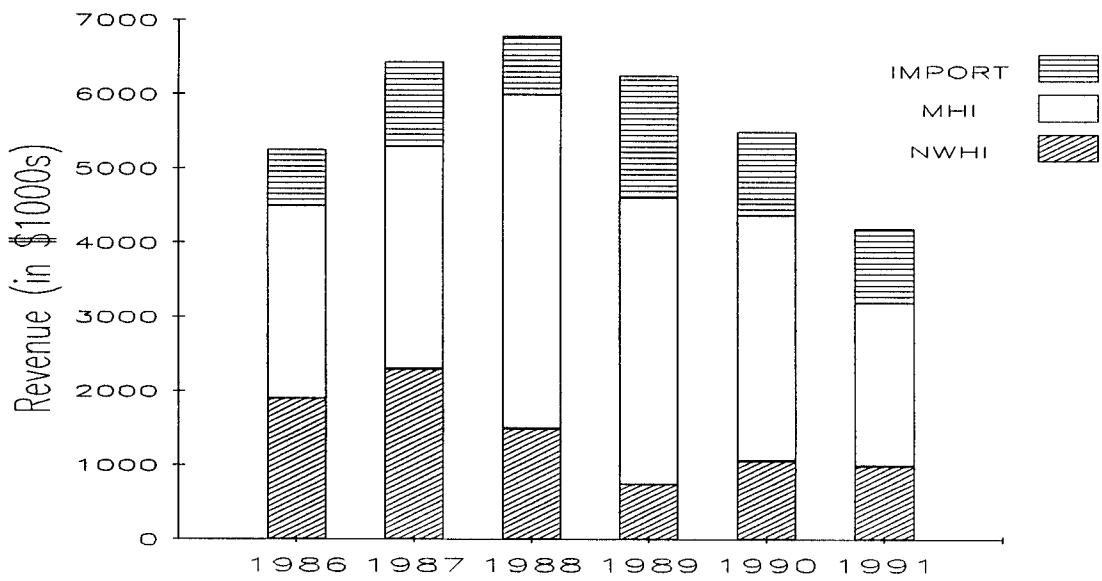


Figure 7.--Hawaii's bottomfish market revenue, 1986-91 (NWHI = Northwestern Hawaiian Islands, MHI = Main Hawaiian Islands). Data from NMFS market monitoring program.

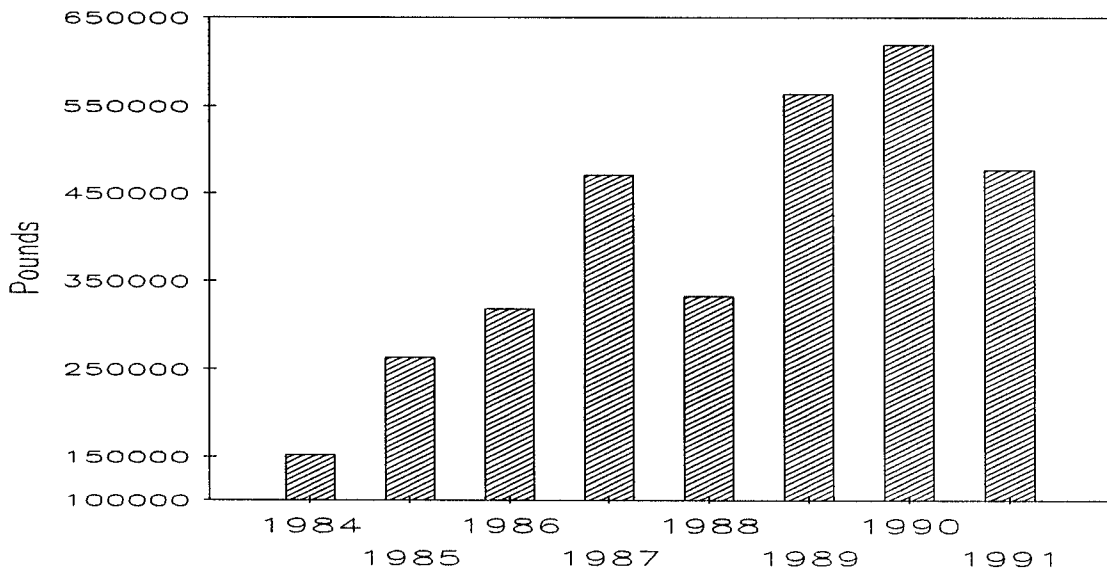


Figure 8.--Bottomfish imports to Hawaii, 1984-91. Data from NMFS Market News.