Southwest Fisheries Science Center
Administrative Report H-93-14

NORTHWESTERN HAWAIIAN ISLANDS BOTTOMFISH FISHERY, 1992

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AUGUST 1993

NOT FOR PUBLICATION

OVERVIEW OF THE FISHERY

Implemented in 1989, the Federal fishery management plan for the Northwestern Hawaiian Islands (NWHI) (Fig. 1) bottomfish and seamount groundfish fishery has sought to stabilize and control the level of bottomfishing effort. The limited entry provision within the *Ho'omalu* zone (the limited access area) has stabilized the number of vessels fishing, but the amount of effort, in terms of days fished, has increased. The 1992 data indicate that the total NWHI and the *Ho'omalu* zone catch has increased over 1991 landings but still remains depressed compared to the mid- to late-1980s.

The *Mau* zone (open access area) shows a steady decline in landings since 1990. The number of active vessels has decreased, while the fishing effort (total days fished) has increased. The decline in the catch rates for the *Mau* zone is such that some of the participants have requested that it too become a limited access area.

There has been a revival in the catch of opakapaka[1] (pink snapper) from both areas. Catch volumes are substantially more than those of the last several years. The volume of uku (grey snapper) landings continues to decline in the *Mau* zone but is increasing in the *Ho'omalu* zone where its landings are second to opakapaka.

Predation of hooked fish by sharks and dolphins, primarily *Tursiops* sp., continues to plague fishing operations. Considerable losses of fishes to these efficient predators have been anecdotally reported by the fishermen. 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.

There was no voluntary reporting of any marine mammal interactions during the 1992 bottomfish season. The Southwest Region, National Marine Fisheries Service (NMFS) has continued to field observers on NWHI bottomfish vessels to document interactions between bottomfishing activities and protected species. The summary report will be available from the Pacific Area Office (PAO), NMFS. Preliminary analysis of observer data on the frequency of marine mammal interactions suggests that the marine mammal interactions forms are not being filled out on non-observer trips.

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[1]Scientific names are listed in Table 1.

FLEET OPERATIONS IN THE NWHI

General Fleet Operations

There were a total of 35 permits issued in 1992 (36 permits in 1991) with 13 active vessels (Fig. 2). There were 5 *Ho'omalu* permits issued out of which 5 vessels fished (6 permits--4 active vessels in 1991). Thirty permits were issued for the *Mau* zone of which 8 vessels were active (30 permits--14 active vessels in 1991).

The NWHI fleet operations are jointly monitored in Honolulu by personnel of the Fishery Management and Economics Program (FMEP) of the NMFS Honolulu Laboratory and the State of Hawaii Division of Aquatic Resources (HDAR). There are two sets of 1992 NWHI vessel activity and catch-per-trip information listed in Table 2. The first 1992 column (1992[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 1992 data (1992[b]) is based on a combination of NMFS and HDAR data. This reflects a more complete data base which includes vessels from Kauai that could not be directly monitored by the NMFS. Research for the years 1986-90 comparing the differences in the HDAR and the NMFS estimates is being done on a time-available basis.

There were 92 trips made by 13 individual vessels throughout the NWHI (Table 2, Fig. 2). This represents a decrease 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 22. The areas fished ranged from Nihoa to Midway island. The average trip length, based on NMFS monitoring, was 13.8 days with 8.5 days of fishing (n = 70 trips) compared with 13.4 days with 6.9 days of fishing (n = 38 trips) in 1991.

Comparisons of trip operations and landings by management areas for 1990-92 are shown in Table 3. These results were based only on NMFS-monitored data for consistency (data prior to 1991 are entirely NMFS figures). Table 4 compares the 1992 NMFS and the combined NMFS-HDAR extrapolated data sets.

Of the 13 active vessels, 6 fished on a regular basis (12 active vessels--6 on a regular basis in 1991): 3 vessels in the *Mau* zone and 3 vessels in the *Ho'omalu* zone. One *Mau* and two *Ho'omalu* zone vessels concurrently held longline limited entry permits, while one *Mau* and one *Ho'omalu* vessel held NWHI lobster permits.

Hurricane Iniki which hit Hawaii in September 1992 damaged many of the vessels in the fishery. The island of Kauai sustained major damage to its fishing fleet, harbors, and the supporting infrastructure. The damage virtually eliminated

participation of the Kauai-based vessels through the remainder of the year and will continue to affect their participation for some time in 1993. As a result of the hurricane, one of the permitted Mau zone vessels sank at sea with the loss of two of its three fishermen.

Ho'omalu Zone Fleet Operations

The average trip length and days fished (Table 3) in the *Ho'omalu* zone have increased, while the catch-per-fishing-day has decreased. Effort in terms of total days fished increased 44% (NMFS monitored data). Although bottomfish management unit species (BMUS) catch-per-fishing-day has decreased slightly, the increase in the days fished per trip has increased the BMUS catch-per-trip. Revenue per trip and per vessel has also increased.

Although there were 5 permitted vessels that fished the *Ho'omalu* zone, only 3 fished regularly. There were 37 trips made with an average of 7 trips per vessel (Table 4, based on NMFS-HDAR data). The areas fished ranged from French Frigate Shoals to Midway island. The majority of the fishing activities were centered in the French Frigate Shoals to Maro reef area. The average trip lasted 18.8 days with 11.5 days of fishing (n = 33, NMFS-monitored trips).

Mau Zone Fleet Operations

There was a decrease in the number of vessels fishing in the *Mau* zone. Eight vessels made 55 trips in 1992 (NMFS-HDAR data). Some differences in the number of vessels and trips are because many Kauai vessels that were active in 1991 either did not fish or drastically cut down their fishing effort in 1992.

Fishing effort (total days fished) increased 11% within the *Mau* zone (Table 3) for the Oahu vessels. Fishing trips to the *Mau* zone averaged 9.5 days in length with 5.8 days of fishing (n = 37, NMFS-monitored trips). The fishing area encompassed the entire Mau zone.

BOTTOMFISH LANDINGS DATA

General NWHI Landings

The total bottomfish landings for the NWHI increased 9% (Table 5, Fig. 3). The average NWHI landings for all species per trip (NMFS-monitored trips) was 4,528 pounds, 424 pounds more than in 1991 (1991 = 4,104 pounds, 310 pounds less than in 1990) (Table 2). BMUS accounted for 91% of the total landings (88% in 1991). BMUS landings-per-trip averaged 4,160 pounds.

Species composition for the NWHI is provided in Table 6. The top 5 BMUS accounted for 74% of the BMUS landings (Fig. 4). Opakapaka landings were the highest, followed by uku, butaguchi, and hapuupuu. Onaga, other BMUS, and ehu made up the remainder of the landings.

Overall, the catches of uku were up 24% in 1992. *Mau* zone uku landings dropped by 62%, while the *Ho'omalu* zone landings increased 122%. BMUS catch-per-trip in the *Mau* zone dropped 29%, while *Ho'omalu* zone catches increased 37%.

Opakapaka landings increased 68% in 1992. The *Mau* zone catch-per-trip increased 174%. *Ho'omalu* zone landings increased 109% per trip.

Based on NMFS estimates, the bottomfish landings have increased for the NWHI (Fig. 3). Percentage increase of opakapaka landings, coupled with the increased prices, consequently increased revenue (Fig. 7).

Ho'omalu Zone Landings

Ho'omalu zone bottomfish landings were up 24%. BMUS landings were 99% by weight of the total bottomfish landings. Opakapaka landings were the highest (Fig. 5B), followed by uku, butaguchi, hapuupuu, onaga, other BMUS, and ehu. The *Ho'omalu* zone average landing per trip was 9,954 pounds with 9,468 pounds (95%) of BMUS (Table 4, NMFS-HDAR data). The average landings-per-trip increased 49% while average BMUS landings-per-trip increased by 61%. The majority of the increases in catch can be attributed to opakapaka and uku.

Mau Zone Landings

The *Mau* zone landings decreased 31%. Bottomfish landings-per-trip averaged 1,690 pounds with 1,275 pounds (75%) of BMUS. The BMUS catch-per-trip increased 6%. The overall catch-per-trip increased by 23%. Opakapaka led the landings (Fig. 5A), followed by butaguchi, onaga, hapuupuu, uku, other BMUS, and ehu.

BOTTOMFISH PRICES

The 1992 average ex-vessel prices for bottomfish (all sources) in Hawaii have increased slightly from 1991 levels (Table 7, Fig. 6A). The average price for NWHI bottomfish has also increased slightly. Opakapaka prices have increased, while onaga prices have decreased (Figure 6B). The MHI prices have remained stable (Figure 6C). Total Hawaii bottomfish revenue rose in 1992 to $3.0 million. The overall bottomfish market revenue (including imports) also sustained an increase in 1992 (Table 5, Fig. 7).

The other BMUS and other bottomfish species price-per-pound information for 1992 in Table 7 is identical because these categories were combined. In general the average price of the other BMUS should follow the existing trends of being higher than that of the other bottomfish species.

Bottomfish imports to Hawaii have increased from 1991 levels (Fig. 8). The additional 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 has been virtually eliminated except in special circumstances; i.e., high seasonal demand or little or no local supply.

CONCLUSIONS

The mandatory NMFS Southwest Region observer program currently in place has provided important data on protected species interactions with fishing operations. More research is needed to improve the efficiency of the fishing operations while reducing the interactions and ensuring the safety of protected species.

The potential benefits of improved catch and effort information are considered substantial from a biological assessment as well as an operational and economic assessment perspective. At present these assessments rely on incomplete shoreside monitoring information and aggregate trip information. A formal logbook program would provide comprehensive long-term data on area fished and the catch-and-effort needed for more efficient management. A mandatory Federal logbook, with the addition of a protected species interaction section as provided in the longline fishery logbook, might encourage improved reporting of marine mammal interactions as well.

Some fishermen have voiced support for a tag and release program. This program could be initiated by the observers on a time-available basis. The number of fish released by fishermen is substantial at times. Information on the movements of bottomfish species is nonexistent; therefore, any information gleaned from such a program would prove invaluable for fisheries management.

The impact of catch predation should be addressed. Estimates of the quantity and value of these losses due to sharks or protected species need to be quantified. Shark damage to the gear is a major expense and a serious concern of fishermen.

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

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

Table 2.--Activity of the bottomfish fleet in the Northwestern Hawaiian Islands, 1987-92 (BMUS = bottomfish management unit species). Data for 1987-91[a] and 1992[a] are based on a consistent sample, by the NMFS, of the fleet in each year. Data from 1991[b] and 1992[b] come from a combined NMFS-HDAR data set.

	1987	1988	1989	1990	1991[a]	1992[a]	1991[b]	1992[b]
Vessels (No.)	28	13	10	16	14	10	17	13
Trips (No.)	134	93	50	80	73	78	131	92
Trips/vessel (No.)	5	7	5	5	5	7	7	7
Days at sea	2,211	1,441	740	990	978	1,079	NA	NA
Days fished	938	660	335	530	503	660	NA	NA
Days/trip	16	15.5	15	12	13	13	NA	NA
BMUS/trip (lbs.)	6,145	5,502	5,036	4,053	3,644	4,160	2,878	4,570
Total catch/ trip (lbs.)	7,303	6,842	6,054	4,414	4,104	4,528	3,258	5,014
BMUS/fishing day (lbs.)	877	763	611	525	491	NA	NA	NA
Total catch/fishing day (lbs.)	1,043	917	666	591	535	NA	NA	NA
Revenue/trip ($US)	17,462	16,400	14,994	11,126	10,045	12,956	8,532	14,496
Revenue/vessel ($US)	83,571	117,324	74,971	55,634	52,381	101,062	65,753	102,588

[a]Data from NMFS.
[b]Data from combination 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 2 because of rounding and extrapolation.

	1990		1991		1992	
	Mau	*Hoomalu*	*Mau*	*Hoomalu*	*Mau*	*Hoomalu*
Vessels (No.)	4	4	11	4	5	5
Trips (No.)	55	25	37	36	42	36
Trips/vessel (No.)	4	4	4	9	8	7
Days at sea	577.5	412.5	362.6	615.6	401	1,079
Days fished	330	200	218	288	243	416
Day fished/trip	6	8	5.9	8	5.8	11.5
Days/trip	10.5	16.5	9.8	17.1	9.5	18.8
BMUS/trip (lbs.)	3,438	5,406	1,976	5,368	1,388	7,393
Total catch/ trip (lbs.)	3,820	5,715	2,151	6,112	1,786	7,726
BMUS/fishing day (lbs.)	573	675	333	671	239	639
Total catch/ fishing day (lbs.)	636	714	364	764	308	668
Revenue/trip ($US)	9,650	14,374	5,732	14,479	4,941	22,309
Revenue/vessel ($US)	37,911	71,874	19,281	130,311	41,505	160,626

Table 4.--Activity of the bottomfish fleet in the Northwestern Hawaiian Islands by management areas (*Mau* and *Ho'omalu* Zones) for 1992 comparing NMFS data (1992a) and a combination of NMFS and HDAR extrapolated data set (1992b).

	1992a		1992b	
	Mau	*Ho'omalu*	*Mau*	*Ho'omalu*
Vessels (No.)	5	5	8	5
Trips (No.)	42	36	55	37
Trips/vessel (No.)	8	7	6	7
Days at sea	401	1,079	NA	NA
Days fished	243	416	NA	NA
Days fished/trip	5.8	11.5	NA	NA
Days/trip	9.5	18.8	NA	NA
BMUS/trip (lb)	1,388	7,393	1,275	9,468
Total catch/trip (lb)	1,786	7,726	1,690	9,954
BMUS/fishing day (lb)	239	639	NA	NA
Total catch/fishing day (lb)	308	668	NA	NA
Revenue/trip (US$)	4,941	22,309	4,754	28,977
Revenue/vessel (US$)	41,505	160,626	32,687	214,430

Table 5.--Hawaii's market for bottomfish caught in the Northwestern Hawaiian Islands (NWHI) and the main Hawaiian Islands (MHI), based on market expansion estimate by the National Marine Fisheries Service, 1986-92. Columns may not total because of rounding and landings not enumerated by source.

Source	1986	1987	1988	1989	1990	1991	1992
				Landings (in 1,000 lb)			
Hawaii	1,680	1,799	1,791	1,310	1,082	948	1,012
NWHI	869	1,015	625	303	421	387	424
MHI	811	784	1,165	1,007	661	561	588[a]
Imports[b]	319	472	334	564	620	479	634
Total bottomfish	1,999	2,271	2,125	1,874	1,702	1,427	1,646
				Revenue (in US$1,000)			
Hawaii	3,951	4,644	4,788	3,840	3,335	2,711	3,026
NWHI	1,900	2,300	1,500	756	1,070	1,000	1,210
MHI	2,051	2,344	3,288	3,090	2,265	1,711	1,809
Imports[b]	697	1,070	800	1,396	1,567	1,238	1,809
Total bottomfish	4,648	5,714	5,588	5,236	4,911	3,949	4,835

[a]Preliminary estimate from Hawaii Division of Aquatic Resources data.
[b]Estimated by NMFS.

Table 6.--Species composition of bottomfish landings in the Northwestern Hawaiian Islands, 1987-92 (BMUS = bottomfish management unit species).

Species	Catch (x 1000 pounds)					
	1987	1988	1989	1990	1991[a]	1992[a]
Opakapaka	370	154	112	79	86	145
Onaga	77	80	13	21	46	23
Ehu	40	45	9	25	20	8
Hapuupuu	223	156	66	85	59	57
Butaguchi	217	111	57	103	75	79
Uku	2	6	5	60	69	86
Other BMUS	72	69	39	42	22	22
Total BMUS	1,001	621	302	413	377	420
Other bottomfish	14	5	1	8	10	4
Total bottomfish	1,015	626	303	421	387	424

[a]Combination NMFS-HDAR data set.

Table 7.--Hawaii's bottomfish prices (US$/lb) by capture location, and Hawaii's bottomfish market prices by species and source, 1989-92 (NWHI = Northwestern Hawaiian Islands, MHI = main Hawaiian Islands).

Species	Market	NWHI	MHI	Market	NWHI	MHI
		1989			**1990**	
Opakapaka	3.58	3.78	3.51	4.81	4.19	5.07
Onaga	4.81	3.23	4.92	5.88	3.82	6.10
Ehu	3.36	1.85	3.71	3.96	2.65	4.73
Hapuupuu	2.86	2.61	3.64	2.83	2.65	3.44
Butaguchi	1.85	1.31	3.16	1.66	1.39	3.38
Other BMUS	2.42	1.20	2.52	2.69	2.57	2.62
Other bottomfish	2.08	1.52	2.16	2.27	1.22	2.48
Imports	2.97	2.05				
Total bottomfish	3.12	2.61	3.26	3.11	2.65	4.09
		1991			**1992**	
Opakapaka	3.89	3.53	4.08	4.06	3.98	4.14
Onaga	5.06	4.47	5.26	5.17	3.87	5.56
Ehu	3.00	2.71	3.17	3.58	2.51	3.92
Hapuupuu	2.72	2.50	3.38	2.71	2.57	3.30
Butaguchi	1.46	1.19	2.16	1.56	1.51	3.34
Other BMUS	2.59	2.50	2.32	2.31[a]	2.51[a]	2.23[a]
Other bottomfish	2.11	1.31	2.17	2.31[a]	2.51[a]	2.23[a]
Imports	2.11			2.86		
Total bottomfish	2.80	2.68	3.39	3.08	2.86	3.40

[a]Combination of Other Bottomfish Management Unit Species and other bottomfish species.

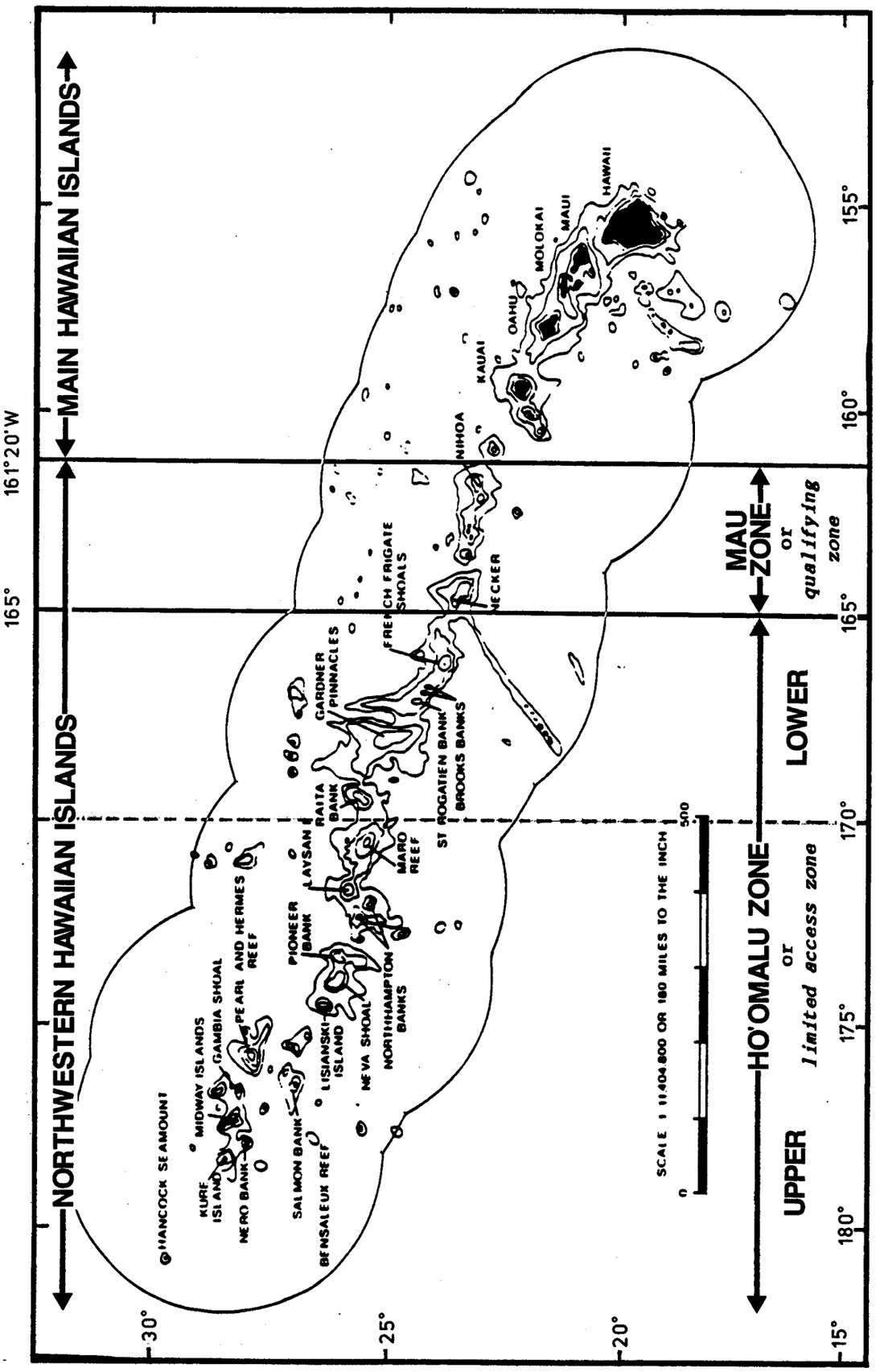

Figure 1.--Map of the Northwestern Hawaiian Islands.

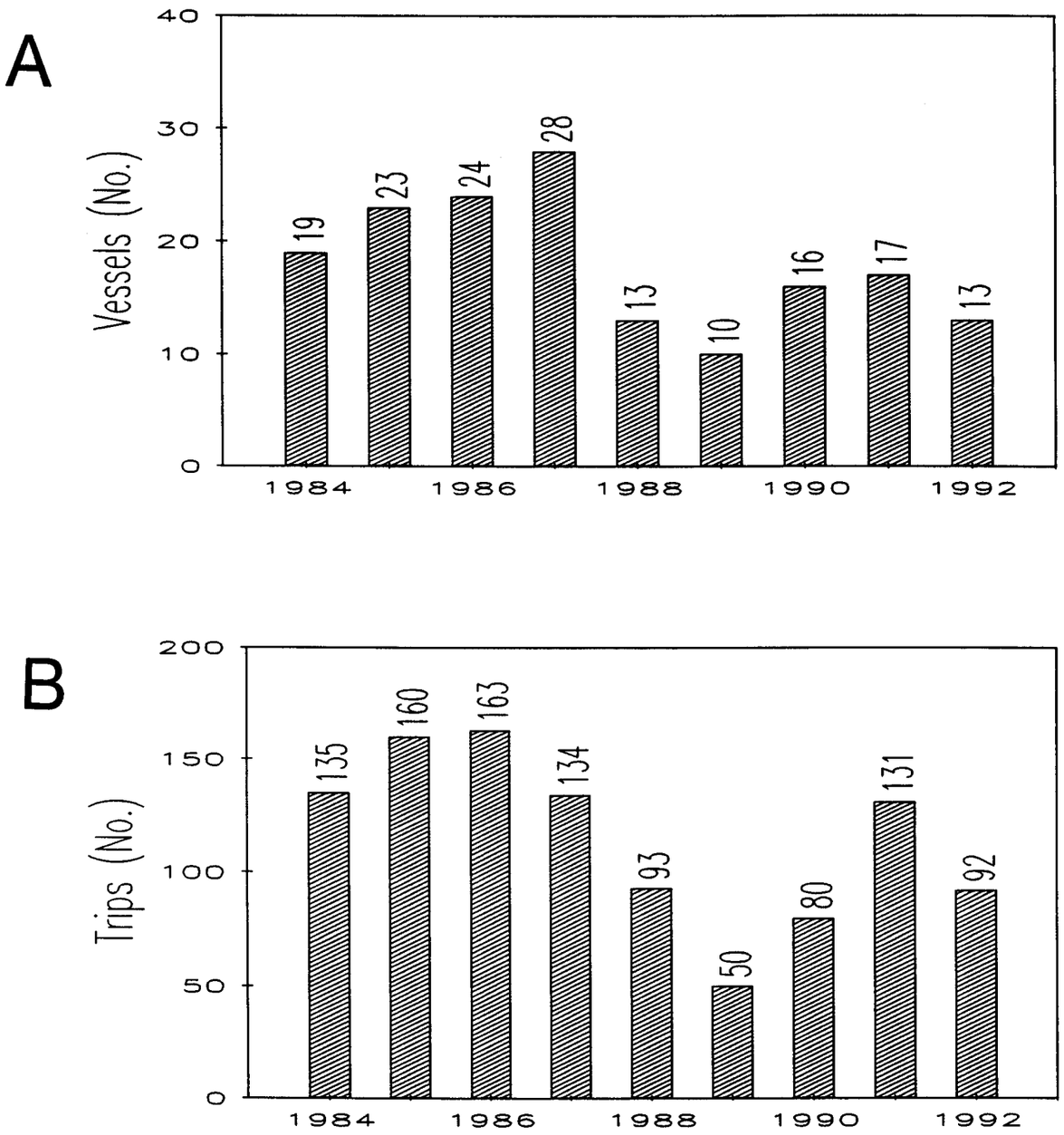

Figure 2.--The bottomfish fleet in the Northwestern Hawaiian Islands, 1984-92: (A) number of vessels and (B) trips. Data for 1984-90 are from the monitoring program of the National Marine Fisheries Service. Data for 1991 and 1992 are from the combined NMFS-HDAR data set.

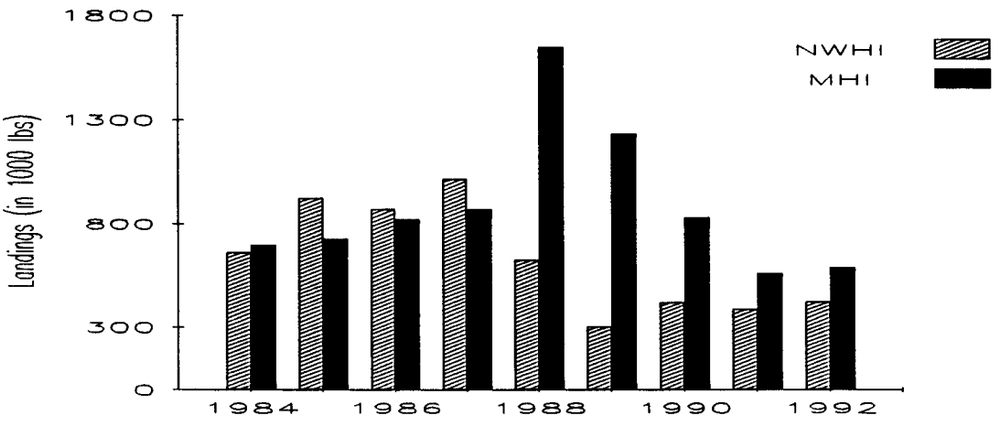

Figure 3.--Hawaii's bottomfish landings, 1984-93, based on estimates made by the National Marine Fisheries Service (NWHI = Northwestern Hawaiian Islands, MHI = Main Hawaiian Islands).

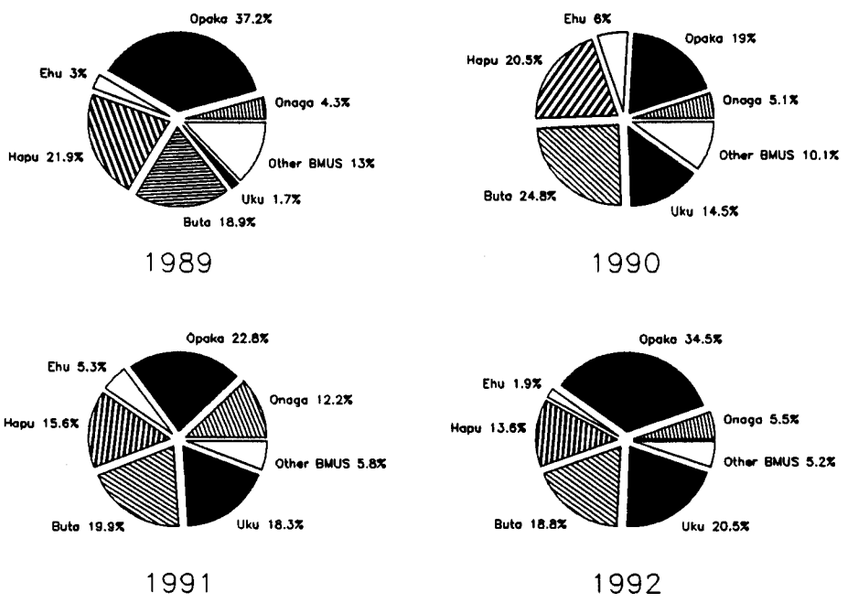

Figure 4.--Composition of landings (by weight) of bottomfish management unit species by the bottomfish fleet in the Northwestern Hawaiian Islands, 1989-92.

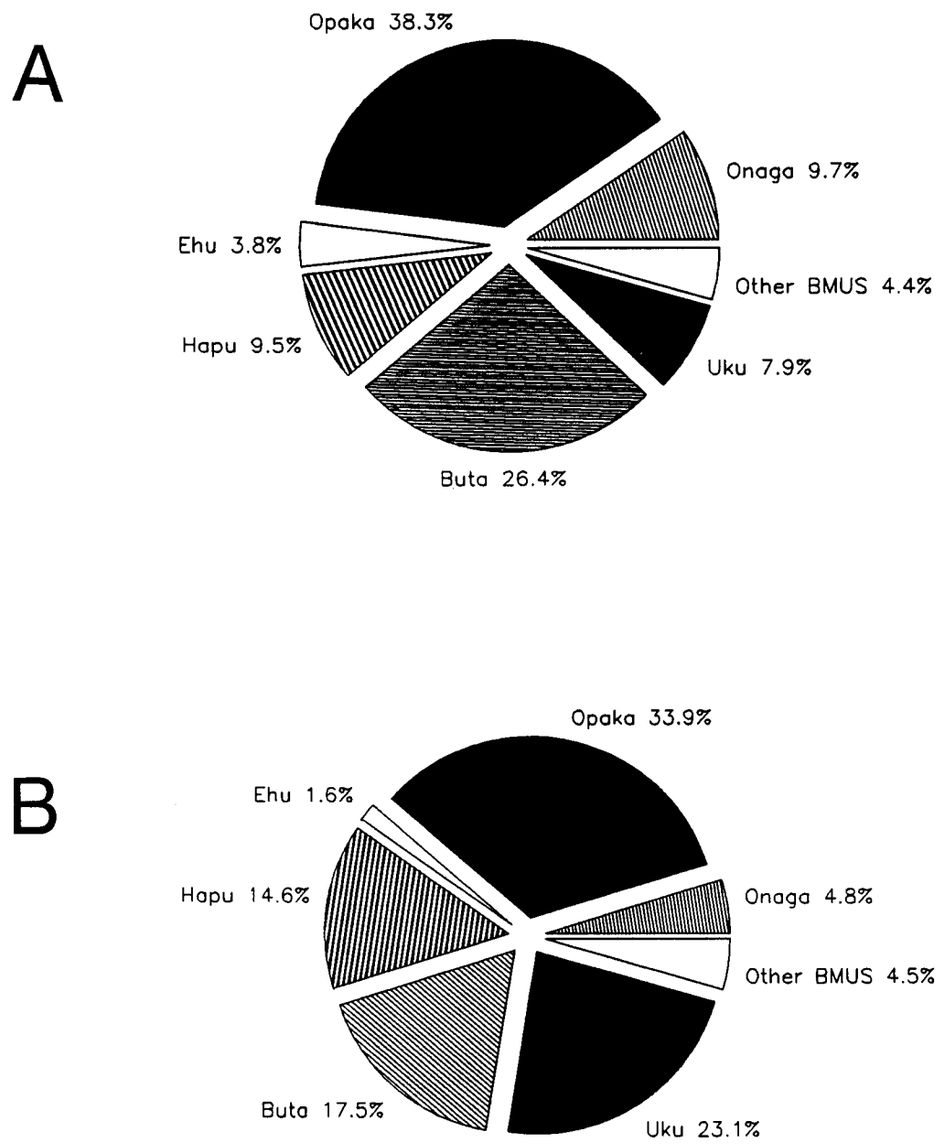

Figure 5.--Species Composition of landings (by weight) of bottomfish and species landed in (A) the *Mau* Zone (top) and (B) the *Ho'omalu* Zone (bottom) in 1992.

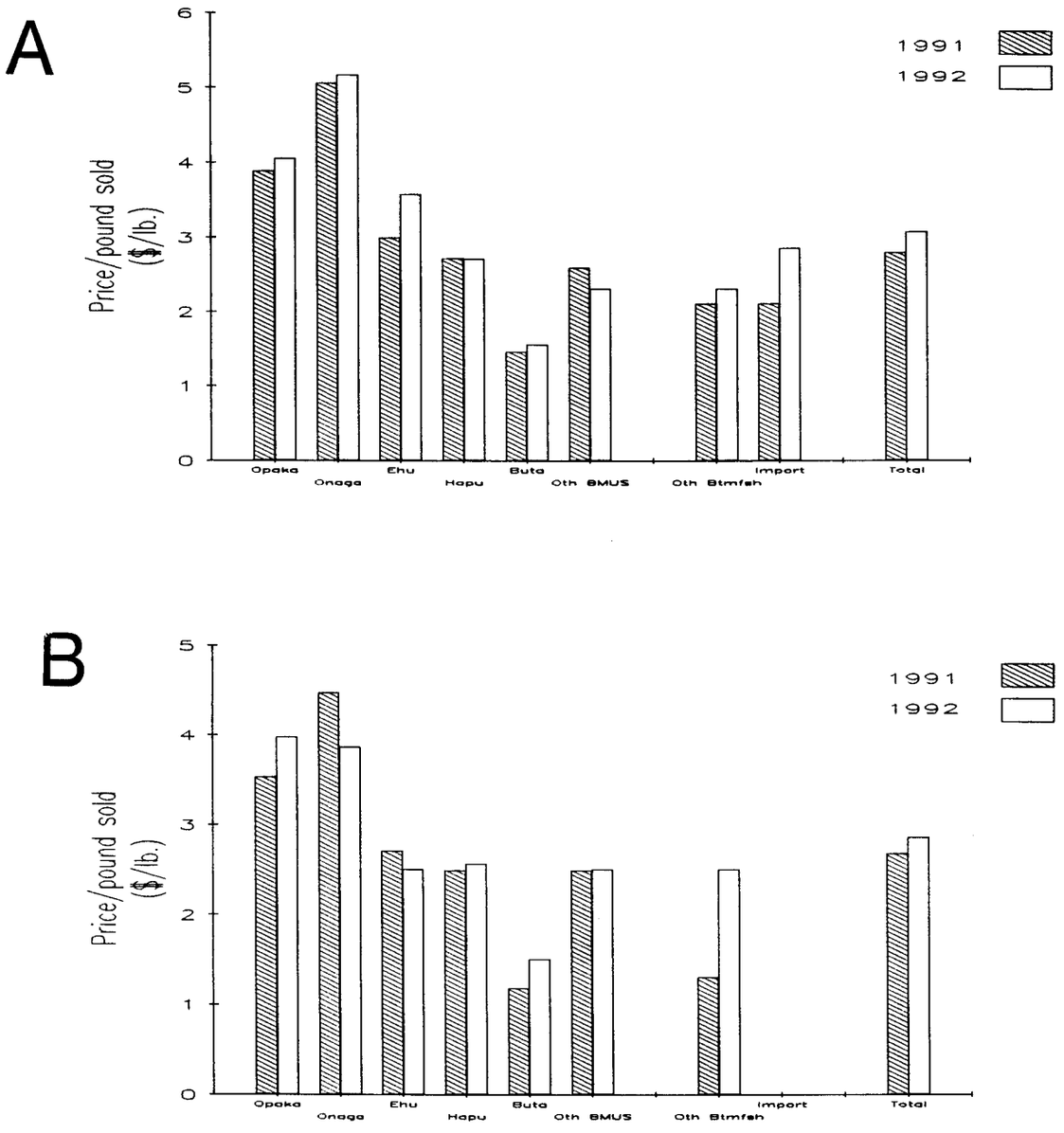

Figure 6.--Hawaii's 1991-92 market prices for bottomfish: (A) NWHI and MHI combined (top) and (B) NWHI (bottom).

C

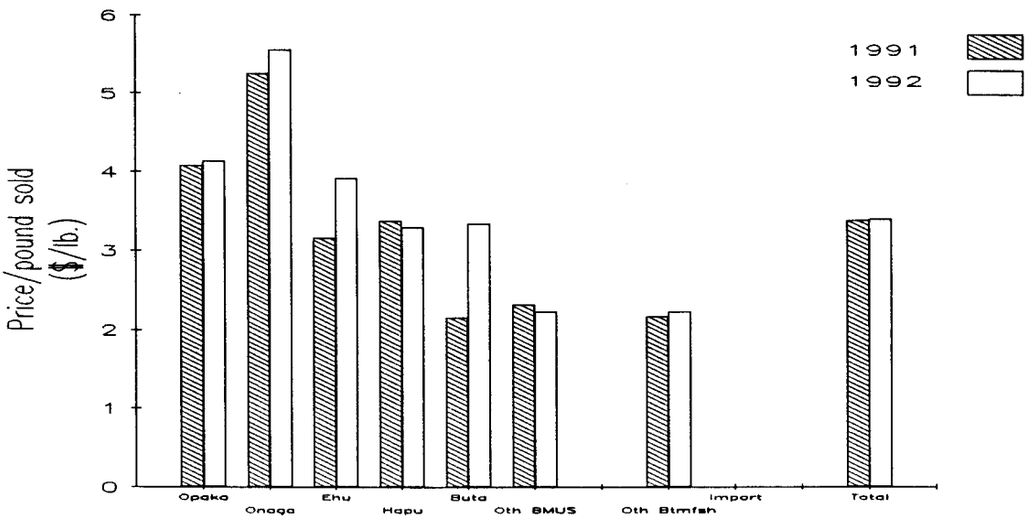

Figure 6.-Continued. (C) MHI.

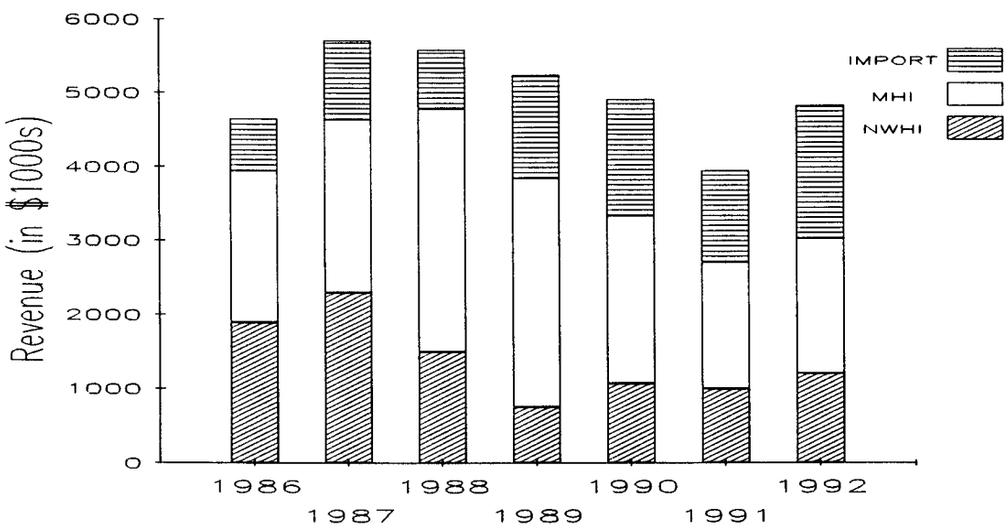

Figure 7.--Hawaii's bottomfish market revenue, 1986-92 (NWHI = Northwestern Hawaiian Islands, MHI = Main Hawaiian Islands). Data from NMFS market monitoring program.

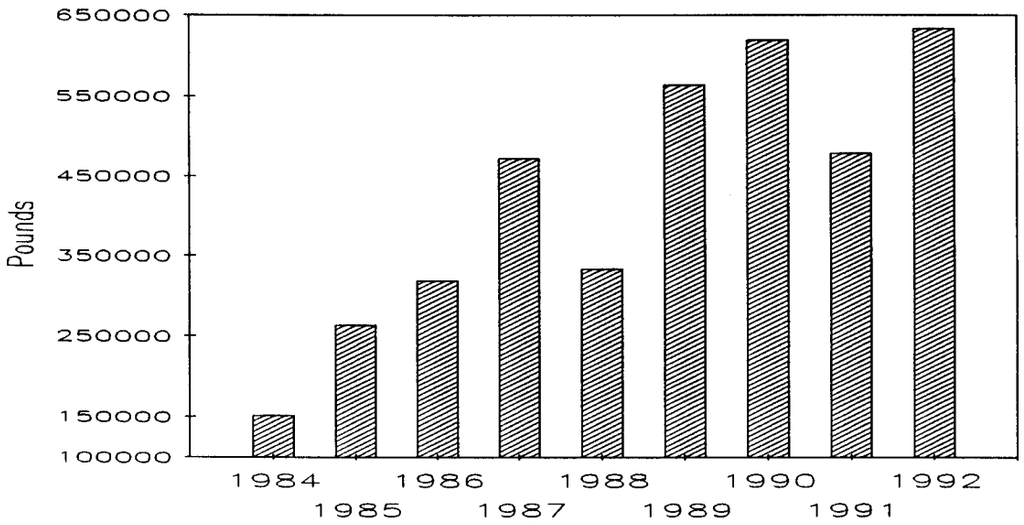

Figure 8.--Bottomfish imports to Hawaii, 1984-92. Data from NMFS Market News.