

Southwest Fisheries Science Center
Administrative Report H-98-09

**ANNUAL REPORT OF THE 1995-97
WESTERN PACIFIC LOBSTER FISHERY**

Samuel G. Pooley
Kurt E. Kawamoto

Honolulu Laboratory
Southwest Fisheries Science Center
National Marine Fisheries Service, NOAA
Honolulu, Hawaii 96822-2396

August 1998

NOT FOR PUBLICATION

This Administrative Report is issued as an informal document to ensure prompt dissemination of preliminary results, interim reports, and special studies. We recommend that it not be abstracted or cited.

PREFACE

The purpose of this report is to provide a timely and accessible summary of basic information on the performance of the Northwestern Hawaiian Islands (NWHI) lobster fishery. More detailed information on the status of the NWHI lobster populations is contained in separate reports prepared by the NMFS Honolulu Laboratory's Stock Assessment Investigation (Haight, et al., 1995; DiNardo, et al., 1998). Economic research on the NWHI lobster fishery has been limited in recent years to ad hoc analyses required for fishery management plan amendments. The last comprehensive analysis was Clarke and Pooley (1988) and Clarke, Yoshimoto, and Pooley (1992).

The Fishery Management Plan (FMP) for the western Pacific crustacean fisheries was prepared by the Western Pacific Regional Fishery Management Council (Council) and was implemented by NMFS in midyear 1983. Lobster permits are issued by the Regional Director, Southwest Region (SWR) through the Pacific Islands Area Office (PIAO) in Honolulu. These permits allow lobster fishing operations in the U.S. Exclusive Economic Zone (EEZ) from 3 to 200 nmi offshore American Samoa, Guam, Hawaii (including the NWHI and the EEZ areas of the main Hawaiian Islands). The NWHI lobster fishery is a limited entry fishery with all permits currently issued.

The Fishery Management and Economics Program (FMEP) of the Honolulu Laboratory collects catch, effort, landings, and economic information from Federally permitted vessels. All information presented in this report pertains only to NWHI.

No Federally permitted lobster vessels have operated in the EEZs of American Samoa or Guam since the passage of the FMP in 1983. One Federally permitted vessel began to operate in the EEZ of the main Hawaiian Islands in 1997. That vessel is required to file Federal logbooks for its operations in the EEZ, and to comply with State and Federal fishery regulations. However, because of confidentiality restrictions, no information on the operations of that vessel is included in this report.¹ Information on the nearshore lobster fisheries of these areas can be found in the NMFS WPacFIN's Fishery Statistics of the Western Pacific annual volumes.

Mr. Alvin Z. Katekaru of PIAO provided information on permit transfers and current regulations for this report.

¹Federal confidentiality restrictions require activity by at least three vessels before aggregate or summary statistics are made public.

CONTENTS

	Page
Introduction	1
Recent Developments	1
Catch, Landings and Revenue	3
Fishing Effort	3
Economic Information	4
Harvest Guideline	5
Endangered and Threatened Species Interactions	6
Fishery Management Activities	6
Permits	7
Acknowledgments	7
References	8
Tables	11
Table 1. Annual NWHI lobster landings and ex-vessel revenue (spiny and slipper lobsters combined) and vessel participation, 1977-97	13
Table 2. NWHI lobster fishing effort (trap-hauls) and catch and catch rates by species, 1983-97	15
Table 3. Annual NWHI lobster landings and prices by species, and total revenue, 1983-97	16
Table 4. Annual fishing effort (fleet days fished and trap-hauls) and catch-per-unit-effort (CPUE) for spiny and slipper lobsters by area in the NWHI, 1995-97	17
Table 5. Annual fishing effort (vessels, trips, fishing days, fishing days per vessel, and trap-hauls) for the NWHI lobster fishery, 1983-97	18
Table 6. NWHI lobster landings, revenue, and price by product type and species, 1990-97	19

Table 7.	Average NWHI lobster fishing vessel operating patterns, 1996 and 1997	20
Table 8.	Protected species interactions, 1995-97	21
Table 9.	NWHI lobster fishery regulations (FMP, amendments, and major administrative actions), 1983-97	22
Table 10.	NWHI lobster fishery limited access permit holders and transfer profile 1991-97	23
Figures		25
Figure 1.	Map of the Northwestern Hawaiian Islands (NWHI)	27
Figure 2.	NWHI lobster landings (whole pounds) and ex-vessel revenue (nominal and inflation-adjusted [*]), 1977-97	28
Figure 3.	NWHI landings (pounds, whole weight) of spiny and slipper lobsters, 1983-97	29
Figure 4.	NWHI lobster fishery catch rates (total and kept), 1983-97	30
Figure 5a.	NWHI lobster fishery participation (vessels and trips), 1977-97	31
Figure 5b.	NWHI lobster fishing effort (trap-hauls) and catch (number of spiny and slipper lobsters, combined), 1983-97	32
Figure 6.	NWHI lobster fishery average ex-vessel prices (per lobster [nominal and inflation-adjusted {*}, and per pound [nominal]), 1977-97	33
Figure 7.	NWHI lobster fishery, revenue per trap haul (nominal [RPUE] and inflation-adjusted [RPUE*]), 1983-97	34

INTRODUCTION

The Northwestern Hawaiian Islands (NWHI) is an isolated range of islands, atolls, islets, reefs, and banks which extends 1,500 nmi west northwest of the main Hawaiian Islands from Nihoa Island to Kure Atoll (Fig. 1). The commercial lobster fishery has operated in the NWHI for 20 years, targeting primarily two species: spiny lobster, *Panulirus marginatus*, and slipper lobster, *Scyllarides squammosus*. Two other species--green spiny lobster, *P. penicillatus*, and ridgeback slipper lobster, *S. haanii*, are caught incidentally in low abundance. The fishery currently operates under a seasonal harvest guideline system which opens the fishery yearly on July 1. The fishery became an optional "retain all" fishery without size limits or prohibitions on the retention of berried female lobsters in 1996. Escape vents are required on all traps.

This report details commercial lobster fishing activity in the NWHI for 1995-97, and reports historical information on the performance of the fishery since its beginning in 1977. Current catch, effort, and revenue statistics are based on federal logbook data and landings reports. Statistics are presented for the main target species in tabular format, and brief summaries illustrate key points. Evaluations of current conditions of the fishery are also provided. This report concludes with information on protected species interactions and administrative activities in the fishery.

RECENT DEVELOPMENTS

During the past 5 years, the NWHI lobster fishery has faced two major developments: first, a complete closure in 1993 followed by an emergency closure during the 1994 season and an experimental permit fishery in which only one vessel was allowed to fish in 1995 (with a very restricted quota); and second, a return to relatively normal operations in 1996 with a small quota and a larger quota in 1997 under the new, retain-all regulatory regime.

The 1993 closure was prompted by the NMFS preseason estimate that catch rates would lie below a threshold level, resulting in a zero quota. The 1994 closure occurred when in-season reports of commercial catch rates were substantially less than those anticipated by the stock assessment, leading to an emergency action by the NMFS SWR to close the fishery 8 weeks into the season. The fishery remained closed for the remainder of 1994 and opened to only one vessel under an experimental permit in 1995 to assess conditions of the lobster stocks.

The fishery and environmental causes which led to the 1993 closure are discussed in Polovina and Mitchum (1992, 1994), who believe that the spawning stock biomass at Maro Reef (a major bank in the NWHI lobster fishery) declined dramatically

due to extremely poor post-larval recruitment and subsequent fishing down of the remaining population in the years following 1986. The recruitment problem appears associated with a shift in oceanographic regime (a weakening of the subtropical counter current) which changed patterns of larvae lobster transport and with the accumulated commercial fishing pressure during that period.

Subsequently, the Stock Assessment Investigation of the NMFS Honolulu Laboratory, in conjunction with the Western Pacific Regional Fishery Management Council (Council), undertook a comprehensive review of the quota setting procedure. The result was development of a risk assessment model in 1996 which opened the fishery with a small quota (lobsters, spiny and slipper lobsters combined) but with the removal of the previous restrictions against taking small-size and berried lobster (DiNardo, 1995).

In 1996 the NMFS SWR experimented with the use of a Vessel Monitoring System (VMS) for communicating catch reports from vessels on the lobster grounds to NMFS. This satellite-based system (which is operative throughout the Hawaii-based longline fishery under Federal regulation) also allows NMFS Enforcement to track the position of vessels on a near-continuous basis. As a result, fishermen requested use of the VMS system in 1997 to allow a change in the "starting point" for the fishery. In previous seasons, all vessels were required to be east of longitude 161°W or outside the 200-mile EEZ around the NWHI prior to the opening of the season (July 1). As a result, with a small quota the vessels all transited directly to the closest productive bank (Necker Island) and concentrated their effort there for the entire 1996 season. With VMS, vessels could be verified to be "off the grounds" prior to the opening of the season. This proposal was accepted by the Council and NMFS, such that vessels using VMS were allowed to be outside 50 miles of any lobster fishing location in the NWHI as the season opened. All vessels used the VMS system in 1997, mostly utilized to be closer to the grounds as the season opened, with the resulting fishing effort being more evenly spread throughout the NWHI (although the majority of fishing effort remained at Necker).

In 1996, 5 of the 15 vessels permitted under the Council's limited entry program operated in the fishery, each vessel taking one trip. Nine vessels operated in 1997, each taking one trip. Two vessels landed a fair number of live lobsters in 1996, and there was substantial discussion about the fishery becoming a live-lobster fishery. However, due to operational considerations, only four vessels landed live lobsters in 1997.

Total landings (whole weight pounds) of spiny and slipper lobster in 1997 were the highest since 1992, as was ex-vessel revenue and landings for individual species. More vessels participated in 1997 than any year since 1992. The total catch rate

(number caught per 1,000 traps) was also the highest since 1988.² Nonetheless, there were a number of troubling aspects to the fishery's performance which were being considered by the Stock Assessment Investigation during the off-season. These are reviewed in the latest status of the stocks report (DiNardo, et al., 1998).

CATCH, LANDINGS, AND REVENUE

The total combined NWHI landings of lobsters in number retained (kept), pounds (round weight), and ex-vessel revenue for 1977-97 are shown in Table 1. Table 1 also summarizes vessel participation in the fishery. Catch and catch rate of lobsters by species from 1983-97 is presented in Table 2.³ Landings, ex-vessel prices, and ex-vessel revenue by species are shown in Table 3. The long-term trend in annual landings and revenue (and adjusted for inflation) is shown in Figure 2. The composition of landings (spiny and slipper lobster) is shown in Figure 3. The area distribution of the catch is summarized in Table 4 (although some information is not reported here due to confidentiality restrictions). Most fishing effort has been at Necker Island under the harvest guideline regulations, although some fishing has occurred at Maro Reef and other locations in the NWHI. Catch rates (total and kept) are shown in Figure 4. Total CPUE (total number caught per trap haul) has been stable over the past 4 years. Kept CPUE rose in 1996 and 1997 due to the change in regulations to a retain-all fishery.

FISHING EFFORT

Nine vessels participated (out of 15 permits) in 1997, the most since 1992. Fishing effort in 1997 (as measured by trap-hauls) was also the highest since 1992 (Table 5 and Figs. 5a, 5b). However, vessels fished for only 20 days each, the shortest time in the fishery's history. This represents some significant cost constraints associated with a fleet-quota fishery. Similarly, the trap-hauls per vessel were the lowest on record. Because the lobster fishery has had seasons as short as 1 month in the 1990s, all NWHI lobster vessels now participate in other fisheries during other periods of the year. These include the Hawaii-based domestic longline fishery and the

²Catch rate comparisons between years became more difficult with the implementation of the retain-all regulations in 1996. The only comparable figures based solely on logbook figures are total catch which includes both legal, sublegal, and berried lobster for the earlier years and total kept and total discarded for later years. Differences in catch rates by species should reflect differences between trips (or sets) targeting spiny and those targeting slipper lobster. However this has proven to be difficult to achieve using standard statistical techniques.

³Tables 1 and 2 contain revisions and updates from Clarke, Pooley, et al., 1988; Clarke, 1989; Landgraf et al., 1990; Dollar and Landgraf, 1992; and Dollar, 1995.

NWHI bottomfish fishery, as well as fisheries on the mainland U.S. and in other countries.

ECONOMIC INFORMATION

During 1995-97, as in most of the previous years, frozen lobster tails represented the predominate product of the NWHI lobster fishery and accounted for the largest source of income (approximately two-thirds of total sales by weight and value). Live lobster is more important in the current fishery than in the past, many of which were exported to Japan, Taiwan, and Hong Kong. Some live lobster is also sold in upscale restaurants in Hawaii, particularly in tourist resort areas.

Changing market conditions greatly influence the price and salability of seafood products. During 1993-95 there was a significant shortage of frozen Hawaii lobster tails due to the fishery closures. Market conditions and prices in 1996 and 1997 were quite good (and there was relatively little discounting by size or species). Ex-vessel price (all product forms) trends is shown in Figure 6.

Brokers said that the 1993-95 closures hurt the Hawaii lobster product both locally and in mainland U.S. markets since the lobsters are no longer available on a timely and consistent basis in the quantities and sizes preferred by restaurants and other retailers. Because of this, several brokers have stopped handling Hawaii lobster products. In general, almost everyone in the industry was unhappy with the impact of the seasonal and full-year closures on the market for Hawaii lobsters. Therefore, the return of substantial quantities in 1996 and 1997 was well received.

Economic information on landings by product type are summarized in Table 6. Some information is not reported in these tables due to confidentiality restrictions (the number of sellers or buyers was less than three).

Average spiny lobster frozen tail prices were \$15-\$18 per pound in 1995-97, and slipper lobster tail prices were \$10-\$11 per pound. Live spiny lobsters were \$9-\$10 per pound, and live slipper lobsters were \$7-\$8 per pound.

The 1996 and 1997 fishing seasons were mixed from an economic point of view. Ex-vessel revenue was \$10.79 per trap haul (1996-97 average), the highest in the history of the fishery in both nominal and inflation-adjusted terms (Fig. 7). This represents a lower number of trap hauls per set than usual and the value of live lobster: price per lobster was highest in 1996 but total CPUE was highest in 1997 (due to the targeting of slipper lobsters on some banks). On average, vessels received \$225,000 per trip in ex-vessel revenue.

Representative cost of operations figures were not available, but economic conditions have changed dramatically since the 1980s, and largely not for the better. The short seasons mean that fixed costs and equipment must be amortized over a shorter time horizon. Similarly, since the number of fishing days per trip is much lower

than in the mid-1980s, travel costs (and time) are a higher percentage of total costs. Fleet fishing operations occur at the same time and frequently in the same place (as indicated by the 1996 fishing season where all five vessels operated at Necker Island). Participation in alternative fisheries must also weigh heavily in the decision about participation in the NWHI lobster fishery. Although crew availability may improve because of the short season, limited returns to the crew may also restrict the labor pool from which crew can be attracted. Collectively these economic factors, as well as the uncertainty of the forthcoming year's harvest guideline, make the rebound in the Hawaii lobster fishery not entirely the bonanza it appears.

Average statistics hide dramatic differences in per vessel returns. A simple analysis of the vessels which operated in 1996 and 1997 shows the following range in basic operating characteristics between vessels in each of the past 2 years (Table 7). Although almost all vessels fished within a day or two of the maximum number of days in the season each year (as shown by the very low coefficient of variation), there was substantial differences between vessels in trap hauls per set (22.9% coefficient of variation). Not surprisingly, when there was more competition for the quota in 1997 (more vessels fishing), trap hauls per set increased and variation decreased. Despite the increased interest in live lobsters, which in general take special handling, vessels on average were forced to fish to their operating capacity.

HARVEST GUIDELINE

The Laboratory's Stock Assessment Investigation estimates the annual exploitable lobster population which is used by the NMFS SWR director to issue a harvest guideline for the year. The guideline is to be announced annually in the *Federal Register* by March 31.

The harvest guidelines for 1995-97 were:

Harvest Guideline	
Year	Number of spiny & slipper lobsters combined
1995	38,300
1996	185,000
1997	310,000

In the 1995 experimental permit fishery, a NMFS observer was on board the one vessel permitted to operate. In 1996 and 1997, NMFS scientists extensively sampled the landed product (DiNardo, 1997). In 1997, NMFS observers were on board six of the lobster vessels.

The NOAA research ship *Townsend Cromwell* also undertook handling mortality studies in 1996 (DiNardo and Haight, 1996) during its annual stock assessment cruise. Stock assessment cruises were also conducted in 1995 and 1997. The *Townsend Cromwell* is scheduled for two lobster research cruises in 1998 to acquire more life history information on lobsters throughout the NWHI archipelago.

ENDANGERED AND THREATENED SPECIES INTERACTIONS

Summaries of interactions with endangered and threatened species in the NWHI lobster fishery are based on information received from the daily lobster catch reports and are outlined in Table 8.

These data are as reported by the lobster fishermen in the logbook's protected species section. Fishermen may see greater numbers of protected species than are indicated in the catch reports. Observer data should be used as the primary source of protected species interactions.

FISHERY MANAGEMENT ACTIVITIES

The Council is the primary policy-making organization for the management of fisheries in the U.S. EEZ around American Samoa, Guam, Hawaii, the Northern Mariana Islands, and other U.S. island possessions in the Pacific. The Council prepares Fishery Management Plans (FMPs) and makes amendments to those FMPs for domestic and foreign fishing in the region. The FMP for crustaceans was implemented in 1983 and has been amended nine times as conditions in the fishery have changed (Table 9).

During the 1996 and 1977 lobster fishing seasons, the PIAO received lobster catch and effort data reported by vessel operators through a daily call-in or VMS report. These data were used to forecast the close of the fishery. The close of the fishery was announced 5 days in advance via VMS technology and other ship-to-shore contacts. The season was closed on July 26 in 1996 and July 22 in 1997.

PERMITS

In 1991, a limited entry program for the NWHI lobster fishery was established under FMP Amendment 7 which imposed a limit of 15 permit holders at any time.

Permits could be transferred or sold; however, no one individual, partnership, or corporation is allowed to hold a whole or partial interest in more than one permit, except for any person who qualified initially for two or more permits.⁴ A permit must be registered to a vessel in order for the vessel to fish in the NWHI lobster fishery (Crustaceans Permit Area 1).

Between 1991 and 1997, there were 20 permit transfer actions (Table 10). By 1997, fewer than half of the permits that were issued in 1991 were still held by fishermen who initially had qualified for and were issued limited entry permits.

Although the value of the permits transferred is not recorded by NMFS, dockside reports indicate values ranging from \$40,000 to over \$100,000 over the past 2 years. Permit prices roughly represent the economic rent available from the fishery, and hence represent a *future* on the condition of the lobster population and lobster market conditions.

ACKNOWLEDGMENTS

Mr. Alvin Z. Katekaru of PIAO provided information on regulatory and administrative details during this period. We would also like to thank Honolulu Laboratory editorial staff for their assistance in completing this report.

⁴ Final rule implementing FMP Amendment 7 (*Federal Register* Vol. 57, No. 59, March 26, 1992, 10437-10442)

REFERENCES

Clarke, R. P.

1989. Annual report of the 1988 western Pacific lobster fishery. Southwest Fish. Cent. Honolulu Lab., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Southwest Fish. Cent. Admin. Rep. H-89-5, 28 p.

Clarke, R. P., and S. G. Pooley.

1988. An economic analysis of Northwestern Hawaiian Islands lobster fishing vessel performance. U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-SWFC-106, 46 p.

Clarke, R. P., S. G. Pooley, P. A. Milone, and H. E. Witham.

1988. Annual report of the 1987 western Pacific lobster fishery. Southwest Fish. Cent. Honolulu Lab., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Southwest Fish. Cent. Admin. Rep. H-88-5, 48 p.

Clarke, Raymond P., Stacey S. Yoshimoto, and Samuel G. Pooley.

1992. Bioeconomic analysis of the Northwestern Hawaiian Islands lobster fishery. *Marine Resource Economics*. 7: 115-140.

DiNardo, G. T.

1995. Alternative harvest guidelines for the Northwestern Hawaiian Islands lobster fishery. Manuscript prepared for the Western Pacific Regional Fishery Management Council. NMFS Honolulu Laboratory.

1997. The extent of lobster discarding during the 1996 Northwestern Hawaiian Islands commercial lobster fishery and its effect on the Amendment 9 harvest guideline system. Honolulu Lab., Southwest Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Southwest Fish. Cent. Admin. Rep. H-97-01, 27 p.

DiNardo, G.T. and W.R. Haight.

1996. Estimates of lobster handling mortality associated with the Northwestern Hawaiian Islands lobster trap fishery. Honolulu Lab., Southwest Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Southwest Fish. Cent. Admin. Rep. H-96-03. 7 p.

DiNardo, G. T., W. R. Haight, and J. A. Wetherall.

1998. Status of lobster stocks in the Northwestern Hawaiian Islands, 1995-1997, and outlook for 1998. Honolulu Lab., Southwest Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Southwest Fish. Cent. Admin. Rep. H-98-05, 35 p.

Dollar, R. A.

1995. Annual Report of the 1994 western Pacific lobster fishery. Honolulu Lab., Southwest Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Southwest Fish. Cent. Admin. Rep. H-95-06, 33 p.

Dollar, R. A., and K. C. Landgraf.

1992. Annual report of the 1991 western Pacific lobster fishery. Honolulu Lab., Southwest Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Southwest Fish. Sci. Cent. Admin. Rep. H-92-10. 26 p.

Haight, W. R., G. T. DiNardo, and J. A. Wetherall.

1995. Status of lobster stocks in the Northwestern Hawaiian Islands, 1994. Honolulu, Lab., Southwest Fish. Sci. Cent., Natl Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Southwest Fish Sci. Cent. Admin. Rep. H-95-03, 17 p.

Landgraf, K. C., S. G. Pooley, and R. P. Clarke.

1990. Annual report of the 1989 western Pacific lobster fishery. Honolulu Lab., Southwest Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Southwest Fish. Cent. Admin. Rep. H-90-6, 30 p.

Polovina, J.J, and G.T. Mitchum.

1992. Variability of spiny lobster *Panulirus marginatus* recruitment and sea level in the Northwestern Hawaiian Islands. Fish. Bull. 90(3): 483-494.

1994. Spiny lobster recruitment and sea level: results of a 1990 forecast. Fish. Bull. 92(1): 203-205.

TABLES

Table 1.--Annual NWHI lobster landings and ex-vessel revenue (spiny and slipper lobsters combined) and vessel participation, 1977-1997.^e Data compiled by Year of Landing.^f

Year	Landings (Spiny & slipper lobsters combined) [Year of Landing]			Fishery participation [Year of Landing]	
	Number landed	Pounds (Whole weight) ^g	Revenue	Vessels	Trips
1977	57,000	72,000	\$209,000	5	14
1978	36,000	45,000	\$135,000	2	12
1979	79,000	100,000	\$320,000	2	6
1980	260,000	328,000	\$1,114,000	3	12
1981	618,000	780,000	\$2,730,000	10	25
1982	148,000	187,000	\$673,000	7	19
1983 ^h	175,300	220,000	\$621,000	4	19
1984	935,200	1,189,000	\$2,943,000	11	38
1985	1,940,200	2,369,000	\$5,888,000	16	62
1986	1,950,300	2,213,000	\$6,006,000	16	60
1987	805,000	965,000	\$3,972,000	11	38
1988	1,063,900	1,404,000	\$5,034,000	9	28
1989	1,166,000	1,470,000	\$6,295,000	11	33
1990	777,400	950,000	\$4,889,000	14	45
1991	146,100	183,000	\$1,028,000	9	19
1992 ⁱ	434,200	473,000	\$2,116,000	12	27
1993			Fishery Closed		
1994	131,000	159,000	\$835,000	5	5
1995 ^j	38,300	56,000	\$300,000	1	1
1996	185,200	211,000	\$1,268,000	5	5
1997	309,800	330,000	\$1,881,000	9	9

^eData from 1977-82 are estimates from NMFS Honolulu Laboratory's Fishery Monitoring and Economics Program (FMEP) shoreside monitoring; data from 1983-97 are from Federal logbooks and revenue reports compiled by FMEP. Detailed description of data sources on following page.

^fData are compiled either by Year of Landing (the year in which the vessel actually returned to port), or Year of Haul (the year in which the lobsters were actually harvested from the sea).

^gIncludes frozen lobster tails expanded to estimate whole weight (see accompanying notes).

^hNumber caught for 1983 is from logbook records only; landings are extrapolated to estimate the entire year.

ⁱIncludes some lobsters landed from fishing in 1993 when the fishery was officially closed.

^j1995 the fishery was officially closed. One vessel was allowed to operate under an experimental permit to assess the conditions of the stocks.

Source: NWHI lobster catch, effort, landings, and revenue data.

For 1977-82, data are estimates from NMFS Honolulu Laboratory shoreside monitoring of the growing NWHI spiny lobster fishery.

In 1983, the fishery management plan (FMP) for spiny lobsters prepared by the Western Pacific Regional Fishery Management Council (Council) was implemented by NMFS. The FMP required logbooks and revenue reports be filed by participating fishers. Because the regulations went into effect during the fishing year, NMFS Honolulu Laboratory staff made estimates of complete year catch, effort, landings, and revenue for 1983.

From 1983-95 logbooks specified legal, sublegal and berried (egg-bearing) categories for catch.

From 1984-87, size and condition regulations were limited to spiny lobsters, although reporting of slipper lobster catch was required. During this period, NMFS fishery monitoring staff convinced most participating fishers to record the amount of slipper lobster retained and discarded on a voluntary basis. However, the figures for released slipper lobsters may be particularly suspect during this period.

In 1988, size and condition regulations were applied to slipper lobsters.

Beginning in 1996, size and condition regulations were replaced with a retain all management regime: lobsters were recorded as kept or released following the format of the Federal logbooks for the U.S. domestic longline fishery in the western Pacific region. For NWHI lobster logbook reports prior to 1996, legal lobsters were recoded as kept, and sublegal and berried lobsters were recoded as released.

Data are compiled and report in both Year of Landing and Year of Haul summaries. In some years lobsters which were caught (hauled) in one year were landed shoreside in the following year (e.g., caught on the banks in November for a vessel returning to port in January). Year of Landing information is primarily of interest from a fisheries statistics and aggregate economics point of view (e.g., for inclusion in *Fisheries of the United States*) while Year of Haul information is primarily of interest from a stock assessment perspective.

Catch is reported in number of lobsters, either for individual species or combined. Landings are reported in both number and pounds.

Pounds are round weight (whole lobster) estimates from product categories listed in the revenue reports. Spiny lobster tails are estimated to be 35.6% of round weight; slipper lobster tails are estimated to be 33.3% of round weight.

Trap-hauls are the basic level of fishing effort, representing the setting, soaking, and hauling of the lobster traps. Multiple and partial day sets are unusual in this fishery. Data reported here are not corrected for duration of set.

CPUE (catch-per-unit-effort) represents total lobsters caught per trap-haul or the number of lobster kept per trap hauls. Previous reports used the number of legal lobster caught (equivalent to the number of lobsters kept). In years before the retain-all regulation, the number of lobsters discarded may have been estimated by lobster vessel captains.

Revenue is reported on a per-trip basis. Some trips overlap years; some sales are delayed from one year to another. Revenue for those years is prorated to each year. Revenue frequently is obtained by fishermen over a period of time (frequently several months) as frozen product is sold from storage. As a result, revenue from one year's fishing may be reported from a subsequent year.

Table 2.--NWHI lobster fishing effort (trap-hauls) and catch & catch rates by species, 1983-1997.

Data are from Federal logbooks and revenue reports compiled by the NMFS Fishery Monitoring and Economics Program. Year of Haul.^a

Year	Trap-hauls	Total catch spiny and slipper lobsters combined		Retained (kept) spiny and slipper lobsters combined		Spiny lobsters		Slipper lobsters	
		Total no. caught	Total CPUE ^b	No. kept	Kept CPUE	Total no. caught	Total CPUE	Total no. caught	Total CPUE
1983 ^c	64,700	243,700	3.77	175,300	2.71	218,100	3.37	25,600	0.40
1984	371,400	1,279,000	3.44	948,200	2.55	991,000	2.67	288,000	0.78
1985	1,040,500	2,739,100	2.63	2,034,200	1.96	1,490,100	1.43	1,249,000	1.20
1986	1,293,100	2,475,500	1.91	1,848,800	1.43	1,293,700	1.00	1,181,800	0.91
1987	806,200	1,216,200	1.51	802,200	1.00	727,300	0.90	488,900	0.61
1988	841,800	1,566,400	1.86	1,061,800	1.26	1,281,700	1.52	284,700	0.34
1989	1,068,100	1,821,100	1.71	1,165,500	1.09	1,481,000	1.39	340,100	0.32
1990	1,182,500	1,546,300	1.31	777,400	0.66	1,236,400	1.05	309,900	0.26
1991	297,300	402,500	1.35	166,800	0.56	352,600	1.19	49,900	0.17
1992	683,700	850,400	1.24	413,600	0.60	607,700	0.89	242,700	0.36
1993	Fishery Closed								
1994	168,500	270,100	1.60	131,000	0.78	185,300	1.10	84,800	0.50
1995	64,200	101,200	1.58	38,300	0.60	89,700	1.40	11,500	0.18
1996 ^d	115,300	187,600	1.63	185,200	1.61	165,200	1.43	22,400	0.19
1997	177,700	310,200	1.75	309,800	1.74	175,800	0.99	134,400	0.76

^aSee detailed notes following Table 1.

^bCatch-Per-Unit-Effort (number of lobsters per trap-haul). Kept CPUE is number of lobsters retained per trap-haul. Total CPUE includes lobsters kept (previously termed legal and lobsters discarded (including sublegal or berried during the period of size and condition restrictions). Lobsters discarded may be estimated, rather than counted.

^c1983: Data for 1983 reflect only the 9 months in which logbooks were required.

^d1996: A retain-all regulatory regime began in 1996. Size limits and prohibition on landing berried female lobsters removed in 1996 and for subsequent years.

Table 3.--Annual NWHI lobster landings and prices by species, and total revenue, 1983-97.

Data are from Federal revenue reports compiled by the NMFS Fishery Monitoring and Economics Program.
Compiled by Year of Landing.

Year	Spiny lobster			Slipper lobster		
	Pounds	Price per pound ^a	Price per lobster	Pounds	Price per pound	Price per lobster
1983 ^b	203,000	\$2.91	\$3.75	17,000	\$1.78	\$1.69
1984	935,000	\$2.66	\$3.73	254,000	\$1.78	\$1.69
1985	1,437,000	\$2.94	\$4.42	932,000	\$1.78	\$1.69
1986	1,149,000	\$3.23	\$4.14	1,064,000	\$2.16	\$2.18
1987	528,000	\$4.68	\$6.26	437,000	\$3.44	\$3.66
1988	1,218,000	\$3.66	\$5.01	186,000	\$3.12	\$3.32
1989	1,267,000	\$4.44	\$5.96	203,000	\$3.29	\$3.00
1990	784,000	\$5.51	\$7.31	166,000	\$3.44	\$3.06
1991	150,000	\$6.06	\$7.97	33,000	\$3.55	\$3.68
1992	319,000	\$5.20	\$6.27	154,000	\$2.97	\$2.71
1993	Fishery Closed					
1994	113,000	\$5.92	\$7.86	46,000	\$3.62	\$3.63
1995 ^c	52,000	\$5.92	\$7.86	4,000	\$3.62	\$3.63
1996	191,000	\$6.24	\$7.31	20,400	\$3.77	\$3.44
1997	211,000	\$6.76	\$8.14	119,000	\$3.82	\$3.38

^aPrice per pound is estimated whole (round) weight from both live, frozen whole, and frozen tail product forms.

^b1983-85: Slipper lobster revenue and prices are estimated for these years.

^c1995: Landings (pounds), price per pound, and revenue figures for 1995 are estimated using 1994 average weights per piece and average prices (due to confidentiality nondisclosure).

Table 4.--Annual fishing effort (fleet days fished and trap-hauls) and total catch-per-unit-effort (CPUE) for spiny and slipper lobsters by area in the NWHI, 1995-97. Data compiled by Year of Haul.

1995 ^a			Total CPUE	
			Spiny lobster	Slipper lobster
Area	Fleet days fished	Trap-hauls	Total	Total
Necker	35	36,213	1.95	0.11
All other	28	28,008	0.69	0.27
Total	63	64,221	1.40	0.18

1996			Total CPUE	
			Spiny lobster	Slipper lobster
Area	Fleet days fished	Trap-hauls	Total	Total
Total ^b	118	115,340	1.43	0.19

1997			Total CPUE	
			Spiny lobster	Slipper lobster
Area	Fleet days fished	Trap-hauls	Total	Total
Necker	117	113,861	1.33	0.18
All other	62	63,851	0.36	1.77
Total	179	177,712	0.99	0.76

^aThe fishery was closed by regulation in 1995: one vessel fished under and experimental permit.

^bOnly one vessel fished outside of Necker Island.

Table 5.--Annual fishing effort (vessels, trips, fishing days, fishing days per vessel, and trap-hauls) for the NWHI lobster fishery, 1983-97. Compiled by Year of Haul.

Year	Vessels	Fleet trips	Fleet fishing days	Fishing days/vessel	Total trap-hauls	Trap-hauls/vessel
1983	4	19	273	68	64,700	16,175
1984	13	41	845	65	371,400	28,569
1985	17	66	1,738	102	1,040,500	61,206
1986	16	62	2,016	126	1,293,100	80,819
1987	11	40	1,211	110	806,200	73,291
1988	9	29	1,139	127	841,800	93,533
1989	11	33	1,309	119	1,068,100	97,100
1990	14	45	1,466	105	1,182,500	84,464
1991	9	21	433	48	297,300	33,033
1992	12	28	850	71	683,700	56,975
1993		----- Fishery closed -----				
1994	5	5	199	40	168,500	33,700
1995 ^a	1	1	63	63	64,200	64,200
1996	5	5	118	24	115,300	23,060
1997	9	9	179	20	177,700	19,744

^aThe fishery was closed by regulation in 1995. One vessel operated under and experimental permit.

Table 6.-- NWHI lobster landings, revenue, and price by product type and species, 1990-97. Data compiled by Year of Landing.^a

Year	Product form	Vessels	Trips	Spiny lobsters			Slipper lobsters		
				Pounds	Revenue	Price per pound (product weight)	Pounds	Revenue	Price per pound (product weight)
1990	Live	6	16	57,900	\$421,300	\$7.28	6,000	\$41,000	\$6.83
	Frozen Tailed	14	43	258,300	\$3,894,000	\$15.08	53,200	\$526,800	\$9.90
1991	Live	4	11	5,900	\$47,400	\$8.03	2,500	\$19,200	\$7.68
	Frozen Tailed	9	14	51,300	\$859,900	\$16.76	10,000	\$97,900	\$9.79
1992	Live	4	10	10,100	\$98,700	\$9.77	2,100	\$20,500	\$9.76
	Frozen Tailed	11	23	110,000	\$1,554,200	\$14.13	50,500	\$437,500	\$8.66
1993	----- Fishery Closed								
1994	Frozen Tailed	5	5	40,100	\$668,900	\$16.68	15,200	\$166,400	\$10.95
1995 ^b	Product Form data confidential in 1995 due to small number of vessels and buyers. ^c								
1996	Live	2	2	14,700	\$137,000	\$9.32			
	Frozen Tailed	5	5	62,900	\$1,054,000	\$16.76	6,800	\$77,000	\$11.32
1997	Product Form data confidential in 1997 due to small number of buyers.								

^aTrips may not sum to total across product forms since single trips can result in multiple product forms (e.g., live and frozen tails).

^bThe fishery was closed by regulation in 1995. One vessel fished under an experimental permit.

^cNOAA confidentiality restrictions require three or more business entities to be involved in an activity before any aggregate information on that activity can be released.

Table 7.--Average NWHI lobster fishing vessel operating patterns, 1996 and 1997. Data compiled by Year of Haul.

		1996	1997
Trap hauls per trip	Average	23,068	19,407
	Standard deviation	5,965	3,342
	Coefficient of variation	25.9%	17.2%
Sets per trip	Average	23.6	19.8
	Standard deviation	1.1	1.3
	Coefficient of variation	4.8%	6.5%
Trap hauls per set	Average	971	980
	Standard deviation	222	135
	Coefficient of variation	22.9%	13.7%

Table 8.--Protected species interactions, 1995-97. Data compiled by Year of Haul.

Type of interaction	1995	1996	1997
Observed in area			
Monk seals	0	4	3
Turtles	0	2	0
Observed in vicinity of fishing gear			
Monk seals	0	0	1
Turtles	0	0	0

Protected species interactions as reported by commercial fishermen on Federal logbooks. No direct interaction with protected species was recorded by fishermen or by NMFS observers.

Table 9.--NWHI lobster fishery regulations (FMP, amendments, and major administrative actions), 1983-97.

Year	FMP or Amendment	Primary Regulatory Effect ^a
1983	FMP takes effect (3/8/83)	Permits, logbooks, legal sizes, and trap dimensions
	Amendment 1	Adopt State of Hawaii measures in EEZ around main Hawaiian Islands
	Amendment 2	Limit the size of trap entrances
1985	Amendment 3	Redefine minimum size by tail width and set smaller minimum size
1986	Amendment 4	Prohibits capture of slipper lobster in refugia
1987	Amendment 5	Minimum size for slipper lobster; require escape vents in traps
1990	Amendment 6	Defines overfishing as Spawning Stock Biomass per Recruit
1991	Amendment 7	Limited access system; adjustable annual harvest quota; closed season
1993	Emergency closure	Fishery closed for entire year
1994	Emergency closure	Fishery closed following in-season revision (decrease) in harvest quota
	Amendment 8	Revision to limited access system (removal of two-year use-lose requirement)
1995	Fishery closed	one vessel operates under experimental (exploratory) permit (with observer)
	Amendment 9	Revised annual harvest guideline; elimination of in-season adjustment to quota; removal of minimum size and condition restrictions. A regulatory "framework" procedure was implemented to ease annual regulatory changes.
1996		Risk-based management system (Amendment 9) replaces original quota system; optional retention of all sizes; small quota.
1997		Normal operations; "normal" harvest guideline (quota); observers on most vessels; VMS used by all vessels.

^aThis table should not be viewed as a substitute for the detailed Federal regulations implementing these and additional measures in the fishery.

Table 10.--NWHI lobster fishery limited access permit holders & transfer profile 1991-97.

Initial Permit Holder -- F/V (vessel)	1992	1993	1994**	1995	1996	1997 Current Holder
Pacific Seafoods Inc F/V Bounty						Pacific Seafoods Inc F/V Pacific Dream
Pacific Seafoods Inc F/V Cornucopia						Pacific Seafoods Inc F/V Pacific Pride
Pacific Seafoods Inc F/V Miss Jessico						Pacific Seafoods Inc F/V Miss Jessico
J. Ray F/V Archer						J. Ray No Vessel
Parker Seafoods Inc F/V Sea Spray						Parker Seafoods Inc F/V Sea Spray
Marie M Corp F/V Marie M			→			Viking V. Inc F/V Marie M
K. Knutsen & D. Gunn F/V Aleutian Spray						K. Knutsen & D.Gunn F/V Aleutian Spray K. Knutsen F/V Aleutian Spray
Shaman Inc F/V Shaman →	Pacific Winds Inc → F/V Haida		J. Johnson No Vessel			J. Johnson No Vessel → BEL Leasing Inc No Vessel
Ka'upu Ltd F/V Laysan →	CKM Inc → F/V Petite One		Ka'upu Ltd F/V Petite One			Ka'upu Ltd F/V Petite One
Blue Hawaii Enterprise Inc F/V Haida →	G. Johnson → F/V Ocean Challenger		Blue Hawai Enterprise → F/V Fortuna	J. Burr No Vessel		J. Burr No Vessel
DGA Inc F/V Dominis			→	Hawaii Protective Assoc No Vessel		Hawaii Protective Assoc No Vessel
Yochum Trust F/V Liberty			→	J.H. Prescott No Vessel →		D.M. Prescott No Vessel
Lusty Voyages Inc F/V Lusty			→	J. Hebert No Vessel →		Lusty Voyages Inc No Vessel → D.Gunn/D. Williscroft F/V Sea Venture

Initial Permit Holder -- F/V (vessel)	1992	1993	1994**	1995	1996	1997 Current Holder
Dragon Fishing Co F/V Magic Dragon			→	K. Bowyer No Vessel	→	Katrianna Pacific Corp F/V Paradise Queen II
G. Nabeshima F/V Betty N					→ R. Enslow - No Vessel → P. Sakuda - No	Vessel Mgmt Assoc F/V Katy Mary

** = No permits were transferred during 1994 → = permit transferred to

FIGURES

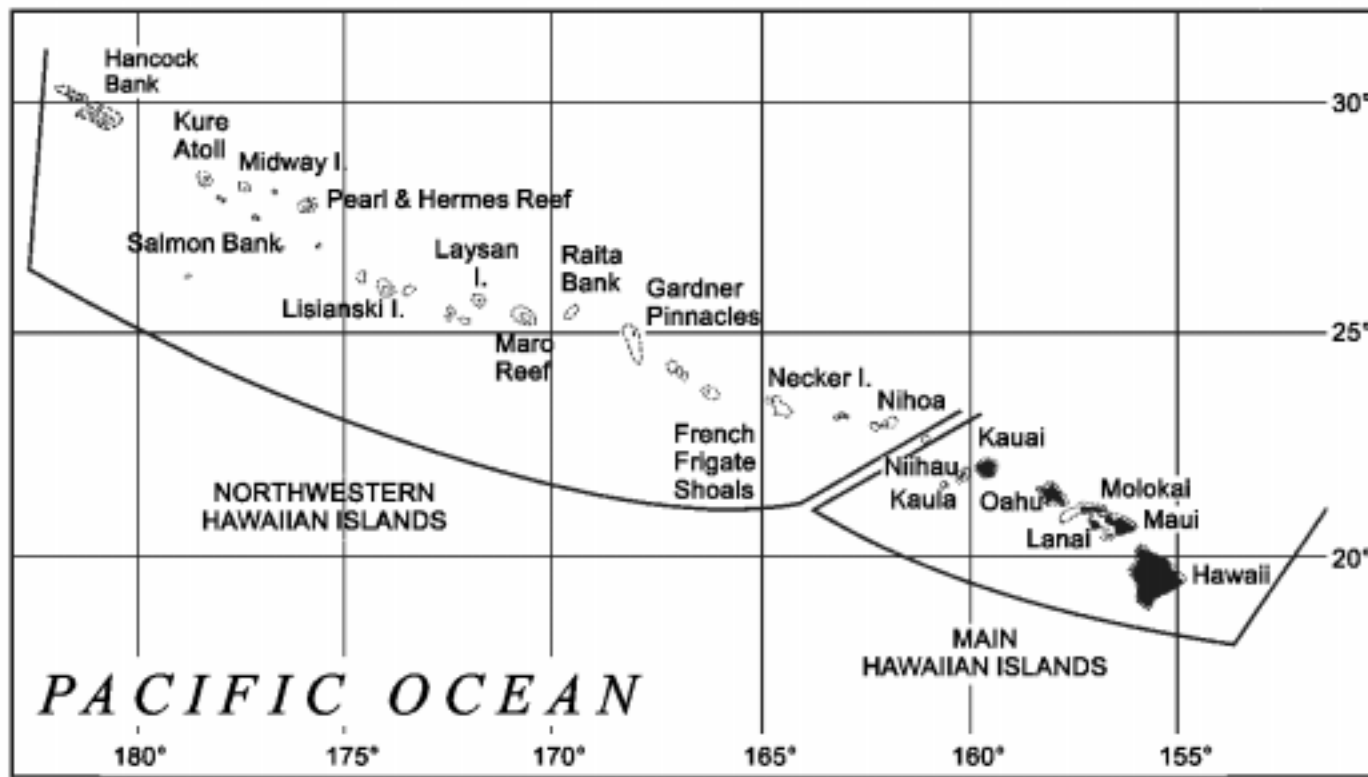


Figure 1.--Map of the Northwestern Hawaiian Islands (NWHI).

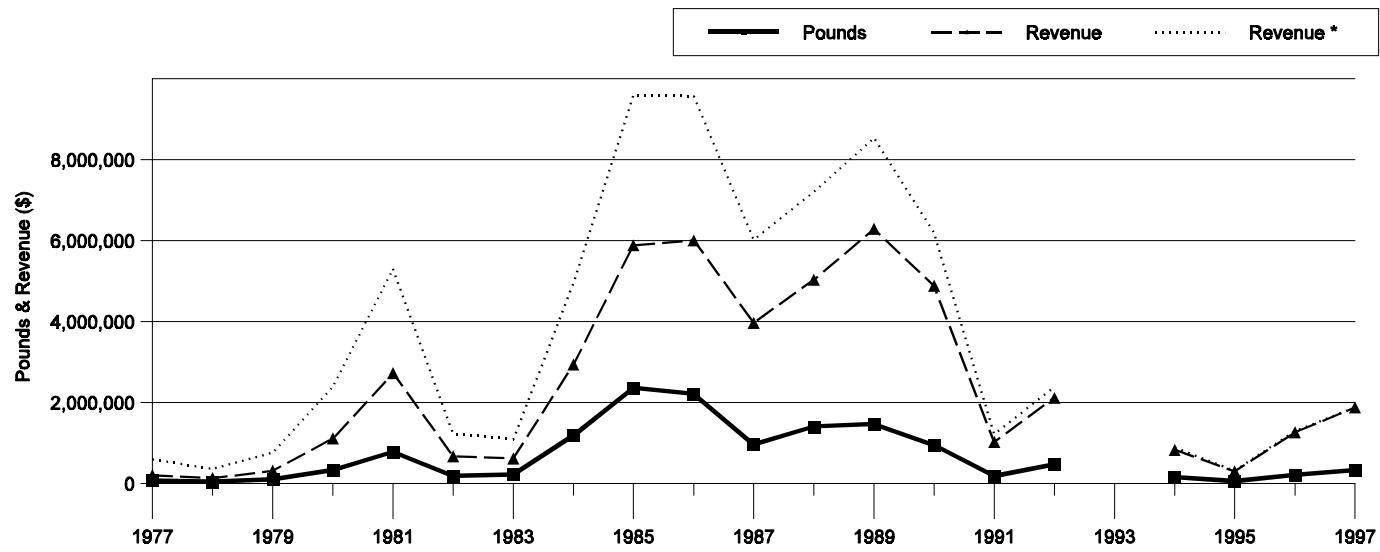


Figure 2.--NWHI lobster landings (whole pounds) and ex-vessel revenue (nominal & inflation-adjusted [*]), 1977-97. Compiled by year of landing.

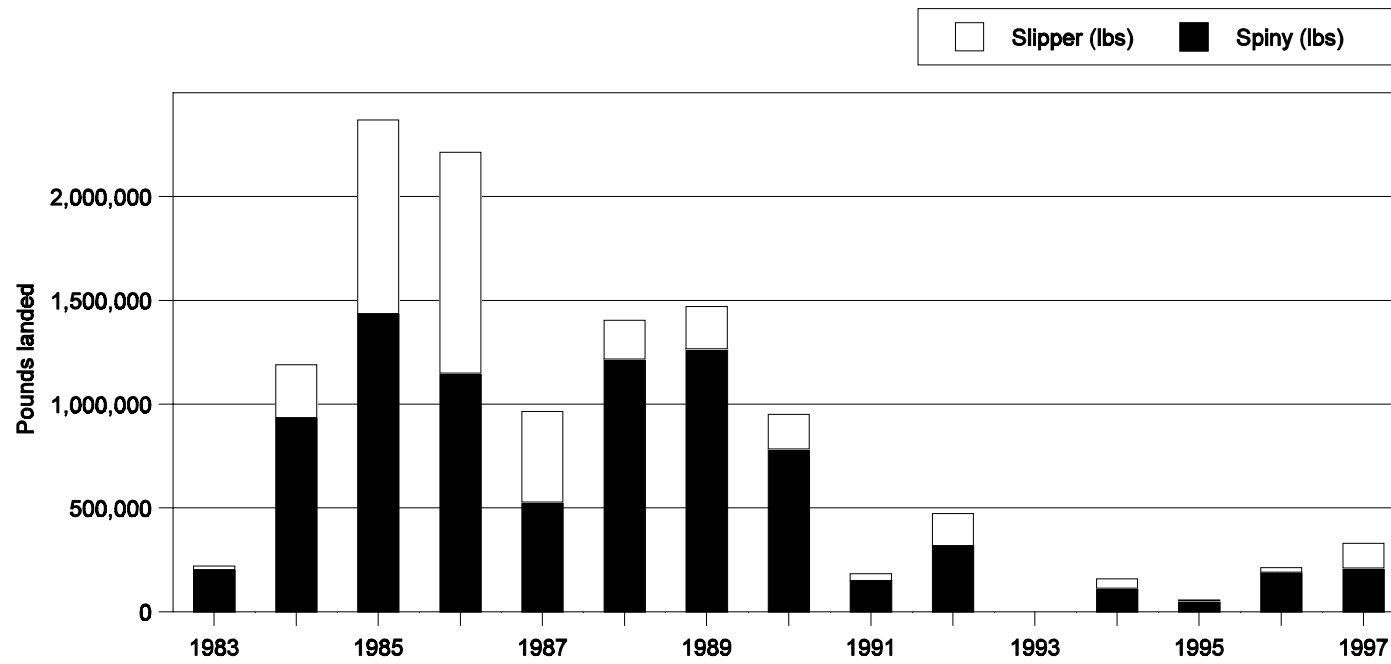


Figure 3.--NWHI landings (pounds, whole weight) of spiny and slipper lobsters, 1983-97. Compiled by year of landing.

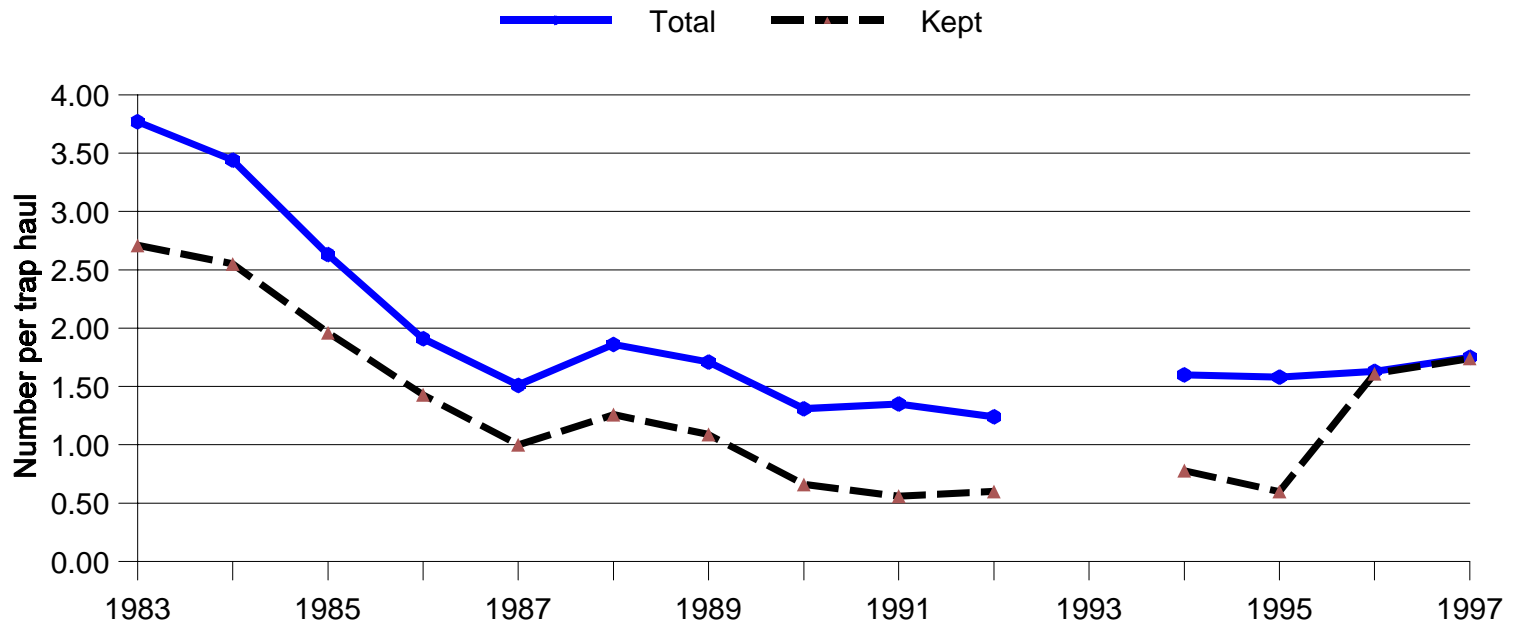


Figure 4.--NWHI lobster fishery catch rates (total and kept), 1983-97. Compiled by year of haul.

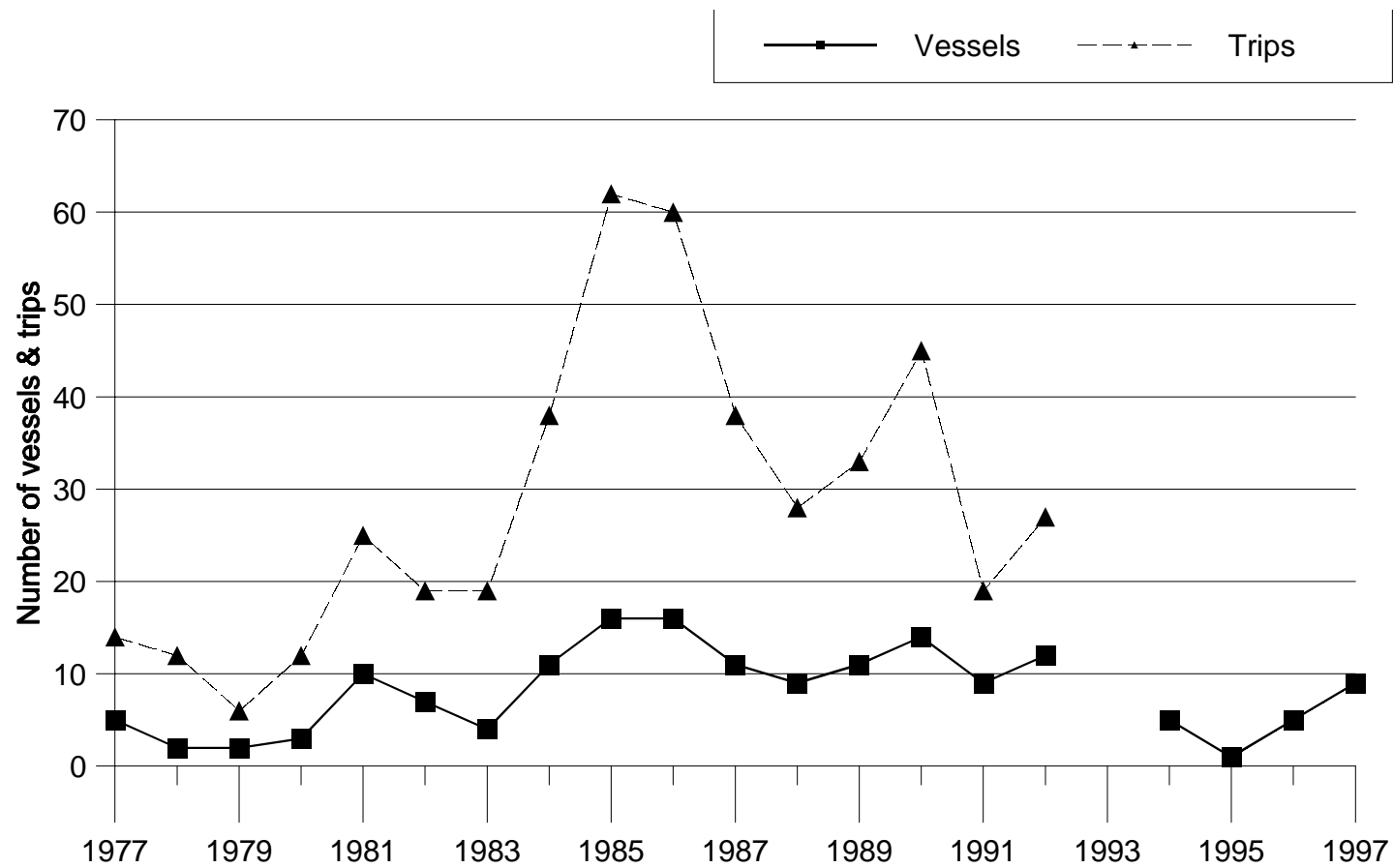


Figure 5a.--NWHI lobster fishery participation (vessels and trips), 1977-97.^b Compiled by year of landing.

^bNumber of vessels and trips coincide for 1995-97.

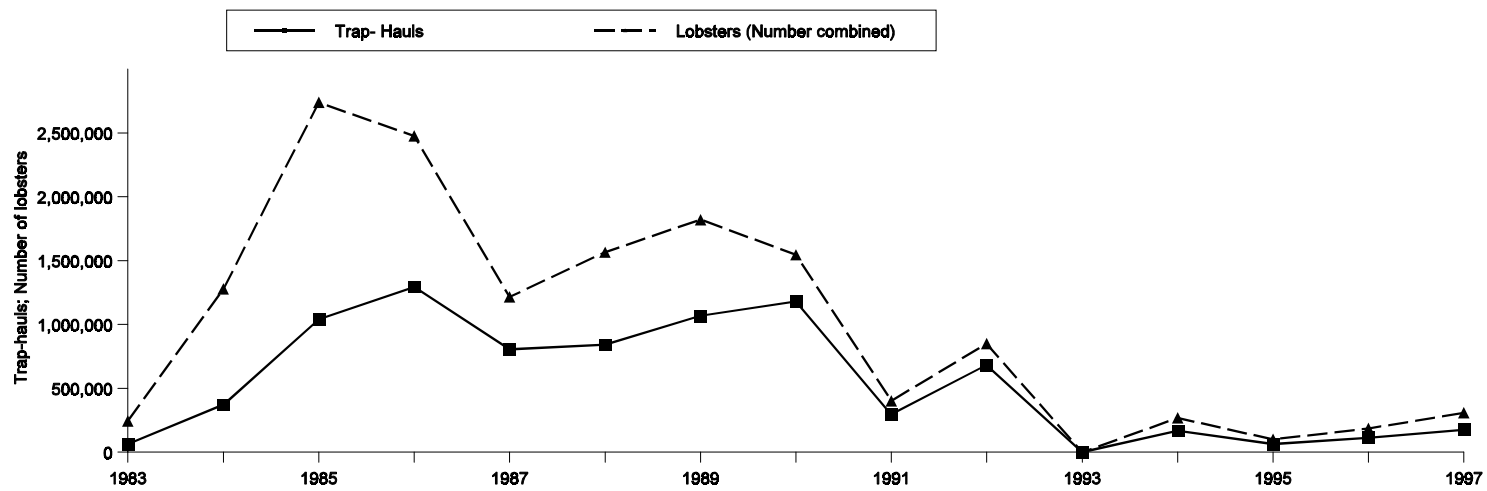


Figure 5b.--NWHI lobster fishing effort (trap-hauls) and catch (number of spiny and slipper lobsters, combined) , 1983-97. Compiled by year of haul.

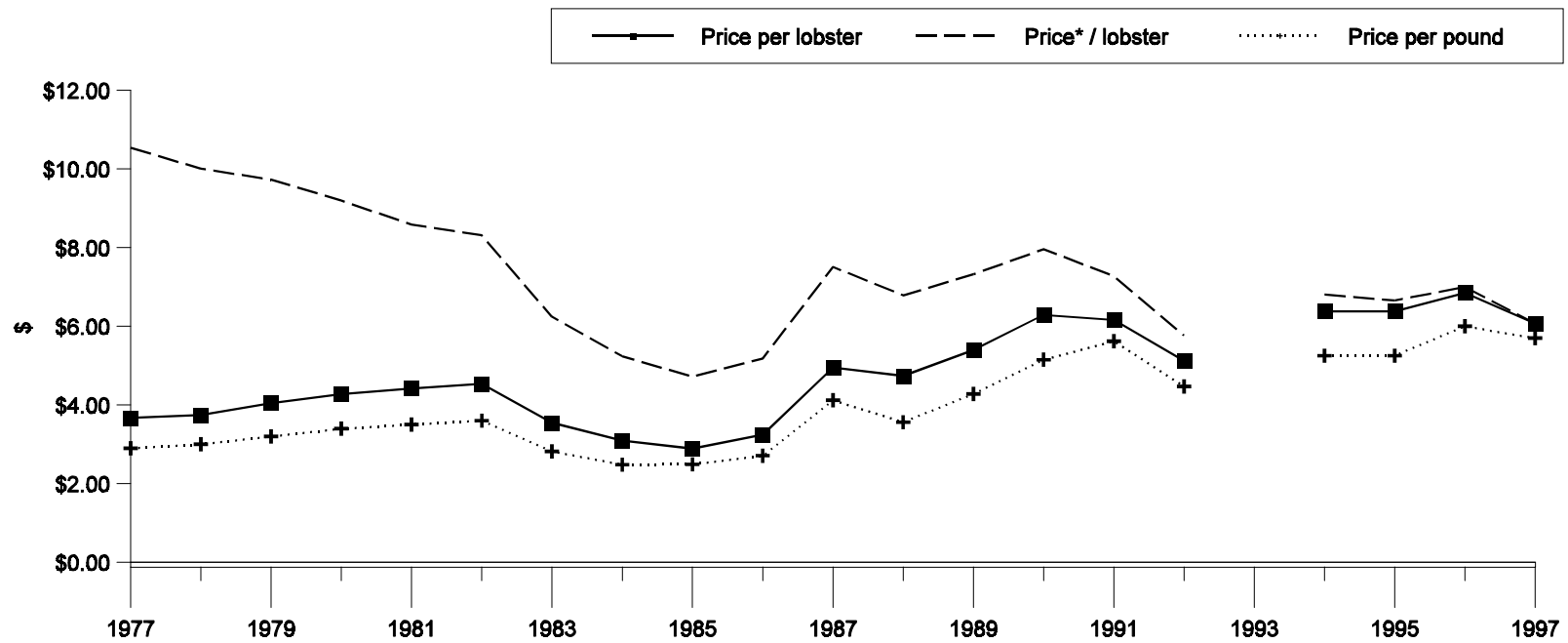


Figure 6.--NWHI lobster fishery average ex-vessel prices (per lobster [nominal and inflation-adjusted {*}], and per pound [nominal]), 1977-97. Compiled by year of landing.

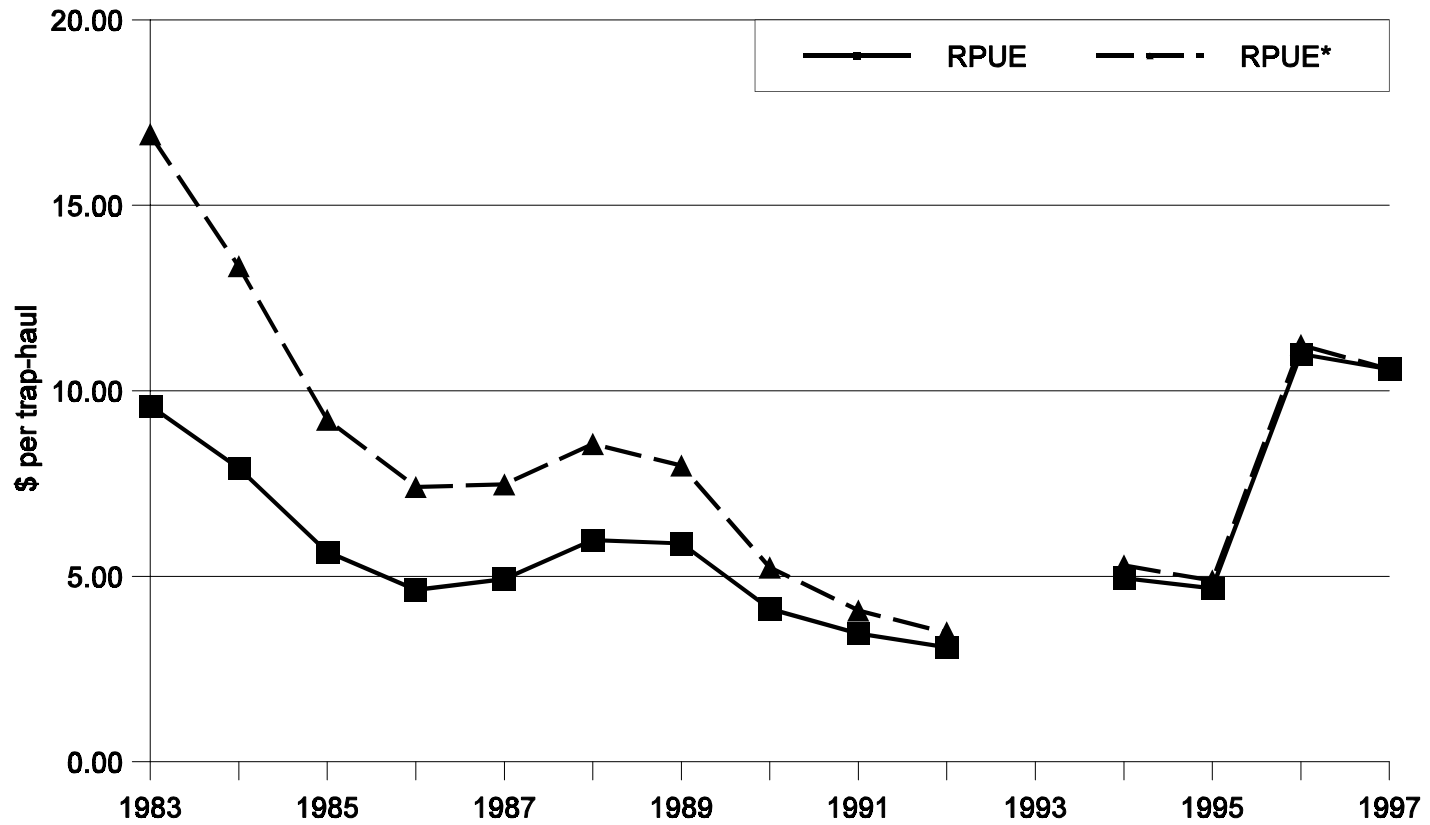


Figure 7.--NWHI lobster fishery, revenue per trap haul (nominal [RPUE] and inflation-adjusted [RPUE*]), 1983-97. Compiled by year of haul.