

PRELIMINARY RESULTS OF LOBSTER TRAPPING
IN NORTHWESTERN HAWAIIAN ISLANDS WATERS

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INTRODUCTION

Since mid-1975, the National Marine Fisheries Service's, Southwest Fisheries Center at Honolulu has been engaged in a program to assess quantitatively, the marine resources in waters surrounding the Northwestern Hawaiian Islands (NWHI). The islands, often called the "Leeward Islands," stretch for over 1,000 miles (1,850 km) northwestward beyond the island of Kauai in the major Hawaiian group.

At present, there is a great urgency to know a great deal more about the marine resources of the NWHI. The State of Hawaii, pressed with a growing demand for assessment and rational utilization of its marine resources, recognizes the vital importance of the sea to its economic growth and has fostered a program of harvesting the marine resources of the waters surrounding the entire Hawaiian chain (State of Hawaii 1969, 1974).

Among the preliminary results obtained after four survey cruises to the NWHI was that there is probably a large, unutilized resource of two species of spiny lobsters, Panulirus marginatus and P. penicillatus, both of which are of great importance in the sport and commercial fisheries of Hawaii. This report presents some of the results that were obtained during our survey cruises.

DESCRIPTION OF TRAPS USED

Two types of traps have been used to capture the major portion of the lobsters during the survey cruises. One is actually a

Hawaiian-type fish trap which, in waters around Oahu, is used primarily to capture fish; lobsters are usually caught incidental to this primary function. Early models of traps used measured 5' x 5' x 4' (1.5 x 1.5 x 1.2 m) and 2' x 2' x 4' (0.6 x 0.6 x 1.2 m) with one or two entrances, but recent survey cruises have switched to traps which are rectangular and measure 5' (1.5 m) long, 3' (0.9 m) wide, and 2' (0.6 m) high with two entrances either round and measuring 5.5" (14 cm) in diameter or oval and measuring 5" (12.7 cm) along the short axis and 9" (22.9 cm) along the long axis. Construction consists of 1" (2.5 cm) square mesh galvanized wire stretched over a 0.5" (1.3 cm) reinforcing rod framework. The second type of trap used is the California two-chambered lobster pot which is rectangular, measures 3.1' (0.9 m) long, 2' (0.6 m) wide, and 1.4' (0.4 m) high, and occupies about a third as much space as the Hawaiian trap. The lobster pot has no reinforcing steel framework; construction consists simply of 2" x 4" (5.1 x 10.2 cm) heavy duty galvanized wire mesh. There are two outer conical entrances measuring 6.5" (16.5 cm) in diameter and another inner entrance of the same diameter between the two chambers which permits the lobsters entering the first chamber from the outside to enter the second chamber which is baited. Bait is placed in a 0.5" (1.3 cm) wire cage. All traps were weighted at the bottom with heavy-duty chains to maintain stability in strong currents and surges.

FISHING STRATEGY

Preliminary tests showed that the traps fished best at night. There were no catches from sets made in daylight hours. Set usually at 1700, the traps baited with 1-5 lb (0.4-2.3 kg) of chopped fish (mackerel, skipjack and yellowfin tunas, kawakawa, goatfish, pink snapper, wahoo, butterflyfish, surgeonfish, triggerfish, and pipefish) soaked overnight for 13-16 h in waters varying in depth from 16 to 65 fathoms (29.3 to 118.9 m). Retrieving lines of 0.5" (1.3 cm) polypropylene rope were attached to a plastic float marked with a flag.

CATCH RATES

Results from an early cruise using the 5' x 5' x 4' (1.5 x 1.5 x 1.2 m) and 2' x 2' x 4' (0.6 x 0.6 x 1.2 m) Hawaiian-type fish traps showed that lobster catches from various locales within the NWHI were quite variable. For example, the best catches occurred off Necker Island where 17 traps set in 16-31 fathoms (29-57 m) produced 160 P. marginatus or an average catch of 9.4 lobsters per trap. Closer examination of the data indicated that traps that fished deeper in 24-31 fathoms (44-57 m) of water produced the best catches. At a station north-northwest of Nihoa Island, 11 traps, fished in 24-26 fathoms (44-48 m) of water produced only 41 lobsters or an average catch of 3.7 lobsters per trap. At stations occupied near Pearl and Hermes Reef, Kure Atoll, Lisianski Island, Laysan Island, and Gardner Pinnacles, catches were relatively poor.

During the most recent cruise, lobster catches made by the 5' x 3' x 2' (1.5 x 0.9 x 0.6 m) Hawaiian fish trap and the California lobster pot were the best around Necker Island. Traps were used at each station in two pairs--one pair consisting of one of each of the two types of traps--and spaced 3 fathoms (5.5 m) apart. The distance between each station was 10 fathoms (18.3 m) and six stations constituted one set of 24 traps. Forty-five minutes were required to complete the set and 1.5-2 h needed to retrieve the traps on a power block.

Among the six sets made during the cruise, one set produced a spectacular 428 lobsters. At this particular set, the Hawaiian traps produced 229 lobsters or an average of 19.1 per trap. The California pot, being much smaller in size and total volume, yielded 199 lobsters or an average catch of 16.5 per trap. The maximum catch at one station, consisting of a string of 4 traps, was 106 lobsters or an average of 26.5 per trap. For individual traps, one Hawaiian trap yielded a maximum of 49 lobsters where the maximum for a California pot was 33 lobsters.

SIZE DISTRIBUTION

The lobsters taken on our survey cruises were generally small. Among lobsters taken in traps near Nihoa, Necker, Gardner Pinnacles, Laysan, and Kure, the females were considerably smaller than the males. For 71 females sampled, the weights varied between 0.4 and 2.5 lb (202 and 1,151 gm) and averaged 0.6 lb (256 gm). Among 128 male lobsters,

however, the range in weights was wider, varying from 0.4 to 3.0 lb (205 to 1,374 gm) and averaging 1.5 lb (692 gm).

On our most recent survey cruise, carapace lengths were measured and their distribution, by sex, is shown in Figure 1. Of 923 lobsters measured, 691 (74.9%) were males and 232 (25.1%) were females. Four-hundred and sixty-five (67.3%) of the males and 39 (16.8%) of the females caught were of legal size (minimum legal size in Hawaii is 1 lb or a carapace length 3.25" (8.25 cm)).

MISCELLANEOUS CATCHES

In addition to lobsters, both the Hawaiian trap and California pot caught a variety of fish, some commercially valuable on the Honolulu fresh fish market. On the early cruises, snappers, locally called "opakapaka," Pristipomoides microlepis, were caught in fair numbers on four occasions in the large traps that were fished at the shelf edge north of Necker Island in 24-31 fathoms (44-57 m) of water. Catches ranged from 10 to 17 lb (4.5 to 7.7 kg) per trap and average 11.9 lb (514 kg). Near Kure Atoll, one trap, fished at 26 fathoms (48 m) produced 40.5 lb (18.4 kg) of carangids, Caranx cheilio. Two traps out of 12 that were fished at Lisianski Island produced 35 and 105 lb (16 and 48 kg) of another species of carangid, Carangoides ajax.

On our most recent cruise this past fall, squat lobsters, Scyllarides squammosus, moray eels, blue-lined snappers, Lutjanus kasmira, opakapaka, P. microlepis, moano, Parupeneus multifasciatus,

malu, P. pleurostigma, squirrelfishes, Myripristis berndti, and a few other species were also taken in both types of traps.

CONCLUSION

It appears from our preliminary cruise results that at present, the best ground for lobster trapping is in waters around Necker Island. Catch rates were highest along the periphery of the bank near the upper slope zone in about 16 to 30 fathoms (29 to 55 m) of water. Our program of stock assessment in waters of the NWHI is continuing and we hope that in time we will be able to estimate the degree to which the lobster stock can be harvested.

LITERATURE CITED

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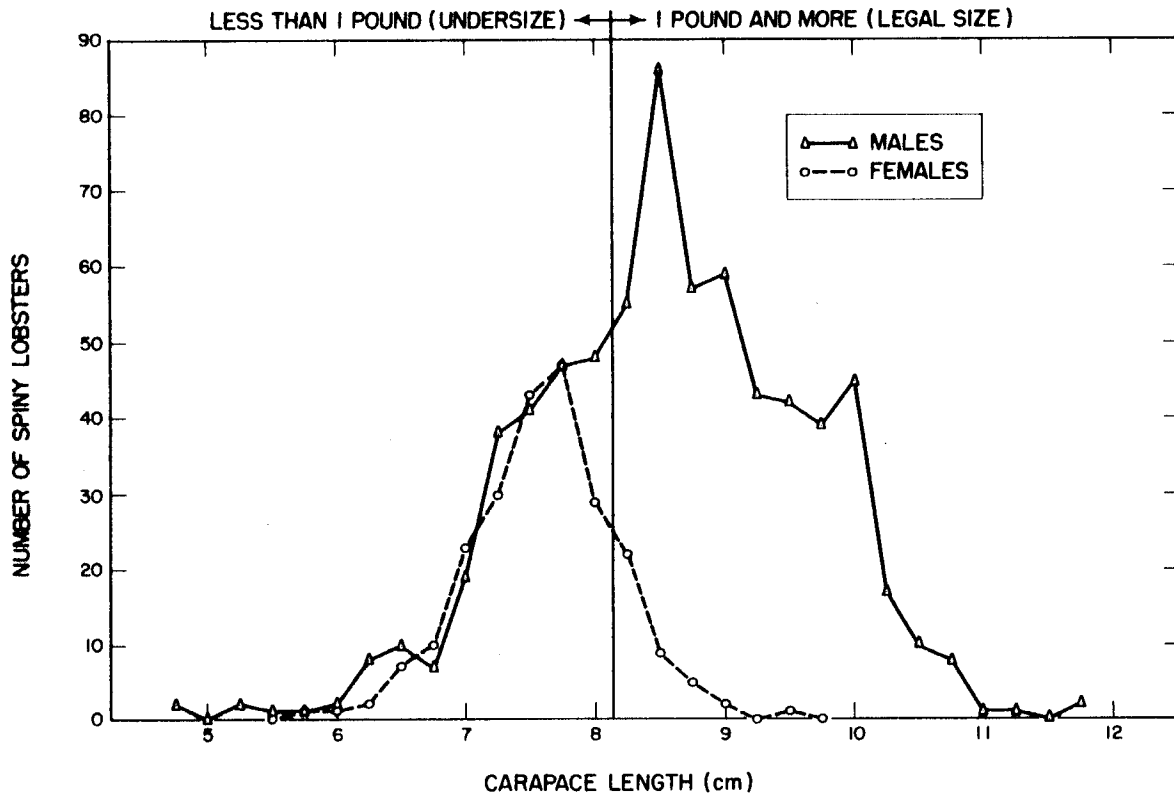


Figure 1.--Carapace length (cm) frequency of spiny lobsters, Panulius marginatus, caught trapping around Necker Island on Townsend Cromwell cruise 76-06-73 (October-November 1976).