

# SOUTHWEST FISHERIES CENTER

NATIONAL MARINE FISHERIES SERVICE

HONOLULU LABORATORY

P.O. BOX 3830

HONOLULU, HI 96812

September 1983

## PORPOISE / FISHERIES INTERACTIONS WITHIN THE HAWAIIAN ISLANDS

BARBARA A. KULJIS

49-139 Kam Hwy  
Kaneohe, Hawaii 96744

This report is used to insure prompt dissemination of preliminary results, interim reports, and special studies to the scientific community. Contact the Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, if you wish to cite or reproduce this material.

## PREFACE

This report was prepared under contract (83-ABA-00253) by Barbara A. Kuljis. The main objectives of the contract were to determine the distribution, frequency, and type of dolphin/fishery interactions occurring around the main Hawaiian Islands. A survey of Hawaiian fishermen was performed during October and November 1982, to assess this problem. Since this report was prepared under contract, the statements, findings, and conclusions herein are those of the contractor and do not necessarily reflect the view of the National Marine Fisheries Service.

William G. Gilmartin  
Leader, Marine Mammals and  
Endangered Species Program

September 30, 1983

## PROBLEM STATEMENT

The National Marine Fisheries Service Southwest Center, Honolulu Laboratory has recently become cognizant of the increasing adverse impact of porpoise/fishery interactions on the Hawaiian fishing industry. Generally, the overriding complaint of the Hawaiian fishing community concerns the removal of commercially valuable bait and catch from fishing gear by dolphins in a variety of fishing situations. This is not an isolated problem, it occurs in a number of locations including the west and east coasts of the United States as well as in Australia and involves both sea lions and porpoise. The first step in developing a method to ameliorate the situation is to determine the extent and type of interactions. Long term studies directed toward this goal have been or are being conducted on the west coast of the U.S. (Miller 1981, Demaster, 1982), but to date little work has been done in the Hawaiian Islands to ascertain the scope of the problem.

## BACKGROUND

In the past decade a number of field trips within the Hawaiian Islands have been conducted by the National Marine Fisheries Service in order to document the problem. These included three trips to the Kona coast of the island of Hawaii and two trips to the Waianae coast of the island of Oahu. These field observations revealed the following; live bait used by trollers were taken by Pacific bottlenose dolphins

(Tursiops gilli); bottom fish caught on handlines were removed from the hooks by the Pacific bottlenose (Iversen 1975); opelu (Decapterus macarellus) caught on handlines at night were taken by a species tentatively identified as the bottlenose dolphin (Peiterson 1982); opelu used as bait on longlines were removed by the rough toothed dolphin (Steno bredanensis) (Naughton 1981). While these facts are critical to begin to understand this fishery problem, the distribution and frequency of these interactions throughout the Hawaiian fishing area has not been fully determined.

There now exists a clear and present need for basic information concerning the various factors which comprise the porpoise/fishery interactions. This report summarizes information recently gathered from fishermen throughout the Hawaiian islands, which will help to define the problem.

## OBJECTIVES

The objective of the present study was to survey the Hawaiian fishing community in order to assess the impact of the porpoise/fishery interactions as they relate to the following:

- 1) Geographical distribution: Since the Hawaiian fishery is comprised of a number of islands, some with different species and quantities of cetaceans, is there any one area that is suffering more than another?
- 2) Fisheries most affected: Is one type of fishery affected more than another ?

- 3) Species of animal involved: Of the variety of cetaceans inhabiting Hawaiian waters, which species are impacting the Hawaiian Fisheries?
- 4) Incident Summary: Via what behavioral methods are various species of porpoise carrying out the act of removing bait/catch?
- 5) Seasonal and annual fluctuation: Has there been a marked increase or decrease in the number of interactions during the past decade, and is there any cyclic variation within an annual period?
- 6) Economic impact: What effect do these interactions have on the economics of the Hawaiian fishery?
- 7) Methods used to discourage the interactions: What approaches have local fishermen used to dissuade porpoise from removing bait/catch and how successful have they been?

#### APPROACH

Because of the reported magnitude and diversity of the fishery interactions, and the distribution of local fishermen within the fishery, personal and telephone interviews of fishermen were used as the most efficient means to obtain the required information within the short time frame of this contract. In order to be consistent a list of questions were compiled and used to conduct the interviews. The list was generated to cover all of the critical parameters involved in this fishery problem. A list of registered commercial fishermen was obtained from the National Marine Fisheries Service, Southwest Center's, Honolulu Laboratory and telephone interviews were selected from those names.

Personal interviews were conducted at local harbors, as well as at fisheries meetings throughout the islands during the contract period. A total of 94 interviews were conducted during the months of October and November of 1982. Thirty eight of these were personal interviews and the remainder were conducted via telephone. This sample represents 6% of Hawaii's registered commercial fishermen. All respondents were guaranteed anonymity in an attempt to eliminate any possible reluctance to respond to specific questions which may have involved illegalities under the current Marine Mammal Protection Act of 1972. Therefore, follow up interviews are not possible nor is querying respondents for more detailed information. An attempt was made to probe areas from which no complaints had been received as well as key areas that had been previously identified as problem areas. It is obvious that this technique did not produce a truly random sampling of Hawaii's registered fishermen, as it only covered those fishermen who attended the fishery meetings or who had listed telephone numbers, or who were present at the docks during the interview periods. These factors should be considered when interpreting the results presented here.

## RESULTS

The geographical representation consists of five major fishing areas within the state of Hawaii. They are: 1) the big island of Hawaii, 2) Maui, 3) Kauai, 4) Oahu, 5) Lanai-Molokai. The results presented here are first listed by island, with intra-island areas designated where appropriate, followed by a summary overview of the problem.

## HAWAII

This island consists of two major fishing areas, Hilo and Kona. Fishermen who indicated Kona as the area fished utilized the west coast of the island and extended seaward as far as 22 miles off shore to a floating platform known as the OTEC buoy. The Hilo fishermen usually fished the waters off the east to south east coast of the island. The two main fishing types in both areas were handlining and trolling.

In the Hilo area night handlining for ahi (Thunnus albacares) or bottom fishing for opakapaka or pink snapper (Pristipomoides filamentosus) were the predominant fishing types. The major complaint from this area was the loss of bait to porpoise. Few fish were caught when the dolphins were present so most fishermen resorted to pulling up gear for anywhere from 1/2 to 1 1/2 hours and waiting for the porpoise to leave the area. This technique worked; however, the fishermen not only lost time and bait, they also lost any fish that might have been hooked if baits could have been left on lines. The general feeling was that when a boat shut down the porpoise moved to another boat, and worked back and forth. Of the fourteen people interviewed in this area eleven were bothered by porpoise stealing their baits (mainly opelu, Decapterus macarellus). One of the fourteen interviewed lost his catch to porpoise but he had never had bait taken. His catch was generally snapper caught while using cut bait. Two skippers reported losses of both bait and catch to porpoise. Bait/catch thefts were reported to occur from 20 to 50% of the time spent fishing. Cetacean species identification was particularly difficult in these cases because most fishing was done at night. Nine of the fishermen felt that the porpoise interaction problem had increased



over the past four years and had become particularly bothersome in the past two years.

In the Kona area the two major fishing types were: 1) daytime trolling for ahi or marlin (Makaira nigricans) using lures or live bait and, 2) day and night handlining for snappers or ahi. The problem in this area involved the removal of baits before a fish could be caught in the case of trolling and ahi handlining, and detachment of catch from handlines before it could be landed in the case of handliners using cut bait. Of the twenty fishermen interviewed from this area, nine had their bait and catch stolen, three had catch only taken, six had bait only removed and two reported no losses to porpoise. These losses were also reported to occur 20 - 50 % of the time with only one respondent having experienced higher losses. T. gilli were identified as the problem species by inshore fishermen and S. bredanensis were blamed for offshore losses.

#### MAUI

Of the fifteen fishermen interviewed on Maui thirteen fished off the western shore of Maui in an area surrounded by three smaller islands. Within this four island region the predominant fishing style was bottom fishing with handlines using cut bait or squid to catch snappers. Two of the respondents trolled on the north-west coast of the island and used lures for bait to catch ono (Acanthocybium solandri) and mahi mahi (Coryphaena hippurus). Only one of the 15 people interviewed had ever lost bait or catch to porpoise, and that was only on one occasion. He

had used whole opelu for bait (not his usual bait) and 6-8 porpoise swam by his boat, one of them removed the bait and then moved on. All but one of the other respondents interviewed had seen porpoise while fishing but reported no adverse interactions with them.

#### KAUAI

Of the twelve fishermen questioned on this island, four had experienced loss of catch to porpoise. One fished off the southeast shore of the island and claimed that he had his ahi stolen by porpoise during the 1960's but no longer had a problem. Two fished in the waters off the south-west coast of the island and had ahi stolen from their lines while trolling but the incident rate was low. Most felt that sharks were a much bigger problem. One bottom fisherman from Hanalei stated that porpoise took akule (Trachurops crumenophthalmus) from his lines while he was bottom fishing, but the problem was not severe and occurred less frequently now than it did in the early 70's. All other fishermen queried had not experienced loss of bait/catch to porpoise but had seen groups of porpoise while fishing and felt they hampered fishing efforts by scaring the fish. No one interviewed was able to give a detailed description of the physical characteristics of the animals so species identification was not possible.

#### OAHU

Twenty-seven fishermen were interviewed on this island. Ten fished off the west coast of the island in the Waianae area. The remaining seventeen represented the following areas: five from the south shore,

four from the south-east shore, seven from the east shore and one from the north shore. No incidents of bait or catch theft by porpoise were reported from the southern or eastern shores of the island. The north shore respondent claimed to be bothered occasionally by porpoise removing his catch (opelu) . He said the problem was sporadic and not serious.

All ten of the fishermen from the Waianae area had experienced loss of baits and catch to porpoise. All who took the time to respond were handline fishermen. They all fished for opelu and some bottom fished for uku (Aprion virescens) and onaga (Etelis coruscans).

All the respondents from the Waianae area gave the same general description of the interactions. Six to eight porpoise followed the boats out and when lines were baited and placed in the water, a large animal, often accompanied by a smaller animal would move in and clean the hook. When the catch was stolen the animals waited until the hooked fish was near the surface and then pulled it off the line. The fishermen claimed the larger animals were so experienced that they did not damage gear, however the smaller ones broke the lines. All respondents commented on the possibility of the larger animals having been trained as they had seen them tail walk and leap around the boats. It is likely that the interactions in this area were limited to a small group of animals, as the fishermen felt they had seen the same animals over and over. The lowest estimate of the amount of bait/catch lost to porpoise in this area was 33%. Most respondents claimed to lose 75 to 80% of their catch on a regular basis. Most of the Waianae fishermen reported that they pulled up their lines and moved to another location when porpoise were around, in an effort to minimize their losses. One fisherman had tried chili pepper in

his baits with no success, and a few others admitted they had tried shooting the animals. None of these solutions had worked, and the fishermen stated that they had lost more fish in 1982 than ever before. Four of those interviewed claimed that they were on the verge of going out of business. Removing or killing the offending animals were the two solutions suggested by the fishermen to likely be the most effective method of dealing with the problem.

### MOLOKAI-LANAI

Six interviews were conducted on these islands, three on Molokai and three on Lanai. Five of those interviewed trolled for ahi or mahi mahi and used lures or cut bait. One was a bottom fisher who used cut bait or squid to catch snapper. Although they all stated that they had seen porpoise while fishing none had experienced any losses to them.

### OVERVIEW

Geographical extent- The west, east and southern coastline of the island of Hawaii and the north west coast of the island of Oahu are the major areas currently being impacted by this fishery problem. The southeast shore of the island of Kauai has to date experienced only minor deprecation, but the potential is there for further losses. The fisheries of Molokai, Lanai and Maui are not currently experiencing any adverse porpoise fishery difficulties.

Fisheries most affected - The night handline fisheries for ahi, opelu and bottom fish are all affected greatly by porpoise. Daytime ahi and bottom fishermen are also seriously impacted, as are the live bait trollers.

Species involved - The descriptions of the animals involved in harassing night handline fishermen on both the big island and on Oahu indicate that the offenders are Pacific bottlenose dolphins, T. gilli. No clear description of the animals involved off of Kauai could be obtained, therefore no identification could be made. Ahi, bottom, and day time trolling fishermen of the Kona coast near the OTEC buoy are losing fish to the rough toothed dolphin, S. bredanensis.

Incident summary - Night handline fishermen off the eastern and southern shores of the big island of Hawaii claimed the porpoise stationed themselves 5 to 10 fathoms below their boats and ate whatever bait was put in the water, which was generally opelu. They felt that the lights used while fishing attracted the porpoise groups, which ranged in number from possibly 12 in the group off Hilo to only 6-8 off Waianae. Both areas reported that usually only one or two animals at a time fed off their lines. The bottom fishermen from Kona and Waianae said the porpoise waited until the catch was brought close to the surface before pulling it off the hook. Waianae fishermen claimed that they saw the same animals all the time and could identify individual porpoises. At the OTEC buoy fish were taken at depths as well as close to the surface. As many as 30 animals were stated to be seen in the waters around the buoy but again only a few at a time harassed an individual boat. The reports from this area indicated that the porpoise moved from boat to boat as fish were hooked. Trollers from Kona stated that one animal would act as a

"decoy" around the boat while another animal moved in and removed fish from their lines.

Seasonal and annual fluctuation - All the areas surveyed, that reported problems with porpoise, claimed that when the fishing was good the porpoise were there. Two fishermen from Hilo and three from Kona felt that their losses were higher during the summer months. Half of those interviewed on the island of Hawaii stated that porpoise interactions had increased over the past two years. One respondent from this area had experienced fewer losses in 1982 than in past years. He had started using fast retrieve reels. All the respondents from the Waianae area felt there was no seasonal fluctuation associated with their losses; however their losses had increased on an annual basis over the past two years.

Economic impact - The average number of fishing days per month was reported to be 15 on the island of Hawaii with a range in catch from 600 to 3000 lbs and bait costs of from \$1 - 2.25/lb. The Waianae fishermen averaged 14 fishing days a month with a catch range from 100 to 300 lbs. Bait costs in this area were reported from \$.70 - 2.50/lb. With an average loss rate of 20 - 50% per trip on Hawaii and 75 - 80% on Oahu these fisheries are being seriously impacted by porpoise.

Methods used to discourage the interactions - The most common method reported was removal of lines from the water and either waiting for the porpoise to move on, or moving to a new location. Some departed the area and went home. Other methods tried were: shooting, poisoned bait, chili pepper in bait, switching from live bait to lures, wire wrapped around the tail of baits, welding rod or copper wire inserted along the back bone

of bait, loud noises, light sticks and fast retrieve reels. Some of these methods were reported to temporarily deter the animals, however, to date none of them have worked for long.

## CONCLUSIONS

1. Opelu appear to be one of the target fish being stolen as catch and bait, on Oahu and as bait on Hawaii. Small ahi and snappers also ranked high.
2. Squid, cut bait and fish over 50 lbs were generally not removed from lines.
3. At present only two major fishing areas within the Hawaiian islands are being seriously impacted by the porpoise/ fishery interaction problem. These areas are: the waters surrounding the island of Hawaii and the the waters off the west coast of the island of Oahu (Waianae).
4. Handlining for bottom fish or ahi and live bait trolling are the two fisheries most affected.
5. Within the affected areas, porpoise fishery interactions have increased greatly in the past two years.
6. Losses are adversely affecting the economics of the Hawaiian fisheries, however, the actual dollar amounts vary among fishermen.
7. No method has yet been tried which decreases interactions for an extended period of time.



8. The following should be considered in any control efforts: Opelu appears to be one of the key species of fish involved in the porpoise fishery interactions. Chemical or combination acoustic/chemical control methods utilizing opelu might be helpful in ameliorating this fishery problem. The Waianae fishing area would be an excellent location in which to conduct field trials using the above mentioned techniques. If field trials are conducted an effort should be made to identify individual animals. Any control methods tested should be carefully documented and field trials should be supervised by the National Marine Fisheries Service. Development of alternate fishing techniques may also be an appropriate course of action.

## ACKNOWLEDGEMENTS

I would like to thank all of Hawaii's fishermen who took the time to respond to all the questions asked of them. Their patience and cooperation was appreciated.

I am grateful to Mark Suiso, Pete Hendricks, Gayle Ishimoto and Howard Takata of the University of Hawaii's Sea Grant Extension Service for the information they provided me, and for their assistance in contacting fishermen throughout the islands.

I would also like to express my appreciation to the National Marine Fisheries Service Southwest Laboratory for their support and cooperation.

## REFERENCES

- DeMaster, D. P. , D.J. Miller, D. Goodman, R. Delong and B. Stewart.  
1982 Assessment of California Sea Lion - Fishery Interaction.  
Proceed. 47 No. American Wildlife and Natural Resources Conference,  
Wildlife Management Institute, Washington, D.C.
- Iversen, R. T. B. 1975 Trip report, Marine Mammals, Hawaii Island
- Miller, D. J. 1981 Marine Mammal Fisheries Interaction Study.  
Annual Report for period of July 1979 to June 1980
- Naughton, J.J. 1981 Trip report, Porpoise - Fisheries Interaction  
Kona, Hawaii.
- Peiterson, G. 1982 Trip report, Porpoise Fisheries Interaction  
Waianae Coast.