Subregion Eight

MARINE RECREATIONAL FISHERIES SURVEY: CATCH AND EFFORT STATISTICS

Final Data Collection Report:
Year Three

(Contract No. NA-81-SAC-00662)

July 1982

Prepared for:

U.S. Department of Commerce
National Marine Fisheries Service
Resource Statistics Division, F/SR1
Washington, DC 20235

Prepared by:

Human Sciences Research, Inc.
Westgate Research Park
7710 Old Springhouse Road
McLean, Virginia 22102

CONTENTS

Page

Executive Summary 2

Introduction 5

The Household Survey 8

The Intercept Survey. 13

Recruitment and Training of Interviewers. 23

Modification of Instruments for Subregion 8 25

Data Preparation 26

APPENDICES (contents on first page of each appendix)

A. Pressure Data by State and Mode

B. Data Collection Instruments by Geographical Area

C. Editing and Coding Procedures

LIST OF TABLES

1. Household Survey Sample Sizes by Location by Year 8

2. Household Survey Sample Sizes in the State of Hawaii by County by Year 12

3. Subregion 8 Household Survey Results: March-December 1981 14

4. Intercept Survey Sample Sizes by Geographical Area by Year 15

5. Results of 1981 Intercept Survey: Hawaii 19

6. Results of 1981 Intercept Survey: Guam 20

7. Results of 1981 Intercept Survey: American Samoa 21

8. Results of 1981 Intercept Survey: Northern Marianas 22

EXECUTIVE SUMMARY

Subregion Eight

MARINE RECREATIONAL FISHERIES SURVEY: CATCH AND EFFORT STATISTICS

Final Data Collection Report: Year Three

(Contract No. NA-81-SAC-00662)

July 1982

Prepared for:

U.S. Department of Commerce
National Marine Fisheries Service
Resource Statistics Division, F/SR1
Washington, DC 20235

Prepared by:

Human Sciences Research, Inc.
Westgate Research Park
7710 Old Springhouse Road
McLean, Virginia 22102

EXECUTIVE SUMMARY

(Contract No.: NA-81-SAC-00662)

This report describes data collection procedures and results for the third year of the Catch-and-Effort component of the Marine Recreational Fisheries Survey in Subregion 8: the State of Hawaii, American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands. The report describes coding, editing, quality control, sampling and other data collection procedures required to reproduce the survey and its results. This volume includes an Executive Summary (also produced as a separate document), description of the Household and Intercept surveys, and attached tables and appendices presenting intercept site lists, pressure data, and editing programs.

The report has been prepared for the National Marine Fisheries Service (NMFS) by Human Sciences Research, Inc. (HSR), which utilized Survey and Marketing Services, Inc. (SMS) as a subcontractor for all Subregion 8 data collection activities. HSR and SMS have benefited from the close cooperation and indispensable assistance of many governmental agencies in the region, including the Division of Fish and Game of Hawaii's Department of Land and Natural Resources, the Office of Marine Resources of the Government of American Samoa, Guam's Division of Aquatic and Wildlife Resources, and the Marine Resources Division of the Commonwealth of the Northern Mariana Islands.

This data collection effort has reflected (1) the requirements of the complemented-survey methodology originally developed by HSR and NMFS for the overall Catch-and-Effort study and (2) the cultural diversity of the several Pacific Basin entities in Subregion 8. The study has collected trip and catch data by mode of fishing—i.e., on beaches and banks; from manmade structures such as piers, jetties, bridges, and causeways; and for party and charter boats as well as private and rental boats.

Earlier methodological studies, especially those conducted during 1976 and 1977 for NMFS,* indicated that the survey should be structured around a data collection approach known as a "complemented surveys" methodology. The methodological studies showed that a household survey could be used to collect reliable data on certain aspects of recreational fishing, such as number of trips taken in the past two months, and dates on which those trips were taken. Other information, however, such as species, number, and weight and length of fish caught, could not be reliably reported by a household survey approach, even shortly after a fishing trip. It was also found that information on both trips and catch became unreliable beyond a two-month recall period.

As a result, the complemented surveys approach was developed in which data on the number of households with fishermen and the number of fishing trips during a two-month period was collected by a household survey. Catch data, i.e., species, number, weight, length, etc., was collected by an on-site intercept survey. Data from these two separate sources were then combined to produce estimates of total catch and total participation.

The Subregion 8 household and intercept surveys have been conducted in geographical areas whose diversity poses special challenges for survey research and data collection. Hawaii, American Samoa, Guam, and (for the past two study years) the Northern Marianas are substantially rural and remote. Each presented unique geographical and social conditions to which the data collection approach was adapted. Furthermore, the Western Pacific fisheries presented individual characteristics (e.g., the use of weirs) as well as time-of-year and other variations in fishing patterns to which the survey was sensitive.

*Gary L. Brown, *A Review of Literature in Selected Areas Relevant to the Conduct of Marine Recreational Fisheries Surveys* (McLean, Va.: HSR, August 1977); Gary L. Brown, Robert L. Hiett and Dhirendra N. Ghosh, *Evaluation of the Door-to-Door Personal Interview Method as a Technique for Collecting Marine Recreational Fishing Statistics* (McLean, Va.: HSR, June 1977); Kathryn A. Chandler, *A Methodological Study of On-Site Intercept Surveys of Marine Recreational Fishermen on the West Coast* (McLean, Va.: HSR, July 1977); Robert L. Hiett and Jay W. Worrall, *Marine Recreational Fishermen's Ability to Estimate Catch and to Recall Catch and Effort Over Time* (McLean, Va.: HSR, July 1977); Brenda C. Metze, *Evaluation of the Telephone Interview Method as a Technique for Collecting Marine Recreational Fishing Data* (McLean, Va.: HSR, July 1977); Robert L. Hiett and Dhirendra N. Ghosh, *Recommended Approach to the Collection of Marine Recreational Finfishing and Shellfishing Data on the Pacific Coast* (McLean, Va.: HSR, August 1977); Kathryn A. Chandler and Gary L. Brown, *A Pretest of an Approach to Collection of Marine Recreational Fishing Data on the East and Gulf Coasts* (McLean, Va.: HSR, January 1978).

Household Survey

The results of the household survey are presented in tabular form by data collection wave for each of the four major geographical areas within Subregion 8. The number of household interviews obtained for the year in Hawaii (4,677) and Guam (1,337) were slightly above projected quotas, while the number of household interviews obtained in the Northern Marianas (490) was slightly below the projected quota. The number of interviews conducted in American Samoa (624) was essentially by the same as that projected. Overall, the total number of household interviews conducted in Subregion 8 in 1981 was slightly over the projected quota of 7,000, with a total of 7,128 interviews being conducted.

Intercept Survey

The results of the 1981 Subregion 8 Intercept Survey are provided in tables depicting the numbers of interviews projected and the numbers completed by wave of data collection by mode. This information is provided separately for the State of Hawaii, Guam, American Samoa, and the Northern Marianas. A total of 11,521 interviews were completed for the year in the four geographical areas—or 521 interviews above the projected quota.

The present report addresses only those technical and methodological issues unique to the Subregion 8 survey. For a comprehensive description of the catch-and-effort survey procedures, the reader should consult the *Marine Recreational Fishery Statistics Survey, Atlantic and Gulf Coasts, 1979*, which was prepared for NMFS by HSR.*

*(Washington, D.C.: NMFS, 1980).

INTRODUCTION

This report describes data collection procedures and results for the third year of the Catch-and-Effort component of the Marine Recreational Fisheries Survey in Subregion 8: the State of Hawaii, American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands. The report describes coding, editing, quality control, sampling and other data collection procedures required to reproduce the survey and its results. This volume includes an Executive Summary (also produced as a separate document), description of the Household and Intercept surveys, and attached tables and appendices presenting intercept site lists, pressure data, and editing programs.

The report has been prepared for the National Marine Fisheries Service (NMFS) by Human Sciences Research, Inc. (HSR), which utilized Survey and Marketing Services, Inc. (SMS) as a subcontractor for all Subregion 8 data collection activities. HSR and SMS have benefited from the close cooperation and indispensable assistance of many governmental agencies in the region, including the Division of Fish and Game of Hawaii's Department of Land and Natural Resources, the Office of Marine Resources of the Government of American Samoa, Guam's Division of Aquatic and Wildlife Resources, and the Marine Resources Division of the Commonwealth of the Northern Mariana Islands.

This data collection effort has reflected (1) the requirements of the complemented-survey methodology originally developed by HSR and NMFS for the overall Catch-and-Effort study and (2) the cultural diversity of the several Pacific Basin entities in Subregion 8. The study has collected trip and catch data by mode of fishing—i.e., on beaches and banks; from manmade structures such as piers, jetties, bridges, and causeways; and for party and charter boats as well as private and rental boats.

Earlier methodological studies, especially those conducted during 1976 and 1977 for NMFS,* indicated that the survey should be structured around a data collection approach known as a "complemented surveys" methodology. The methodological studies showed that a household survey could be used to collect reliable data on certain aspects of recreational fishing, such as number of trips taken in the past two months, and dates on which those trips were taken. Other information, however, such as species, number, and weight and length of fish caught, could not be reliably reported by a household survey approach, even shortly after a fishing trip. It was also found that information on both trips and catch became unreliable beyond a two-month recall period.

As a result, the complemented surveys approach was developed in which data on the number of households with fishermen and the number of fishing trips during a two-month period was collected by a household survey. Catch data, i.e., species, number, weight, length, etc., was collected by an on-site intercept survey. Data from these two separate sources were then combined to produce estimates of total catch and total participation.

The Subregion 8 household and intercept surveys have been conducted in geographical areas whose diversity poses special challenges for survey research and data collection. Hawaii, American Samoa, Guam, and (for the past two study years) the Northern Marianas are substantially rural and remote. Each presented unique geographical and social conditions to which the data collection approach was adapted. Furthermore, the Western Pacific fisheries presented individual characteristics (e.g., the use of weirs) as well as time-of-year and other variations in fishing patterns to which the survey was sensitive.

*Gary L. Brown, *A Review of Literature in Selected Areas Relevant to the Conduct of Marine Recreational Fisheries Surveys* (McLean, Va.: HSR, August 1977); Gary L. Brown, Robert L. Hiett and Dhirendra N. Ghosh, *Evaluation of the Door-to-Door Personal Interview Method as a Technique for Collecting Marine Recreational Fishing Statistics* (McLean, Va.: HSR, June 1977); Kathryn A. Chandler, *A Methodological Study of On-Site Intercept Surveys of Marine Recreational Fishermen on the West Coast* (McLean, Va.: HSR, July 1977); Robert L. Hiett and Jay W. Worrall, *Marine Recreational Fishermen's Ability to Estimate Catch and to Recall Catch and Effort Over Time* (McLean, Va.: HSR, July 1977); Brenda C. Metze, *Evaluation of the Telephone Interview Method as a Technique for Collecting Marine Recreational Fishing Data* (McLean, Va.: HSR, July 1977); Robert L. Hiett and Dhirendra N. Ghosh, *Recommended Approach to the Collection of Marine Recreational Finfishing and Shellfishing Data on the Pacific Coast* (McLean, Va.: HSR, August 1977); Kathryn A. Chandler and Gary L. Brown, *A Pretest of an Approach to Collection of Marine Recreational Fishing Data on the East and Gulf Coasts* (McLean, Va.: HSR, January 1978).

The present report addresses only those technical and methodological issues unique to the Subregion 8 survey. For a comprehensive description of the catch-and-effort survey procedures, the reader should consult the *Marine Recreational Fishery Statistics Survey, Atlantic and Gulf Coasts, 1979*, which was prepared for NMFS by HSR.*

The following sections describe—with variations for each of the four survey areas—the data collection procedures associated with the Household Survey and the Intercept Survey.

*(Washington, D.C.: NMFS, 1980).

THE HOUSEHOLD SURVEY

A total of 6,000 household interviews was allocated to Subregion 8 for 1979 and 7,000 each for 1980 and 1981. The following table shows the breakdown of interviews for each area by year.

Table 1. Household Survey Sample Sizes By Location By Year

	1979	1980	1981
Hawaii	4,500	4,500	4,500
American Samoa	500	625	625
Guam	1,000	1,250	1,250
Northern Marianas	—	625	625
TOTALS	**6,000**	**7,000**	**7,000**

At the time the Northern Marianas were added to the scope of work, the quota for the household sample was increased by 1,000 interviews. These additional interviews were allocated within the Pacific area in such a way as to preserve a two-to-one ratio between the sample sizes for Guam and American Samoa and to ensure that the Northern Marianas and American Samoa had equal size samples.

Methodology

Hawaii was the only area in Subregion 8 that used a telephone survey of the general population. The telephone penetration of residential households is very low for other areas in Subregion 8, making it impossible to rely upon a telephone survey methodology in these areas. Therefore, door-to-door surveys utilizing systematically selected samples of residential dwelling units were conducted on Guam, American Samoa and the Northern Marianas.

State of Hawaii. The population of the State of Hawaii was surveyed by telephone. For the island of Oahu (City and County of Honolulu) in the State of Hawaii, a sample of telephone numbers was generated by the SMS Research random telephone number generation program. The program added three random digits to a four-digit "stem" in order to produce a sample telephone number. All number ranges that included at least ten percent working residential numbers were incorporated in the program. About 75 percent of all numbers generated by the program were working residential numbers. Both numbers listed in the directory and unlisted numbers were automatically included in the sample. For each of the three neighbor island counties of Hawaii, Maui, and Kauai, samples of residential telephone numbers were drawn by a random telephone generation program similar in structure, specifications and performance to the Oahu program.

The sample of numbers for each county was drawn once for the entire contract year (all waves). This permitted the programs to generate sample lists of unduplicated numbers. In other words, no residential telephone number appeared more than once in the sample throughout the year.

Guam. A door-to-door survey of civilian households on Guam was conducted. The sample for the survey was compiled with the assistance of the Bureau of Labor Statistics (BLS) of the Government of Guam. The Bureau has a data file and accompanying maps which document every civilian residential and commercial unit on Guam. Each unit (including each individual unit in multiple unit residential structures) was assigned a unique ten-digit number which indicated the district, the map number, the building number, and (in the case of dwellings in multiple unit structures) the apartment number. The sample listing also included a description of the structure (single family versus duplex or apartment) and whether or not the unit was occupied at the time of the last BLS census. The maps and data files were continuously updated by BLS field and data processing workers who record new construction and demolition of units.

On Guam, housing units on military bases had to be surveyed in a different fashion than units in civilian areas. Although maps showing housing units on military bases are available, survey teams are denied physical access to base housing in accordance with military policy. Therefore, the survey of dwelling units on base was conducted by telephone. We arranged for permission for an interviewer to come on base for several evenings each wave and to use a military telephone for survey purposes. (On-base units usually cannot be reached through the civilian telephone service.)

The sample for the telephone survey of units on base was drawn from the military residential telephone directory, using a systematic skip with a random start. Although the directory lists approximately 3,200 military household numbers out of the total of about 4,000 on Guam bases (approximately 800 numbers are unlisted), it was the only feasible sample frame for this survey.

American Samoa. A door-to-door household survey was also implemented in the Territory of American Samoa.

The materials necessary for drawing a sample of dwelling units in American Samoa included population statistics and base maps. The population statistics, which were obtained from the Department of Planning of the Government of American Samoa, indicate the residential population of each of the 76 villages throughout American Samoa (including the island of Manula). The base maps were obtained from the Army Corps of Engineers. These maps show the location of each dwelling unit ("fale") in the Territory. Commercial structures on the maps were identified and crossed out, so that only residential structures were a part of the sample frame.

The sample to be selected consisted of clusters of six dwelling units. All the clusters necessary for a year's sample were selected at one time; the sample for each of the 5 or 6 waves consisted or every 5th or 6th cluster from all the clusters that were selected for the year period.

The first step in drawing the sample was to specify the number of clusters to be selected from each of the 76 villages. The number of clusters assigned to each village was in proportion to the village's population.

The second step consisted of specifying the location of the assigned number of clusters within each village. On the base map, a serpentine path was traced which passes through every residential structure in the village. Within each village the appropriate number of cluster starting points was selected by using a random start and marking every nth structure along the path.

In the field, interviewers were instructed to conduct interviews at the first six households encountered from the cluster starting point along the direction indicated. For survey purposes, a household was defined to include all persons who eat and sleep together. Since in American Samoa separate structures are used for cooking and sleeping, sleeping structures were utilized as indicators of individual households.

Northern Marianas. For the last two years, the Northern Marianas were included as a part of the Pacific area to be surveyed. The Northern Marianas are a chain of 16 Pacific islands. The three principal islands are Saipan (122 square kilometers), Tinian (101 square kilometers), and Rota (83 square kilometers). Because almost of the population of the Northern Marianas lives on these three islands, the household survey was conducted only on Saipan, Rota, and Tinian.*

Because of the predominantly rural and economically underdeveloped nature of these islands, there is a very low telephone penetration of households. This, in turn, meant that a door-to-door methodology was required for the household survey.

The sample frame developed and used was based on a set of maps obtained from the Planning Division of the Department of Public Works. The 46 maps covered Saipan, Rota and Tinian and showed the location of all structures. Business and non-residential structures were specially noted on the maps, which were updated in 1979. The number of residential dwellings was determined for each of the maps.

The procedure for selecting the sample from the sample frame was as follows. The number of clusters to be selected was first assigned to each of the 46 subareas in proportion to its number of households. On the base maps, starting points for clusters of six dwelling units were selected by marking every nth unit along a serpentine bath, from a random start.

---

* In a letter to SMS Research dated July 23, 1978, the Governor of the Northern Mariana Islands recommended that the survey be conducted on these three islands.

Sample Sizes and Distribution

The allocation of the total sample in the State of Hawaii is presented in Table 2.

The total sample was distributed in proportion to the estimated population of each county. The 1977 and 1978 population estimates from the State Department of Planning and Economic Development were used for 1979 and 1980; the latest available estimates from the 1980 U.S. Census were used for 1981 allocations.

Table 2. Household Survey Sample Sizes in the State of Hawaii By County By Year

	1979	1980	1981
City and County of Honolulu	3,600	3,613	3,555
Hawaii	405	405	450
Maui	315	306	315
Kauai	180	176	180
TOTAL FOR STATE	**4,500**	**4,500**	**4,500**

To allocate the number of interviews per wave, for 1979 we relied on records of seasonal variations in commercial fish catches for a determination of the number of interviews to be conducted for each wave. In 1980, after examining the data on total fisherman trips by wave for the previous year, we concluded that these retrospective data yielded reasonable seasonal trends which correspond closely to variations in commercial fish catches. Therefore, for 1980 and 1981 the household sample for Hawaii was allocated in accordance with results (i.e., total fisherman trips adjusted for number of household interviews) from the six waves of the previous year's household survey.

American Samoa, Guam and Northern Marianas. Consultation with experts and officials in the other three Pacific areas advised us that the seasonal variations experienced in Hawaii did not necessarily apply to their regions, and that the best policy would be to make roughly equal allocations to each wave. Therefore, during the three contract years, we assigned equal numbers of household interviews to waves in American Samoa, Guam, and the Northern Marianas. Allocating among islands in the Northern Marianas was in proportion to population.

The results of the household survey are presented in Table 3 by data collection wave for each of the four major geographical areas within Subregion 8. The number of household interviews obtained for the year in Hawaii (4,677) and Guam (1,337) were slightly above projected quotas, while the number of household interviews obtained in the Northern Marianas (490) was slightly below the projected quota. The number of interviews conducted in American Samoa (624) was essentially the same as that projected. Overall, the total number of household interviews conducted in Subregion 8 in 1981 was slightly over the projected quota of 7,000, with a total of 7,128 interviews being conducted.

INTERCEPT SURVEY

Procedures employed in conducting the intercept portion of the survey in the Western Pacific were basically the same as those used on the mainland. Additional information regarding these procedures can be found in the total projected household survey sample sizes and the procedures for allocating the sample which were employed in the intercept survey within the Pacific region are described below.

Because there were no estimates of the extent of recreational fishing among the populations of the different areas, we had no independent formula for allocating the 10,000 intercept interviews among these areas.

A total of 10,000 intercept interviews was allocated to Subregion 8 for 1979: 7,500 were allocated to the State of Hawaii, with two-thirds of the remainder (1,667) allocated to Guam, and one-third (833) to American Samoa. For 1980 and 1981, the total allocation was raised to 11,000 intercept interviews. The decision rules for the allocation of these additional 1,000 intercept interviews were the same as those used to allocate additional household survey interviews. (See section on Household Survey.)

Table 3. Subregion 8
Household Survey Results –March-December, 1981*

Completed Interviews

	Hawaii	Guam	American Samoa	Northern Marianas	Total
Wave II (actual)	563	265	126	145	1,099
(quota)	549	250	125	125	1,049
Wave III (actual)	992	274	138	128	1,532
(quota)	968	250	125	125	1,468
Wave IV (actual)	1,617	257	120	123	2,117
(quota)	1,517	250	125	125	2,017
Wave V (actual)	615	274	120	67	1,076
(quota)	611	250	125	125	1,111
Wave VI (actual)	890	267	120	27	1,304
(quota)	855	250	125	125	1,355
TOTAL (actual)	**4,677**	**1,337**	**624**	**490**	**7,128**
(quota)	**4,500**	**1,250**	**625**	**625**	**7,000**

*The beginning of the 1981 survey was delayed for two months by a postponement of the contract award. The overall quotas for the year remained the same, but were reallocated over a ten-month year.

Below in Table 4 is shown the breakdown of intercept interviews by geographical area.

Table 4. Intercept Survey Sample Sizes By Geographical Area By Year

	1979	1980	1981*
Hawaii	7,500	7,500	7,500
American Samoa	833	875	875
Guam	1,667	1,750	1,750
Northern Marianas	–	875	875
TOTALS	**10,000**	**11,000**	**11,000**

*The beginning of the 1981 survey was delayed for two months by a postponement of the contract award. The quotas for the year remained the same, but were reallocated over a ten-month year.

State of Hawaii. To allocate the number of interviews by wave, for 1979 we relied on records of seasonal variations in commercial fish catches for three pelagic species (ahi, billfish and mahimahi) to give seasonal trends. In 1980 and 1981 we used the results from the previous year's survey to estimate seasonal fishing effort and allocate interviews accordingly.

Interviews were also allocated by mode and by county. In 1979, SMS used a procedure which determined the number of intercept interviews for each mode (boat, beach/bank, or man-made structure) within each county of Hawaii for each wave on the basis of household survey results for the previous wave. Such a procedure yielded unstable estimates from one wave to the next, however, because of the small sample bases involved (especially for the three smallest counties). Because of this, the first year's practice of establishing modal allocations for each county for each wave on the basis of previous wave results was replaced for the second year by a procedure that utilized results for the entire first year to produce allocations with less fluctuation. This procedure involved making three separate estimates for the next year independently: 1) mode by wave; 2) mode by county; and 3) county allocations for the year. These estimates were used to generate specific numbers of intercept interviews to be conducted for each mode in each wave, for Oahu (Honolulu County) and the other islands (the other three Hawaii counties).

However, application of this method still yielded some (although less) instability in quota allotments by mode and wave, principally because of slender sample bases for first year survey estimates. For example, one-half of the entire second year's quota for pier and jetty intercept interviews was allocated to Wave IV. Therefore, a modified procedure was adopted which "smoothed out" the allocation of modal quotas over waves. Such modification of rigid mode-per-wave allocations for Hawaii was appropriate for the third contract year, since no significant alteration of the size of sample bases for these estimates occurred during the second year.

The approach used involved moderating or "evening out" to some degree the extreme variation in sample size from one wave/mode combination to another that would be the consequence of making allocation solely on the basis of the 1980 household survey results. In order to do this, 50 percent of the interviews were allocated equally among the 5 waves. The remaining 50 percent were allocated according to the relative levels of fishing activity per wave found in the 1980 household survey. This resulted in reducing the variance in the numbers per wave from a range of 1,612 interviews (2,527 to 915) to a range of 807 interviews (2,014 to 1,207). In addition, 15 percent of the interviews allocated equally per wave were also distributed equally among the three modes. This resulted in a minimum sample size of 37 interviews per wave/mode combination. Within each wave, the remaining interviews were allocated by mode according to the relative level of fishing activity per mode found in the 1980 household survey.

The final task involved allocation of interview effort by site. A rather elaborate procedure for site selection was employed during 1978. It involved sampling each site at least once a wave and selection of sites on the basis of quantitative pressure data obtained through cumulative field experience.

For 1980 and 1981 sites were chosen at one time for the entire six waves of 1980 and 5 waves of 1981.

Hours of effort were allocated in four-hour increments, and were assigned to sites with a probability proportional to pressure data for each site. These pressure data were estimates of fishers per hour obtained from the 1970 and 1980 intercept survey, respectively, a systematic random method was used to select sites. Appendix A provides pressure data by fishing site and mode of fishing.

In the field, effort was allocated between weekdays and weekends in the same way for all three years. For the boat mode on all islands and for all modes on Oahu, 75 percent of all hours of interviewing effort were allocated to weekends. For the beach/bank and man-made structure on the Neighbor Islands, 50 percent of all hours were allocated to weekdays and 50 percent to weekends.

Guam, American Samoa and the Northern Marianas. There is much less diversity in seasonal fish catch data in the other Pacific areas than there is in Hawaii. Therefore, allocation by mode was a much more straightforward process; interviews were distributed equally among waves.

Guam possesses extensive information on sites in its area which is derived from a decade of field experience. In Guam, low tide was the most important index by which to gauge the time of the day and of the month when the greater percentage of fishers would be fishing. The Division of Aquatic and Wildlife Resources was conducting a survey of the same kind of their own department and had developed a specific accurate system for site selection and days of the week for conducting the creel census.

In Samoa, it was suggested by local fishing experts that pressure by site be determined according to the population of the villages within a certain shoreline area since the fishers seldom traveled further than the beach or bank immediately adjacent to their village.

The sample within the Northern Marianas Islands was distributed in proportion to the population of each island (Saipan, Rota, Tinian). The allocation of interviews by mode (boat, beach/bank, pier/jetty), however, changed in 1981 because of experience in conducting the survey the previous year. Beach/bank interviews were raised from 50 to 58 percent of the total of Saipan, Rota and Tinian. Boat interview allocations were reduced to 25 percent on Rota and Tinian but kept at 40 percent for Saipan. Pier/jetty quotas were slightly more on the smaller islands than on Saipan.

The results of the 1981 Subregion 8 Intercept Survey are provided in Tables 5-8 following. These tables present the numbers of interviews projected and the numbers completed by wave of data collection by mode. This information is provided for the State of Hawaii, Guam, American Samoa, and the Northern Marianas in Tables 5, 6, 7, and 8, respectively. A total of 11,521 interviews were completed for the year in the four geographical areas—or 521 interviews above the projected quota.

Table 5

Results of 1981 Intercept Survey

HAWAII

(ALL COUNTIES)

	BOAT		BEACH & BANK		PIER & JETTY		TOTAL	
	Quota *(Cumulative quota)*	Number Completed *(Cumulative number completed)*	Quota *(Cumulative quota)*	Number Completed *(Cumulative number completed)*	Quota *(Cumulative quota)*	Number Completed *(Cumulative number completed)*	Quota *(Cumulative quota)*	Number Completed *(Cumulative number completed)*
WAVE II	423 (423)	428 (428)	639 (639)	785 (785)	145 (145)	300 (300)	1,207 (1,207)	1,513 (1,513)
WAVE III	582 (1,005)	741 (1,169)	904 (1,543)	899 (1,684)	71 (216)	207 (507)	1,557 (2,764)	1,847 (3,360)
WAVE IV	421 (1,426)	402 (1,571)	1,466 (3,009)	1,392 (3,076)	127 (343)	266 (773)	2,014 (4,778)	2,060 (5,420)
WAVE V	332 (1,758)	415 (1,986)	797 (3,806)	900 (3,976)	130 (473)	254 (1,027)	1,259 (6,037)	1,569 (6,989)
WAVE VI	251 (2,009)	391 (2,377)	1,090 (4,896)	479 (4,455)	122 (595)	134 (1,161)	1,463 (7,500)	1,004 (7,993)

Table 6

Results of 1981 Intercept Survey

GUAM

	BOAT		BEACH & BANK		PIER & JETTY		TOTAL	
	Quota *(Cumulative quota)*	Number Completed *(Cumulative number completed)*	Quota *(Cumulative quota)*	Number Completed *(Cumulative number completed)*	Quota *(Cumulative quota)*	Number Completed *(Cumulative number completed)*	Quota *(Cumulative quota)*	Number Completed *(Cumulative number completed)*
WAVE II	140 (140)	134 (134)	175 (175)	206 (206)	35 (35)	32 (32)	350 (350)	372 (372)
WAVE III	140 (280)	197 (331)	175 (350)	214 (420)	35 (70)	7 (39)	350 (700)	418 (790)
WAVE IV	140 (420)	148 (479)	175 (525)	161 (581)	35 (105)	12 (51)	350 (1,050)	321 (1,111)
WAVE V	140 (560)	134 (613)	175 (700)	192 (773)	35 (140)	0 (51)	350 (1,400)	326 (1,437)
WAVE IV	140 (700)	187 (800)	175 (875)	203 (976)	35 (175)	15 (66)	350 (1,750)	405 (1,842)

Table 7

Results of 1981 Intercept Survey

AMERICAN SAMOA

	BOAT		BEACH & BANK		PIER & JETTY		TOTAL	
	Quota *(Cumulative quota)*	Number Completed *(Cumulative number completed)*	Quota *(Cumulative quota)*	Number Completed *(Cumulative number completed)*	Quota *(Cumulative quota)*	Number Completed *(Cumulative number completed)*	Quota *(Cumulative quota)*	Number Completed *(Cumulative number completed)*
WAVE II	35 (35)	42 (42)	123 (123)	362 (362)	17 (17)	46 (46)	175 (175)	450 (450)
WAVE III	35 (70)	38 (80)	123 (246)	99 (461)	17 (34)	37 (83)	175 (350)	174 (624)
WAVE IV	35 (105)	85 (165)	123 (369)	16 (477)	17 (51)	11 (94)	175 (525)	112 (736)
WAVE V	35 (140)	18 (183)	123 (492)	22 (499)	17 (68)	12 (106)	175 (700)	52 (788)
WAVE IV	35 (175)	88 (271)	123 (615)	14 (513)	17 (85)	36 (142)	175 (875)	138 (926)

Table 8

Results of 1981 Intercept Survey

NORTHERN MARIANAS

	BOAT		BEACH & BANK		PIER & JETTY		TOTAL	
	Quota *(Cumulative quota)*	Number Completed *(Cumulative number completed)*	Quota *(Cumulative quota)*	Number Completed *(Cumulative number completed)*	Quota *(Cumulative quota)*	Number Completed *(Cumulative number completed)*	Quota *(Cumulative quota)*	Number Completed *(Cumulative number completed)*
WAVE II	67 (67)	56 (56)	95 (95)	137 (137)	14 (14)	13 (13)	176 (176)	206 (206)
WAVE III	67 (134)	66 (122)	95 (190)	94 (231)	14 (28)	0 (13)	176 (352)	160 (366)
WAVE IV	67 (201)	6 (128)	95 (285)	205 (436)	14 (42)	36 (49)	176 (528)	247 (613)
WAVE V	67 (268)	18 (146)	95 (380)	49 (485)	14 (56)	75 (124)	176 (704)	142 (755)
WAVE VI	67 (335)	0 (146)	95 (475)	5 (490)	14 (70)	0 (124)	176 (880)	5 (760)

RECRUITMENT AND TRAINING OF INTERVIEWERS

State of Hawaii. The majority of Hawaii intercept interviewers was recruited from marine program participants at the University of Hawaii. Undergraduates and graduate students from the Sea Grant Marine Advisory Program and the Marine Options Program worked on the study.

Interviewer applicants were tested by the SMS Research project director. Applicants were accepted only after a personal interview indicated that each one also had the appropriate personal characteristics to communicate well with fishermen in the field. Because of the two month delay in beginning the 1981 survey, many of the experienced interviewers were unable to weather the transition. Therefore, at the end of February a training for nine interviewers was held and field work began on March 1st.

All training sessions for new State of Hawaii interviewers were conducted by SMS staff members who have been working on the study since its initiation. Training sessions included an overview of the study purpose, indoctrination in the use of fish keys and fish lists, a presentation of general interviewing techniques, and a training in the use of the survey instrument. Each interviewer was given copies of "The Handbook of Hawaiian Fishes" by W.F. Gosline and V.E. Brock and "Fishes of Hawaii" by Spencer Tinker. These guides have proved to be extremely useful for field identification of unfamiliar species.

The household survey interviewers were drawn from SMS's trained and experienced corps of telephone interviewers. The SMS interviewers were highly skilled in the techniques of eliciting respondent cooperation over the phone and were very knowledgeable about the need for precise data collection.

As a quality control procedures, a minimum of 20 percent of both intercept and telephone interviews was verified through recontacting a random selection of respondents and checking on the validity of the recorded responses.

Guam. Mr. Harry Kami, Director of the Division of Aquatic and Wildlife Resources (AWR), Government of Guam, and his staff successfully carried out the intercept interviewing for three years. Most of the biologists who served as interviewers in 1979 and 1980 were available to continue the creel census for 1981. A part-time graduate student was hired by AWR to work exclusively on the recreational fishing project for 1981.

In April of 1981, Mr. Kami and his staff at the Aquatic and Wildlife Resources Division (AWR) determined that the press of work for the division precluded their continuing administration of the household survey portion of the recreational fishing project for NMFS. That portion of the 1981 contract, therefore, was assigned to Pacific Basin Environmental Consultants (PREC), who also handled the 1980 and 1981 Northern Marianas survey under subcontract to SMS Research.

American Samoa. In Samoa, SMS relied heavily upon the cooperation and assistance of the Director of the Office of Marine Resources and his staff for supervision of the survey interviewers and technical support in the identification of fish species.

New interviewers hired for the study worked with an SMS trainer and a biologist from the Office of Marine Resources to learn methods for identifying Samoan fishes, their common and scientific names, and procedures for accurately weighing and measuring catch. All interviewers were trained in the field by staff members before being sent out on their own. All intercept interviewers were provided with the field guide, which featured color plates of Polynesian fishes marked with their commonly-used Samoan name and the ten-digit NMFS-supplied code. This method, which was suggested by the Director of Marine Resources in Samoa, proved to be a very successful approach.

The survey instrument required the addition of Samoan words to some of the responses categories because there are many different Samoan interpretations for English words like "ocean." Also, an additional fishing mode called "weir" was added as a code, since it is widely used in Samoa.

For the household survey, Pulenu'us (village mayors) were employed as interviewers through the assistance of the Office of Marine Resources. Because of the significant prestige the Pulenu'us enjoy and the respect they engender, they have been very effective, and the refusal rate for the household survey was virtually nil.

Northern Marianas. Pacific Basin Environmental Consultants (PBEC) supervised and coordinated SMS's intercept interviewing staff in the Northern Marianas for 1980 and 1981. The two principals of the firm are trained biologists based on Guam who received their M.S. degrees from the University of Guam's Marine Laboratory. The company's capabilities include Environmental Impact Assessments, marine and terrestrial surveys, and many other planning and data analysis services relevant to the marine habitat, and its possesses an in-depth knowledge of the fishes, corals, algae, invertebrates, birds, mammals, and plants of the Pacific area.

The firm's principals had conducted various marine and terrestrial studies and surveys throughout many of the islands of Micronesia, including Guam, Tinian, Saipan, Pagan, Truk, Ponape, Yap, Ulithi, and Woleai. One of the two principals, Ronald Strong, was very knowledgeable about the NMFS Recreational Fishing Survey, having worked on it during the first year of the study when he was employed as a marine biologist in Mr. Kami's department on Guam.

The door-to-door household survey on Guam was taken over in 1981 by Pacific Basin Environmental Consultants. The same experienced interviewers were used and supervised by PBEC.

MODIFICATION OF INSTRUMENTS FOR SUBREGION 8

The data collection instruments, which were used in the household and intercept surveys in 1981 in Subregion 8 are provided in Appendix B. The questionnaire/answer sheet format for the intercept survey was developed by SMS in consultation with HSR and NMFS in 1980 to enhance the efficiency of the implementation of the creel census. This answer sheet was much easier to handle in the field and in the office than was the 1979 questionnaire; postage was also sharply reduced, and storage was simplified.

This revised format was also used in Guam, American Samoa and the Northern Mariana Islands. Codes were added for type of gear used because of the predominance of certain fishing methods in these areas.

Intercept and household forms used in Samoa were translated into Samoan by a consultant to SMS, but most intercept interviews were conducted in English.

DATA PREPARATION

As the interviews were received from the field, they were quickly reviewed by the SMS project director to pinpoint problems, if any, and further instruct the interviewer as soon as possible on coding or interviewing techniques.

Each interview then was edited thoroughly including fish codes and passed on to be verified by phone by an SMS staff member.

Almost all of the data processing was carried out in-house, verified, and cleaned by inspection of frequency tables and use of a program which tested for valid codes and skips. The fish codes were then checked once again by inspecting computer printout and comparing individual lengths and weights for consistency. In Appendix C described the procedures and legal codes for editing Subregion 8 interviews.

A tape containing both intercept and household survey data for all four areas was sent to HSR 35 days after the end of each wave.