

**AMERICAN SAMOA SHORE-BASED CREEL SURVEY DOCUMENTATION**

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# CONTENTS

	Page
1.0 Introduction.....	1
2.0 Survey Methodology.....	2
3.0 Survey Sites .....	2
4.0 Data Collection .....	2
4.1 Participation Count .....	2
4.2 Interview .....	3
2.2.3 Opportunistic Data Collection Methodology.....	5
5.0 Survey Scheduling .....	6
6.0 Data Quality Control.....	8
6.1 Fish Identification Training .....	9
7.0 Reports .....	9
7.1 Shore-based Expanded Catch and Effort Report .....	10
7.2 Shore-based Expanded Species Composition.....	11
Appendix 1 Tutuila Survey Sites Map.....	12
Appendix 2 Ofu-Olosega Survey Sites Map.....	13
Appendix 3 Ta'u Survey Sites Map .....	14
Appendix 4 Shore-based Participation Survey Form.....	15
Appendix 5 Shore-based Interview Survey Form.....	16
Appendix 6 Craig Graham's American Samoa Historical Creel Details written in 2006.....	17
Appendix 7 Sabrina Mariner's American Samoa Timeline written in Mid-2006.....	26
Appendix 8 Manu'a Shore-based survey details.....	33

## LIST OF TABLES AND FIGURES

Tables and Figures	Page
Table 1. American Samoa Shore-based Scheduling Components	6
Figure 1.--1990-1996 Participation Form	18
Figure 2.--1990-1996 Interview Form	19
Figure 3.--2002-2003 Participation Form	21
Figure 4.--2002-2003 Interview Form	22
Figure 5.--2006 Participation Form	24
Figure 6.--2006 Interview Form	25

## 1.0 INTRODUCTION

The purpose of this manual is to document the American Samoa Department of Marine and Wildlife Resources (DMWR) Shore-based Creel Survey Program and to provide standard guidelines about for shore-based data collection program in American Samoa.

This manual may be used by program managers, data collection technicians, data entry technicians, data managers, and programmers to guide their work and to train new staff. This manual can also be provided to users outside of DMWR who want to learn more about the island creel survey programs. DMWR also has a Boat-based Creel Survey Program that monitors fishing activity conducted from boats regardless of where the fishing occurred, e.g., inside the reef or lagoon or in offshore water. A similar manual is available for that program (see Oram, R. et al., 2010. *"American Samoa Boat-based Creel Survey Documentation"*).

The objective of the American Samoa Shore-based Creel Survey Program is to estimate the participation, effort, and harvest of shore-based recreational/subsistence fisheries to support American Samoa's marine fisheries resources — and to gather limited biological data that will add to a long-term historical database on American Samoa's important inshore fish species. Effective management of American Samoa's marine fishery resources requires data collection of fishing effort, methods used, and harvest. The American Samoa Shore-based Creel Survey Program is one of the major data collection systems used by the DMWR to estimate fisheries resources. This survey was formerly known as the American Samoa Inshore Creel Survey. The term "inshore" was previously used when referring to this Creel Survey Program. The preferred term is "shore-based" because it covers all fishing done from shore regardless of where the fishing occurred, e.g., inside or outside the reef or lagoon. This is an important distinction because the place where the fishing activity is initiated (shore vs. boat) determines how that activity is accounted for in the survey systems. For instance, the fishing activity of a small boat (without a motor) that is easily launched from the shoreline to hold gear (net, coolers, floating devices) will be included in the shore-based data collection program.

DMWR has been monitoring shore-based fishing activities since 1978 to identify trends in fishing activities. This program was not operated continuously, but rather stopped and began again numerous times until the time of writing this document. This document primarily describes the survey methodology that has been in use since 2004 (see "Appendix 6 Craig Graham's American Samoa Historical Creel" written in 2006 and "Appendix 7 Sabrina Mariner's American Samoa Timeline written in Mid" written in Mid-2006) for historical information about these programs. The Western Pacific Fisheries Information Network (WPacFIN) program at the Pacific Islands Fisheries Science Center (PIFSC) implemented a data processing application, which standardized the data processing and the method of expanding the estimated landings. Expansion software was developed to create annual expanded (estimated) landings for this fishery. The current database used to expand and analyze the data runs in Visual FoxPro 6.0 SP2 and was implemented in 1990.

This manual covers data collection procedures for the American Samoa Shore-based Creel Survey Program including: survey sites, survey methodology, survey scheduling, quality

assurance and quality control procedures. Survey forms and maps used by the program are shown in the Appendices.

## **2.0 SURVEY METHODOLOGY**

American Samoa's Shore-based Creel Survey is a stratified, randomized data collection program. This program collects two types of data to estimate catch and effort information and to monitor fishing activity of the shore-based fishery: 1) Participation Counts to collect effort data, 2) Interviews to collect catch and effort data. The data collected are expanded at a stratum level (expansion period [quarterly or annually], day type [weekday or weekend], day or night, and gear type) to create the estimated landings by gear type for this fishery.

## **3.0 SURVEY SITES**

American Samoa's Shore-based Creel Survey Program covers the most accessible shoreline areas along Tutuila's Southern shore (see "Appendix 1 Tutuila Survey Sites Map"). Survey collections are conducted at three separate routes:

- West: Amanave to Vailoa
- Central: Nu'uuli to Aua
- East: Lauli'i to Tula

## **4.0 DATA COLLECTION**

American Samoa's Shore-based Creel Survey Program uses two types of data collection methods to estimate the catch, effort, and fishing activity of the shore-based fishery: a Shore-based Participation Count that involves counting the number of people fishing at the scheduled survey route, where their trip originated from the shoreline and not using a boat; and a Shore-based Interview that involves interviewing fishermen to determine catch, method used, lengths and weights of fish, species composition, catch disposition, and if any fish were not kept (bycatch).

### **4.1 Participation Count**

The Participation Counts collect fishing effort information by counting the number of fishermen fishing along the accessible Southern shoreline, on a minimum of seven surveys per quarter: five weekdays per route per quarter, and two weekend/holidays per route per quarter. Participation data are used to calculate the fishing effort (per hour) at the stratum level (expansion period [quarterly or annually], day type [weekday or weekend], day or night, and gear type).

Staff drive along the designated survey route (see "Appendix 1 Tutuila Survey Sites Map") and stop at designated areas to make visual observations of fishing activity. Participation data are recorded on a Shore-based Participation Count Survey Form (see "Appendix 4 Shore-based Participation Survey Form". Any activity that involves a motorized vessel is not counted

unless the vessel is used primarily for transporting such items as gill nets, surround nets, and drag nets and was launched from a beach, not a boat ramp.

The Participation Count Survey Form includes:

- Date of survey.
- Location (West, Central, East, Aunu'u).
- Shift start and end time stated in military time.
- Run number, start and end time.
- Village.
- Number of people fishing.
- Gear type (glean, speardiving, rod/reel, bamboo pole, gill net, throw net, handline, sand mining).
- Number of gears.
- Weather (clear, partly cloudy, rain, overcast)
- Remarks.

The Shore-based Participation Counts are conducted during the same shift, and using the same staff, as the Shore-based Interviews. A sampling sweep consists of a one-hour drive along the designated, scheduled survey route — in one direction collecting participation data — and a one-hour drive back along the designated area in the opposite direction collecting catch data through interviews. The staff continues to repeat driving back and forth, conducting participation and interview runs until a total of 3 of each are completed during each 8-hour shift. Two hours are set aside to allow surveyors to centralize in the office and to provide ample time for them to drive to the designated starting point. Participation counts are collected during three separate shifts per scheduled day (see Table 1).

## **4.2 Interview**

American Samoa Shore-based Interviews collect data on fish catch by interviewing fishermen after they return from a fishing trip, or in some cases, while they are still fishing. Data collected during interviews are used to analyze fishing effort and species composition, for example, interview data are used to calculate catch per unit (hours fished) effort (CPUE) at the stratum level (expansion period [quarterly or annually], day type [weekday or weekend], day or night, and gear type). Detailed species composition and length-weight information are collected and used to calculate length-weight regression analyses, and to create estimated landings for individual species. At a minimum, Interview data are collected: seven surveys per quarter; five weekdays per route per quarter; and two weekend/holidays per route per quarter (see Table 1). Interview data are also used to validate other DMWR fishery-independent data collection programs.

On a scheduled survey day, after completing the participation counts, staff interview fishermen who fish along the coastline to collect creel data. Data collected is recorded on a Shore-based Interview Survey Form (see "Appendix 5 Shore-based Interview Survey Form").

The Interview Survey Form includes:

- Date of interview.
- Type of day – weekday (WD) or weekend/holiday (WE/H).
- Village.
- Number of fishermen.
- Interviewer's name.
- Interview time (military).
- Start time of fishing (military).
- Day before (when the fisher has been fishing since the day before the interview, for example, the fisher started fishing at 7 PM Sunday night and the interview was conducted at 2 PM on Monday afternoon).
- Stop time of fishing (military).
- Day after (when the fisher will be done fishing the day after the interview, for example, the interview is conducted at 12 PM on Friday and the fisher is planning to stay overnight fishing until 6 PM on Saturday).
- Down hours (hours not fished).
- Fishing method used.
- Number of gears.
- Location.
- Percent of catch unsold.
- Percent of catch sold.
- Fish species.
- Fish length in centimeters and fish weight in kilograms.
- Total number of fish (actual or estimated).
- Total weight of fish (actual, calculated, or estimated).
- Whether the interview was complete on a scheduled survey day, incomplete on a scheduled survey day, or opportunistic.
- Bycatch – Staff ask the fishermen if there was any fish thrown back (bycatch), and if there was, staff asks details like the species weight; number of pieces of each species; disposition (live, or dead/injured); length, and comments. In Samoa it is very rare for fishermen to throw any fish back in the sea, but it is still important to ask if there is any bycatch.

When staff reach the end of the designated region, they turn around and conduct the participation portion of the survey until they get to the other end of the route. Staff continue to alternate the participation counts and interviews until three of each are completed. Staff attempt to complete as many interviews for different methods as possible during the survey period. Spearfishing is given top priority as this fishing method is difficult to encounter and is seldom captured during interviews. For returning fishermen, staff may ask, "How did you do today?" "What types of fishing did you do?" and "Did you do any other types of fishing?"

**Fish Identification, Measure, and Weight** -- During the interview, staff measure and weigh all the fish a fisherman caught. If the staff cannot do that, they need to at least measure lengths. If the staff still cannot do that, they count or estimate the total number of pieces by



species and estimate the total weight per species. If only a subsample of fish can be measured, each individual specimen of a particular species is randomly selected with no preference for fish size.

Several standard units of measurement are used. All fish are measured with measuring boards or tapes, weighed with scales, and the data is recorded in centimeters and pounds. For finfish with forked tails, fork length (FL) is the standard unit of measurement. For species with rounded or truncated tails, FL equals total length.

**A Complete Interview** -- A complete interview accounts for all of the catch and ensures that there are no missing or erroneous data. It is important to have a complete measure of all the catch per interview since these data are used to determine the average catch per unit (hours fished) effort (CPUE) calculation. If staff are unable to count all of the catch during an interview, they do not have the whole landing for that period of fishing activity. When all catch cannot be measured individually during the interview (e.g., the fisher was in a rush or uncooperative), staff attempt to 1) estimate the total number of fish per species, or if they cannot do that, then 2) estimate the total weight of the entire catch per species. If not all fish are measured, and an estimate of species composition and weight per species cannot be made, then this entails an incomplete interview and is not used in the data expansion process.

Since multiple runs are made during a survey period, staff may encounter a fisherman who has already been interviewed. If this happens, they update their forms taking care not to double count fish and making sure to update the total number of hours fished. If staff cannot do that, they discard the previous interview and interview the fishermen over again.

Participating in interviews is voluntary. Fishers may decline being interviewed if they perceive that the survey will be time consuming due to a large catch or the obtaining of length and weight data. If fisheries staff sense that a fisher does not want to provide data (e.g., fisher ignores staff, fisher states that he is in a rush), they cease the interview and thank the fisher for his/her time. Most fishers are cooperative and support American Samoa's overall fishery management program.

### **2.2.3 Opportunistic Data Collection Methodology**

Staff sometimes collect interview information on a non-scheduled survey day if they see a fisherman fishing with a method that is difficult to capture. This may happen on a survey or a non-survey route. This is called an opportunistic interview, and the form is marked as such. Opportunistic data gives managers an average catch rate for the hard to obtain methods, providing an estimate to create CPUE for those methods. At the time of writing this document, DMWR had one staff living in Aunu'u who could conduct opportunistic interviews for the Shore-based Creel Survey Program in Aunu'u. Opportunistic interviews occur about one – two times per month using the Shore-based Interview Survey Form (see "Appendix 5 Shore-based Interview Survey Form").

## 5.0 SURVEY SCHEDULING

For the American Samoa Shore-based Creel Survey scheduling, a weekend/holiday is normally defined as either a weekend or a government-recognized holiday. Weekends and holidays are grouped together as a single strata for scheduling and data expansion purposes. Weekend/holiday schedules start on Friday evening at 18:01 and end on Sunday evening at 18:00, including the evening shift (18:01 – 24:00 and 00:01 – 06:00) before a government-recognized holiday. For example, when a holiday falls on a weekday, the night shift (18:01 – 24:00 and 00:01 – 06:00) on the preceding day is considered a weekend/holiday. However, no survey is scheduled for the 00:01 – 06:00 shift due to government restrictions about working on holidays so this shift is not part of the scheduling selection. Furthermore, there is a restriction on working overtime due to lack of funding. No work is scheduled on Sundays in American Samoa due to local customs.

A weekday is normally defined as starting from Sunday evening at 18:01 and lasting until Friday evening ending at 18:00 and includes the evening shifts (18:01 – 24:00) on a government-recognized holiday. However, no survey is scheduled for this shift due to government restrictions about working on holidays so this shift is not part of the scheduling selection.

The American Samoa Shore-based survey is conducted during three separate shifts (two day and one night shift). A second night shift (00:01 – 06:00) is not conducted because there is not much fishing activity during this period.

**Table 1. American Samoa Shore-based Scheduling Components**

Shifts	Survey-Shift Combinations:	Survey Crews:
1) (AM) 04:30 – 13:00	A) Shifts 1 and 3	T1) Luatasi and Oliver
2) (AM) 10:30 – 19:00	B) Shifts 2 and 3	T2) Herbie and Auva'a
3) (PM) 16:30 – 01:00	C) Shifts 1 and 2	

It usually takes three complete runs (a participation count followed by an interview is one run) for each eight-hour survey day. However, the actual sampling is done in six hours. The first hour of the shift is used to gather survey equipment and forms, and to drive out to the sampling area. The last hour of the shift is used to return to the office, double check the forms and submit them, clean equipment, and close out the shift.

Scheduling for the Shore-based program is normally conducted for a whole year at a time to ensure fairness in rotation of the team and weekend days off. A list of the survey teams and the steps that the scheduler takes to complete the scheduling follows:

Team A: Auva'a and Herbie; Team B: Oliver and Luatasi

1. Mark off all holidays and office days (payday Mondays).
2. Randomly select the shift combinations (1 – 2, 1 – 3, 2 – 3) for each week, without replacement.
3. Assign a team to work on the week where shift 3 is selected. Rotate the team during the assignment and start with the team that did not work on the last shift 3 of the previous schedule. For example, if team A worked shift 3 on the last schedule, then team B will work the first week (of this schedule) where a shift 3 is identified.
4. Assign the opposite team to work on the non-shift-3 of the same week. This takes care of assigning a team to work for the weeks that have the shift combinations of 1 – 3 and 2 – 3.
5. At the end of steps 3 and 4, only weeks with shift combinations 1 – 2 remain. Rotate the teams assigned to shift 1 and 2, starting with the team that did not work shift 1 for the last schedule and assign them to work shift 1 for this schedule.
6. For each month, select two weekend days (Friday or Saturday) as a day off for each team. The Friday or Saturday must not be from the same week and it must be from the week where shift 3 was identified. For fairness, rotate each team so each team will have a Friday and a Saturday off within a two month period. Assignment of which team will have the first Friday off is followed from the last schedule.
7. Staff are only allowed to work five days per week. A weekday must be selected as a day off for each team for the week that they did not have a Friday or Saturday off. To ensure data collection is covered evenly within the weekdays, this weekday off must be rotated for the days between Monday to Thursday. Both teams should not have the same day off within the week, and no day off is allowed for the weekday that follows a holiday. For example, this week, if team A has a day off on Tuesday, then team B will be off on Wednesday. Next week, team A will be off on Thursday and team B is off on Monday; however, if Monday is a holiday then team B will be off on Wednesday instead.
8. Rotate East-Central-West routes and assign each route to the weekend day shifts (Friday, Saturday, and the day before a holiday) for weeks with shift 1 and 2 assigned.
9. Rotate East-Central-West routes and assign each route to the weekend night shifts (Friday, Saturday, and the day before a holiday) for weeks with shift 3 assigned.
10. Rotate East-Central-West routes and assign each route to each of the weekday shifts for weeks with shift 1 assigned.
11. Rotate East-Central-West routes and assign each route to each of the weekday shifts for weeks with shift 2 assigned.
12. Rotate East-Central-West routes and assign each route to each of the weekday shifts for weeks with shift 3 assigned.
13. There should be no days left by the time you reach this step.

## **6.0 DATA QUALITY CONTROL**

The Shore-based Creel Survey Program in American Samoa employs several methods to ensure quality assurance and quality control of the data that are collected. First, the data forms are completed by the data collection technicians. The technicians who collect the data are required to come back to the office and review the survey forms to check for any mistakes or missing data. If missing data are easily recalled, then it can be filled in at that time. Staff turn in the forms to the shore-based supervisor. The supervisor reviews the forms to check for missing data (for example, forgot to fill in some fields or the writing is unclear). The supervisor asks the data collection technicians to fill in the missing data or clarify unclear handwriting. All remarks and edits are written in red pencil and the supervisor writes their initials on the form next to the changes. After the supervisor approves the form, they sign it and return it to the data entry technicians. The data entry technicians write the date received and their initials on their forms.

The data are then entered, on almost a daily basis, into the computer that has the Shore-based data system on it. If the system detects an error while entering data, an error prompt appears on the screen to notify the data entry technician that something is wrong. For example, a fish might be flagged as too long or too short for its weight because the decimal point is in the wrong place. The data entry technician stops and talks to the supervisor. The supervisor either corrects the error or asks the data collection technician to correct it. If the mistake cannot be resolved at once, it is set aside for clarification, and once clarified it is entered into the database. Another error that might occur is when there is a new Samoan fish name on the form but no matching species in the code file used for validation during data entry. The data entry technician asks the supervisor and data collection technicians if there is another Samoan name for the fish. If there is and it is in the system, the data entry technician uses the existing name for the fish. If it is not in the system, the data entry technician asks the data manager to include it in the system (since the data manager is the only one authorized to make this type of change). If a new fish is included in the system, the data manager transfers the modified code files to the Boat-based and Shore-based computer database.

After the data entry technician enters the form, they run the "suspicious interviews report" and follow up on any potential errors identified in the report. After all errors are corrected, they sign their name to show that it is complete. The data manager reviews the final data entry and compares it to the raw data forms. If there are no errors, the data manager approves the form and signs it. If there is a problem, the data manager writes a note that describes the problem and signs it. The form then goes back to the data entry technician for correction. When the error is corrected, the data entry technician signs the form and the process is complete. The paper forms are scanned and archived using the Document Imaging Archival System (DIAS), developed by WPacFIN, and then filed by quarter into the filing cabinet. The data file is given to the supervisor on at least a monthly basis.

The Quality Assurance module is run as the last step. This module must be run before data is shared or published. The Quality Assurance module includes three main steps:

1. It checks to make sure that data is entered and up to date
2. It checks for data entry errors and gaps in the data
3. It cross checks data from different data systems

On a quarterly basis, WPacFIN comes to correct data issues (e.g., fix errors and add enhancements to the data entry and database system software, look for data entry errors, and create a backup).

### **6.1 Fish Identification Training**

American Samoa does not have a comprehensive fish identification training formulated for their staff at this time. Some planning to do this has begun, but more time and effort needs to be spent to develop a training module for new staff and refresher courses for existing staff. There is recurring confusion with species names because Samoan names are not standardized. Staff must work toward learning scientific names of fish species.

## **7.0 REPORTS**

The WPacFIN data processing system generates data entry validation reports, maintenance reports, and various data summary reports, including expanded catch and effort (see "7.1 Shore-based Expanded Catch and Effort Report"), and expanded species composition (see "7.2 Shore-based Expanded Species Composition").

### 7.1 Shore-based Expanded Catch and Effort Report

The following is an example annual expanded report that shows the estimated landings for this fishery for each stratum.

<b>AMERICAN SAMOA SHORE BASED CREEL SURVEY SYSTEM</b>							
<b>EXPANDED CATCH/EFFORT DATA FOR EACH STRATUM</b>							
<b>With Pooling</b>							
<b>Calendar Year 2002 - EASTERN - 2002-2004</b>							
<b>Day Survey</b>			<b>Weekdays</b>				
Type of Gear	Num of Interv.	Pooling	Total Pounds	Total Gear-Hrs	Pounds/Gear-Hr	Expanded Gear-Hrs	Expanded Pounds
BAMBOO POLE	1	DF	19.51	8.00	2.43	232	566
GILL NET - ACTIVE	1	DF	13.20	1.00	13.20	117	1553
GLEANING	3	-1	25.16	37.95	0.66	1215	806
MOSQUITO NET	0		0.00	0.00	0.00	32	0
ROD AND REEL	4		55.97	237.58	0.23	1436	338
SPEAR - SNORKEL	1	DF	13.13	0.83	15.82	600	9493
THROW NET	3	-1	24.14	4.66	5.17	360	1865
<b>Total</b>					3.661	3994	14623
<b>Day Survey</b>			<b>Weekend/Holidays</b>				
Type of Gear	Num of Interv.	Pooling	Total Pounds	Total Gear-Hrs	Pounds/Gear-Hr	Expanded Gear-Hrs	Expanded Pounds
BAMBOO POLE	1	DF	19.51	8.00	2.43	272	663
GLEANING	3	TD1	25.16	37.95	0.66	272	180
ROD AND REEL	4	TD	55.97	237.58	0.23	1332	313
SPEAR - SNORKEL	1	DF	13.13	0.83	15.82	136	2151
<b>Total</b>					1.644	2012	3309
<b>Night Survey</b>			<b>Weekdays</b>				
Type of Gear	Num of Interv.	Pooling	Total Pounds	Total Gear-Hrs	Pounds/Gear-Hr	Expanded Gear-Hrs	Expanded Pounds
GLEANING	4	DF	17.05	7.28	2.34	587	1377
ROD AND REEL	16	DF	47.55	47.90	0.99	587	583
THROW NET	6	DF	22.09	13.83	1.59	1763	2817
<b>Total</b>					1.625	2939	4778
<b>Night Survey</b>			<b>Weekend/Holidays</b>				
Type of Gear	Num of Interv.	Pooling	Total Pounds	Total Gear-Hrs	Pounds/Gear-Hr	Expanded Gear-Hrs	Expanded Pounds
BAMBOO POLE	2	DF	4.32	2.93	1.47	163	241
ROD AND REEL	16	DF	47.55	47.90	0.99	326	323
<b>Total</b>					1.154	489	565
<b>Route Total</b>					2.466	9436	23276

## 7.2 Shore-based Expanded Species Composition

The following is an example annual expanded report that shows the estimated species composition for this fishery by route and by day and night surveys.

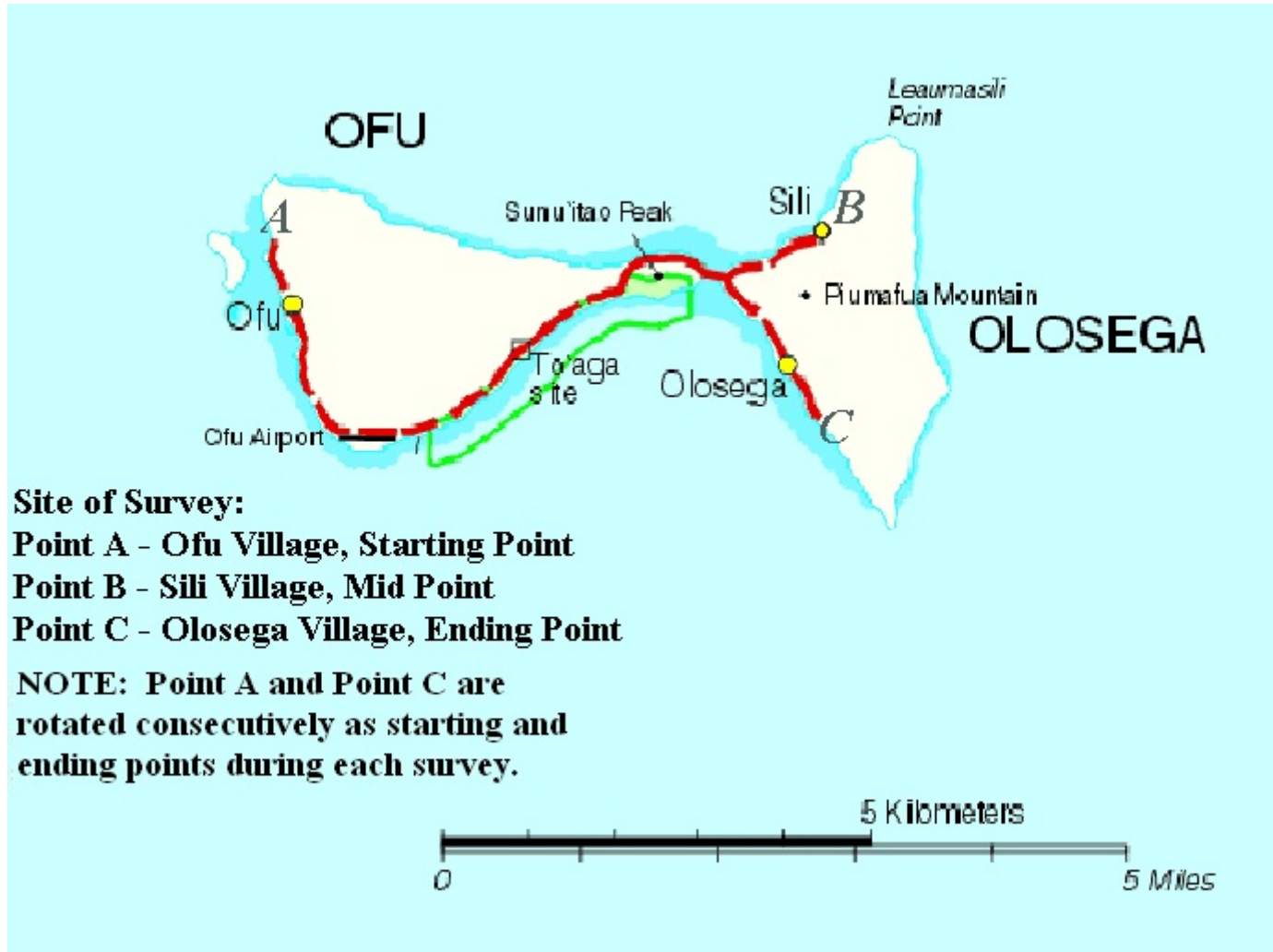
<b>AMERICAN SAMOA SHORE BASED CREEL SURVEY SYSTEM</b>			
<b>SPECIES COMPOSITION BY ROUTE, DAY &amp; NIGHT SURVEY REPORT</b>			
<b>With Pooling</b>			
<b>Calendar Year 2002</b>			
<b>EASTERN - 2002-2004</b>	<b>Total Pounds Caught</b>		
<b>Species Name</b>	<b>Day Survey</b>	<b>Night Survey</b>	<b>Total</b>
Amberjack, Greater	0.0	198.3	198.2
Bass, Mountain	0.0	263.6	263.6
Clam, Pipi	78.4	0.0	78.4
Crabs, Grapsid	0.0	124.5	124.5
Emperors	43.6	33.6	77.2
Filefishes	0.0	38.8	38.8
Flagtail, Barred	0.0	28.8	28.8
Goatfish, Yellowstripe	0.0	69.6	69.6
Goatfishes	33.6	0.0	33.6
Grouper, Honeycomb	0.0	161.9	161.9
Grouper, Peacock	326.3	0.0	326.3
Groupers	439.4	349.4	788.8
Hawkfish, Flame	5.1	0.0	5.1
Hawkfish, Stocky	0.0	6.8	6.8
Jacks	354.7	104.6	459.3
Lyretail, Yellow-edged	203.9	0.0	203.9
Mulletts	340.5	281.8	622.3
Needlefishes	12.8	4.5	17.4
Octopus	554.3	846.8	1401.1
Parrotfishes	22.3	451.7	474.0
Redfish, Surf	0.0	49.8	49.8
Reef fishes (unknown)	330.0	0.0	330.0
Rudderfishes	335.5	781.5	1117.0
Sea Cucumber, Leopard	0.0	10.7	10.7
Sea Cucumber, Loli	0.0	21.3	21.3
Sergeant major	9.4	4.4	13.8
Sisi	0.0	177.9	177.9
Snail, Turban	196.0	0.0	196.0
Snapper, Onespot	0.0	33.7	33.7
Snapper, Ruby (Ehu)	190.5	0.0	190.5
Squirrelfishes	422.1	31.0	453.1
Surgeonfish, Blackstreak	313.9	0.0	313.9
Surgeonfish, Blue-Banded	9949.4	664.1	10613.5
Surgeonfish, Brown	1665.4	84.4	1749.8
Surgeonfish, Whitespotted	0.0	245.5	245.5
Surgeonfish, Yellowfin	0.0	96.7	96.7
Surgeonfishes/tangs (asstd)	86.8	0.0	86.8
Sweepers	0.0	7.9	7.9
Tang, Convict	141.5	96.4	237.9
Triggerfishes	0.0	10.0	10.0
Tuna, Dogtooth	89.7	0.0	89.7
Unicornfishes	1553.5	0.0	1553.5
Wrasse, Red Ribbon	0.0	7.0	6.9
Wrasse, Sunset	9.0	0.0	9.0
Wrasses	225.8	56.6	282.4

## APPENDIX 1 TUTUILA SURVEY SITES MAP





APPENDIX 2 OFU-OLOSEGA SURVEY SITES MAP



APPENDIX 3 TA'U SURVEY SITES MAP





### APPENDIX 5 SHORE-BASED INTERVIEW SURVEY FORM

<b>Shore-based Creel Survey Interview Form</b>												
Department of Marine and Wildlife Resources American Samoa												
Date _____	WD / WE/HD	Village _____	# Fishermen _____	Interviewer _____								
(MM/DD/YY)												
Interview Time _____	Start Time _____	Day	Stop Time _____	Day	Down Hours _____							
(Military)	(Military)	Before ____	(Military)	After ____								
<b>Method</b>	<b>Gear Units</b>	<b>Location</b>	<b>%Unsold</b>	<b>%Sold</b>								
1. Spear Snorkel	_____	_____	_____	_____								
2. Hand Line	_____	_____	_____	_____								
3. Gleaning	_____	_____	_____	_____								
4. Throw Net	_____	_____	_____	_____								
5. Rod and Reel	_____	_____	_____	_____								
6. Gill Net	_____	_____	_____	_____	Complete	_____						
7. Bamboo	_____	_____	_____	_____	Incomplete	_____						
8. Sand Mining	_____	_____	_____	_____	Opportunistic	_____						
9. Other	_____	_____	_____	_____								

Species	Length (cm)	Wt. (kg)	Length (cm)	Wt. (kg)	Length (cm)	Wt. (kg)	<u>Total No.</u>		<u>Total Weight</u>			
							Actual	Est.	Actual	Calc.	Est.	

Bycatch: Did you release or throw back any fish?     NO     YES    (if yes, list below)

Bycatch Species	Method	<u>Bycatch Type</u>		Length (cm)	Wt. (kg)	Length (cm)	Wt. (kg)	<u>Total Number</u>		<u>Total Weight</u>		
		<u>Released</u>	<u>Released</u>					Actual	Est.	Actual	Calc.	Est.
		Alive(1)	Dead(2)									

REMARKS:

## **APPENDIX 6 CRAIG GRAHAM'S AMERICAN SAMOA HISTORICAL CREEL DETAILS WRITTEN IN 2006**

### **Introduction**

Shore-based Creel surveys have been done in American Samoa in an intermittent fashion since 1978 by various researchers. In 1978 H. Hill did an 8-month road survey from 19 villages from Faga'itua to Malaloa. During 1977 and 1978 Richard C. Wass started surveying nine contiguous villages from Faganeanea to Lauli'I and then in 1979 and 1980 surveyed the four non-contiguous villages of Faga'itua, Masefau, Fagasa, and Vaitogi. In 1990 Bonnie J. Ponwith established the shore-based creel survey protocol described below. This protocol was used by other researchers until Sabrina Mariner established the shore-based creel survey protocol in use at the time of writing this document in 2006.

The current American Samoa Shore-Based Creel Survey Data System is designed around Bonnie Ponwith's and later survey protocols as detailed data from the earlier surveys is not available. Each survey is entered in the system as its own route or collection of routes to allow for the data in all of these surveys to be collected and examined in one data system and yet analyzed differently if necessary.

### **Methods**

#### **Data Collection 1990 – 1996**

This protocol was established in FY 1991 by Bonnie Ponwith. It was used in FY 1992 by John McConnaughey and then by Susan Saucerman until FY 1996. It was done along a single route from Nu'uuli to Lauli'i and entered in the current American Samoa Shore-Based Creel Survey data system as the Central 1990–1996 Route. It employed a systematic, random sampling program that stratified sampling by type of day (either weekday or weekend/holidays with Sunday included), by day or night survey, and by fishing method.

A day survey was defined as from 06:00 to 18:00 while a night survey is from 18:00 to 06:00. The type of day for a night survey is determined by the day it ends. For example, a night survey that begins at 18:00 on a Friday evening ends on Saturday at 06:00 and is considered a weekend night survey. The fishing methods covered by this survey were gleaning, rod and reel fishing, bamboo pole fishing, spear diving, handline fishing, throw netting, gill netting, sand mining, and swimming with no fishing.

DMWR staff normally sampled 3 days a week following a monthly schedule that ensured every hour in the 24-hour day, every day of the week, and all lunar, tidal, and weather conditions were covered with at least a 6% coverage in the year. During each eight-hour shift, DMWR staff made four runs from one end of the route to the other to determine the participation count. These runs were not to exceed one hour and usually lasted from 30 to 45 minutes. All fishing activity seen during these runs was entered on an Inshore Participation Form (see Figure 1.--1990-1996 Participation Form.) Runs where no fishing activity occurred were also entered into the system to accurately account for these zero-participation runs.

## INSHORE PARTICIPATION FORM

Sampler \_\_\_\_\_

Date \_\_\_\_\_

Month/Day/Year

Check: Week day \_\_\_\_\_

Week end \_\_\_\_\_

Holiday \_\_\_\_\_

Methods: G = gleaning  
 R&R = Rod & Reel  
 BP = Bamboo Pole  
 D = Spear dive  
 HL = Hand line  
 THNET = Throw net  
 GNET = gill net  
 SWIM = not fishing  
 SAND = mining sand

Page \_\_\_\_ of \_\_\_\_

Weather: C = clear  
 PC = partly cloudy  
 O = overcast  
 R = rain

Time	Village	Method	Number Gear units	Number People	Weather	Comments/milage

Figure 1.--1990-1996 Participation Form

### INSHORE INTERVIEW FORM

Page \_\_\_\_\_ of \_\_\_\_\_

Sampler \_\_\_\_\_

Time \_\_\_\_\_

Disposition: Sell \_\_\_\_\_  
Keep \_\_\_\_\_

Date \_\_\_\_\_  
Month/Day/Year

Check: Complete \_\_\_\_\_  
Incomplete \_\_\_\_\_

Home village? Yes \_\_\_\_\_  
No \_\_\_\_\_

Check: Week day \_\_\_\_\_  
Week end \_\_\_\_\_  
Holiday \_\_\_\_\_

Method \_\_\_\_\_

Age and number of fishermen:

Village \_\_\_\_\_

Hours fished \_\_\_\_\_

Boys < 14 \_\_\_\_\_ Men > 14 \_\_\_\_\_

Gear units \_\_\_\_\_

Girls < 14 \_\_\_\_\_ Women > 14 \_\_\_\_\_

Number people \_\_\_\_\_

#### FISHERMEN'S CATCH DATA

Species/Description	Number of fish	Weight (lbs or grams?)	Length (inch or mm?)	Comments

Be sure to check: Did you weigh the fish in grams or pounds? Did you measure in inches or millimeters?

Figure 2.--1990-1996 Interview Form

The catch was sampled opportunistically or during the time between runs during a shift and the detailed catch was entered on Inshore Interview Forms (see Figure 2.--1990-1996 Interview Form.) Interviews were only taken if the fishermen had been fishing for at least half-hour. If all of the fish could not be measured individually they would be entered as so many pounds of a certain species or as so many pounds of miscellaneous fish if the species could not be determined.

### **Data Collection – 2002- 2003**

Dr. Emmanuel Coutures expanded Bonnie Ponwith's shore-based creel survey sampling protocol in 2002, by expanding her Nu'uuli to Lau'i'i route to include the Eastern and Western ends of Tutuila's South shore. His Eastern route ran from Lau'i'i to Tula and his Western route ran from Lau'i'I to Amanave. On Saturdays he covered the entire South Shore of Tutuila from Amanave to Tula. His protocol also employed a systematic, random sampling program that stratified sampling by type of day (either weekday or weekend/holidays, excluding Sundays), by day or night survey, and by fishing method.

Dr. Coutures made three participation runs a week randomly and evenly divided between his Eastern and Western routes. He made two participation runs per month along the entire South Shore of Tutuila on Saturdays. His schedule based on randomly selected shift times that ranged from 05:00-13:00 to 16:00-24:00 also ensured every hour in the 24-hour day except for the hours from midnight to 05:00, every day of the week except Sunday and all lunar, tidal, and weather conditions were covered with at least a 6% coverage in the year. During each eight-hour shift, DMWR staff would travel back and forth within the selected route and any fishing activity seen during these shifts was entered on an Inshore Participation Form (see Figure 3.--2002-2003 Participation Form.)

To allow Dr. Coutures participation data to be entered and analyzed along with the 1990 –1996 and the current data, his Eastern Route participation data was divided and entered into the system as the belonging to the Eastern 2002 –2003 Route which ran from Tula to Aumi and to the Central 2002 –2003 Route which ran from Nu'uuli to Lau'i'i. His Western route participation data was divided into the Western 2002 –2003 Route which ran from Amanave to Leone and the same Central 2002–2003 Route. The South Shore route that he covered on Saturdays was divided up into all three Eastern, Western, and Central routes.

Catch data was obtained by interviewing fishermen during the participation runs or on surveys dedicated solely to fishermen interviews. Parties that had no catch were recorded as such and included in the CPUE calculations. All fish were measured using a measuring board to determine length and weighed to the nearest ounce on a spring scale. The interview data collected was entered on an Interview Form (see Figure 4.--2002-2003 Interview Form.) Interviews that had no indication of how long the fisherman was fishing were discarded and not entered into the system.





*American Samoa Shore-based Creel Survey*

**Interview - Inshore Creel Survey - Interview**  
**Department of Marine & Wildlife Resources**  
**Pago Pago, American Samoa**

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Sampler(s) \_\_\_\_\_ Page \_\_\_\_ of \_\_\_\_  
 Month/Day/Yr \_\_\_\_\_ Gear Type \_\_\_\_\_ Gear Units \_\_\_\_\_  
 Village \_\_\_\_\_ Weather \_\_\_\_\_ WE \_\_\_\_\_ WD \_\_\_\_\_  
 Male \_\_\_\_\_ Female \_\_\_\_\_ Tide \_\_\_\_\_ Reef Flat/Edge \_\_\_\_\_  
 Age: < 14 \_\_\_\_\_ > 14 \_\_\_\_\_

Start Time	Est. End Time	Species Caught	# of Species	Wt. (lbs)	Len. (cm)	Comments

Figure 4.--2002-2003 Interview Form

## **Data Collection 2004 – 2006**

In August 2004 Sabrina Mariner modified and improved Dr. Couture's sampling protocol by having three non-overlapping routes along Tutuila's South Shore. These routes are entered in the data system as the Eastern 2004 and Later Route running from Lau'i to Tula, the Central 2004 and Later Route running from Nu'uuli to Aua, and the Western 2004 and 2005 Route running from Amanave to Leone. She also had regularly scheduled and overlapping shifts that ran from 00:00 – 0800, 06:00 – 1400, 12:00 – 2000, and 18:00 – 02:00.

Five days each week, including Saturday and holidays (but not Sunday), one of these three routes was randomly selected to be sampled during one of the four randomly selected shifts by picking routes and shifts out of a container. Changing the shift time every day proved to be difficult to manage and too hard on the samplers working different hours every day. From April 2005 to January 2006 the shift time was randomly selected every week instead of every day and the route was still selected randomly every day.

In February 2006 an additional sampling team was available, allowing two sampling shifts to be run each day 12 hours apart. The first shift time was still randomly selected every week and the 2<sup>nd</sup> shift was always 12 hours after it on the same day. The routes were randomly selected every day for both shifts independently.

In 2006 it was discovered that a lot of fishing activity was occurring at Sliding Rock in the village of Vailoa adjacent to Leone, the Eastern most village of the Western 2004 and Later Route. A new route, the Western 2006 and Later route, was created to add Sliding Rock and Vailoa to the old Western 2004 and Later Route. The old Western 2004 and Later Route was renamed the Western 2004 and 2005 Route.

Again during each eight-hour shift, DMWR staff would make four runs from one end of the route to the other to determine the participation count. These runs were not to exceed one hour and usually lasted from 30 to 45 minutes. All fishing activity seen during these runs was entered on an Inshore Participation Form (see Figure 5.--2006 Participation Form). Even if no fishing activity was seen during the run, the beginning village name, the time visited, the ending village name, and the time visited had to be entered on the form and entered into the data system to get an accurate count of zero-participation runs.

Again, the catch was sampled opportunistically or during the time between runs during a shift and the detailed catch was entered on Inshore Interview Forms (see Figure 6.--2006 Interview Form).



**INSHORE CREEL PARTICIPATION FORM**  
Department of Marine and Wildlife Resources  
Pago Pago, American Samoa

DATE(MM/DD/YY): \_\_\_\_\_ Location: **West**

Shift Time (Military Time) \_\_\_\_\_ **Central**

Start \_\_\_\_\_ **Eastern**


End \_\_\_\_\_

Weather: C - Clear R - Rain  
P - Partly Cloudy O - Overcast Interviewers: \_\_\_\_\_

Gear Type: G-Gleaning GNet-Gill Net  
D-Spear Diving THNet-Throw Net  
R&R-Rod/Reel HL-Handline  
BP-Bamboo Pole SND-Sand Mining \_\_\_\_\_

Run No.	Start/End Time	Village	Number of People	Gear Type	Number of Gear	Weather	Remarks

Figure 5.--2006 Participation Form



**INSHORE CREEL INTERVIEW FORM**  
 Department of Marine and Wildlife Resources  
 Pago Pago, American Samoa

**Date:** \_\_\_\_\_ **# Gear** \_\_\_\_\_ **Fishing Party Total**  
 (Military Time)

**Complete**     **Incomplete**    \_\_\_\_\_ **Interview Time**    \_\_\_\_\_ **Total Hrs Fished**

**Route:** \_\_\_\_\_ **Interviewers:** \_\_\_\_\_

**Village:** \_\_\_\_\_

**Gear Type:** \_\_\_\_\_

Species Name	Scientific Name	By Catch	Pieces	Length (cm)	Weight (g)

Figure 6.--2006 Interview Form

**APPENDIX 7 SABRINA MARINER'S AMERICAN SAMOA TIMELINE WRITTEN IN MID-2006**

**H. HILL. 1978**

**The use of nearshore marine life as a food resource by American Samoans**

<b>METHODOLOGY</b>	<b>FACTORS</b>	<b>DURATION</b>	<b>RESULTS</b>
Road Survey between Faga'itua and Malaloa	Age/sex (11?)-site (19 villages) - fishing activity (10) - equipment (13)- physical data: tide height (4); tide period (3); weather (4); wind (spd); sea (5) - reef location (10) -	8 months	<p>Walking-gleaning 36.9 %; Diving 24 %; Fishing Pole-Bait 17.6 %; Fishing rod-reels 3.7 %; Fishing pole-flies 2 %; Gill net or trap 4.3 %; "paopao" activity 4.8.</p> <p>Description of fishing groups &amp; equipment for "atule"</p> <p>79.3% are fishing in "their" reefs in front of their village.</p> <p>p. 93: table fishery activities/ reef location</p> <p>Relative importance of the regions of the reef to the fishery: Inner reef 29 %, Mid reef 23 %, Outer Reef 26 %, Reef front 22 %; but variation according to the reef in front each village (specialization)</p> <p>Potential over fishing in the "urban" portion of Tutuila</p> <p>Average gleaner: 2.2 kg/week, diver: 2.2; line fisherman: 2.9</p> <p>By night and by gleaning: 0.6 lb / hour of fish, 0.4 lb of Crustaceans, 0.2 lb of Molluscs (Gastropods and Octopus)</p> <p>Van Pel, 1954: 100 t per year, 3 % for markets</p> <p>Probably overfishing when we compare AS CPUE with Western Samoa ones (respect. 0.6 and 2.2 lb, permanhour)</p> <p>Yearly catches estimates for the daylight subsistence fishery activities in the site: 22.5 ton (1 t for Crustaceans) + 10 t of Atule</p> <p>Reef area from shore to the seaward boundary of the reef slope in the site (15.4 km): 203 ha</p> <p>Night catch is estimated to one-tenth of the day catch</p>
Interview In the field and meetings	Fishing activity	79	Fishermen may harvest their catches from any of numerous reef zones. Changes in the tides, weather and surf conditions also provide obvious reasons for employing different fishing techniques to different degrees in harvesting the nearshore marine life.
Exhaustive sampling / observation	Activities-catches	3 X 1 week	

Richard C. WASS, 1981

The shoreline Fishery of American Samoa - Past and Present

**METHODOLOGY**

**A.** During 1977-1978, nine contiguous villages:  
Faganeanea to Lauili'i: 18.8 km

Objectives: to determine average daily fishing effort for each village and method; and catch surveys designed to determine catch/man hour for each village and method (Day gleaning, night gleaning, bamboo rod fishing, rod and reel fishing, day diving, night diving, throw netting, and seining

1. The number of fishermen engaged in each fishing method for each village was multiplied by the quotient obtained from dividing the number of hours (8) to calculate total man-hours of effort for the 8 hours period.

201 8-hours effort surveys covering all portions of the 24-hr day equally WD, Sat and Sun, and all conditions (tide, weather, wind...)

2. Catch surveys were conducted on days when no effort surveys were scheduled (age, sex, fishing method, length/weight of fishes)

748 catches, 1,969 man-hours of effort.

**B.** During 1979 and mid-1980, four villages far from Pago Pago: Faga'itua, Masefau, Fagasa, and Vaitogi), the observer spent 8 hr within the village.

**RESULTS**

Around Tutuila, 100 MT / yr

(respectively, fish and Invertebrates in kg), Day gleaning (2,364; 19,430), night gleaning (4,191; 5,596), bamboo rod fishing (10,171; 30), rod and reel fishing (11,356, 168), day diving (13,955; 5,433), night diving (10,168; 1,342); throw netting (9,551; 32), and seining (5,615; 0)

p. 69/70. Table Invertebrate/fish species catch per method.

p. 71. Table Estimated annual harvested catch by species

These values are under-estimated.

p. 73. Table Population size and per capita catch by active fishing methods for the 13 villages.

Extrapolation of the estimated total catch to the entire Tutuila (30,626 inh.): 248,071 kg for active fishing method (overestimated, 10 villages are inland); 15,619 kg fish and 3,063 kg invertebrates for passive fishing method (for outlying villages only).

Total shoreline subsistence/recreational catch (weighted by overlooked fishing effort) about 300,000 kg

p. 76. Estimated annual catch by village per unit area of reef. From 0 to 8 m, catches range from 147 to 440 kg/ha (av. 266).

Night catch is estimated to quarter of the day catch

In the biblio., from other islands, invertebrates are not included (1/3 in AS), and considerable part of the Samoan catches consists of a diverse assemblage of smaller fishes which are generally not taken elsewhere.

There is an increasing tendency to fish the reefs of neighboring villages and the Bay (Pago) area, and a decreasing tendency to group fishing.

Bonnie J. PONWITH, 1991

The shoreline Fishery of American Samoa - A 12-year comparison

**METHODOLOGY**

3 days a week, in a monthly schedule, each of the 24h in a day, every day of the week, all lunar, tidal and weather conditions.

Sample rate: 6% of all possible hours in the year-long study

1 During each 8-hr shift, four 1-hr sampling sweeps: drive from Lauli'ituaui to Nu'uuli (began at on the dot and finish in the same hr), all fishing activity are recorded.

Reported as gear-hour

Effort are separated in WD D 600-1800; WD N 1800-600 (Sunday included); WE D 600-1800; WE N 1800-600 (Fri. & Sat.).

To estimate total effort (**TE**):

(total # of Gear-units / total hrs observed) [= mean # of gear units per hr] x total number of hrs possible in the 1-yr study

2 Catch data were collected opportunistically during the shifts (if time allowed, catches are also sampled during a sweep). Fishermen are sampled only if they have fished at least  $\frac{1}{2}$  hr.

CPUE per catch (in lb per gear-hour) = TW/TE

Species composition estimation

3. Separate sampling for the Palolo fishery.

Similar method

**RESULTS**

Bambou pole+handline+rod&reels: 71 % of **TE** & 63 % of **TC** (total catch)

Skindiving: snorkel, mask, and Hawaiian spear

495 sampling sweeps and 366 interviews = 1257 gear-hrs of effort.

Annual effort: 64,500 gear-hrs and 152,500 lb (69,100 kg)

With Palolo: 66,250 gear-hrs and 155,996 lb (70,750 kg)

WD and WN (79 % of all hrs in a week) = 69 % of effort & 86 % off all catch

Mean CPUE: 3 lb (1.350 kg) per gear-hour

Higher in the day than in the night

Gill net is the more efficient (12.2 lb) and bamboo pole the lowest (.7)

Hand line CPUE: 1.4 lb per gear hour

The villages sampled correspond to 20 % of all villages, 35 % of all population (15,850 - 45,580), and 12 % of total linear shoreline.

Then per capita catch per yr = 9.8 lb (4.4 kg) X Total population = 439 klb (197.8 MT) for a annual fishing effort of 181,000 gear-hrs

With an average price in market of \$1.75 per lb, the total value = \$ 768 k

Atule corresponds to 46 % of the total catch

70 % of all people interviewed were fishing on the reef adjacent of their home village

Comparisons between **79** and **91**: (**& variation**) catch (**157,276** - **135,100**: - **14** %); effort (**73,680** - **61,720**: - **16** %); per capita catch lb (**19.4** - **9.8**); Island population (**30,626** - **44,580**); Island wide harvest in klb (**597** - **439**).

Reduction of Invertebrates catches 59% of non atule catches to 25%, but because decreasing (-66 %)of people who is gleaning/diving

Yield per unit area of reef (to -8m isobath): **25** MT/km<sup>2</sup> (79) - **13** (91)



Bonnie J. PONWITH, 1995

The Pala Lagoon subsistence fishery

METHODOLOGY	RESULTS
<p>2 sampling shifts per week during which all fishing activities are noted.                      At he beginning, we look for all fishing activities "in progress" (net, pots...). Then monitoring from Lion's Park. Every 1-2 hrs, circumnavigation by kayak to check invisible part of the lagoon. Participation form as in other creel surveys. We try to obtain catch data of at least 50% of activities.                      Effort by day, by night, WE WD</p>	<p>Exclusively by walking                      Fish: R&amp;R, Bamboo pole, handline, gill nets and Throw nets, rarely spear divers                      Clams: <i>Gafrarium timidum</i> (Tugane); <i>Asaphis deflorata</i> (pipi), mainly during low tide                      Mangrove crab: pots (deployed with paopao) and netting.  <i>Lysiosquilla mantis</i>                      565 hrs of observation, 849 gear-hr, 3999 pot-hr and 1220 100'-hr of passive gill net.                      TC: 23,776 lb                      Values of cpue/gear</p>

John McConnaughey

The shoreline Fishery of American Samoa in FY92

METHODOLOGY	RESULTS
<p>Same data than Ponwith, 1991</p>	<p>Catch per capita <u>per village</u> (according to population of each village)                      No recorded catches of clams in FY92                      Lobsters: 1580 lb in 1979; 378 in FY91; 301 in FY92                      Comparisons between 91/92 of surgeon fish, mullets, sea-urchins, octopus                      %age of fish sold: 79: 9%; FY91: 7%; FY92: 24%                      increasing of imports sold in market (p. 54)</p>

**Suesan SAUCERMAN, 1995**

**The inshore Fishery of American Samoa 1991 - 1994**

<b>METHODOLOGY</b>	<b>RESULTS</b>
Same protocol than Ponwith, 1991 Road survey every 2 hrs (same sampling area) Summary of participation counts 91-94	75 % decrease in total weight landed from 91 to 94, 30 % of effort decrease; 60 % CPUE decrease (2.86 lb to 1.12 lb per gear-hr)

**E.Coutures, 2000-2001**

<b>METHODOLOGY</b>	<b>RESULTS</b>
Same protocol than Ponwith, 1991 Road survey every 2 hrs (same sampling area) Summary of participation counts 91-94	75 % decrease in total weight landed from 91 to 94, 30 % of effort decrease; 60 % CPUE decrease (2.86 lb to 1.12 lb per gear-hr)

**E.Tardy, 2002-2004**

<b>METHODOLOGY</b>	<b>RESULTS</b>
Same protocol than Ponwith, 1991 Road survey every 2 hrs (same sampling area) Summary of participation counts 91-94	75 % decrease in total weight landed from 91 to 94, 30 % of effort decrease; 60 % CPUE decrease (2.86 lb to 1.12 lb per gear-hr)

S. Mariner, 2004 - Mid-2006

METHODOLOGY	RESULTS
<p><b>Routes:</b> West (Amanave - Leone)                      Central (Nuuuli - Aua)                      East (Laulii - Tula)</p> <p><b>Sampling days:</b> 5 days/wk; 1 route sampled per day</p> <p><b>Sampling Shifts:</b> 0000 - 0800                      0600 - 1400                      1200 - 2000                      1800 - 0200</p> <p><b>Sampling strata:</b> Wkend/Holiday day                      Wkend/Holiday night                      Wkday day                      Wkday night</p> <p><b>Sampling Schedule:</b></p> <ol style="list-style-type: none"> <li><b>Aug 04 - March 05:</b> An annual count of maximum sampling days and all holidays and weekends are made, routes and sampling times are randomly selected by picking numbers and routes out of two containers, one for each criteria. Modifications are made only where schedule times overlap in such cases, switches are made within that week to a month to avoid extensive alterations to the random selection process.</li> </ol> <p><i>Changes in the schedule were made as a result of the following reasons:</i></p> <ol style="list-style-type: none"> <li>Limited by only 2 technicians, the daily random changing in schedule times made sampling and keeping up with the schedule very difficult. Motivation to work dwindled down to the point where I had no technicians showing up to work.</li> <li>There were too many days modified as the random schedule times overlapped.</li> <li><b>April 05 - Jan 06:</b> Instead of randomizing the schedule daily, the schedule was randomized weekly. A randomly selected sampling shift is assigned as the designated shift for the week,</li> </ol>	<p>Once one full year of data collection was achieved, the data was analyzed by WestPacFIN. Results were unsatisfactory; there was not enough data to make a confident analysis that would be representative of the shore based fishery in AS. Therefore changes in the schedule and modifications in the methodology were made.</p> <p><b>Feb 06 - Mid-2006:</b> Changes in the schedule were made as a result of the following reasons:</p> <ol style="list-style-type: none"> <li>After consultation with WestPacFIN, it was decided that by increasing the sampling effort, we can increase our chances of achieving more data for an analysis.</li> <li>Two more technicians were designated for shore based creel survey, making it a total of 4 technicians.</li> </ol> <p><b>Modification in Procedure:</b></p> <ol style="list-style-type: none"> <li>Sampling doubled daily, every twelve hours a shift would begin.</li> <li>Randomizing the schedule was basic. Once one annual schedule was randomly created, the second schedule would follow it twelve hours later. Routes are random daily and different for the two schedules.</li> <li>After one month of observation at Sliding Rock in the village of Vailoa we have discovered the high frequency of fishing here, as a result the West route was modified:                      West route - (Amanave - Vailoa - sliding rock)</li> </ol>

while the sampled area was still randomly selected.

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## **APPENDIX 8 MANU'A SHORE-BASED SURVEY DETAILS**

Shore-based Creel Survey data are also collected in Manu'a. Survey methodology follows similar to Tutuila survey. However, the details of the scheduling were not available at the time this document was written (see Appendix 2 Ofu-Olosega Survey Sites Map and Appendix 3 Ta'u Survey Sites Map for information about the location of the routes.)