

# AN INVESTIGATION INTO MARINE RESOURCE USE AND MANAGEMENT IN AUNU'U, AMERICAN SAMOA

## *A household survey*



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## EXECUTIVE SUMMARY

A household survey was carried out in the community of Aunu'u, American Samoa. Aunu'u island has a land area of 1.52 km<sup>2</sup> (0.59 m<sup>2</sup>) and a population of 476 (U.S. Census 2000). Like other Pacific Island cultures, the Samoans have depended on coral reef resources for much of the 3000 year time period that they are known to have existed in Samoa. The introduction of Western culture throughout the last century in American Samoa has led to a shift from a subsistence lifestyle to a cash-based economy where families rely on jobs for income to buy food. The island of Aunu'u is being considered as a priority site for potential MPA designation. Biological data have shown that Aunu'u has relatively healthy and diverse coral reefs and fish populations. A household survey was created as part of a larger socioeconomic assessment of the community to attempt to answer assessment objectives relating to: dependency on, use of, perceptions of, knowledge of and attitudes towards marine resources as well as management structures and receptiveness to new management. An attempt was made to carry out a full households census and carry out an interview with each household. According to the 2000 United States household census, there are 78 households in Aunu'u. However, at the time of this survey only 39 households were located indicating that approximately half of the households may have moved away from Aunu'u.

The results showed that around half of the population surveyed depends on fishing and farming as a source of food. However, the majority of households have sources of income from the Government and do not have a solely subsistence based lifestyle. Regular fishing activity by most (at least once a month) indicates that fishing is an important cultural and traditional activity for households in Aunu'u. The most popular fishing activities use Rod and Reel on the reef flat and the reef slope and the majority of fishing access is by foot, although some have access via motorized boat. The majority of households (90%) also enjoy swimming in the area. Relatively few people know what a marine protected area is and those that claimed to know did not fully understand. The people of Aunu'u have generally positive perceptions of all marine resources, although a decline in fish abundance and reef condition has been observed by some. Approximately one third of households perceived environmental problems and the issue of sand extraction was highlighted. Overall, the village council was listed as the main manager of the marine environment and its importance was emphasized, although the level of satisfaction was mixed. Around one third of those interviewed were aware of regulations (fishing) and agreed with them, except for sand extraction which also produced mixed responses regarding the agreement with regulations.

Overall, households were very receptive to new management but the need for money from the Government was highlighted. Seventy nine percent would like to have closed MPAs and explained that fish will multiply in this way. Responses to attitude statements showed that households have a good level of knowledge regarding the importance of natural resources and high value of them. They also value the importance of protecting resources for the future. Some requests for more education were made and the fact that many were unaware of regulations suggests that enforcement education as well as education relating to the science behind MPAs and factual information about MPAs in American Samoa would be a good idea.

It is essential that this report is not the end of this project. The ground work has been laid out for a future of productive collaboration between the village and DMWR. The results of this survey clearly support: the establishment of a Marine Protected Area in Aunu'u; more involvement of the village council and more involvement of the local government in marine resource management. The importance of money was highlighted by the village and this collaboration can assist the village to locate funds to carry out new projects. The results of a participatory learning and action (PLA) workshop are currently being analyzed and several community action plans have been created. It is anticipated that by combining the results of this assessment with the outcomes of the workshop, the community of Aunu'u together with DMWR can seek funding to carry out some of their prioritized projects. It is important to understand the current socio-cultural importance of fishing in addition to economic and nutritional benefits (WPFMC 2007) provided by fishing activities prior to considering MPA establishment or any other type of additional management. The results of this survey, therefore, constitute a large step towards understanding these issues. Providing that the results are utilized effectively and in clear collaboration with the community it is hoped that marine management in Aunu'u can be substantially improved.

## INTRODUCTION

American Samoa is a tropical island located at approximately 14° South and 170° West in the South Pacific. American Samoa consists of five volcanic islands (Tutuila, Aunu'u, Ofu, Olosega and Ta'u), one coral atoll (Rose Atoll) and one low lying island (Swains Island). It is an unincorporated territory of the United States (U.S.) and is the only U.S. jurisdiction in the South Pacific. The most recent population estimate of 70,100 (U.S. DOC 2009) is approximately 13,000 more than the population in 2000 according to the U.S. Census. The islands are surrounded by steeply sloping coral reefs inhabited by over 250 species of coral and over 961 species of fish (Craig 2009). The majority of the population lives on the main island of Tutuila. Tutuila has a land area of 138 km<sup>2</sup> and has steeply sloping terrain which provides very little cultivable land for the inhabitants.

The culture in American Samoa is Polynesian and the islands have been inhabited since approximately 1000 B.C. (Craig, 2009). Like other Pacific Island cultures, the Samoans have depended on coral reef resources for much of this 3000 year time period. Systematic fish catch data for the coastal area is not available prior to 1950 but anecdotal evidence suggests a heavy reliance on marine resources (Bindon 1996). Not surprisingly therefore, the relationship between Samoans and their marine environment is closely interconnected. There are many legends relating to the ocean in Samoa and villages traditionally carried out strict management of fishing relating activities. For example, the *tautai* (master fisherman) in each village made the decisions about which fishing activities could take place during certain seasons. He was even awarded decision making power above other Matais when it came to fishing related matters (Levine and Allen 2009). To the present day, some villages still practice traditional fish drives during certain seasons (e.g. Atule spawning in the village of Fagasa) and non villagers usually have to gain the permission of villagers to fish in the immediate vicinity of their village.

The introduction of Western culture in American Samoa has led to a shift from a subsistence lifestyle where households practiced farming and fishing on daily basis in order to feed their families, to a cash-based economy where families rely on jobs for income to buy food. In parallel to this shift, studies of fisheries resources have been carried out and have generally reported the fishery to be overexploited. A lack of Apex predators and large fish species is often reported (Green 1996, Craig et al. 2005) and intensive SCUBA spearfishing in the 1990s led to a rapid reduction in Scarids amongst other fish families (Green, 2003). However, as pointed out by Sabater and Carroll (2009) these conclusions were often drawn from fishery independent data alone such as underwater surveys (Green 1996) and reconstruction models (Zeller et al. 2006). Analysis of inshore creel data from 1991 - 1995 actually showed a decrease in fishing effort, catch, value of landings and constant catch per unit effort (Adams and Daltzell 1995) indicating that the situation is more complex than it might appear. Another factor that also contributes to these findings is the degradation of marine habitat due to rapidly increasing human population and associated anthropogenic pressures, as well as, natural disturbances that have contributed greatly to a decline in the health of coral reef resources (Craig et al. 1995).

The Marine Protected Area (MPA) Program was established by DMWR in 2005 in an effort to meet the territories goal to protect 20% of the coral reefs and associated habitats inside no-take MPAs by 2010. The MPA program's goal in addition to meeting the 20% target is to protect unique and diverse ecosystems and protect spawning stocks. Biological reconnaissance surveys have been carried out at fifteen sites in Tutuila and five sites in Manu'a. The survey results from Aunu'u showed that coral cover and fish abundance/diversity were relatively high (Jacob et al., in prep) in comparison to other sites. In addition to these results, Aunu'u is valuable due to its island ecology and productive local oceanographic conditions. Aunu'u was therefore considered as a priority site for potential MPA designation.

Aunu'u is a small volcanic island on the south-east of American Samoa with a land area of 1.52 km<sup>2</sup> (0.59 m<sup>2</sup>) and a population of 476 (U.S. Census 2000). Aunu'u is only accessible by boat during day-light hours. The trip takes around 15 minutes one-way and costs \$1 per person. The village of Aunu'u is located on the northwestern portion of the island. In addition to the healthy and diverse coral reefs already described, Aunu'u has unique terrestrial flora and fauna, including the largest wetland in American Samoa (Faimulivai marsh), an area of sinking sand and the Chinese water chestnut which is not found anywhere else in American Samoa. These valuable terrestrial and coastal habitats led to Aunu'u being designated as a National Natural Landmark by the United States National Parks in 1972. However, there is no formal management associated with this designation.

Given the historic and cultural importance of fishing in American Samoa, it is important to understand the current socio-cultural importance of fishing in addition to economic and nutritional benefits (WPFMC 2007) provided by fishing activities prior to considering MPA establishment. Socioeconomic assessments were therefore written into the MPA Program Master Plan as an important part of the MPA process (Oram et al. 2008). A socioeconomic study was designed for the community of Aunu'u which included a household census. This report provides details on the methods, results and discussion/conclusions for the household survey. However, it is important to realize that this work is part of a larger ongoing assessment that is currently being carried out in the community of Aunu'u. Other activities include Key Informant Interviews and a workshop using Participatory Learning and Action (PLA) tools (Jacob et al, in prep). The PLA workshop involved approximately 80 community members that were guided through a set of participatory activities including visioning marine environments in the future, mapping marine resources and creating action plans for prioritized activities.

Following a training that was provided in the SEM Pasifika technique for socioeconomic monitoring, seven assessment objectives were designed for the assessment in Aunu'u. These assessment objectives led to a set of twenty indicators being selected to assist in the design of the tools (table 1). The household survey (Appendix 1) was designed to partially answer these seven assessment objectives. It is anticipated that more thorough answers to the objectives will be provided through the aforementioned Key Informant Interviews and the results of the PLA Workshop.

1. Ascertain the level of dependency on marine resources in Aunu'u
2. Learn about marine resource use in the locality of Aunu'u
3. Understand the existing management structures and measures in place in Aunu'u
4. Assess the receptiveness of households and the community to new management
5. Gain a better understanding of peoples' perceptions of the status of marine resources
6. Gain a better understanding about people's knowledge about natural and anthropogenic impacts on the environment now and in the past
7. Find out about peoples' attitudes towards marine resources

## METHODOLOGY

A SEM Pasifika Workshop was held from 24th February to 5<sup>th</sup> March 2009 in which approximately 25 local agency personnel were trained. SEM Pasifika is a set of guidelines designed by the Community Conservation Network (CCN) with input from the Pacific Socioeconomic Monitoring Steering Committee (Wongbusarakum and Pomeroy 2008) to assist with socioeconomic monitoring in the Pacific. The manual was used along with a set of worksheets to design a household survey and set of key informant interview questions. The worksheet activities included: defining assessment objectives; identifying the site and indicators and refining them; working with stakeholders; preparing the budget, schedule and study team; preparing and carrying out a reconnaissance visit; audience analysis; designing the sampling regime and preparing a work schedule. The work schedule is available in appendix 3. The budget was submitted to the Secretariat for the Pacific Regional Environmental Program (SPREP) who agreed to fund the items that were needed for the assessment. The team decided to attempt a full household census because there were only 79 households recorded in the US census of 2000. A reconnaissance trip was made to Aunu'u by four staff members from the Department of Marine and Wildlife Resources (DMWR) on 24th April 2009 during which the necessary logistics were identified (Appendix 4).

Table 1 shows the set of indicators that were selected to answer the assessment objectives (see page 2 and 3). It also shows which assessment objectives those indicators relate to and which method(s) were selected to try to find the answers to the indicators. A household survey (Appendix 1) was designed based on these indicators by a team of staff from (DMWR's) MPA Program with assistance from interns from the American Samoan Community College (ASCC). A team of staff worked to translate the household survey which was then back translated to English and pre-tested.

After training the survey staff, the survey team traveled to Aunu'u in the afternoons of 14th, 15th and 16th July 2009 and during daylight hours on 18th July 2009. Two DMWR staff from Aunu'u assisted the team to locate houses and household heads whilst in Aunu'u. Teams of two (one recorder and one interviewer) interviewed the household heads at each house. If the household head was not available, efforts were made to interview the wife or oldest household member. If there was no one at home, the team tried to go back at a later time or date. Each interview, which could be carried out in English or Samoan but usually in Samoan, took approximately 20 minutes. At the end of each day, there was a short debriefing during which surveyors relayed any important information or questions to the team leader. The team leader checked survey forms to make sure that all information had been completed correctly. After the final day of surveying a full debrief was held with the team and lessons learned from them were recorded.

The data from the survey forms was entered into an Excel spreadsheet that had been prepared by the team leader. Two of the survey team entered all of the information from the survey forms. The analysis of the data was carried out in Excel by an Intern from ASCC along with guidance from the team leader. The key findings were presented to the Coral Reef Advisory Group on 10th December 2009 and to members of the survey team and key community members on 11th December 2009 (the Pulenu'u and the Fa'ifaeau).

Key Informant Interviews were planned and it is hoped to use a cascade interview style of data collection, starting with the High Talking Chief. Due to the constraints of finding a mutually convenient time and the effect of the tsunami in September 2009, these have been delayed. However, an ASCC intern has been taken onboard solely for this project and it is hoped that these can be carried out in early 2010. A Participatory Learning and Action (PLA) workshop was carried out in Aunu'u on 24th and 25th September.

Indicator	Assessment Objectives)	Method
C5. Dependency on coastal and marine resources	1	KI, HH
D12. Sources of household income	1	HH
C12. Alternative and supplementary livelihoods	1	KI, HH
C1. Coastal and marine activities	2, 1	HH, FGD
C4. Location of coastal and marine activities	2, 1	HH, FGD
C6. Types and levels of use by outsiders	2	KI, FGD
T2. Perceived resource condition	5	HH, FGD
M2. Management types and structure	3	KI, FGD
M5. Management tools and measures	3	KI, FGD
M10. Local tenure, customs and traditions	3, 1, 2	KI
M11. Awareness of rules and regulations	4	HH
A1. Awareness of management structure	4	HH
M16. Management effectiveness	4	HH, FGD
A2. Additional management needs	4	HH, FGD
C10. Knowledge of coastal and marine resources	6	KI, FGD
T3. Perceived threats to coastal and marine resources	6	KI, FGD
T4. Perceived coastal management problems	6	HH
T5. Resource conflicts	7	KI
C11a. Attitudes towards marine resources	7	HH
C11b. Non-market and non-use values	7	HH

**Table 1. Indicators from the SEM Pasifika manual (Wongbusarakum and Pomeroy 2008) that were identified during the process of designing the household survey for the assessment of marine resource use and management in Aunu'u. A1 and A2 were not from the manual and were designed for the purposes of the project.**

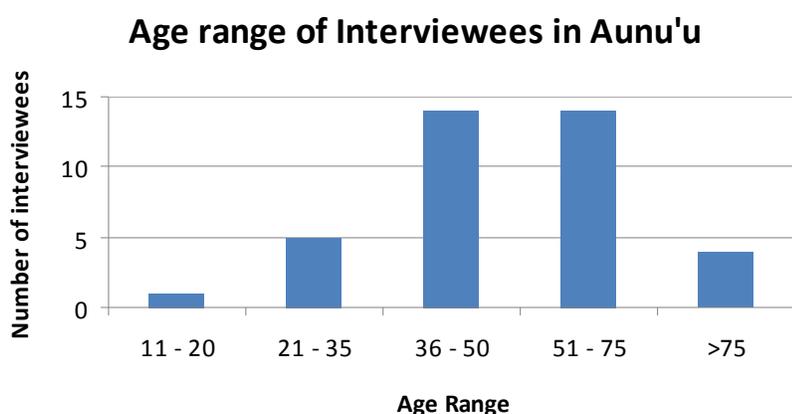
The objectives of the PLA workshop were:

- To raise awareness and build the capacity of coastal subsistence users to enable them to undertake specific fisheries management functions within a sustainability framework
- To gain a better understanding of marine resources and coastal activities in Aunu'u and issues that could threaten them
- To assist in the development of a community action plan
- To empower the community to understand their management needs and implement actions to build on those needs
- To provide advice and technical support to emerging management structures.

The activities that were selected for the workshop were: collective vision; historical profile; resource mapping - use and activities; identification of problems / causes and solutions; ranking matrices / prioritization; stakeholder analysis and action planning and next steps. There were approximately 80 participants in the workshop and the results are in the process of being analyzed and summarized to be presented back to the community as a part of the overall socioeconomic assessment in Aunu'u.

## RESULTS

Efforts were made to reach all of the households in Aunu'u. According to the census there should have been 79 households. However, during the survey days the teams only managed to locate 39 (44.9% of the anticipated number) households whose inhabitants were available and able to participate. The average number of members per household was **seven** with a range of **two** to **eleven** and the average number of children per household was **four**. According to the household survey results, the total number of household members in Aunu'u is 254. 37 out of the 39 (95%) interviewees stated that they were the household heads. The average age of the household heads was 51-75 years old. Figure 1 shows the frequency of interviewees in each of the age categories. The majority of respondents fell into two age categories: 36 - 50 and 51 - 75. Respondents were asked about household members currently residing away from the island of Aunu'u. Table 2 shows that 36% of households had one or more members currently off-island attending school and 36% had household members currently working permanently off island. 28% of households had members currently off island working and 26% had members in the military. A household was defined as the people that live under the same roof (or would if they were on island).



**Figure 1. Distribution of age range frequencies of interview respondents in Aunu'u. 39 respondents (37 household heads) were interviewed in July 2009.**

Reason for being off the island of Aunu'u	Percentage of households with family members living away from Aunu'u
Attending School	36
In the military	26
Temporary Work	28
Permanent Work	36
Other (mainly migration)	10

**Table 2. The percentages of households that have members living off island for different reasons. 39 respondents (household heads) were interviewed in July 2009. Respondents could answer in more than one category.**

### **FISHING PRACTICES IN AUNU'U**

The percentage of households that practice fishing in Aunu'u was 82%. A series of fishing related questions were asked to these households which accounted for 32 interviews. Figure 2 shows that 97% of the fishing households use their catch for consumption, whereas 31% fish for recreational reason and 19% fish for monetary purposes. Respondents could pick more than one answer which accounts for total percentages greater than 100%. Households were asked how much of their catch they: keep for household consumption; share with friends and family and sell for profit. Figure 3 shows that 43% of households keep half of their catch whilst 18% keep more than half and only 9% keep all of their catch for household consumption. Similarly, 43% of households share half of their catch and 15% of households share more than half of their catch. It was interesting that 21% of households said that they sell less than half of their catch and 4% said that they sell half of their catch. This percentage is slightly higher than those shown in figure 2 (only 19% said that they sell their catch). 75% of respondents said that they sell none of their catch.

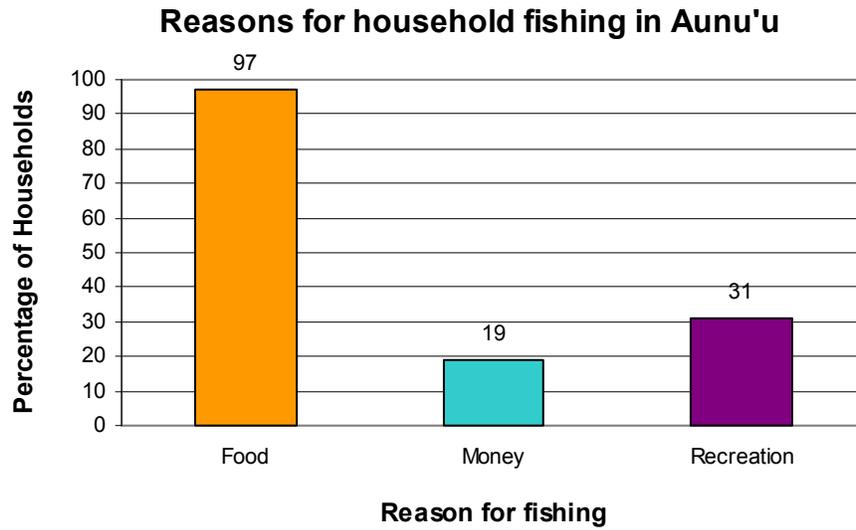
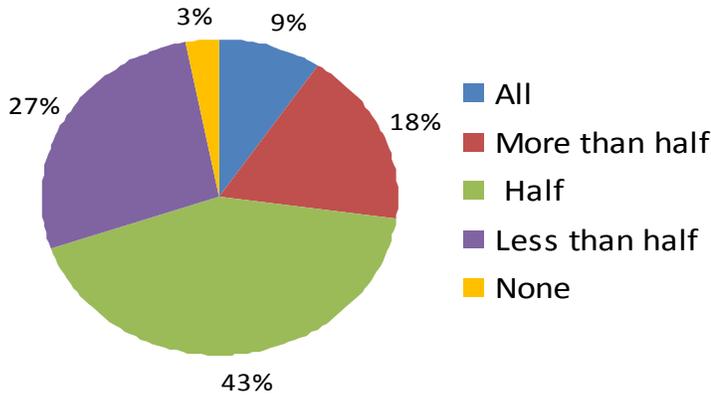
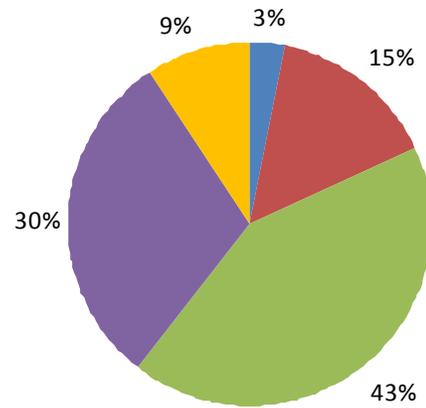


Figure 2. percentages of households in Aunu'u that fish for different reasons. 32 fishing households were interviewed in July 2009 and could select more than one option (food; money; recreation)

#### Amount of fish catch kept for household consumption



#### Amount of fish catch shared with family and friends



#### Amount of fish catch sold for profit

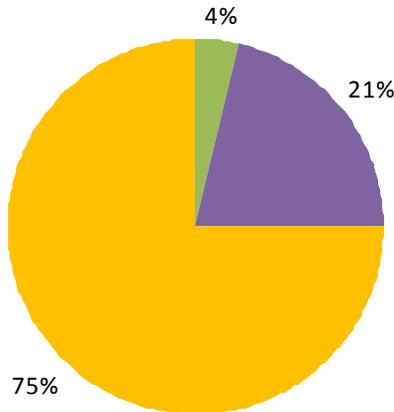
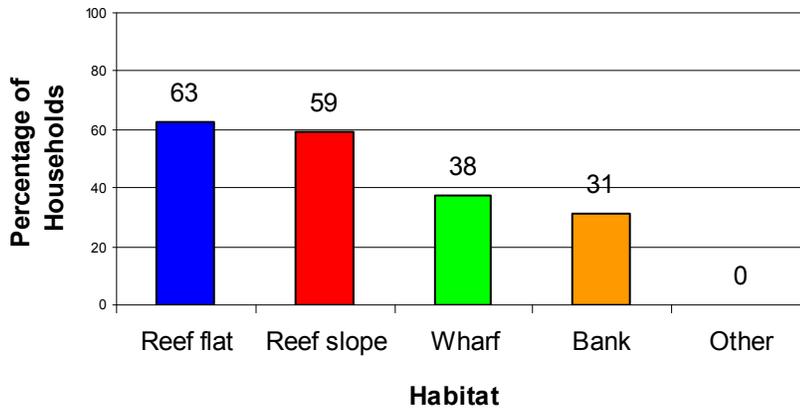


Figure 3. Amount of fish catch that is kept for household consumption, shared with friends and family and sold for profit. Percentages of households choosing all, more than half, half, less than half and none are shown in different colors. 32 fishing households responded in July 2009.

### Preferred fishing habitats in Aunu'u



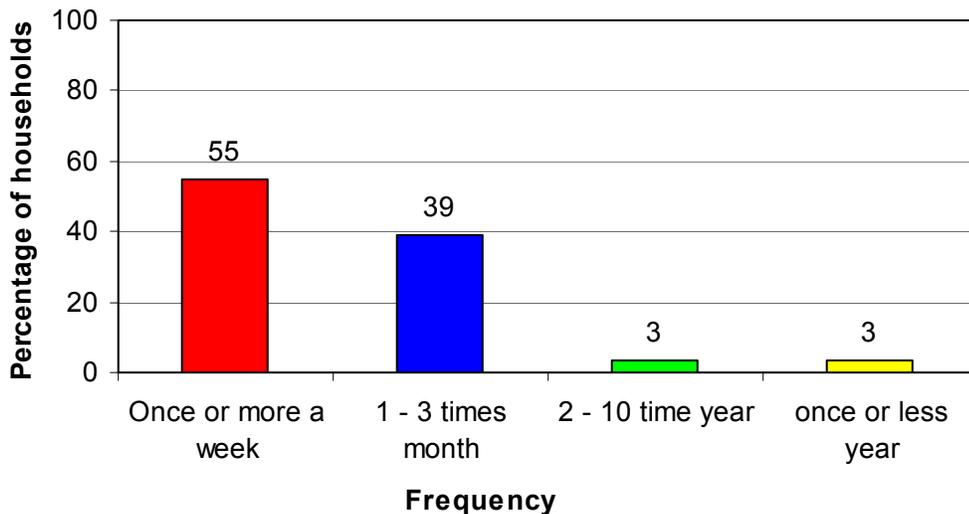
**Figure 4. Locations of fishing activity in Aunu'u. 32 respondents were interviewed in July 2009 and could select more than one option.**

Sixty three percent of the households in Aunu'u practice fishing on the reef flat and 59% on the reef slope making those two habitats the most popular. Many respondents answered that their households fish in more than one habitat. Thirty eight percent fish in the wharf which is easily accessible even in rough weather (see Plate 1) and 31% fish on the offshore banks. Fourteen respondents fish in one habitat and 14 said they fish in two. The remaining five fishers reported that they fish in either three or four locations. Some fishers also reported that they carry out bottom fishing, presumably on the banks.



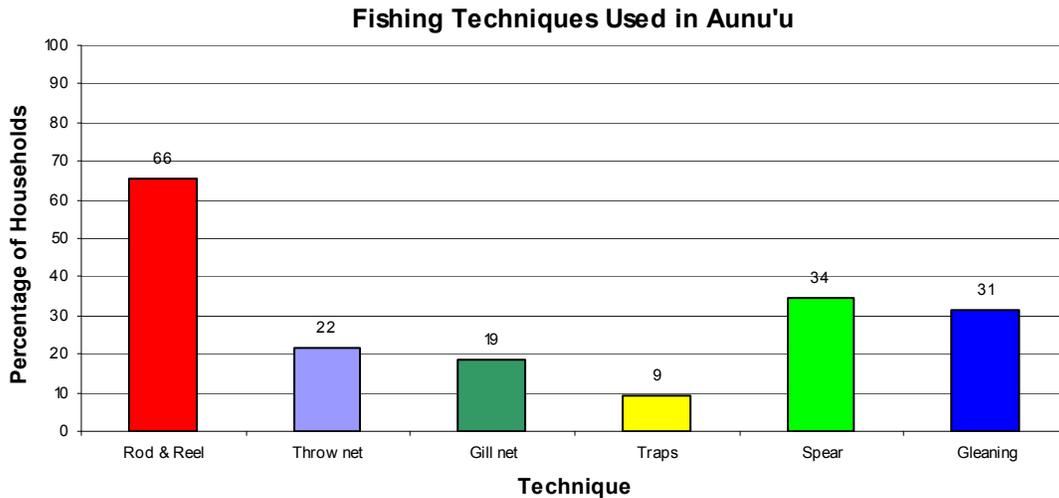
**Plate 1. The wharf at Aunu'u looking back towards Tutuila with two 'Alia' boats in the wharf.**

### Frequency of Fishing Activity in Aunu'u



**Figure 5 The graph above is showing the frequency of fishing activity practiced in Aunu'u. 32 respondents interviewed in July 2009 could select more than one option.**

Approximately half (55%) of the households fish regularly (once a week or more) and 39% fish on regular basis but not as frequently (1 – 3 times a month). The remaining 6% of households fish less regularly but this only accounted for six households in total. In summary, 94% of fishing households in Aunu'u fish more than once a month. A pattern was seen whereby the majority of fishers who fished once or more a week tended to use only one technique (72%). Fishers who fished less regularly (1—3 times per month) most commonly used either one (44%) or 2 (44%) techniques. Interestingly the only fisherman who fishes 2 - 10 times per year actually stated that he/she practices six fishing techniques.



**Figure 6. Fishing techniques used by households in Aunu'u. 32 fishing households were interviewed in July 2009 and could provide more than one answer.**

The most commonly used gear type in Aunu'u is rod and reel with 66% of fishing households using this method. The other most commonly used methods are: spear fishing (34%), gleaning (31%) and throw nets (22%). Gill nets (19%) and traps (9%) are also used but not as commonly.

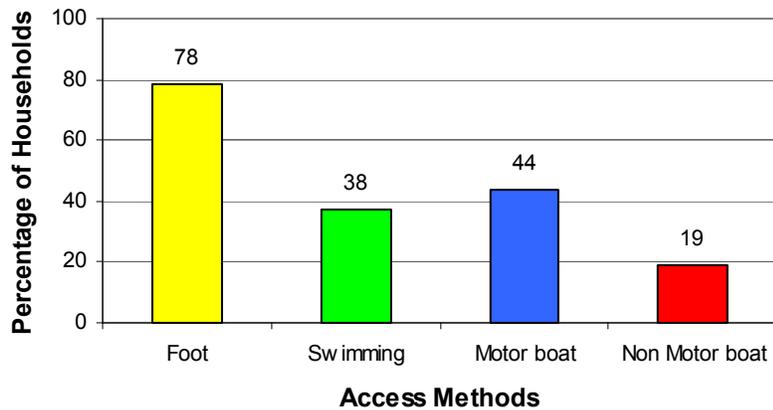
Species Type	Number of fishing households (%)	Average number in catch per trip
Shellfish and invertebrates	19 (59%)	14
Reef Fish	27 (84%)	15
Pelagic Fish	21 (66%)	11

**Table 3. Numbers of individuals collected on an average fishing trip and the percentage of fishing households responding for those types of species (invertebrates, reef fish, pelagic fish).**

Table 3 reveals that the majority of species taken from the marine area are reef fish and on average people catch approximately 15 per trip. Only 59% of fishers harvest invertebrates and reportedly take the same amount as they do for reef fish (approximately 14). Sixty six percent of fishers report to harvest around 11 pelagic fish per trip.

Fishing households were asked what method they use for accessing the fishing area. The options were: by foot; swimming; motorized boat; non-motorized boat. The most common method of accessing the fishing area is by foot with 78% of fishing households using this method of access. The other most commonly used methods are: motorized boat (44%) and swimming (38%). 19% of fishers responded that they access the fishing area by non-motorized boat. No other options were provided by respondents.

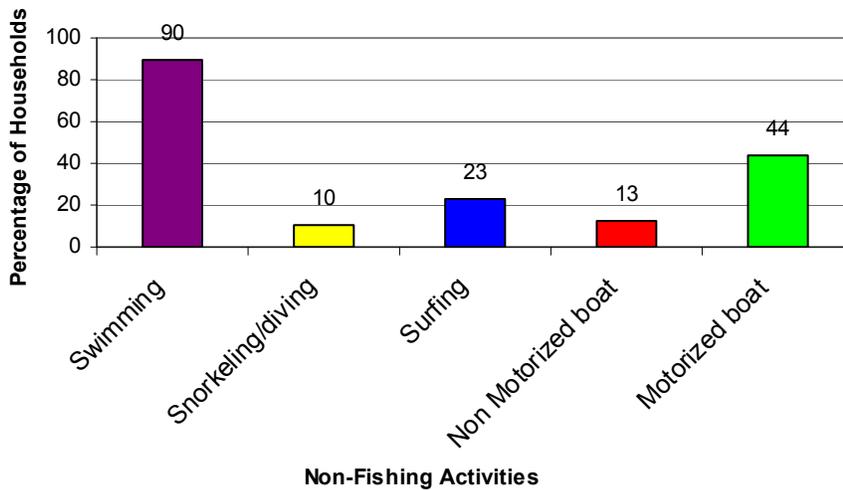
### Methods of Accessing Fishing Areas



**Figure 7. most common method of access to fishing areas practiced in Aunu'u. 32 respondents were interviewed in July 2009 and could select more than one option.**

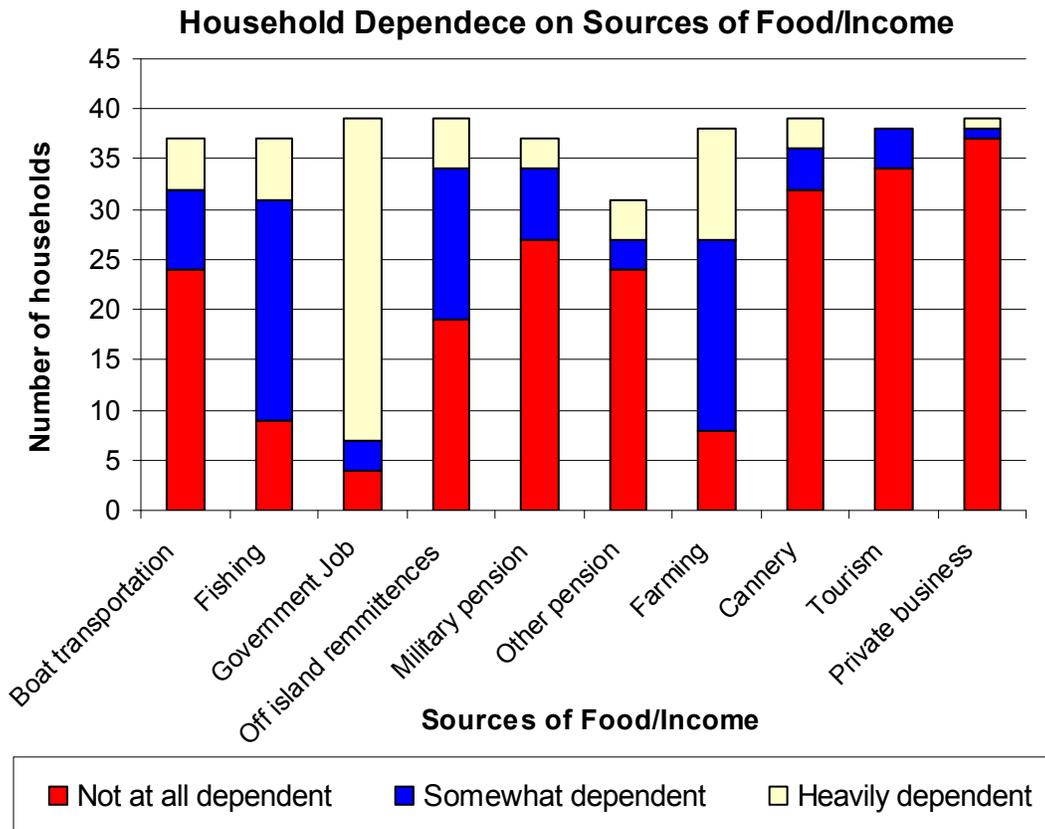
Interviewees were asked what types of non-fishing related activities they do in relation to the marine environment. Ninety percent of households in Aunu'u reported that they practice swimming and 44% use motorized boats. Twenty three percent of households in Aunu'u reported that they go surfing which was also interpreted as using boogie boards. Thirteen percent carry out motorized boating activity and 10% go snorkeling or diving. No other activities were listed by respondents.

### Non-Fishing Activities Practiced in Aunu'u



**Figure 8. Non-fishing related activities practiced in Aunu'u. 39 respondents were interviewed in July 2009 could select more than one option.**

Households were provided with a list of income/food sources and asked to select on which ones they are 'heavily dependent,' 'somewhat dependent,' and 'not dependent at all.' Figure 9 shows the level of dependency of households in Aunu'u on these different sources for food and income. Government jobs (82%) were reported to be the most common source of food/income that households are heavily dependent on, followed by farming (28%) and fishing (15%). Respondents reported that they are somewhat dependent on fishing (56%), farming (49%) and off island remittances (38%). The majority of households reported that they are not dependent at all on private business (95%) and tourism (87%).



**Figure 9. Graph showing various sources of food and income that households in Aunu'u are dependent for food and income. 39 households were interviewed in July 2009.**

### MARINE RESOURCE MANAGEMENT IN AUNU'U

Households were asked who manages the marine resources in Aunu'u. The question was open ended and the answers all described village community members. 21 people mentioned the high chief, 14 said the village council, nine households said the Mayor, two simply mentioned the matais and two said families. The majority of respondents mentioned more than one person (e.g. the high chief and the village council). When asked how satisfied they were with the current management, 12 (31%) households said they were very dissatisfied, 8 (21%) said they were dissatisfied, 8 (21%) said they were satisfied and 6 (15%) said they were very satisfied. The remaining 5 (13%) households said neither or gave no answer. When asked to provide comments, four respondents provided positive responses and four provided negative responses. The following comments were translated from Samoan: *“The rules are good because of the High Chief’s staff members”* and *“Its good for the church youth and the community.”* Negative comments were *“it’s is not the same as it used to be”*, *“there is no written management”* and *“its not sacred and its not so.”*

Figure 10 shows the percentage of households that think that there are regulations in existence for the following activities: fishing, coral use, sand extraction, wetland activity, mangrove use and residential activity. The activity for which most people answered “yes” was fishing (41%) followed by residential development (29%) and wetland activity (28%). Very few people thought there were any regulations in place for mangrove use (14%), coral use (18%), sand extraction (19%). When asked what types of regulations were in place, all respondents answered either village, or local government. No one described any type of federal or international regulation. Those who answered ‘yes’ to the existence of regulations were asked whether or not they agreed with them (figure 11), 73% said that they did for fishing regulations and 86% said they did for coral regulations. The majority of respondents did not provide a response to their level of agreement with the regulations. Two percent of those who had responded that there were regulations in existence for sand extraction stated that they did not agree with them. However this was a small number of people (2).

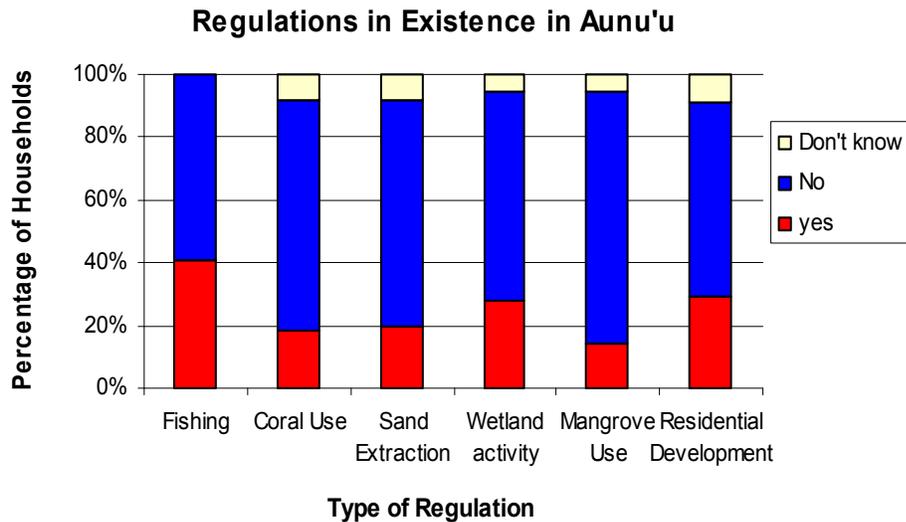


Figure 10. Household knowledge of regulations in existence for a variety of activities (fishing, coral use, sand extraction, wetland activity, mangrove use, residential development). 39 households were interviewed in July 2009.

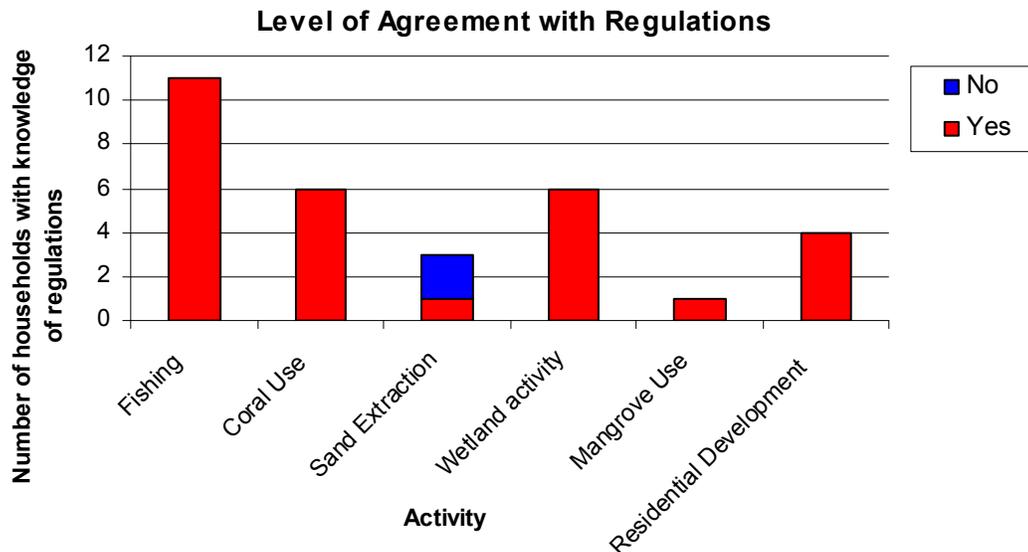
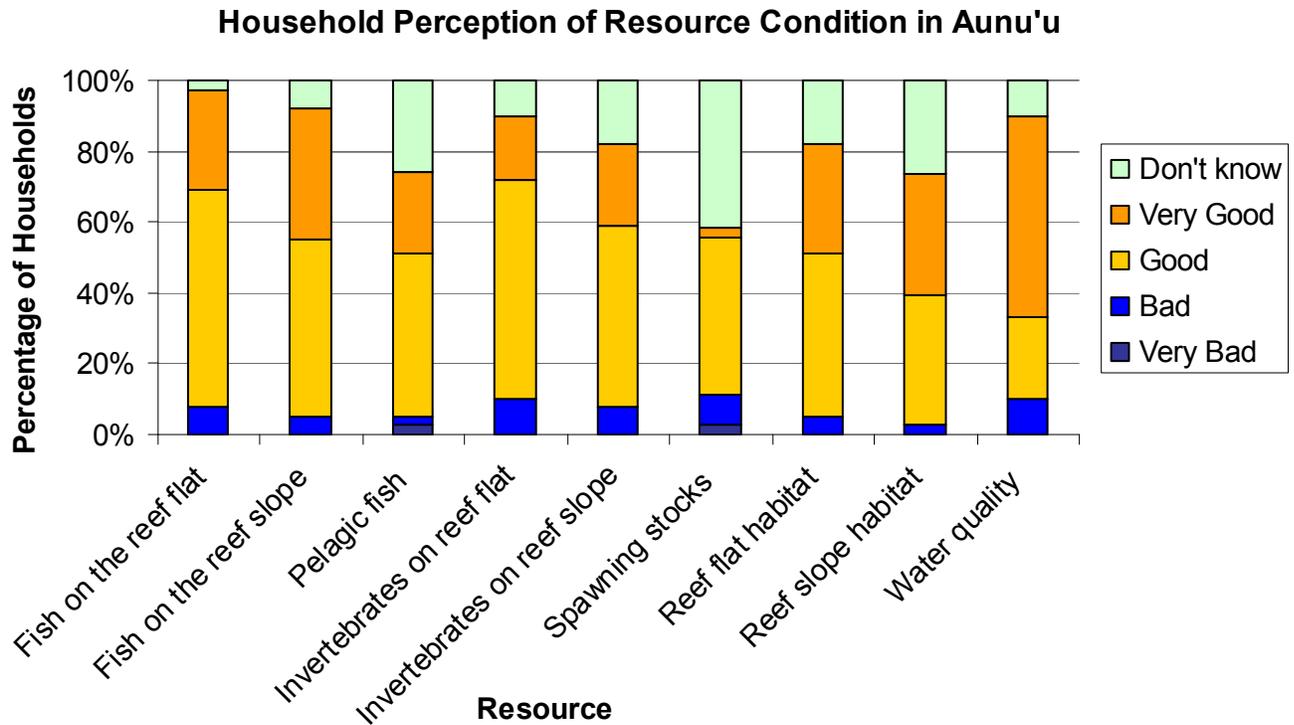


Figure 11. Level of agreement with regulations. Only those that answered 'yes' to figure 10 are included. N = 5—15.

## HOUSEHOLD PERCEPTION OF RESOURCE CONDITION IN AUNU'U

The majority of households have a positive perception of the condition of the marine resources in Aunu'u. The most commonly selected answer was 'good' for most resources with the exception of water quality for which 56% of respondents said 'very good' with several pointing out that they use well water. Apparently the translation of water quality was not appropriate for sea water. A relatively large percentage (37%) of respondents also rated the condition of fish on the reef slope as 'very good' compared with 28% for fish on the reef flat and 23% for pelagic fish. An average of 18% of respondents answered that they did not know the condition of the various resource with the greatest number of respondents (42%) being unsure about the condition of spawning stocks around Aunu'u. An average of 7% of households rated the resources as bad and even fewer (1%, 2 households) as 'very bad' with only 1 household rating the condition of the pelagic fish stocks and spawning stocks as 'very bad'. Several respondents commented that fish and invertebrates are *'not the same as they used to be'* and that *'now-a-days they cannot catch as many fish'*. One respondent commented that there used to be parrotfish and now there are none and another commented that the fish *'do not spawn anymore around Aunu'u.'* 11



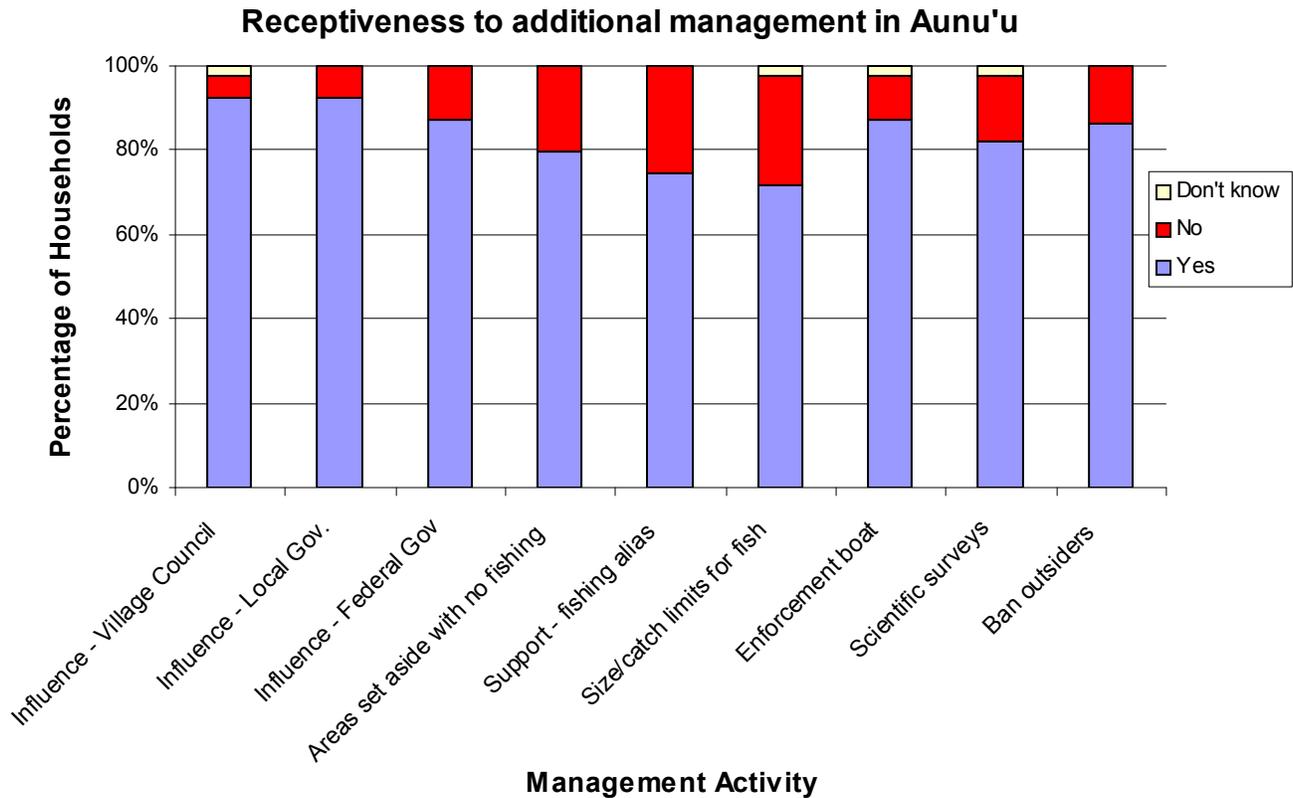
**Figure 12.** Households were asked to provide their responses on perception of resource condition for nine different resources. 39 respondents were interviewed in July 2009 and given a scale of 1—4 ranging from very good to very bad.

### ADDITIONAL MANAGEMENT RECEPTIVENESS

Households were asked what types of additional management strategies they would like to see in Aunu'u. The majority of households answered that they would like to see all of the options that were offered but some were more unanimous than others (Figure 13). For example, 92% of households said that they would like to have more influence from the village council and also from the local government. This question generated many interesting comments from the interviewees. 79% of respondents said that they would like to have an area set aside where fishing is not allowed (i.e. a marine protected area). A total of 102 comments can be found in the appendix 4 in relation to these additional management options. There were five comments made that referred to fish multiplying inside closed areas.

### KNOWLEDGE OF MPAS

When asked if they knew what an MPA is, 51% of respondents said that they did not and 41% said that they did. The remaining 8% were unsure. Answers ranged from 'a place where outsiders are not allowed to fish' to 'a place for fish and coral to grow' and one lady who did not know what an MPA is requested that DMWR could come to Aunu'u to educate them about such things. When asked if they knew any villages with MPAs, 46% said that they did and 46% said they did not. From those that did, the most popular known location was the CFMP village of Alofau which was listed by nine people. Eleven people were able to name one village, six people named two and one person was able to name four and five. All of the correctly named villages were CFMP villages, two villages were named incorrectly and Nu'uuli was named by two people. Nu'uuli is in fact a Special Management Area (SMA) but there are no fishing regulations in place.



**Figure 13. Households responses to whether or not they would like to have different types of management. Choices were A = more influence from the village council; B: areas set aside where no fishing is allowed; C: more influence from the local government; D: more influence from the federal government; E: support for local fishing alia; F: size/catch limits for fish; G: enforcement boat for Aunu'u; H: scientific studies of the fish and habitat; I: ban outsiders from fishing in Aunu'u. Respondents could answer 'yes', 'no' or 'don't know.'**

### PERCEIVED ENVIRONMENTAL PROBLEMS IN AUNU'U

Respondents were asked whether they considered a range of different activities/environmental impacts (sand extraction, erosion, removal of corals from beaches, removal of coral from sea, coral bashing, overfishing, illegal fishing) to be problems in Aunu'u now. Overall, erosion was considered not to be a problem in Aunu'u with respondents answering that they have '*never seen a landslide*' '*there are no mountains*' and '*it is the only problem not found here*'. The activity that was considered by most people to be a problem was the removal of corals from beaches (rated as a problem by 14 people). People commented that it could '*cause the fish to flee their homes*' and that it is a '*problem that kills the corals*'. One respondent answered they would like a branch of DMWR in Aunu'u to stop people doing this. Overall, approximately one third of all respondents answered that they thought all the remaining activities were problems and two thirds did not. Eight comments were made relating to people removing sand from the beaches and concerns about the effect that it might have on peoples' homes. Several comments were made that people in Aunu'u are using Ava niukini (poison made from natural resources) and several comments were also made about the fish populations not being the same as they used to be and the coral being dead. One person also commented that people are removing small fishes which is a problem. Overall it appears that the majority of households do not consider these activities to be problems in Aunu'u. Respondents could provide comments and a total of 33 comments were received which can be found in Appendix 4.

### Perceived Environmental Problems in Aunu'u

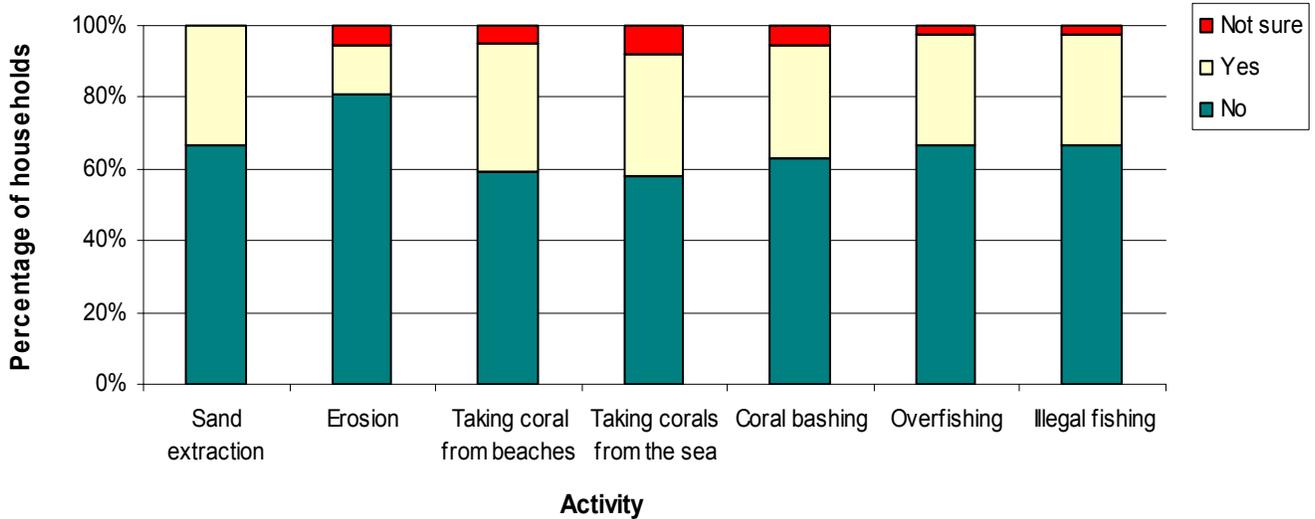


Figure 14. Perceived environmental problems in Aunu'u. Respondents were asked if seven activities/effects are problems in Aunu'u now. These were: sand extraction; erosion; removing corals from the beaches, removing corals from the ocean, coral bashing, overfishing and illegal fishing. Respondents (n = 39) could answer 'yes', 'no', or 'not sure.'

### ATTITUDES TOWARDS MARINE RESOURCES IN AUNU'U

Figure 15 show responses to attitude and knowledge statements. The majority of respondents (74%—90%) agreed with the coral reef and mangrove non-use value statements “the coral reef is important for protecting the land from erosion”, “mangroves are not important for protecting the coast from erosion” and “coral reefs are only important if you fish or dive” indicating that they have a high value for these resources even if they do not use them. Sixty nine percent of households agreed with the statement that we should ‘restrict fishing in certain areas in order to allow fish and coral grow’ and 59% agreed that ‘development should be restricted in certain areas to allow the future generations to have natural environments’. Sixty seven percent of respondents disagreed with the statement that ‘big fish produce the same amount of eggs as small fish’. Overall its could be stated that households place a high value on marine resources and have are relatively well informed as to their importance.

### Responses to Statements on Marine Resource Value and Knowledge

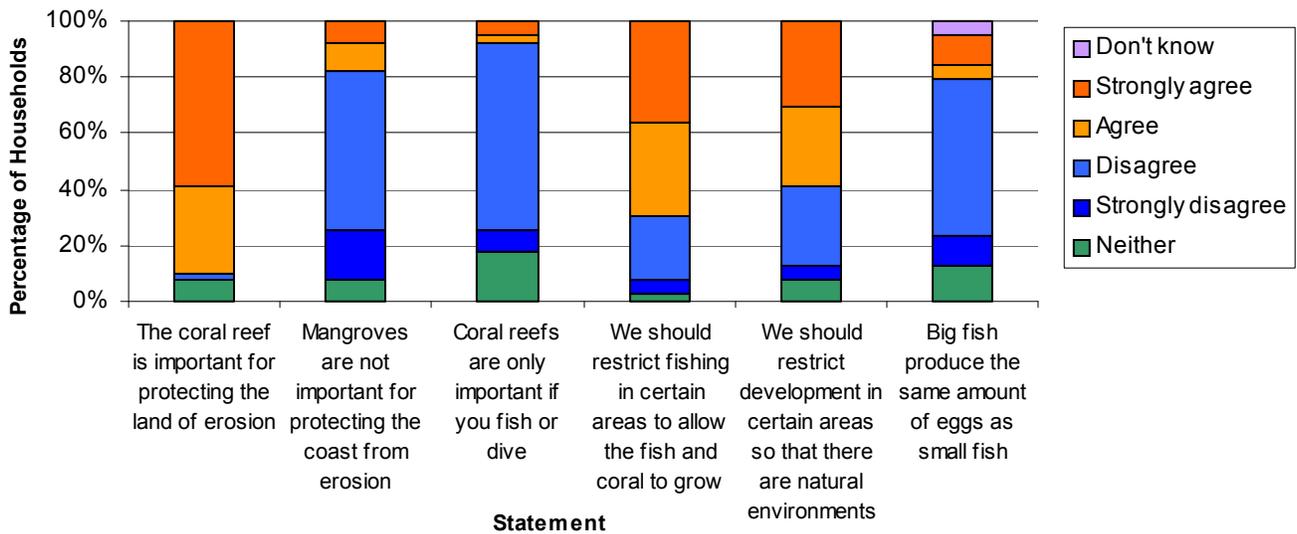


Figure 15. Respondents were asked to provide agreement statements to six attitude/knowledge statements. Answer choices were ‘strongly agree,’ ‘agree,’ ‘strongly disagree,’ ‘disagree,’ ‘don’t know,’ ‘don’t know.’ 39 respondents were asked to provide answers in July 2009

## DISCUSSION

Despite attempts to reach all of the houses in Aunu'u, it was surprising that the teams were only able to interview 39 households. According to the 2000 Census, there are 79 households in Aunu'u meaning that approximately half were not interviewed. The limited households that were interviewed led to an estimated population approximately 200 less than that stated in the 2000 census (476). The surveys were carried out across several afternoons and a weekend in an effort to find people when they were at home. It was not possible to interview some households due to the household head not being home and no one else suitable being able to answer the questions, or in one case, the members of the household were suffering from old age and frailty and could not be interviewed. It is possible that more houses are unoccupied than the 2000 census found and therefore adjustments to the surveyed/unsurveyed ratio could be made after the 2010 census. The team, led by Supin Wongbusarakum (2009, in prep), carrying out a socioeconomic assessment in the village of Amouli also found fewer households than were listed in the 2000 census. The results showed that around one third of households have family members off island for various reasons and it is possible that many of these members left the island in the last 10 years. A recent report by the American Samoan Statistics Division (ASDOC 2009) found a net out-migration of Samoans from the territory and a reduction in the birth rate so it is highly likely that the resident population in Aunu'u is declining.

The following format follows the seven assessment objectives (page 2) and attempts to discuss them using the results from the households survey:

***Assessment Objectives:***   **1) Ascertain the level of dependency on marine resources in Aunu'u**  
  **2) Learn about marine resource use in the locality of Aunu'u**

It is interesting to note that a large proportion (82%) of the households interviewed reported to practice some type of fishing but that only a small percentage actually sell the catch for profit. Sauafea-Leau and Curren (2000) also found that 82% of the population reported to be fishers when carrying out interviews in 11 villages around American Samoa. These results corroborate anecdotal evidence that the majority of fishing in Aunu'u is carried out for consumption and is shared amongst families but rarely sold. It is hoped to learn more about this issue through key informant interviews. From observations, it could be stated that the lifestyle in Aunu'u is slightly more traditional than that of other villages on the mainland of Tutuila. The results could therefore be indicative of a more traditional lifestyle in Aunu'u, meaning that all members of the family still cooperatively contribute the products of their labor to the family creating a self sustaining economic group as was reported to be the case in the past (Coulter 1941).

It was not surprising that the reef flat was the most commonly used fishing location because it is the most accessible area. Sauafea-Leau and Curren (2000) also found that the majority of fishers (73%) fished on the reef rather than the open ocean. The majority of fishers answered that they access their fishing area either by foot or by swimming which would make it very easy to reach the flat or wharf. Only those with boats would be able to access the other fishing areas. 31% of the population reported that they fish on the banks presumably carrying out bottom fishing from 'alia' boats. It is hoped that more information about the location of this fishing could assist the community in the potential development of an MPA. It will therefore be very important to work with the fishing groups in more depth to ascertain the actual locations of their fishing activity. Members of the community have stated that there are approximately five alia fishing boats in American Samoa.

A variety of fishing methods are used in Aunu'u with the most common being rod and reel. On average it seemed that the fishermen in Aunu'u take approximately 15 fish or invertebrates per trip. The most commonly reported catch was reef fish which correlates with the most commonly reported location (reef flat) and gear-type (rod and reel). It was interesting to note that those that fish most regularly tend to utilize only one gear-type and the less regular fishers use a diversity of techniques. It would seem that there are two main types of fishing groups: the reef flat fishing community (gleaners included) and the offshore fishing community with the former being the largest group. It is likely that the reef flat fishing community utilize preferred locations and that knowledge of these areas could assist in the development of both no-take and community based MPAs. The offshore fishing community are likely to have a variety of fishing locations due to the convenience of traveling by boat and also the necessity of the weather. However, they are limited by topography for bottom fishing and it is assumed they would also have a preference for certain areas (e.g. banks). It would also be important to consider the location and frequency of visitation of these sites during MPA design.

It was also considered important to understand the frequency and type of use of the marine area for non-fishing activities. It is assumed that those carrying out these non-fishing activities may benefit from having an area where the potential impact of fishing is removed. Swimming was reported to be a popular activity by 90% of households in Aunu'u indicating that the marine environment is important to almost all households regardless of fishing. Twenty three of households reported that they 'go surfing' and it would be interesting to learn whether this is actually true. There are two known surf breaks in Aunu'u but it is not common to see villagers surfing them (Turnbull pers. comm.). It is possible that the translation of surfing from English to Samoan led to a different interpretation of the activity. Indeed some of the interviewers have reported that they think respondents were talking about 'boogie boards' as well as surfboards.

Households were offered a choice of ten income generating activities and asked to rate whether they were 'heavily', 'somewhat' or 'not at all' dependent on them for food or income. The heavy dependence of most households (82%) on government jobs is indicative of a change from former times before the American Samoan Government became 'self governing' in 1967. Prior to that, during the naval administration, only one percent of the population drew salaries from the U.S. Government through employment as local guards. It was estimated that this supported approximately 20% of the population in 1940 through the family system (Coulter 1940). Another income generating activity in former days was the selling of handicrafts such as Tapa, fine mats and also making coconut oil from making copra. In the past, families obtained food through the tending of communal plantations, farming and fishing. It could therefore be concluded that families are much less dependent on fishing and farming than they used to be. However, approximately half of the households did report that they are 'somewhat' dependent on fishing and farming for food or income. It is most likely that this is due to the taro plantation that Aunu'u families have cultivated in the wetland and fishing activities that are carried out by the majority of households. It can therefore be stated that according to the results of the household survey, the community of Aunu'u are 'somewhat' dependent on fishing for food and only a few families are heavily dependent on fishing possibly those that own alia fishing boats.

***Assessment Objectives: 3) Understand the existing management structures and measures in place in Aunu'u***  
***4) Assess the receptiveness of households and the community to new management***

Overall the majority of respondents were not aware of any regulations in place for the activities that were listed (fishing, coral use, sand extraction, wetland activity, mangrove use, residential development). However, it was noted by 38% of respondents that there are regulations in place for fishing. These were mostly described as village based and are presumably controlled by the village council and the High Talking Chief (as the majority of respondents listed these as the managers of the marine environment in Aunu'u) although four households stated that there was some involvement of the local Government in these regulations. Community members tend to agree with regulations that they know about which indicates that this minority of the population supports the management regime for all activities with the exception of sand mining. Sand mining was the only activity to illicit negative responses with regards to the regulations in place. Several of these respondents commented that too many people and youths remove sand from the beaches and that sand is important for protecting their lands from erosion and their homes from inundation.

The overall level of satisfaction with existing management in Aunu'u tended towards the negative end of the continuum. A total of 52% were either dissatisfied or very dissatisfied, 36% were either satisfied or very satisfied and the rest were unable to answer. It would be interesting to know more about what causes these negative attitudes towards the current management although some of the comments revealed that people feel that the management is not as satisfactory as it was in the past and there was no written management. Some facilitated discussion about exactly what was done in the past that is not done now and what should be written down could help to improve things for the future.

The households in Aunu'u seemed to be very receptive to new management including more influence from the village council, local government and federal government although comments relating to the latter were focused around obtaining money from the federal government. It was very encouraging to note that more people (79%) would like to have 'areas set aside where no fishing is allowed' or marine protected areas than would like to have support for the fishing alia or size/catch limits. This indicates that moving forward with the MPA Program (community based and no-take) in Aunu'u, as the village council have recommended, would also be a positive action for the community at large. A concern for the community of Aunu'u seems to be the effects that outsiders fishing might have on their coral reef resources. Under American Samoan territorial regulations, it is not possible to simply ban outsiders from fishing in village waters. However, by setting aside an area that the village agrees upon as a no-take MPA it could be possible to prevent all fishing activity in that area. This would help to protect the fish stocks for everyone in the future.

***Assessment Objective: 5) Gain a better understanding of peoples' perceptions of the status of marine resources***

The majority of households had a positive perception of the marine resource conditions although comments (appendix 4) did indicate some decline in fish stocks and general coral reef health. The positive perception of coral reef resources that the public has verified the results of underwater visual census surveys such as those carried out by the American Samoan Coral Reef Monitoring Program (Waddell and Clarke 2008) and the Biological Reconnaissance surveys of the No-take MPA Program (Jacob et al. 2009 in prep). It was not certain whether people would be able to rate the condition of many of the resources but the fact that more people indicated that they were uncertain about the condition of the pelagic fish and the spawning stocks indicates that answers were valid as it was expected

that less people would know about the state of these resources. A very high rating was given to water quality and it became apparent after the survey that the Samoan translation for this related to drinking water (drawn from well water) rather than coastal waters.

***Assessment Objective: 6) Gain a better understanding about people's knowledge of natural and anthropogenic impacts on the environment now and in the past***

Overall the results showed that the majority of households did not rate the range of anthropogenic impacts listed as problematic in Aunu'u. Comments relating to these issues can be found in Appendix 4. Six of the respondents made comments about sand extraction indicating that they are aware that it could cause environmental problems. This shows that approximately 15% of households are aware of the potential environmental impacts of sand extraction. From the comments found in the appendix it can be estimated that less than 10% of the population really understood enough about the associated environmental problems caused by certain activities. However, these comments were offered voluntarily and so this figure is not reliable. Throughout the survey, several requests for more assistance from DMWR including education were made. One follow-up activity from this survey could include education workshops or activities for the public in Aunu'u.

***Assessment Objective: 7) Find out about peoples' attitudes towards marine resources***

The responses to statements about the non-use value of coral reefs indicated that the households in Aunu'u have a high value for their marine resources. Coral reefs appeared to be valued to a higher (90% agreed or strongly agreed) extent than mangroves (74% disagreed or strongly disagreed) which seems logical given that the coral reef in Aunu'u is more extensive than the mangrove. The fact that 69% of respondents said that they would like to have areas closed to fishing indicates that the majority of the community would be receptive to marine protected area establishment. This is 10% less than the amount of people that were receptive to having areas closed to fishing in question 18 (appendix 1), but given that the question required a response to a statement rather than a direct answer, it is not surprising that there is a variation. The fact that the majority of people in Aunu'u would like to have an area closed to fishing, in order for the fish to multiply indicates that the community in Aunu'u places a strong emphasis on protecting the fish stocks for the future. It was interesting that the percentage of people answering positively to an area closed to fishing was even greater than the number of people answering positively to restricting development. It is possible that the value that people in Aunu'u place on marine resources is even greater than the value that they place on terrestrial resources but this conclusion could not be drawn from the data collected.

## **Conclusion**

In summary, around half of the population surveyed depend on fishing and farming as a source of food. However, the majority of households have sources of income from the Government and do not have a solely subsistence based lifestyle. Regular fishing activity by most (at least once a month) indicates that fishing is an important cultural and traditional activity for households in Aunu'u. The most popular fishing activities use Rod and Reel on the reef flat and the reef slope and the majority of fishing access is by foot, although some have access via motorized boat. The majority of households (90%) also enjoy to swim in the area. Relatively few people know what a marine protected areas is and those that claimed to know did not fully understand. The people of Aunu'u have generally positive perceptions of all marine resources, although a decline in fish abundance and reef condition has been observed by some. Approximately one third of households perceived environmental problems and the issue of sand extraction was highlighted. Overall, the village council were listed as the main managers of the marine environment and their importance was emphasized, although the level of satisfaction was mixed. Around one third were aware of regulations (fishing) and agreed with them, except for sand extraction which also produced mixed responses regarding the agreement with regulations.

Overall, households were very receptive to new management but the need for money from the Government was highlighted. Seventy nine percent would like to have closed MPAs and explained that fish will multiply in this way. Responses to attitude statements showed that households have a good level of knowledge regarding the importance of natural resources and high value of them. They also value the importance of protecting resources for the future. Some requests for more education were made and the fact that many were unaware of regulations suggests that enforcement education as well as education relating to the science behind MPAs and factual information about MPAs in American Samoa would be a good idea.

### **LESSONS LEARNED AND NEXT STEPS**

One of the first main surprises of this project was that the team were only able to locate approximately one half of the houses that were anticipated. This is a concern because it is not clear what sample of the entire population we have been able to interview. In the future, it could be good to spend substantial time prior to the survey doing an inventory of the houses with a community member (ideally the village mayor) in order have a more accurate estimation of the population being surveyed.

An internal challenge that was experienced throughout the duration of this project was high project staff turn-over. This was due to the fact that the project relied on many volunteers that had other work commitments and interns that only had short terms. A lesson learned for the future would be to attempt to seek funding to offer payment for volunteers throughout the duration of the survey (from training through to data inputting) in order to ensure availability of staff throughout the project. This would not only assist in the project development through to fruition but would also assist the staff to develop their skills more fully.

Overall the survey team reported that the interviews went well and that the respondents were very honest with their answers and willing to spend time assisting them. It is not known if the respondents really were honest but this is the impression that the interviewers got. A set of posters in Samoan and English relating to marine ecology and conservation was given to each household which they appreciated and it would definitely be recommended to provide small incentives to households giving their time in the future. The household survey was intended to be carried out before Key Informant (KI) interviews but delays (caused by the tsunami, Christmas and other factors) mean that the KI interviews have yet to be carried out. It is possible that better communication with the village council and the clear establishment of project objectives could minimize such delays in future surveys.

It is essential that this report is not the end of this project. The ground work has been laid out for a future of productive collaboration between the village and DMWR. The results of this survey clearly support: the establishment of a Marine Protected Area in Aunu'u; more involvement of the village council and more involvement of the local government in marine resource management. The importance of money was highlighted by the village and this collaboration can assist the village to locate funds to carry out new projects. The results of the PLA workshop are currently being analyzed and several community action plans have been created. It is anticipated that by combining the results of this assessment with the outcomes of the workshop, the community of Aunu'u together with DMWR can seek funding to carry out some of their prioritized projects. As stated in the introduction (page 2), it is important to understand the current socio-cultural importance of fishing in addition to economic and nutritional benefits (WPFMC 2007) provided by fishing activities prior to considering MPA establishment or any other type of additional management. The results of this survey, therefore, constitute a large step towards understanding these issues. Providing that the results are utilized effectively and in clear collaboration with the community it is hoped that marine management in Aunu'u can be substantially improved.

## References

- Adams, T. J. H. and P. J. Dalzell. 1995. Management of Pacific Island Fisheries. **In** *Proceedings of the Third Australasian Fisheries Managers Conference, at Rottnest Island*. Perth: Western Australia Fisheries Department. 10pp.
- American Samoan Department of Commerce. 2009. American Samoa Population: 2009. ASG Department of Commerce, Statistics Division, American Samoa 96799. Approved by Director of DOC September 2009.
- Bindon, J.R., P.T. Baker. 1996. Bergmann's rule and the thrifty genotype. *Journal of Physical Anthropology*. Volume **104**, No. 2.
- Coulter, J., W. 1941. Land Utilization in American Samoa. Bernice P Bishop Museum. Bulletin **170** pp49.
- Craig, P. 2009. Natural History Guide to American Samoa. National Park of American Samoa, Department of Marine and Wildlife Resources and American Samoa Community College. 3rd edition.
- Craig, P. C., DiDonato, G., Fenner, D., Hawkins, C. The State of Coral Reef Ecosystems of American Samoa. **In:** *The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States: 2005* (J. Waddell, Ed., pp. 312–337). Technical Memorandum NOS NCCOS 11. NOAA/NCCOS Center for Coastal Monitoring and Assessments Biogeography Team. Silver Spring, MD (2005).
- Craig, P. C., Green, A. L. , Saucerman, S. 1995. Coral reef troubles in American Samoa. *S. Pac. Commission Newsletter*, **72**: 33–34.
- Green, A. 2003. American Samoa Bans Destructive Scuba fishery: the role of science and management. A case study prepared for the International Tropical Marine Ecosystem Management Symposium (ITMEMS 2), Manila, Philippines, March 24-27, 2003.
- Green, A. L. Status of the Coral Reefs of the Samoan Archipelago. Report to the Department of Marine and Wildlife Resources, American Samoa (1996).
- Levine, A., and S. Allen. 2009. American Samoa as a fishing community. U.S. Dep. Commer., NOAA Tech. Memo., NOAA-TM-NMFS-PIFSC-19, 74 p.
- Oram, R. 2008. A manual to guide the establishment and management of no-take marine protected areas. Biological Report Series 2008-01.
- Sabater, M.G., Carroll, B.P. 2009. Trends in reef fish population and associated fishery after three millennia of resource utilization and a century of socio-economic changes in American Samoa. *Rev Fish Sci* 2009 **17**:318-35.
- Sauafea-Leau, F., Curren, F. 2000. Survey of village reef fishing problems in American Samoa. DMWR Technical report.

## **References continued**

U.S. Department of Commerce. Population and Housing Profile: 2000. 2000 Census of Population and Housing. American Samoa. Issued 2004.

Waddell, J.E. and Clarke, A.M. (eds). 2008. The State of the Coral Reef Ecosystem of the United States and Pacific Associated States: 2008. NOAA Technical Memorandum NOS NCCOS 73. NOAA/NCCOS Center for Coastal Monitoring and Assessment's Biogeography Team. Silver Spring, MD. 569pp.

Wongbusarakum, S., Pomeroy, B. 2008. SEM-Pasifika. Socioeconomic Monitoring Guidelines for Coastal Managers in Pacific Island Countries. SPREP CRISP NOAA. 137pp.

Western Pacific Regional Fisheries Management Council (WPRFMC). 2007. Report on the 2007 Ecosystem Policy Workshop. Impact Assessment Inc. Pacific Islands Office, Hawaii.

Zeller, D., Booth, S., Craig, P., Pauly, D. 2006. Reconstruction of coral reef fisheries catches in American Samoa, 1950—2002. *Coral Reefs*, **25**, 144—152pp.

**HOUSEHOLD SURVEY**

**FOR THE COMMUNITY OF AUNU'U**

Survey #: \_\_\_\_\_ Interviewer: \_\_\_\_\_ Recorder:

Date:

1 How many people live in your household (under the same roof)?

2) Please list all your household members including yourself who are living under this roof.

<b><u>Inter-viewee</u></b> Place *asterisk next to interviewee	<b><u>Relationship to HH head</u></b> Hh = household head Sp = spouse, F = father, M = mother, S = sibling, C = child O = other relation, NR = No relation	<b><u>Age</u></b> 1 = 0-10; 2 = 11-20; 3 = 21-35; 4 = 36- 50; 5 = 51-75; 6 = > 75	<b><u>Sex</u></b> F = female, M = male

3) Please complete the table below with details of household members that currently live away from Aunu'u

<b><u>Reasons</u></b>	<b><u>Current location</u></b> T= Tutuila, M = Manu'a, O = other location	<b><u>No. of HH members off island</u></b>	<b><u>Approx length of time off island</u></b>
School			
Military			
Work – temporary			
Work – permanent			
Other, pls specify			
Other, pls specify			
Other, pls specify			

*Now I have a few questions to ask you about fishing. (The word "fishing" in this survey includes catching fish and harvesting invertebrates.)*

**4) Does anyone in your household fish? If not, please proceed to the questions 12.**

Yes

No

**5) If yes, why? You may choose more than one**

- a) For food
- b) For money
- c) Sports or fun
- d) Other. Please specify:

**6) On an average fishing trip, how much fish does your household usually catch?** (Please provide answer in pounds/coolers or other.)

	Pounds (lb)	Coolers	Numbers
Shellfish and other invertebrates (figota)			
Reef fish			
Pelagic fish			

**7) How often does your household fish?**

- a) Once or more a week.
- b) 1-3 times per month
- c) 2 – 10 times per year
- d) Once a year or less

Explanation

**8) How much of your fish does your household: Please choose from the following.**

	All	> Half	Half	< Half	None	comments
Keep for household consumption						
Give away to friends/ family						
Sell for profit						
Other. <i>Please specify:</i>						
Other. <i>Please specify:</i>						
Other. <i>Please specify:</i>						

**9) Around Aunu'u, where does your household fish?**

a) Reef Flat		
b) Reef Slope		
c) Wharf		
d) Offshore bank		
e) Other. Please Specify:		

**10) What fishing method does your household use? You may choose more than one.**

a) Rod & Reel		
b) Throw net		
c) Gill Net		
d) Traps		
e) Spear		
f) Gleaning		
g) Other. Please Specify:		

**11) How do people in your household access the fishing area?**

a) Foot		
b) Swimming		
c) Motorized Boat		
d) Non Motorized Boat		
e) Other. Please Specify		

**12) Which of the following activities does your household depend on for food and/or income?**

	Heavily depend-ent	Somewhat de-pendent	Not dependent
Boat transportation			
Fishing			
Government job			
Off island remittances			
Military pension			
Other pension			
Farming			
Cannery			
Tourism			
Private business			
Other. Please specify			
Other. Please specify			

13) Which of the following in-water activities (not including fishing) does your household take part in? You can choose more than one

a) Swimming		
b) Snorkeling / Scuba Diving		
c) Surfing		
d) Non motorized boat activity		
e) Motorized boat activity		
f) Other, Please specify:		

14) To the best of your knowledge, please rate the condition of the following resources.

Resources:	5 = Very Good	4 = Good	2 = Bad	1 = Very Bad	0 = Don't know
Fish in reef flat					
Fish on reef slope					
Fish - pelagic					
Shellfish and other invertebrates on reef flat					
Shellfish & other invertebrates on reef slope					
Spawning stocks					
Reef flat habitat					
Reef slope habitat					
Water quality					

15) Does your village have regulations for the following activities?

Activities	Rules Exist Y = yes N = No DK = don't know	Type of regs (V = village, L = local gov., F = federal gov., RB = Religious Beliefs, O = other)	Description	Level of agreement with the rules 1 = disagree, 0 = neither agree nor disagree 2 = agree
Fishing				
Coral use				
Sand extraction				
Wetland activity				
Mangrove use				
Residential development				
Other. Please Specify:				

16) Within your village, who makes decisions on how to protect and manage the marine resources?  
(Write down everyone)

17) How do you feel about the current management of marine resources in Aunu'u?

1 = Very dis-satisfied	2 = Dissatisfied	0 = neither satisfied nor dissatisfied	3 = Satisfied	4 = Very satisfied

Explanation:

18) Please select from the following options any additional management you would like to see in Aunu'u

Type of management activity	Response (Y = yes, N = no, DK – don't know)	Comments
a) More influence from village council		
b) Areas set aside where no fishing is allowed		
c) More influence from local government		
d) More influence from federal Government		
e) More support for local fishing alia (e.g. financial support, new boats, new equipment to help make new alia)		
f) Size/catch limits for fish		
g) Enforcement boat for Aunu'u		
h) Scientific surveys of fish condition and habitat		
i) No outsiders allowed to fish in Aunu'u		
Other. Please List		
<u>Other: Please list</u>		
<u>Other: Please list</u>		

19) Do you know what a marine protected area is? If so, please explain your answer

Yes \_\_\_

No \_\_\_

Not sure \_\_\_

Explanation:

20) Do you know of any villages that already have an MPA within their marine area and if so, where?

Yes \_\_\_

No \_\_\_

Not sure \_\_\_

Location(s):

21) Do you think the following are problems in Aunu'u now?

<b>Activity</b>	<b>Negative im- pact</b> 2 = Yes 1 = No 0 = Don't know	<b>Comments</b>
a) Sand extraction		
b) Erosion		
c) Removal of coral from beaches		
d) Removal of coral from ocean		
e) Coral bashing		
f) Ava niukini (poison made from natural source)		
g) Over fishing		
h) Illegal Fishing		
i) Other. Please specify:		

22) Please indicate the appropriate response to the statements below:

Statements	1 = Strongly Disagree	2 = Disagree	0 = neither	3 = Agree	4 = Strongly Agree
<i>The coral reefs are important for protecting land from storm waves</i>					
<i>The mangroves are not important for protecting the coast from erosion</i>					
<i>Coral reefs are only important if you fish or dive</i>					
<i>Fishing should be restricted in certain areas to allow the fish and coral to grow</i>					
<i>We should restrict development in some areas so that future generations will be able to have natural environments</i>					
<i>Big fish produce the same amount of eggs as small fish</i>					

Thank You for Your Time!!

<b>Activity</b>	<b>Person responsible</b>	<b>Start date</b>	<b>End date</b>
<b><i>Define objectives of socioeconomic assessment</i></b>	All	5 March	30 <sup>th</sup> April
<b><i>Identify site and indicators</i></b>	All	5 March	30 <sup>th</sup> April
Identify site and study population	All	5 <sup>th</sup> March	
Choose preliminary indicators and data collecting methods	All	5 <sup>th</sup> March	30 <sup>th</sup> April
<b><u>Consult with stakeholders</u></b>			
Identify stakeholders and determine their level of participation	All	5 <sup>th</sup> March	12 <sup>th</sup> March
Consult with stakeholders	Lucy and Bert mainly	23 <sup>rd</sup> March, initial contact	27 March Initial contact
<b><u>Prepare assessment</u></b>			
Determine schedule and budget	All	5 <sup>th</sup> March	20 <sup>th</sup> March
Assemble monitoring team		5 <sup>th</sup> march	23 <sup>rd</sup> June
Conduct reconnaissance visit	all	23 april	
Refine assessment objectives, select final indicators and data collecting methods	All	23 <sup>rd</sup> April	30 <sup>th</sup> April
Determine who to interview and sample size	All	5 <sup>th</sup> March	20 March
Conduct audience assessment	All	5 <sup>th</sup> March	20 March
Develop detailed workplan for S-E assessment	All	5 <sup>th</sup> March	20 <sup>th</sup> March
<b><u>Collect data</u></b>			
Collect and assess secondary data	all	Feb	30 april
Design data collecting instruments (interview questions, survey)	All	20 <sup>th</sup> March	8 may
Translate and back-translate survey (if necessary)	Bert, Noel, Eddie	8 may	31 may
Pretest and revise interview questions and survey	All	16 June	20 June
Ensure that assessment addresses objectives (revise)	All	16 June	20 June
Establish database, data coding system and plan for analysis	Lucy/Bert	8 may	20 June
Train data collecting team on data collecting methods	Lucy/Bert	23 june	10 july
Arrange logistics for field data collection	All	23 june	10 july
Collect data- key informants	All	13 july	24 july

Appendix 2 : work schedule for household survey in Aunu'u

<b>Activity</b>	<b>Person responsible</b>	<b>Start date</b>	<b>End date</b>
Collect data- household survey	All	13 july	24 july
Collect data- focus group (s)	All	13 july	24 july
<b>Analyze data</b>			
Code and enter data	All	27 <sup>th</sup> July	7 <sup>th</sup> August
Have KIs translated	Contractors	27 <sup>th</sup> July	28 <sup>th</sup> August
Complete descriptive statistics and other analysis	All	18 <sup>th</sup> Sep	
<b>Communicate results</b>			
Discuss key learnings with entire team,	All	25 <sup>th</sup> Sep	
Draft assessment report	Lucy/Bert	18 <sup>th</sup> Sep	23 Oct
Draft management recommendations, if applicable	Lucy/Bert	23 Oct	6 Nov
Review and communicate results with the community	All	10 Nov	20 Nov
Circulate assessment report to key stakeholders for review	Lucy/Bert	20 Nov	4 Dec
Finalize and submit assessment report	All		11 <sup>th</sup> December
<b>Use results for adaptive management</b>			
Review results with key decision makers and managers	Lucy/Bert	11 Dec	18 Dec
Determine actions for management changes	Lucy/Bert and stakeholders	11 Dec	18 Dec
Determine needs for further information and future assessments	Lucy/Bert and stakeholders	11 Dec	18 Dec

**Aunu'u Reconnaissance Visit**  
**04/24/09**

**Team:**

1. Lucy Jacob – No Take MPA Leader
2. Bert Fuiava – Environmental Scientist
3. Noel Opa - MOP Intern
4. Eddie Tarrant – Americorp Volunteer

Length of boat trip – cost and charter

- 10 minute trip
- 40 min drive from office to Aasu
- Wait time for ferry (10-40 mins)
- Ferry's run from approximately 4am – 6pm
- \$1.00 per passenger (min 5 passengers or \$5)

How many other boats

- 4 boats with CP ( commercial passenger license)
- 1 boat with CF ( commercial fisheries license)
- 3 unused or damaged boats on land

Dangerous dogs?

- NO – the dogs did not seem bothersome nor territorial

In water activities

- No sign of any fishing or in water activity during the visit aside from transporting of passengers.

Location of houses – mainly front and sides

- 2 Pito nu'u – Alofisau (east) and Salevatia (west)

Shops – opening hours

- 3 grocery stores however we may prefer to bring our own lunches.
- Shops stay open all day

Available Public restrooms

- No public restrooms however we are welcome to use the school restrooms

Fale or shaded areas for lunch?

- Yes – we may ask permission to use the family fales.
- Need to check on this with Mika and/or Pulenu'u
- Its also possible to use the M & O Public Works office by the wharf

Venue for focus group activity – get permission from who

- Please see Mika

### Buildings

- Approximately 78 houses including abandoned or empty houses.
- 3 abandon houses on Alofisau and 2 on Salevatia and more in the back

### Churches

- CCCAS Congregational Christian Church (has largest congregation) and Assembly of God - Alofisau; Latter Day Saints – Salevatia

### Village meetings

- Sometimes there is a monthly meeting for village council on Saturdays
- Saturday around 8am is the best time to go and carry out interviews

Mayor's matai name is: Aleaga

Appendix 4: Comments made on question relating to additional management desires

More influence from the village council		Areas set aside where no fishing is allowed		More influence from local government	
Yes	No	Yes	No	Yes	No
protecting the beaches	it's a must to protect these important things	if its good I say yes	it's a must to protect these important things	"This is a good idea in that way some of our village people could get work in the government."	it's a must to protect these important things
protect for future generation	for its protection	"It wold be nice"	because you get a lot of support and help from it.	"We really need the money to get things going here".	for its protection
"We need it because we need to go by the rules."		"It's a must in order to have various types of fishes".	It's hard to say anything to this village because people are sub-orned.	"We need the funds in order to get things going"	
"It's the matai that handles all the rules and regulations, and he makes the final call."		"Should have this for village benefit"		"we need the money"	
"It is very sacred"	It's hard to say anything to this village because people are stubborn.	"It's a good idea so we can increase the number of fish"		"For money"	
"We are not allowed"		"In order for fish to multiply"		Money for the people.	
"This needs to be done"		"For fish to multiply"		"Money for the people"	
Village support.		To stop them from fishing small fish.		Money for the people"	
"If the village people does not have a strong voice, we are not able to enforce the law."		Some families don't even care if they throw away dead animals along the coastline. It's no use of having rules because most people don't even care.		"It's a good thing, but I hope it will convince others to help out"	
"I think that's a 100% good idea."		"This is a good idea in order for fish to grow and multiply"		"This can help some of the villagers to get government jobs"	

Appendix 4: Comments made on question relating to additional management desires

there are outsiders that still fishes at night time like smugglers.		"Fish multiply"		money	
		Fish multiply			
		"If the program is good, than I agree"			
<b>More influence from federal government</b>		<b>More support for local fishing alia</b>		<b>Size/catch limits for fish</b>	
<b>Yes</b>	<b>No</b>	<b>Yes</b>	<b>No</b>	<b>Yes</b>	<b>No</b>
"Reports and documents are needed in order to support Department."	it's a must to protect these important things	"Most of the alias here are not native but are still allowed to fish here."	it's a must to protect these important things	"There's no use of overtaking fishes if we do not use it"	it's a must to protect these important things
"Like I said, we need the money"	for its protection		for its protection	"Take only what is needed. Try not to overtake."	for its protection
"Like I said, we need the money"	not so sure.	"We need a few more, just to make fishing efficient here.:"	"The wharf is not big enough for more alias. When it is stormy, it can destroy the alias. So there's no point."	"So the fishes can breed"	"I think the person has a mind to decide. Just like my brother and I.
"We need the money"	money	"To help out with fishing needs"	"This is not appropriate"	"We need the fish to grow to the right size before we consume them"	
"It's a must"		"To support fishing needs"	Why bring a lot if no one uses it.	"In order for fish to multiply"	
Money.		As long as they manage it well.	The alias we have right now are good enough	I understand and know the type and amount of fish to take.	
"Get money"			"For fish to grow"	I see a lot of people overtake fish.	
"It's a must because we are getting most of the money from the U.S."				"People should fish for the big ones. Save the small ones"	
more money		improvement for aun'u			
		"If I can get one of the alias, why not"			

Appendix 4: Comments made on question relating to additional management desires

		"For fish to grow"			
		"For fish to grow"			
<b>Enforcement boat for Aunu'u</b>		<b>Scientific surveys of fish condition and habitat</b>		<b>No outsiders allowed to fish in Aunu'u</b>	
Yes	No	Yes	No	Yes	No
"We don't know what people are doing to destroy our fishes".	it's a must to protect these important things	"This is a good idea so we can ensure the benefits for our younger generation"	it's a must to protect these important things	"Rules are pending on this matter".	it's a must to protect these important things
"To protect our environment"	for its protection	"This is a good idea so our village can have knowledge on what's going on with our ecosystem."	for its protection	"Outsiders tend to overtake fishes from here."	for its protection
"For the benefit of the village"	"Emergency transportation"	"This is a good idea so we can see how the fishes will grow and multiply"	education for the kids	"They tend to destroy our environment, but not their own."	not just people from aunu'u , but everyone as well.
"It better for the village"	but the whole village	"So fish can grow without problems"	"Because then we will know and people will go there to catch the fish"	"Support the curfew for the village people"	has to be strictly prohibited
She wants DMWR staff to visits often.		Agreed.		"This is enforced by the aumaga and the village curfew"	
It's good to have one in order to maintain the using of our marine resources.		for the future		I think Aunu'u residents should only be allowed to fish here. No outsiders.	
It can help us chase away foreigner who abuse our marine resources.		"It can really benefit our younger generation"		We should have one because of disease transmission.	
"Emergency transportation"				not allowed if they use illegal fishing	

Appendix 4: Comments made on question relating to additional management desires

				"people usually come and fish here because of the faisua, o giant clam"	
it's a must				"That's the spirit. Especially people from Alofa'u"	
"I don't want a boat, I want a HELICOPTER"				strictly prohibited	
"It's a good idea so we can ensure no more outsiders. Who knows if they're using poisons?"					
Captain in Aunu'u.					

Appendix 4: comments to question relating to environmental problems in Aunu'u.

Sand Extraction		Erosion		Removal of coral from beaches		Removal of coral from ocean	
Yes	No	Yes	No	Yes	No	Yes	No
it may effect the ocean	"Sands were used to be taken, however we are not allowed anymore."		"This is the only problem that is not found here."	"The dead corals are used widely here, and bleached corals also."	"But it is a problem, it will kill the corals"	no fishing	People are not allowed.
sand erosion	"Its use to build houses"		"There are no mountains"	It will flee the fishes away from their habitat area.		Foreigners come in and take.	"Some people here use corals for decoration"
Families fight over it!	It's not a problem, people are taking it.		People use it for gardening.	Some of the kids takes the coral and throw them away.		"It can and it will destroy our oceans'	
protect families from giant waves	"Before when I was young, there were numerous sands. Now there's nothing"		"Although there are heavy rains, I haven't seen a single landslide here in Aunu'u"	but only at high tide		but only at high tide	
One of the families digs in the back of the umu and takes the sand.	"Not so many people do that"			"That's why I want a branch of DMWR here in Aunu'u"		"Before, I use to see numerous of colorful corals, and fishes. As of now, I hardly see any"	
the ocean will reach houses by removing sand from the beach	"Because we use sand for construction, I don't think there's laws that would stop us from using it"			no fishing			

Appendix 4: comments to question relating to environmental problems in Aunu'u.

"As of now, I haven't seen anybody taking the sand"							
"The ocean will tend to rise to our houses"							
"There would be less sand and the water would start to rise"							

Coral bashing		Illegal Fishing		Other. Please Specify:	
Yes	No	Yes	No	Yes	No
no fishing	Probably it's happening, but I'm not aware of it.	no fishing	"Whoever that fishes should use their head to take just as much.	"Especially ava niukini"	"I think this should be eliminated."
Back than, but not any-more	"People should know how much they should and should not take"	Ava niukini! A lot of fishes are dying from it.			
I've seen families overtake but don't care.		Sometimes, people fish at the same time.			
		"this can lead to no more fishes"			

Appendix 4: comments to question relating to environmental problems in Aunu'u.

	<b>Comment 1</b>	<b>Comment 2</b>	<b>Comment 3</b>
<b>Fish on reef flat</b>	Just recently	big change	no parrotfish any-more
<b>Fish on reef slope</b>	I get the about the same amount of fish from this area and the reef flat		
<b>Fish - pelagic</b>	Right now, it is not the same as back then. There use to be a lot of fishes, but now I can't get any		
<b>Invertebrates on reef flat</b>	They're not the same		
<b>Invertebrates on reef slope</b>			
<b>Spawning stocks</b>	Turtle spawning	Not anymore	
<b>Reef flat habitat</b>	The coral is dead.		
<b>Reef slope habitat</b>			
<b>Water quality</b>	The water here is not used for drinking. Just showering	well water	Use well water



All above photographs show team members carrying out interviews with community members in Aunu'u



All above photographs show team members carrying out interviews with community members in Aunu'u



Above photographs show the team of assistants that carried out the household survey interviews in Aunu'u.



Household survey being carried out in Aunu'u



Americorp and ASCC interns on the boat trip to Aunu'u



Local children that enjoyed following the team around in Aunu'u



Leaves drying in the sun in Aunu'u for weaving.