

FISHERIES DIVISION

ANNUAL REPORT

2001-2002

A. Mulipola, S. Time, E. Ropeti, U. Tiitii, M. Lober, R. Imo, A. Solofa & T. Sasi

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MISSION STATEMENT

The Fisheries Division is committed to the Vision, Goal and Objectives identified in the Statement of Development Strategy (SDS) and the Ministry's Corporate Plan (2002-2005) goal of "Growing a Healthy and Wealthy Samoa. Below is the mission statement of the Division:

Promotes the optimum and ecologically sustainable use of the country's fishery resources and the development of suitable alternatives to harvesting of depleted resources in order to maximize benefits to Samoa.

HIGHLIGHTS

The following highlights represent the achievements the Fisheries Division attained during the fiscal year 2001/2003.

- ***New Approved Organisational Structure:*** The new organisational structure was developed to reflect the needs of the Division that are consistent with its mandates. The structure consists of 6 sub-outputs namely Inshore Fisheries, Offshore Fisheries, Aquaculture, Fisheries Extension, Fisheries Data and Statistics and the Administration that includes the Fish market, Enforcement and Administration.
- ***Commercial Fisheries Management Advisory Committee:*** A total of three CF-MAC meetings were held in the fiscal year. Issues addressed by the CF-MAC included a review of the tuna management plan, the proposed marina to be located at Mulinu Point to provide for onshore facilities required by the growth of the tuna industry, the requirements for sea safety regulation and its enforcement, the progress in the establishment of a Samoa Seafood Safety Verification and Certification Program, and the potential for negotiation of reciprocal fishing agreements with neighboring countries.
- ***National Seafood Safety Program:*** A National Seafood Safety System has been established to promote seafood international standards which will enable fish and fish products originating from Samoa to be exported to countries such as the USA and European Countries where the prices are reportedly more attractive. The project has already drafted and submitted to Parliament for approval a national legislation that is consistent with international requirements, to ensure full compliance for these requirements by the local processors. Training exercises in various aspects of this development were already conducted to ensure that the industry personnel are well versed with the new requirements. The responsible staff members of the Fisheries Division were also given trainings and directions as to how this program could be successfully implemented. The Fisheries Division will be known as the Competent Authority under the Seafood Safety Program.
- ***Tuna Longline fishery landings:*** The tuna industry continues to be the number one export earner for Samoa and showing tremendous potential for further developments if given the opportunity to do so. During this period, the longline fishery landed an estimated 6,180 tonnes, 80% of which was exported mainly to the US as frozen tuna to the two canneries in American Samoa. The rest was exported as fresh chilled yellowfin, mahimahi, wahoo, bigeye, and billfish fillets to mainland US, Australia and New Zealand.

- **Export tuna rejection:** An estimated 109 tonnes of fish valued at ST\$817,500 was rejected from the two canneries in American Samoa. Fish that were rejected by the Exporters in Apia was estimated at 412 tonnes and valued at ST\$ 3,090,000. The main reason for the reject of fish is due to the high level of histamine in fish body which is the result of poor control of fish quality during post harvest where the fish is not kept in sufficient amount of ice to maintain low temperatures after capture.
- **Domestic landed and sold fisheries:** The total domestic sales of inshore and offshore fish, invertebrates and marine products was estimated at 203 tonnes and valued at ST\$1.54 million. Of the 183.5 tonnes, 52% of which is accounted for by the inshore fisheries landings of reef and lagoon finfish. Tuna products is estimated at 43 tonnes and represents approximately 50% of the total offshore domestic sales. Sales of fishery products, whole and fresh at Fish markets is still on a downward trend since the last five years.
- **Marine protected areas / fish reserves/sanctuaries.** Monitoring surveys were conducted for 12 established community-owned and managed marine protected areas around Samoa. The results show clear evidence of recovery in each one of the 12 reserves. An improvement in biodiversity was observed as indicated by new coral growth and a much higher degree of species richness and diversity as compared to when the reserves were first established. Eight GCRMN longterm monitoring sites representing different regions of Samoa also showed significant live coral coverage and biodiversity improvement.
- **Aquaculture propagation and production:** The successful bivalve propagation program at the Toloa Hatchery during the 2001/2002 period resulted in the production of an estimated 18,000 seedlings of three giant clam species, *Tridacna derasa*, *T. maxima* and *Hippopus hippopus*. The 10,000 seedlings from last year's production have all been distributed to newly established community owned and managed lagoon nurseries during 2001/2002 for stock enhancement purposes.
- **Mudcrab farming trial:** A trial for farming a local mudcrab species, *Scylla serata*, conducted in 2001/2002 period revealed the growth rate of crabs stocked into the pen as 3.09 mm/month. Mudcrab farming has great potential and is therefore suitable for communities to implement as an alternative source for both food supplementary and subsistence incomes.
- **Fisheries advisory service:** Five new villages with approved Management Plans were achieved during this twelve-month period. These included four in Upolu and one in Savaii. The facilitation process in producing Management Plans for these villages took 5-6 weeks before approval by various village councils (fono). On the whole, there are 76 villages that are engaged in managing their fisheries and marine environment since the inception of the program.
- **Fish market services:** A total of \$60,509 tala was generated from the renting of tables/blocks to fish vendors trading fishery products at the Apia fish market.

SUMMARY OF ACTIVITIES

1. Commercial Fisheries Extension Services

The activities of the Commercial Fisheries Extension Services performed over the year included the establishment of a Tuna Fishery Management Plan and a National Seafood Safety System. Furthermore, the fishing trial for the Super-Alia Prototype was also continued. The annual registration and licensing of fishing vessels, enforcement of fishing licensing regulations and the servicing of the Commercial Fisheries Management Advisory Committee (CF-MAC) were ongoing activities again implemented. Appendix 2 and 3 provided more details of these services.



Alia fishing boat returned from tuna longline fishing

During the 2001-2002 period, 52 vessels of Class A (8-11m), four (4) vessels of Class B (11-12.5m), ten (10) vessels of Class C (12.5-14.9m), twelve (12) vessels of Class D (15-20.5m) and three (3) vessels of Class E (20.5+) have been registered and licensed.

The Fishermen Communication Network (FCN) continued to monitor daily fishing activities of fishers fishing offshore. Throughout the year, the FCN has assisted in coordinating search and rescue for 18 distressed vessels to bring them to safety. A new SSB radio system and accessories has been in placed for the big vessels.

The enforcement of the local fishing boat licensing regulation was carried out jointly by the Police Department, Ministry of Transport and the Fisheries Division. A total of 31 cases of noncompliance was reported. Two are now pending court and the rest were summoned to the Fisheries Office and released upon signing an agreement that the vessels were stopped from fishing unless they are licensed. Sixteen (16) of the unlicensed vessels have responded by renewing licenses while the rest remained uncooperative.

The Ulimasao completed 20 fishing trips in this period and six (6) other trips were undertaken for the Whale Watching Programme. The Fisheries Division in collaboration with Starkist Company (American Samoa) conducted a workshop on tuna quality and grading. Survey for navigational markers in the ports at Salailua Savaii was undertaken and now markers have been installed. A new ice-making machine was constructed at Salailua assisting Savaii fishers for readily access to ice and thus facilitate better quality of fish landed.

The National Seafood Safety Monitoring Programme was established and followed by regulation review and training on HACCP and Auditing for both the Fisheries staff and the industry. Furthermore, a feasibility study for the Construction of the Marina at Mulinuu Point by the Chinese Team was implemented, however, the proposal structure was not conform to the anticipation of the Government and the industry. A bathymetric survey conducted by SOPAC for the Mulinuu-Vaiusu area, proposed for the marina was also completed during the period. A Management Plan for the Fisheries Wharf has been formulated and now awaiting Cabinet approval.

2. Stock Assessment, Fisheries Statistic, Research and Aquaculture Services

The Research, Assessment and Monitoring Section (RAMS) was responsible for the implementation of activities relating to resources monitoring and management, fisheries statistics, research, and aquaculture during the 2001-2002 period. Summaries of these activities in details are presented in Appendices 2 and 4 while the annual target achievements are summarized below.



Mudcrab (Scylla serata) farming trial

Aquaculture activities concentrated on the development and promotion of tilapia fish farming as a food and income source for communities and stock enhancement through giant clam re-seeding. A total of 2,000 tilapia fingerlings was stocked in six village farms and 8,000 giant clam (*faisua*) seedlings in total were distributed for culturing in 25 community owned and managed lagoon nurseries for stock enhancement purpose.

Moreover, tilapia fry and *faisua* seedlings were continually propagated and produced at the Toloa and Apia hatcheries. This resulted in the production of 18,000 *faisua* seedlings. Farming trial of a local mudcrab species, *Scylla serata* was also conducted to assess its farming potentials and economic viability.

The monitoring of habitats and resources such as coral reefs and inshore biodiversity was one of the primary activities of the RAM section. The status of the inshore biodiversity and live corals were continually monitored and investigated in community-owned and managed Marine Protected Areas (MPA) and long-term monitoring sites. A total of 66 villages had established MPA and 24% of these were re-surveyed during the 2001/2001 period. Initial assessment for biodiversity baseline data was carried out for 4 new MPAs. Additionally, the status of coral reefs and fish and invertebrate abundance were assessed on eight (8) sites as part of the GCRMN long-term and ongoing habitat and resources monitoring. Generally, most assessed areas have shown good to moderate live coral coverage and a high level of fish and invertebrate abundance levels.

The collection of fisheries statistics is a primary function and ongoing activity pertinent to resource monitoring and management. The RAM Section conducted fishery samplings on a total of 156 sampling days to collect fisheries statistics on catch, effort, economic, biological, environmental, etc. Six (6) fishery surveys were on-going and conducted randomly thrice or twice weekly. Data were gathered and verified before being entered into the Fisheries Database System developed using Microsoft ACCESS.

Overall, total fish exports amounted to 5,150 Mt for the 2001 calendar year and 4,530 Mt for the 2001-2001 fiscal year. Appropriate management policies and practices are formulated based on survey outcomes.



Staff conducting fish market survey.

3. Fisheries Extension Advisory Services

The Fisheries Extension Advisory Services had concentrated their activities in facilitating, motivating and mobilising local communities in the management of their inshore fisheries and marine environment. Through this approach, local communities were encouraged to participate in identifying problems and solutions and consequently actively engaged in the sustainable management of fisheries resources under their jurisdiction. Appendix 5 provided more information on the fisheries Extension Advisory Services.

Five new villages with approved Management Plans were achieved during this twelve-month period. These included four Upolu and one in Savaii Island. The facilitation process in producing Management Plans for these villages took 5-6 weeks before approval by various village councils (fono). On the whole, there are 76 villages that are engaged in managing their fisheries and marine environment since the inception of the program.

Additionally, a total of 32 Reviews in Upolu and 36 in Savaii were conducted during the last twelve months. Information dissemination on all fisheries and marine resources issues in ensuring that the people of Samoa are informed of such.



Villagers harvesting tilapia in community-owned fishpond.

4. Fish market and Enforcement services

More details relating to the activities and results of the Fish market services output are detailed in Appendix 6.



Woman selling fish at the Apia Fish Market.

The Fish Market continued to service the general public in particularly local fishers that are trading their fishery products daily at the open side of the market. They looked after the cleanliness of the site and collect revenue for government through table rents. The revenue collected of \$60,509 has surpassed the anticipated amount \$60,000 over 12 months.

Additionally, Authorised Fisheries Officers have carried out regular monitoring and enforcement illegal undersized fishes and invertebrates, and egg bearing crustaceans that landed and sold through the market. A total of 222 cases of infringement have been reported.

5. Regional and International fisheries matters

Forum Fisheries Committee (FFC) of the Forum Fisheries Agency(FFA)

The FFA consists of 16 countries namely the Pacific nations including New Zealand and Australia. The Committee which is the FFC and each member is represented, meets annually to discuss issues pertaining to the welfare of fisheries resources within the region and any other issue and activities directly or indirectly relevant to the fisheries of the Pacific countries. During this period, the following matters were deliberated by the FFC during its annual session and emergency sessions.

1. Extension of the Fishery Treaty with the USA – The current fishery treaty between the USA and certain Pacific states expires in March, 2003 and after three negotiation and consultation sessions, the parties to the fishery treaty which is the US and certain Pacific states have agreed to a 10 year extension period.
2. The Tuna Commission for the conservation and management of tuna resources in the Central and Western Pacific Ocean is in the Preparatory Conference process where all the requirements for the establishment and the implementation of the Commission are developed. The previous two Prep Cons developed procedural matters, budget matters and possible scientific functions and requirements of the Commission when it comes into force. The Scientific Coordinating Group which was mandated by Prep Con to look at stock status and data needs scientific requirements of the Commission met in Honolulu and will present its findings to Prep Con when it next meets.
3. Other issues considered by the FFC include the operating environment in Honiara for the Head Quarter. It seems the staff of FFA experience difficulties in terms of security and some general operational requirements of the Head Quarter. The Committee hopes the ethnic tensions in the Solomon Islands continues to improve in the near future.

South Pacific Communities (SPC)

The SPC has the Oceanic Fisheries Program and the Community Fisheries Program, both of which involve Samoa in their activities.

1. OFP – The SCTB (scientific committee on tuna and billfish) met during the period to discuss stock status of the four main tuna species, albacore, skipjack, yellowfin and bigeye. Albacore appears to be in a healthy state so as skipjack, but there are some concerns for yellowfin and bigeye stocks.
2. CFP – The community fisheries program assisted the Fisheries Division in reviewing the Management Plans for the community program in Samoa.

6. Training

A number of workshops, seminars and courses were offered both in-country and overseas where staff of the Division and members from the fishing industry and local communities had attended. Objectively, the participation of staff has acquired appropriate and relevant skills and further enhanced their skills and knowledge to enable them to implement their tasks effectively and efficiently. The participation of various stakeholders facilitated the understanding of stakeholders of fisheries issues and provided a forum where both the Fisheries Division and stakeholders have the opportunity to consult. The various training activities conducted over the 2001/2002 period included Safety at Sea, Fish Quality and Processing, Fisheries Resources and Habitat Assessment and Monitoring, Information organisation and Database training.

7. Challenges

The Fisheries Division is undergoing a highly dynamic period, in particular the exponential growth of the tuna fishing industry currently experienced. This presents some daunting challenges to address the issues of infrastructure requirements of the industry, developments of legislations that accompany management regime put in place for the new developments, the continuous need for capacity development as the manpower demand must be fulfilled. The most difficult aspect of it all is to try and accommodate the dynamic evolution of the fisheries developments into the PSC and Treasury rules of procedures and functions.

Such issues include the proposed marina at Mulinu Point, the new Seafood Authority, the new Wharf Management Plan, the ongoing issue of Safety at Sea and the pressing need for research to address environment concerns which could effect the health of the tuna industry.

There are serious concerns towards the lack of consultations amongst responsible government agencies when it comes to issues that affect developments in the respective agencies. The declaration of the EEZ as a sanctuary was difficult to accept and there could have been a much better option if Cabinet was not ill-advised by the author of the submission. Also, the taxation of the catch could have been resolved in a much better way, as is the case in most developed countries where fishing industries thrive, without seriously compromising the management of the resources.

8. Recommendations

The Public Service Commission and the Treasury Department should grant special considerations to the needs of the Fisheries Division as it develops strategies to satisfy the immediate and future needs of the Division.

The issue of the EEZ being declared as a marine sanctuary should be reconsidered with better consultation amongst the competent authorities of the EEZ.

Recognizing the significant impact and potential benefits of the tuna fishery industry to the local economy, the government should therefore afford top priority to the developments of infrastructures and relevant requirements needed for improvements of the industry.

9. Acknowledgement

The Fisheries Division would like to acknowledge with much appreciation, the invaluable contributions from the following agencies:

- Government of Australia (AusAID)
- Government of New Zealand (NZODA)
- Food and Agriculture Organization (FAO)
- Forum Fisheries Agency (FFA)
- Secretariat for the Pacific Community (SPC)
- Japan International Cooperation Agency (JICA)
- South Pacific Regional Environment Program (SPREP)
- University of the South Pacific – Marine Studies
- SOPAC

Similarly, the Division is appreciative of the support provided by the Ministry of Foreign Affairs, the Public Service Commission, the Attorney General's Office, the Ministry of Transport, the Police Department and the Department of Treasury. Support from other Divisions of MAFFM, other Government Departments and Non Governmental Organizations are greatly appreciated. Acknowledgements must also be made out to our many valuable stakeholders and industry partners who have contributed in so many ways to ensure that our management regimes are customer driven and oriented with minimal government input and guidance.

The staff of the Fisheries Division, especially the Heads of each section are commended for the valiant effort they put forth to meet and satisfy the challenges of this very dynamic Fisheries Institute.

Last but not least, the tremendous support of the Honourable Minister and Director ensuring the achievement of the Division's mandated responsibilities, are greatly acknowledged.

Nanai Tanielu Suá

ASSISTANT DIRECTOR (FISHERIES)

APPENDIX 1.

SUB-OUTPUT 15.1: REGISTRATION, LICENSING AND SURVEILLANCE SERVICES

(Prepared by S. Time, P. Watt, S. Moala & R. Imo)

1. FISHING VESSEL REGISTRATION, LICENSING AND SURVEILLANCE

1.1 Registered and licensed vessels and licensing fees

The review of the management plan early 2002 saw the addition of class E for bigger boats (20.5m and over). A total of 81 local fishing boats were licensed during this fiscal year. These include 56 alias and 25 bigger boats. This is an ongoing process and fishing vessels were registered and licensed according to classes they are categorized in reference to their length and size of gear as shown in Table 1.

Table 1. Registered and licensed fishing vessels during 2001/2002 period.

CLASS	VESSEL SIZE	NUMBER OF VESSELS	LICENSE FEE	SUB TOTAL
A	Up to 11	52	\$200.00	52
B	11-12.5m	4	\$1000.00	4
C	12.5- 14.9m	10	\$5000. 00	10
D	15 – 20.5m	12	\$10000. 00	12
E	20.5m and over	3	\$15000. 00	3
				Total=81

The review of the tuna management plan early 2002 saw the addition of the new class (E) and increase license fee in classes C, D, and E. These new fees became effective on the date of the cabinet approval.(23rd March 2002). However most of the boats above were licensed before March 23. So the Fisheries expected revenue collected from the licensing would not be fully reflected in this financial year.

Compliance by the small alia fleet in rural areas and Savaii remains a problem to overcome. According to the Fisheries monthly boat count a total of 65 alias are recorded and that is an unlicensed number. The Division will be investigating into better options to improve compliance by smaller boats in the rural areas.

1.2 Monitoring Control and Surveillance

Enforcement of fishing boats licensing regulations was carried out mainly at Apia area where 60% of the local fleet is based and on the open ocean during the patrol boat Nafanua's patrol missions. The jointed forces of the Police Department, Ministry of Transport and the Fisheries Division executed the task. The campaign commenced with the awareness programme through the press, radio and television. This was followed by the field visit and patrol missions.

A total of 31 cases of non-compliance were recorded. Two are now pending court case handle by the Office of the Attorney General and the rest were summoned to the Fisheries Office and released upon signing an agreement that the vessels were stopped from fishing unless they are

licensed. The owners were co-operative and came forward to have their vessels licensed and were back to operation.

1.3 Fishermen Safety at Sea

Communication Network (CN) for the fishermen maintained the good services throughout the year through weekends and holidays. It has been noticed that the number of fishing vessel reporting to the base is getting fewer. Some of the boats may have other land bases to communicate.

Three other boats reported to CN-base by their owners but could not be saved because there were no radios on board and reporting was far too late. This happened in August 2001 where one boat ended up in Vanuatu with the assistance of an oil tanker from Fiji. Two crews died after spending two months at sea. Another boat ended up in Papua New Guinea with two survivors from a crew of four after spending five months at the sea. The third one was washed up at Falelima after three crews were picked up by another fishing boat and one was lost.

The HF radio had been upgraded and testing with its coverage is yet to be proved. This HF radio is targeting bigger boats, which can fish up to the limits of the EEZ. This is important for management purposes, as these boats are well equipped.

2. MARINA FOR THE COMMERCIAL FISHING FLEET

In June 2001, the People's Republic of China contributed USD1.3 million towards the construction of the marina at Mulinu'u Point. An engineering team from China was sent in December 2001 to conduct a feasibility study for the marina project. The Government of Samoa did not accept the proposal submitted by the engineering team for the marina.

In February 2002, a swath mapping team from SOPAC visited Samoa to conduct a bottom contour survey, record tidal range and current data for the marina site at Mulinu'u Point. The survey was completed after two weeks. The team concluded that access to the proposed marina is via two isolated pools in the area and that the access channels would necessitate the excavation of approximately 63,000 m³

Due to the success of the tuna longline fishery over the last five years the commercial fishing fleet has expanded from 92 alia (catamarans) to over 150 vessels in 2001. An estimated 61% of the entire fishing fleet is based in the Apia area. The increased number of fishing vessels has resulted in the Fisheries Wharf adjacent to the Fisheries Division being congested. Some fishermen are forced to moor their vessels along the sea wall in front of the bus terminal and the small cove near the commercial wharf in Matautu. These areas are not appropriate for mooring fishing vessels. The area in front of the bus terminal seawall is not safe during tropical storms with strong winds and high seas. The Samoa Port Authority has warned that it will prohibit boat owners from mooring their fishing vessels at the commercial wharf or in the cove in Matautu.

The main areas of concern are safety of the fishing fleet, over-crowding in the Apia area and the facilitation of services to meet the needs of the fishing industry. The local offshore fishing fleet is predominantly 9-metre outboard Aluminium catamarans (alia) that fish for tuna, non-tuna Pelagics and deepwater snappers. However, because of the significant development of the tuna fishery, 27 large vessels ranging from 11 to 25 meters have entered the tuna longline fishery and have added further congestion in the Fisheries Wharf.

To address the problem of congestion at the Fisheries Wharf the Government of Samoa in 1998 initiated a feasibility study to identify a suitable location for a new marina, draft a plan for a marina to accommodate the fishing fleet and determine costs. The Department of Public Works drafted a plan for a marina that included three jetties and a breakwater to be constructed in Sogi. The estimated cost was SAT 3 million. The Government of Samoa approved the plan but did not have the funds to initiate the project. It was recommended that external funding agencies should be approached to secure funds for the marina.

This plan was presented to the Commercial Fisheries Management Advisory Committee (CF-MAC) in November 1999. Representatives from the private sector of the fishing industry raised concerns that the Sogi site for the marina was inappropriate. The main concerns were that the Sogi area did not provide sufficient shelter during periods of high waves and strong winds and the marina could only accommodate small alias as the seabed could not be dredged to a sufficient depth for larger fishing vessels.

A sub-committee was appointed by the CF-MAC to determine the most appropriate location for a new marina for the fishing fleet. After visiting a number of potential sites, the sub-committee recommended that Mulinu'u Point was the most appropriate site.

The Fisheries Division in cooperation with a Japanese engineering company drafted a proposal to JICA for funding to construct a marina at Mulinu'u Point. A survey of the terrestrial and marine area at Mulinu'u Point was conducted to determine the boundaries of the site. An infrastructure plan which included 4 floating mooring pontoons, a breakwater, boat lift, cold store rooms, fuel depot, and a boat repair yard was designed by the engineering company. The estimated cost for the construction of the marina was USD\$12 million. The proposal requesting external funding was submitted to the Ministry of Foreign Affairs for approval. It was subsequently forwarded to JICA for consideration.

In June 2001, the People's Republic of China contributed USD1.3 million towards the construction of the marina at Mulinu'u Point. An engineering team from China was sent in December 2001 to conduct a feasibility study for the marina project. The study included investigating the proposed marina site, establishing the technical requirements for bottom contour surveys, geologic drilling, sea current, sediment and seabed sampling, and developing a conceptual design. During the visit the Ambassador of the People's Republic of China announced that the grant had been increased to USD\$2.6 million. After the feasibility study was completed the engineering team presented their development plan for the marina project.

The team proposed the following plan for the project:

The People's Republic of China would construct:

- 65 meter long by 10 meter wide wharf that could accommodate 4 fishing vessels
- 1500 sq. meter reclaimed area
- 150 sq. meter manager's office
- 1 power boat to shuttle fishing crews back and forth to their vessels

The Government of Samoa would be required to:

- conduct the bottom contour surveys, geologic drilling, sea current and seabed sampling
- dredge the channel from the exterior reef to Mulinu'u Point
- dredge the basin for the fishing fleet to anchor

The proposal was not accepted by the Government of Samoa as a wharf that could only accommodate 4 vessels did not meet the needs of the industry, and funds were not available to conduct the surveys and dredge the channel to the marina site.

Presently, the funding situation for the marina is at a standstill; negotiations with the People's Republic of China have ceased. It is unsure whether the USD\$2.6 million that were committed to the project by China are still available. Also, the grant from China is not sufficient to complete the project. The Japanese engineering firm estimated that the total cost for the marina was USD\$12 million. Therefore, other external funding agencies need to be approached to fund the project.

In February 2002, a swath mapping team from SOPAC, responding to a request from Foreign Affairs, visited Samoa to conduct a bottom contour survey, record tidal range and current data for the marina site at Mulinu'u Point. The survey was completed after two weeks. The team concluded that access to the proposed marina is via two isolated pools in the area and that the access channels would necessitate the excavation of approximately 63,000 m³.

APPENDIX 2.

SUB-OUTPUT 15.2: FISHERIES STOCKS, STATISTICS AND INFORMATION SERVICES

(Prepared by A. Mulipola, A. Solofa & A. Tua,)

1. FISHERIES STATISTICS

The results of activity reports in this section fall under the Sub-output 15.2 of the Output 15.0. The collection of fishery statistics and assessment of inshore habitats and fishery resources were some of the ongoing activities performed by the Research, Assessment and Monitoring Section (RAMS) throughout the year. The ongoing collection of data and information is used to monitor and determine the status and rates of exploitation of fisheries resources over time. Assessment activities are focused on investigation and the monitoring of fishery habitats and resources. The outcomes from these habitat and resource surveys would facilitate the formulation of proper and effective measures management Samoa's fishery resources and habitats sustainably and ecologically.

Data relating to landings, domestic sales and commercial exportation of fish, invertebrates and marine products were gathered using surveys conducted regularly, periodically and randomly at various outlets (i.e. Apia Fish market, Salelologa Market, retailers, landing ports, exporters, etc.). During sampling, major taxa (families to species) of fishes and invertebrates were identified and recorded. The lengths and weights were measured and weighed, and numbers of each representative of each species present were counted. Additional information pertaining to economic value and fishing effort (fishing hours, location, fuel consumption, number of crew, fishing methods, etc.) was also obtained from interviewing sellers, proprietors and vendors. Data and related information were verified and entered into a central Fisheries database system developed using Microsoft ACCESS.

The collection of fisheries statistical data is an ongoing activity and the following surveys were implemented over the 2000/2001 fiscal year period:

- (a) Offshore tuna fishery survey
- (b) Offshore bottomfish fishery survey.
- (c) Inshore fishery survey.
- (d) Longline port samplings.
- (e) Processed inshore fishery survey.
- (f) Commercial & Faaoso Exports

1.1 Total fisheries landings

The overall total of fishery products that was landed and traded at both local and overseas outlets during the 2001/2002 period is totaled approximately 4,729 Mt in weight and valued at around ST\$41.4 million. Offshore fishery items accounted for 69% of the total with tuna as the dominant product. Likewise, inshore fishery contributed 31% of the total with the reef fin-fish being the main type of inshore fishery product landed and traded over the year. Table 1 summarizes the total volumes and values per fishery landed and sold during the 2001/2002 fiscal year period.

Table 1. Overall estimated totals of fishery products that were landed and traded through domestic and overseas outlets during 2001/2002 period.

Fishery	Domestic		Exports		Totals		% Wt
	Wt (Mt)	Value (m\$)	Wt (Mt)	Value (m\$)	Wt (Mt)	Value (m\$)	
Inshore							
Fin-fishes	50.57	477	48.95	90.27	99.52	567.27	68%
Crustaceans	3.63	765	0.62	13	4.25	778	3%
Invertebrates	3.3	140	0.43	7	3.73	147	3%
Processed marine products	39.06	564	0	0	39.06	564	27%
Totals	96.56	1,946	50	110.27	146.56	2,056.27	100%
Offshore							
Tuna	43.2	148	4015.66	32862	4058.86	33010	89%
Deepwater fishes	25.7	181	186.97	2344	212.67	2525	5%
Pelagics	12.7	45	257.09	3404.7	269.79	3449.7	6%
Billfishes	5.4	26	36.03	376	41.43	402	1%
Totals	87.1	400	4,495.75	38986.7	4582.75	39386.7	100%

1.2 Domestic landed and sold fisheries.

Data relating to the domestic sales of inshore originated fish, invertebrates and marine products were extrapolated from three (3) surveys conducted randomly at both the Apia fishmarket and Salelologa market. Additional data was also collected from surveys conducted thrice weekly of processed inshore fishery items sold at Fugalei market and a roadside survey conducted on a twice weekly basis.

Based on outcomes of these surveys, it is estimated that domestic sales of inshore and offshore fish, invertebrates, and marine products is amounted to 203 Mt, valued at ST\$1.56 million (Table 2). Of the overall total volume, inshore fisheries is amounted to approximately 115.8 Mt of which finfish is accounted for 60% (69.8Mt). On the whole, inshore and offshore fishery products were sold at an average prices of ST\$10/kg and ST\$5/kg respectively throughout the year.

Table 2. Overall totals of fishery products that were landed and sold through domestic outlets.

Fishery	2000/2001		2001/2002	
	Est Wt (Mt)	Est Value ('000 ST)	Est Wt (Mt)	Est Value ('000 ST)
Inshore	35.1	395.2*	115.8	1,161.2
Offshore	92.6	414.4	87.08	400.0
Total	127.7	809.6	202.88	1,561.2

Analysis of data from offshore surveys revealed that domestic sales of offshore fisheries totaled 87.08 Mt and valued at ST\$0.40 million. Tuna sales amounted to 43 Mt, valued at approximately ST\$143,000.00 and thus making up the largest proportion of sales for offshore fisheries.

Generally, the annual total of all fishery products that was landed and traded through major domestic outlets has increased by 37%. However, the total volume of offshore landed and sold declined by about 6%. The total volume of inshore fishery products has increased by 70% compared to last year's figures. Inshore-originated products contributed 57% to the total amount of fishery items that were landed and sold through domestic markets during the 2001-2002 fiscal year.

(a) Inshore fisheries

A total of approximately 69.8 Mt, valued at about ST\$496,400 (Table 3) of lagoon and reef fin-fish was traded at local fishmarkets and other outlets throughout the year. This group accounted for 60% of the total volume and was the major type of inshore-originated fishery. Crustacean group comprised of about 3% of the total weight and amounted to 3.63 Mt. From this volume, total revenue of ST\$76,502 was generated. Bivalves and other molluscs amounted to around 3Mt altogether, valued at around \$24,000. Fisheries items that were sold in processed forms such as cooked, wrapped and bottled amounted to 39.1 Mt collectively and valued about ST\$0.56 millio. Although, the total volume of inshore fisheries that was sold at domestic outlets during the 2001/2002 period increased significantly by about 70%, the general trend of local annual sales has been declined over the past five years.

Table 3. Estimated total of Inshore fishery products landed and sold via domestic outlets.

Group	Est. tot. Wt (Mt)	Est. tot. Value(ST)	Avg. price (\$/kg)	% Wt
Reef / lagoon finfish	69.87	\$496,434.05	\$6.50	60.3
Crustaceans	3.63	\$76,502.14	\$21.09	3.13
Bivalves	2.15	\$10,068.87	\$4.68	1.86
Other Molluscs	1.05	\$14,410.53	\$13.67	1.00
Processed	39.06	\$563,827.23	\$14.43	33.7
TOTAL	115.76	\$1,161,242.82	\$10.06	100.00

The most common types of reef and lagoon finfish by weights that traded at domestic outlets were from the family of *Acanthuridae* (*Naso sp.* Unicornfish – Ume, Iiilia, etc.), *Scaridae* (Parrotfish – Fuga, Laea, etc.), *Acanthuridae* (Surgeonfish – Pone, Alogo, etc.), *Lethrinidae* (Emperor – Mataeleele, etc.) and *Muraenidae* (Moray eels – Pusi gatatala, etc.) species. These major fish groups accounted for 13.8%, 12.4%, 7.5%, 6% and 5.9% respectively (Table 4) of the total volume weight of inshore fin-fish products. Fin-fish, again was the most common types of fishery products sold alongside of the Apia-Faleolo main road. Nevertheless, the species composition from this survey was not available. On the whole, fin-fish were sold at an average price of ST\$6.50 tala/kg.

Mudcrab (*Scylla serata*) and lobster (*Panilurus penicillatus*) were the most common types of crustaceans that were traded through local markets and other outlets accounting for 25% and 33% respectively of the total volume of this group. Again, crustacean species such as mangrove mudcrab (*S. serata*) and lobsters (*Panulirus penicillatus*) were sold at around ST\$20/kg and were considered the most expensive commodities per unit price at domestic markets. Likewise, octopus and giant clam were the main types of molluscs traded whole and fresh and both accounted for 40% and 24% respectively of the total volume sale of molluscs. In general, molluscan products were sold on a mean price/kg of ST\$13. Tugane bivalve (*Gafararium tumidums*) was the major type of shellfish (24%) sold locally and was normally sold along roadside in pile of ST\$5/bag.

Table 4. Major composition of reef finfish landed and sold at the Apia & Salelologa fish markets.

English/Samoan Common Name	Scientific Name (Genus/Family)	Est. Total Wt (Mt)	% Wt	Avg. \$/kg	Est. Total Value (ST)
Unicornfish (<i>ume, paumalo, iliilia</i>)	<i>Acanthuridae</i>	9.63	13.78	8.26	\$ 79,558.53
Parrotfish (<i>fuga, fugausi</i>)	<i>Scaridae</i>	8.68	12.42	7.96	\$ 69,027.16
Surgeonfish (<i>alogo, pone, palagi, manini</i>)	<i>Acanthuridae</i>	5.23	7.48	5.99	\$ 31,297.35
Emperor (<i>mataelelele</i>)	<i>Lethrinidae</i>	4.23	6.05	6.65	\$ 28,115.02
Moray eels (<i>pusi</i>)	<i>Muaranidae</i>	4.14	5.92	9.26	\$ 38,339.12
Caranx (<i>malauli, lupo</i>)	<i>Carangidae</i>	3.86	5.52	6.48	\$ 24,981.10
Groupers (<i>Gatala, ataata, papa</i>)	<i>Serranidae</i>	3.45	4.94	8.49	\$ 29,296.79
Snappers (<i>malai, tamala, savane, sinepa</i>)	<i>Lutjanidae</i>	2.36	3.37	5.10	\$ 12,022.38
Mullet (<i>anae</i>)	<i>Mugillidae</i>	2.10	3.00	10.21	\$ 21,399.22
Goatfish (<i>ululaoa, vete, taulaia</i>)	<i>Mullidae</i>	1.07	1.53	6.47	\$ 6,898.94
Topsail drummerfish (<i>ganue</i>)	<i>Kyphosidae</i>	0.99	1.42	8.01	\$ 7,947.14
Rabbitfish (<i>lo, pauulu, malava</i>)	<i>Siganidae</i>	0.91	1.31	7.92	\$ 7,236.74
Soldierfish (<i>malau</i>)	<i>Myripristidae</i>	0.75	1.07	6.97	\$ 5,190.80
Other fish		3.2	4.57	5.9	\$16,428.74
Reef fish (<i>Road Side Survey</i>)*		19.30		6.15	\$ 118,695.00
Totals		69.87	100%	6.49	\$ 496,434.05

Note: Finfishes sold along the roadside of Moataa and Apia-Faleolo were not arranged into taxa or groups.

Apart from inshore-originated items sold whole and fresh at Apia fishmarket, several inshore fishery products were traded in traditional processed forms such as cooked, wrapped, bundled and bottled at the Fugalei Agriculture market. Due to the processed nature of products, it was quite difficult to determine their actual quantities. However, the Section made an attempt whereby weights of processed items were determined. These were used to estimate total quantity of processed inshore fishery products. The composition of major products traded as processed items is summarised in Table 5. Bottled curryfish (*Stichopus horrens*) was the dominant product traded and accounted for 34% of the total value. Seagrapes (*Caulepar sp*) sold in wrapped form (bundle) and coconut-cooked moray eel (*Gymnothorax sp.*) and octopus (*fai-ai pusi*) were accounted for about 18%, 15% and 11% respectively of all processed items. Overall, seagrape was sold at a mean price of ST\$5/bundle, coconut cream-cooked items were transacted at an average price of ST\$13/bundle and *sea* was traded at an average cost of ST\$15/bottle.

Table 5. Summary of processed inshore fishery products traded through Fugalei Agriculture Market in 2001/2001 period.

Product type	Avg price	Value	% Val
Sea (Bottled curryfish)	15.17	189,038.08	33.5
Limu (Wrapped seagrapes)	5.17	99,317.63	17.6
Faiiai pusi (Coconut-cooked eel)	12.94	82,540.49	14.6
Faiiai fee (Coconut-cooked octopus)	13.93	59,490.94	10.6
I'a Vela (Wrapped cook fish)	20.91	40,967.49	7.3
Faiiai matalelei (Cooked scylomia)	5.84	30,637.58	5.4
Faiiai gau (Coconut-cooked seahare)	3.00	21,714.92	3.9
Palolo	12.50	16,736.47	3.0
Alualu (Wrapped jellyfish)	5.17	7,800.26	1.4
Others		15,787.16	2.8
Total		564,031.02	100.0

The annual total estimates of inshore fishery products that landed and transacted locally, through the Apia fish market and other outlets over the past 8 years is illustrated in Figure 1. In general,

the annual totals show a declining over the years especially in the crustacean and invertebrate groups. Finfish landings, although it is consistently similar over the years, it show a trend toward a declining approach and this is due primarily to the banning for sales of undersized and egg bearing fish, invertebrates and crustaceans. The size limits regulation prohibiting the harvesting and sales of undersized fishes, crustacean and invertebrates was established in 1996 and was enforced thereafter. This has prompted the reduction in annual volumes of sales of inshore fisheries landed and traded through domestic outlets since 1996.

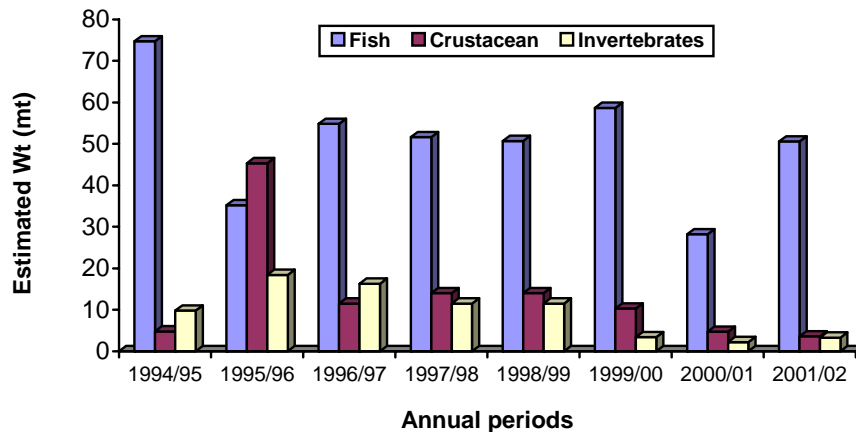


Figure 1. Annual estimated landings of inshore fisheries that were sold locally

(b) Offshore fisheries

The summary of offshore fisheries per major group which was sold locally during the 2001/2002 period is presented in Table 6. An overall total of 87.1 Mt in weight valued around ST\$400,000 was estimated as being traded either whole, by pieces and fresh via the Apia fish market mainly. Tuna accounted for approximately 50% of the total volume. During the year, deepwater and tuna were sold at average prices of ST\$7/kg and ST\$3.43/kg respectively. Billfish and other pelagic fish species regarded as by-catch were normally sold by pieces at an average price of \$4/kg.

Table 6. Estimated total weights and values of offshore fishery products sold at local outlets in 2001/2002.

Group	Est. tot. wt(Mt)	Est. tot. value(\$)	Avg. price (\$/kg)	% wt
Billfish	5.47	26,055.67	4.76	6.28
Deepwater	25.74	180661.98	7.00	29.55
Other Pelagics	12.71	45,054.50	3.55	14.59
Tuna	43.16	148,181.78	3.43	49.57
TOTAL	87.08	\$399,953.92	4.34	100.00

The species composition of offshore fisheries that were locally landed and sold over the 2001-2002 period is summarised in Table 7. The most common deepwater species traded were *Lethrinus elongatus* (28%), *L. variegatus* (24%), *Aprion vireescens* (21%) and *Pristipomoides filamentosus* (12%) of the deepwater fish total volume. Marlin and Broadbill swordfish (*Xiphias gladius*) were the dominant species of billfishes sold normally in 2-3 kg/pieces. Likewise, Dolphinfish (*Coryphaena hippurus*) and Wahoo (*Acanthocybium solandri*) were the most common species of other pelagic fish traded via local outlets over the year.

Table 7: Major species composition of Offshore fish sold at local outlets.

Common / Samoan names	Scientific names	Est. Total Wt (Mt)	Est. Total Values (T)	% wt
Longnose emperor – Filoa vaa	<i>Lethrinus elongatus</i>	7.17	\$50,214.11	28%
Varigated emperor - Pela	<i>Lethrinus variegatus</i>	6.17	\$43,162.27	24%
Grey jobfish – Utu, Asoama	<i>Aprion virescens</i>	5.30	\$37,080.36	21%
Bigscale snapper – Palu-ugatele	<i>Pristipomoides filamentosus</i>	3.09	\$21,650.97	12%
Silverjaw Jobfish – Palusina	<i>Aphaereus rutilans</i>	1.09	\$7,657.73	4%
Grouper – Gatala, Ataata	<i>Epinephelus sp.</i>	1.06	\$7,445.47	4%
Lunar tail grouper – Papa	<i>Variola louti</i>	0.95	\$6,616.81	4%
Other fish – Isi Ia		0.91	6,352.27	4%
<i>Totals</i>		25.74	180179.99	
Billfishes				
Marlin – Sa’ula		2.85	\$ 13609.42	52%
Broadbill swordfish – Sa’ula tao	<i>Xiphias gladius</i>	2.35	\$ 11,200.83	43%
Sailfish- Sa’ula-lele		0.13	\$ 635.07	2%
Shortbill Spearfish – Sa’ulatao		0.12	\$ 591.89	2%
<i>Totals</i>		5.47	26,037.20	1.00
Other Pelagics				
Dolphinfish - Masimasi	<i>Coryphaena hippurus</i>	4.53	\$ 16,083.83	36%
Wahoo - Pala	<i>Acanthocybium solandri</i>	2.07	\$ 7,352.09	16%
Shark - Malie		1.38	\$ 4,910.72	11%
Trevally - Malauli	<i>Carangidae spp</i>	1.23	\$ 4,367.95	10%
Baracuda - Sapatu	<i>Sphyrnaea barracuda</i>	2.20	\$ 7,817.51	17%
Pomfret	<i>Taractichthys steindachneri</i>	0.56	\$ 2,001.66	4%
Moonfish – Ia masina	<i>Lampris guttatus</i>	0.44	\$ 1,579.41	4%
Other pelagics – Isi Iá		0.28	\$ 1,007.33	2%
<i>Totals</i>		12.71	45,120.50	1.00
Tuna				
(skipjack)	<i>Katsuwonus pelamis</i>	27.88	\$ 95,624.05	65%
(yellowfin)	<i>Thunnus albacares</i>	10.17	\$ 34,883.08	24%
(Albacore)	<i>Thunnus alalunga</i>	2.94	\$ 10,077.60	7%
(Bigeye)	<i>Thunnus obesus</i>	1.47	\$ 5,055.61	3%
(dogtooth tuna)	<i>Gymnosarda unicolor</i>	0.70	\$ 2,398.46	2%
<i>Totals</i>		43.16	148,038.80	100.0

The estimated annual landings of offshore fisheries, in particularly tuna, that was traded at domestic fish markets and other outlets had declined substantially over the past 8 years (Figure 2). The reduction in the annual volume weights was due mainly to the increase in fisheries exports. More and more tuna and other pelagic species, i.e. billfishes, have been exported commercially and lesser volumes of fish are sold for local consumption. The offshore deepwater fish landing has remained relative constant over the years.

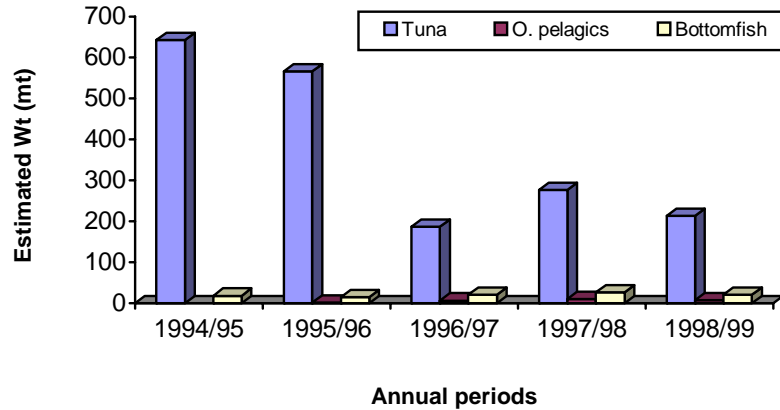


Figure 2. Annual estimated landings of offshore fisheries that were sold locally

1.3 Export fisheries

(a) Commercial Exports (Reported)

Commercial Export data is monitored through a uniform certification system by the Custom Department, Central Bank of Samoa and the Fisheries Division of MAFFM. Export data is derived from Provisional Export Forms (PEF) where exporters declare fishery consignments exported commercially to overseas markets. Each form equates to a single consignment form an exporter, stating the type of fish being exported, the weights of each type of fish, and the estimated value. Additionally Fisheries Division also receive data from other sources like the canneries in American Samoa, Exporter themselves and Airfreight companies. These data are incorporated and used to reconcile the integrity and creditability of fisheries statistics data.

Analysis of data showed that an estimate of 4,048 Mt of tuna was exported frozen, and 1,102 Mt of fresh chilled fish was exported by air freight predominantly to Hawaii and the United States during the 2001 calendar year. The species composition for the exported catch to foreign countries is mainly albacore tuna (78%), yellowfin tuna (12%) and bigeye tuna (3%). Total foreign revenue earned for 2001 is estimated at \$45.8 million tala. However, an estimate of 109 Mt of fish was rejected from the canneries in American Samoa valued at ST\$817,500 during the 2001 period. Fish that was rejected by the Exporters in Apia was approximated at 412 Mt valued at ST\$3,090,000. Likewise, about 618 Mt was not exported because the quality of fish did not meet the standard requirements.

During the 2001-2002 fiscal period, a total of approximately 4,015 Mt of tuna was exported. An additional 519 Mt of Bottomfish, Billfishes and Other Pelagics valued around ST\$6 million was also exported commercially. Overall, a total of 4,534 Mt valued at ST\$39.3 million was exported of which tuna made up 89% of all exports (Table 8).

Table 8. Commercial fishery total exports for 2001/2002 period.

Fishery	Est. Total Weight (Mt)	Est. Total Value (SAT\$)	Average \$/kg	% Wt
TUNA EXPORTS	4,015.02	32,863,425.76	8.18	88.55
BILLFISH EXPORTS	35.83	375,410.29	10.47	0.79
OTHER PELAGICS EXPORTS	256.50	3,403,116.71	13.26	5.66
BOTTOMFISH EXPORTS	186.14	2,339,368.55	12.57	4.11
REEF FISH EXPORTS	40.58	272,868.48	6.72	0.89
TOTAL EXPORTS	4,534.07	\$39,254,189.79		100

Species composition (Table 9) of tuna exported was 78% albacore, 12% Yellowfin and 3% Bigeye respectively. The majority of Albacore landed was sold to the canneries in American Samoa (61%) with most of the Yellowfin tuna and Bigeye tuna being air-freighted as fresh chilled products to predominantly Hawaii and USA markets. The remaining fishery products were also exported as fresh chilled and is accounted for about 17% of the total export. As reported, frozen tuna was sold for an average price of about SAT \$8,100 tala/Mt. The fresh chilled tuna, which was airfreighted was traded at a mean price of \$14 tala/kg. Accordingly, Apia Export Fish Packers Ltd exported the largest collective volume (68%) and was the main exporter of tuna over the 2001-2002 financial year.

Table 9. Total tuna exports by species, weight and values in 2001/2002.

Common Name	Est. Total Weight (Mt)	Est. Total Value (million ST)	% Wt	Avg. Price SAT/kg
Yellowfin tuna	279.8	\$4.82	6.97	14.67
Bigeye tuna	93.3	\$1.52	2.32	13.69
Albacore (fresh chilled)	269.9	\$4.18	6.72	13.30
Albacore (frozen)	3,372.0	\$28.74	83.98	7.17
TOTAL	4,015.0	\$39.26		

(b) Non-Commercial Export

Similar to the Commercial Export Certification process, fishery products that are exported for non-commercial purposes has been collected when people travel out of the country taking fish and other marine products mainly for home consumption or *faaoso*. The certification process involves collecting data on weights, taxa, exporter and destination as well as the checking the legal sizes for compliance with the Fish Size Limits Regulation. The analysed data collected over the 2001-2002 financial year shows an estimated 11.8Mt of fish, invertebrates and marine products was taken out of the country on a non-commercial ('*Faaoso*') basis. The trends of this type of export show that the largest volume of non-commercial export took place during November-January, amounting to 4.2 Mt (Table 10.) The most commonly exported group of product was inshore fishery items, comprising 80% of total non-commercial exports. American Samoa was by far the most popular destination for fish, invertebrate, and marine products with 65% of the total estimated weight.

Table 10: Estimated total non-commercial fishery exports

Group name	Est. Tot. Wt. (Mt)	% Tot. wt.
Billfish	0.23	1.92
Bivalve	0.10	0.87
Bottomfish	0.87	7.33
Crustacean	0.62	5.22
Other invertebrate	0.12	1.05
Other pelagic	0.59	4.95
Reef fish	8.35	70.35
Other molluscs	0.12	1.00
Seaweed	0.09	0.75
Sea cucumber	0.12	1.00
Tuna	0.66	5.55
TOTAL	11.87	100.00

2. RESEARCH, ASSESSMENT AND MANAGEMENT

2.1. Community-owned marine protected areas

Over the past 2 decades, the catches of seafood from lagoons and inshore reefs of Samoa have decreased markedly. Some common shellfish and fish stocks have been over-fished and Helm (1989) and Zann (1991) suggested that these fisheries have exceeded their maximum sustainable levels. Horsman & Mulipola (1995) suggested reasons for this decline, which include overexploitation, the use of destructive fishing methods (including explosives, chemicals and traditional plant-derived poisons), and environmental disturbances.

Since 1996 with the assistance of the AusAID Samoa Fisheries Project, 74 (32% of total) villages have formulated management plan in which promoted community involvement and participation in managing their respective inshore fisheries and marine environment. Instituting a community-owned fish reserve or marine protected area is one of the most desirable and practical management tools that most communities have opted for.

A total of 66 (28% of total villages) small community owned and managed fish reserves have been established since 1996 and they are periodically monitored. The establishment of community-owned fish reserves, is an attempt to re-establish fish and marine invertebrate stock and maintain biodiversity and species abundance in Samoa's depleted inshore fisheries. Although many of the community-owned reserves are small, their large number, often with small separating distances, forms a network of fish refuges. Such a network may maximize linking of larval sources and suitable settlement areas and provide the means by which adjacent fishing areas are eventually replenished with marine species through reproduction and migration.

Table 11 summarizes the numbers of community-owned marine protected areas that have been established since 1996 to 2002. Most fish reserve areas are within the ranges of 20,000 to 300,000 sq.ms. In the 2001-2002 period, four new fish reserves were established at Leusoalii, Saleapaga, Aufaga and Lepa respectively. In addition, 12 reserves were resurveyed in the same period to determine any changes that may have occurred over time. The initial survey and re-assessments were conducted employing the following methods, Line Transect (LIT) and 3-Points Intercept Transect (3-PIT) for coral and other substrate monitoring and the Belt Transect (BT) for fish and

invertebrate counts. Data was gathered and processed in the MPA Database and summarized by major types of substrate and coral forms.

Table 11: Community-owned and managed Fish Reserves surveyed in the 2001/2002 period.

<i>SUBSTRATE COVERAGE (%)</i>								
<i>Marine Protected Areas Locations</i>	<i>Survey Date</i>	<i>Est. Area (m²)</i>	<i>Survey</i>	<i>Live Corals</i>	<i>Dead Corals</i>	<i>Sand</i>	<i>Rubbles</i>	<i>Others / Algae</i>
Fagamalo, Savaii	12/06/02	34,000	R2	72.7	21.2	3.3	2.80	0.00
Vaisala, Savaii	03/06/02	640,000	R1	60.40	11.60	14.40	13.60	0.00
Vaisala, Savaii	25/07/01	128,000	IN	55.03	7.96	17.19	17.42	2.42
Tafitoala, Safata	23/05/02	160,000	R1	51.00	15.00	5.20	27.80	1.00
Lepuia, Manono	16/05/02	46,500	R2	45.13	11.79	10.77	24.36	0.00
Papa, Puleia	11/06/02	80,000	R2	42.3	13.80	1.50	42.10	0.30
Samatau	09/05/02	160,000	R1	35.30	23.00	11.50	26.70	3.50
Tauaoo, Faleasiu	11/07/01	80,000	R2	34.47	25.53	0.67	28.07	11.26
Ulutogia, Aleipata	22/08/01		IN	32.41	15.57	27.26	17.62	7.15
Safaatoa, Lefaga	24/04/02	160,000	R3	31.70	17.96	9.23	13.60	27.51
Saleapaga, Lepa	25/05/02	120,000	R1	26.86	24.64	11.00	37.20	0.30
Aufaga, Lepa	12/12/01	30,000	IN	21.89	7.86	9.62	49.64	10.94
Saleapaga, Lepa	17/12/01	120,000	IN	17.80	15.84	37.33	26.89	2.14
Asau, Savaii	22/08/01		R1	15.14	3.33	26.16	28.61	26.76
Saleaumua, Aleipata	01/11/01		IN	12.25	2.49	48.48	9.91	26.86
Vailoa, Aleipata	03/08/01	150,000	R2	11.06	38.15	10.54	13.75	26.50
Leusoalii, Luatuanuu	10/10/01	19,500	IN	4.69	9.27	16.49	55.24	14.31

I = initial, R1 = re-survey 1, R2 = re-survey 2, R3 = re-survey 3

(a) Results

The status of live coral coverage varies from very good, to moderate and minimal in other areas.. However, there are some areas, which has shown significant improvement in live coral coverage, fish and invertebrate abundance levels. Substantial live coral coverage, along with fish and invertebrates abundance have been noted in Fagamalo, Vaisala, Papa and Lepuia'i MPAs of which each reserved area covered about 73%, 60%, 51%, 45% and 42% respectively of the total reserved areas. Significant live coral coverage as well as fish and invertebrates were also noted in fish reserves of Samatau, Tauao'o, Ulutogia, Safa'atoa and Saleapaga.

The most common live coral forms noted in all the sampled community-owned and managed marine protected areas were the *Acropora* branching and the coral foliose, which constituted 25% and 27% respectively. Other forms such as coral branching, massive, submassive and *Acropora* tabulated occurred in most surveyed areas. The summary of major coral forms is presented in Table 12.

Table 12. Summary of fish reserves assessment by major coral types implemented in 2001/2002 period.

Marine Protected Areas	Survey Date	ACT	ACB	ACD	CB	CE	CF	CM	CS
Aufaga, Lepa	11/07/01		0.79	2.68	7.96		0.40	1.09	8.46
Leusoalii, Luatuanuu	25/07/01				0.10		0.03	4.56	
Papa, Puleia	03/08/01	32.60	3.30	2.30		0.50	2.80	0.50	0.30
Saleaumua, Aleipata	22/08/01		8.63		0.66		1.39	0.81	
Saleapaga, Lepa	22/08/01	1.05	9.52	1.37	1.82		2.53	0.95	0.22
Saleapaga, Lepa	10/10/01	0.52	11.00	1.03	2.31		7.00	1.00	4.00
Samatau	01/11/01		6.20		1.50		13.40	9.80	10.80
Tauaoo, Faleasiu	12/12/01	0.95	13.01		11.60		1.38	0.86	1.35
Ulutogia, Aleipata	17/12/01		0.88		14.64		11.41	2.33	3.10
Vailoa, Aleipata	24/04/02		0.57		0.83		4.06	2.96	
Vaisala, Savaii	09/05/02		9.65				31.08	0.55	
Vaisala, Savaii	16/05/02		24.40		0.80		28.20	2.60	4.4
Tafitoala, Safata	23/05/02	2.70	4.20				13.40	5.20	12.80
Asau, Savaii	25/05/02		11.40					0.76	2.70
Safaatoa, Lefaga	03/06/02		0.80		0.80	2.05	10.0	7.20	12.60
Lepuiai, Manono	11/06/02	2.82	5.90		5.13		0.51	17.18	11.54
Fagamalo, Savaii	12/06/02	2.6	25.4		11.50		18.50	1.80	12.1
Totals		43.24	135.65	7.38	59.65	2.55	146.09	60.15	84.37

Key: ACT: Acropora Coral Tabulate, ACB: Acropora Coral Branching, ACD: Acropora Coral Digitate, CB: Coral Branching, CE: Coral Encrusting, CF: Coral Foliose, CM: Coral Massive, CS: Coral submassive.

2.2 GCRMN Long-term habitat monitoring and assessment

(a) Coral reef monitoring

One of the resource and habitat assessment activities carried out by the Fisheries Division during the 2001/2002 period was the monitoring of coral reefs as part of the Global Coral Reef Monitoring Network. Samoa belongs to the IOI-SW Pacific node with other Pacific countries and sharing collective responsibility of providing timely and reliable reports on the status of coral reefs around their respective countries. Status reports from countries around the world facilitate and formulate the clear picture of the current global status of coral reefs.

In addition to the monitoring of community-owned MPAs, several sites have been selected for long-term coral reef monitoring under the sponsored GCRMN project. Given the existing number of community-owned MPA is so large, only a few sites were chosen as representative of different regions of the country to be monitor continuously over a longer period of time as indicators for coral reef status.

Ten long-term sites were chosen of which four sites are located on Upolu, one on Manono and three on Savaii. The first long-term monitoring of sites was conducted from May to June 2002 and the summary is presented in Table13.

Table 13. Summary of coral reef monitoring sponsored by GCRMN conducted in 2001/2002 period at long-term selected sites.

LONGTERM SITES	Lepuai	Safaatoa	Saleapaga	Samatau	Tafitoala	Papa	Fagamalo	Vaisala
SURVEY DATE	16/5/02	24/4/02	28/5/02	09/5/02	23/5/02	11/6/02	12/6/02	13/6/02
TRANSECTS (3PIT – 50mX2m)	5	5	5	5	5	5	5	5
CORAL BLEACHING	None	None	10%	None	2%	2%	1%	13.2%
CORAL TYPES								
Sand (S)	10.77	9.23	11.00	11.50	5.20	1.5	3.3	14.4
Rubbles/rocks	24.36	13.60	37.20	26.70	27.80	42.1	2.8	13.6
AA		0.30						
Acropora Coral Branching (ACB)	5.90	0.80	11.00	6.20	4.20	3.3	25.4	24.4
Acropora Coral Tabulate (ACT)	2.82		0.52		2.70	32.6	2.6	
Acropora Coral Digitate (ACD)			1.03			2.3		
Coral Branching (CB)	5.13	0.80	2.31	1.50			11.5	0.8
Coral with Algae (CA)					12.70			
Coral Encrusting (CE)	2.05			0.30		0.5		
Coral Foliose (CF)	0.51	10.00	7.00	6.70	13.40	2.8	18.5	28.2
Coral Massive (CM)	17.18	7.20	1.00	9.80	5.20	0.5	1.8	2.6
Coral Mushroom (CMR)							0.8	
Coral Submassive (CS)	11.54	12.60	4.00	10.80	12.80	0.3	12.1	4.4
Others (OT)						0.3		
Dead Corals (DC)	1.79	5.14	19.00	4.40	0.80	13.8	15	5.8
Dead Coral with Algae (DCA)	10.00	12.82	5.64	18.60	14.20		6.2	5.8
Macro-algae (MA)	7.44	26.70	0.30	0.50	1.00			
Sargassum (SG)				3.00				
Halimedeia (HA)		0.30						
Turf-alage (TA)	0.51	0.51						
Total %	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Two monitoring methods were used, a 3 Point Intercept Transect (3-PIT) for coral reef assessment, and the Belt Transect (BT) for assessing the abundance and diversity of fish and invertebrates. In carrying out the monitoring, five 50mx2m transects for the 3-PLT and five 50mx3m for BT were laid randomly. Overall, a total of 1,250 m² was sampled per transect, accounting for about 1 to 10 % of the total area of each respective reserve.

The outcomes of the monitoring activities indicated that 46% of the substrates on all sites are live corals with only 17.4% being dead corals. The remaining substrate types were sands, rubbles or areas covered by algae and seaweeds. The Vaisala, Fagamalo, Papa, Lepuai and Samatau sites each had a high degree of live coral coverage which ranged from about 50% to 72 % of total substrates.

Coral bleaching was one of the factors noted. It was apparent that this phenomenon affected minimum live coral whereby most areas monitored showed either little (1-2%) or no evidence of coral bleaching. However, two sites, Vaisala and Safa'atoa showed moderate impacts of coral bleaching which accounted for 10% and 13% respectively. The *Acropora* species of tabulated coral (ACT) and branching coral (ACB) were the most affected coral forms by bleaching in all sites.

(b) Fish and Invertebrate Monitoring

The abundance levels of fish and invertebrates were also assessed based on numbers counted along the 3mx2m belt transect. The fish and invertebrate count was conducted in conjunction with coral

reef substrate assessment. There were several selected species indicators for both fish and invertebrates. For data analysis and summary, the indicators were grouped into major groups, of which fishes were grouped into eleven (11) major group and five (5) invertebrate groups. In summary, Angelfish, Surgeonfish and Damselfish were the dominant fish groups observed in all sites. Moreover, the Sea urchin and Holothurian were the common groups of invertebrates seen to have occurred and observed in all surveyed sites. Table 14 presents the summary of fish and invertebrate levels of abundance per site.

Table 14: Summary of fish and invertebrate diversity and abundance levels per site

DATE	16/05/02	24/04/02	28/05/02	9/05/02	23/05/02	11/06/02	12/06/02	13/06/02	
SITE	Lepuiai	Safaatoa	Saleapaga	Samatau	Tafitoala	Papa-Puleia	Fagamalo	Vaisala	% No.
BT(3mX2m)	5	5	5	5	5	5	5	5	
<i>Fish indicators</i>									
Angelfish	40.2	15.1	2.2	30.3	0	50.8	56.9	34.2	29%
Butterfly fish	0	1.6	8.2	8.6	5.7	13.7	2.4	1.5	5%
Damsel fish	27	56.3	0	0	19.3	0	0	0	13%
Grouper	0	3.9	0	1.5	0	0	0	0	1%
Goatfish	0	0	0	2.8	0	2.2	0.1	0	1%
Humbug	32.8	0	0	5.5	0	0	6.4	45.8	11%
Parrotfish	0	2.7	29.4	8.9	39.9	0	10	0	11%
Rabbitfish	0	0	0	7.7	0	0	0	0	1%
Surgeonfish	0	18.7	43.1	24.1	35.1	31.1	15.7	4.8	22%
Soldierfish	0	0	0	1.8	0	0	0	0	0%
Wrass	0	1.6	17.1	8.7	0	2.2	8.5	13.7	6%
<i>Invertebrate indicators</i>									
Cowries	0.00%	2.70%	31.30%	1.50%	0.00%				7.1%
Holothurian	71.60%	10.80%	43.80%	45.50%	11.10%				36.5%
Starfish	0.00%	0.00%	6.30%	0.20%	18.50%				5.0%
Sea snail	0.00%	0.00%	0.00%	1.80%	0.00%				0.4%
Sea urchin	28.40%	86.50%	18.80%	51.00%	70.40%				51.0%

3. Training

Two workshops on coral reef monitoring methods were conducted on 23rd October 2001 and February 22nd -24th 2002. The second workshop was conducted by a coral reef specialist, Dr Dave Fisk and was financially sponsored by Canada International Development Agency (CIDA).

APPENDIX 3.

SUB-OUTPUT 15.4: EXPLORATORY FISHING AND DEVELOPMENT

(Prepared by S. Time, P. Watt, S. Moala, R. Imo & A. Mulipola)

1. TUNA LONGLINE FISHERY

1.1 Estimated catch of the tuna longline fleet

The estimated tuna longline exports, longline catch not exported and total longline catch in Samoa from 1996-2001 calendar years are summarized in Table 1 and graphically illustrated in Figure 1. Estimates for 1996 -1997 are based on estimates of exports, 13% catch not exported, and fish rejected by exporters of 5.0% in 1996 ad 4.4% in 1997 (Watt & Moala 1999). Estimates for 1998-2001 are based on estimates of exports, 12% of the catch not exported from Samoa, and fish rejected by the exporters of 6% in 1998, 4.0% in 1999, 5.0% in 2000 and 8.0% in 2001.

Table 1. Estimated tuna longline catch (Mt) from 1996 to 2001

Year	Vessels Active	Longline Catch Exported	Longline Catch Not Exported	Longline Catch Rejected from Exporters	Total Tuna Longline Catch
1996	90	2092	272	105	2369
1997	170	4872	633	215	5720
1998	200	5072	609	304	5985
1999	175	4407	529	176	5112
2000	155	4505	541	225	5271
2001	148	5150	618	412	6180

Note: Estimated exports determined from information provided by the two canneries, airline cargo managers, private air cargo companies, and Customs statistics section. Percentages of catch not exported and fish rejected from exports were determined from interviews with fishermen and exporters

Overall, a total of 6,180 metric tonnes of tuna was landed during the 2001 calendar year in which 5,510 were exported. However, an estimate of 109 tonnes of fish were rejected from the canneries in American Samoa valued at (SAT) \$817,500. Fish that were rejected by the Exporters in Apia was approximated at 412 Mt valued at (SAT) \$ 3,090,000. Likewise, about 618 Mt was not exported because the quality of fish does not meet the standard requirements.

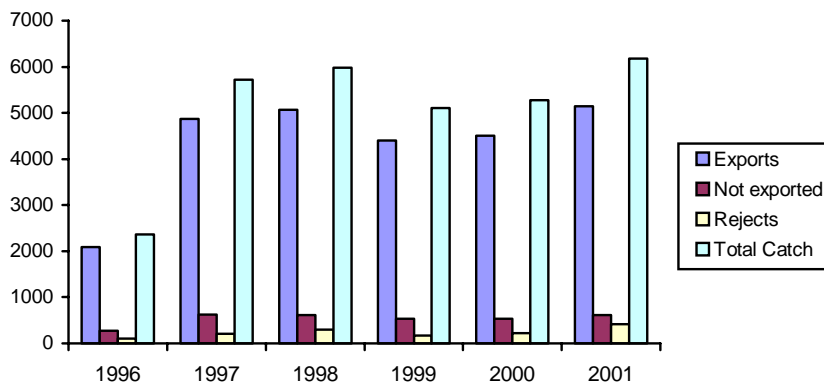


Figure 1. Estimated tuna longline fishery catch(Mt) from 1996 to 2001.

The 2001-2002 total landing catch for the tuna longline fishery is amounted to approximately 4,517 Mt. The major difference in total for the 2001 calendar year and the 2001-2002 fiscal year was attributed to the dramatic lower catch rates during the last half of the year. Furthermore, the weather was also unsuitable for fishing and consequently resulted to many fishing vessels, in particularly smaller crafts became inactive for many months. The total landing in the first half is totaled at 3,354 Mt and the final half amounted to 1,164 metric tonnes. Vessels in categories A and D landed 76% of the total catch overall. Table 2 shown the summary of estimated total landings per vessel category over each 6-months period of the fiscal year.

Table 2. *Estimated total catch of the tuna longline fishery during 2001-2002 period.*

<i>Period</i>	Jul-Dec01	Jan-Jun02	Total
Vessel Category	Est. Tot. Wt (Mt)	Est. Tot. Wt (Mt)	Wt (Mt)
Alia	1,431,106.85	240,681.60	1,671,788.45
10-12.5 m	221,130.00	32,602.50	253,732.5
12.5-15m	498,769.92	329,134.08	827,904
>15m	1,202,949.00	561,280.50	1,764,229.5
Total	3,353,955.77	1,163,698.68	4,517,654.45

1.2 Tuna rejection

An estimate of 109 tonnes of fish were rejected from the canneries in American Samoa valued at (SAT) \$817,500. Fish that were rejected by the Exporters in Apia was approximated at 412 tonnes valued at (SAT) \$ 3,090,000.

A survey conducted by the CFES in January 2002 was to determine the total exports of tuna to the canneries in American Samoa, rejection levels and the loss in foreign revenue due to rejection. The two canneries in American Samoa were requested by the Fisheries Division to provide the tonnage and rejections levels of tuna imported from Samoa. Interviews were conducted with the Samoa fish exporters to determine the percentage of the catch rejected from the fishermen. Results of the survey are in the tables below: This implies that the total foreign revenue lost (Table 3a & 3a) due to low quality of the catches for the year was close to (SAT) \$4 million.

Table 3a. *Estimated value of Mt of tuna rejected from American Samoa Canneries*

Longline rejects (tonnes)	1996	1997	1998	1999	2000	2001
VSC Sampac	36	140	70	53	66.5	94
Star Kist	7	14	120	0	38.2	15
Total tonnes rejected	43	154	180	53	104.7	109
Value tonnes rejected (SAT)	210,700	754,600	927,000	286,200	706,725	817,500

Table 3b. *Estimated value of Mt of fish rejected from Samoan exporters*

Longline rejects (tonnes)	1996	1997	1998	1999	2000	2001
Tonnes of rejected	111	228	327	176	264	412
Value of rejects (SAT)	543,900	1,117,200	1,684,050	950,400	1,782,000	3,090,000

The rejection rate of tuna exported to the two canneries in American Samoa was reduced from 190 t in 1998 to 53 t in 1999. The decrease in rejection was attributed to the majority of the exporters equipping their fish handling and processing plants with blast freezers, cold stores and ice machines. The exporters are now more discriminating with respect to the quality of fish purchased from the fishermen.

The number of tonnes rejected from canneries increased to 109 tonnes in 2001. The increased rejection of tuna in 2001 was attributed to the Food and Drug Administration (FDA) of the United States requiring the canneries to adopt a strict seafood quality management program in the later part of 1999. Furthermore, as a result of the acceptable concentration of histamine been lowered, there is more thorough sampling of tunas purchased by the canneries to ensure that the fish is of an acceptable quality.

1.3 Total fishing effort and catch rates

The CPUE analysis for the year 2001 conducted by the Fisheries Division for the fleet is displayed in Tables 4 below. There were several sources where data was obtained, these include: the two canneries in American Samoa, air cargo managers, private air cargo companies, and the Customs statistics section, logsheet data from fishing vessels in Class C and D, port sampling data, visual boat census surveys, and information provided by boat owners and exporters.

Table 4. Tuna longline fishery total fishing efforts (sets, trips and hooks) and average catch rate per vessel category for 2001 period.

No. of boats	Average no. of trips	Average no. of sets/trip	Average no. hooks/set	Total no. of hooks	Estimated catch (kg)	CPUE kg/100 hooks
116	64	1.65	305	3736128	2376611	64
14	65	1.93	375	658612	428098	65
8	38.2	4	1100	1344640	992195	74
11	30	6	1450	2871000	2383096	83
149				8,610,380	6180000	72

The overall CPUE is averaged at 72 kg/100 hooks calculated for the calendar year 2001 and the catch rate has increased from 62 kg/100 hooks in the year 2000. The estimated total numbers of hooks set was 8.6 million. With the increasing number of larger fishing vessels seeking licenses to join the fishing fleet, the CPUE is forecasted to decrease. The fishery will surpass the breakeven point once the fleet deploys 12 million hooks per annum (point of maximum profitability for the fleet was reached in 1998; see Watt et al., 2000). As noted in that report, “the cost of a large fleet making low individual catches will reduce the net value” – in other words the increasing number of boats in the fishery will decrease profits to the country

The total fishing effort and mean catch rates for the 2001-2002 year were derived primarily from data gathered from the port sampling survey and Class C & D submitted catch Logsheets. Additional information was also available from sources identified. In comparison to the calendar year 2001, the total catch is lesser and this is attributed to the lowering in catch landed in the second half of the fiscal year. During this period, the mean catch rate was 56 kg/100-hooks and a significant number of fishing vessels became inactive. Likewise, the average number of fishing trips for active vessels was dramatically reduced. The total estimate number of hooks that was set during the 2001-2002 year is totaled to 7.5 millions with 4.7 million hooks that was set in the first half. Only 2.8 million hooks was set during the final half of the 2001-2002 fiscal year. Table 5

Due to the increasing demand for more fishing licenses for vessels, in particular Class D, the Fisheries Division met with the CF-MAC in late January 2002 to review the Tuna Management Plan and determine whether additional tuna longline licences should be issued. After a lengthy discussion the CF-MAC members voted in favour of the following licensing scheme:

Class A: vessels up to and including 11 meters	
Licences available: No limit	licence fee SAT\$200
Class B: vessels over 11 meters and up to 12.5 meters	
Licenses available: 19	licence fee SAT\$1000
Class C: vessels over 12.5 meters and up to 15 meters	
Licences available: 21	licence fee SAT\$5000
Class D: vessels over 15 meters and up to 20.5 meters	
Licences available: 16	licence fee SAT\$10000
Class E: vessels equal to or greater than 20.5 meters	
Licences available: 9	licence fee SAT\$15000

The revised tuna management plan includes the addition of 10 large vessels over 15 meters in length into the tuna fishery. A total of 6 additional licenses would be issued in the Class D category (at present there are 9 licences issued to vessels between 15 and 20.5 meters). And a total of 4 additional licences would be issued in the Class E category (at present there are 5 licenses issued to vessels over 20.5 meters). The revised licensing scheme will be presented to Cabinet for approval. The Tuna Management Plan will be reviewed again after a period of two years.

3. NATIONAL SEAFOOD SAFETY VERIFICATION AND CERTIFICATION PROGRAM

3.1 Establishment of a National Seafood Safety

Given the importance of seafood exports to Samoa and the increasing development of value-added and chilled products, the CF-MAC agreed to develop a seafood safety management system encompassing internationally recognised requirements.

In June 2000, an NZODA-funded workshop in Apia provided training in seafood safety practices and HACCP systems for the Samoan fishing industry. As part of the training, participants audited three of Samoa's major fish exporters. Results indicated that exporters would not meet HACCP requirements if audited by an importing country regulatory agency. The absence of an inspection authority or competent third party to carry out inspections based on Good Manufacturing Practice (GMP) or HACCP principles was identified as a risk to the sustainability of Samoa's seafood exports.

An initial report to the Fisheries Division of the Ministry of Agriculture, Forests, Fisheries and Meteorology by consultants recommended the development of an appropriate Seafood Safety Verification and Certification strategy to strengthen and secure Samoa's fisheries exports. A middle option between full "equivalency" and the status quo was chosen to provide a regulatory framework to facilitate and protect seafood exports.

It was proposed to establish a Seafood Standards Council in order to develop a comprehensive set of industry agreed standards. The proposal is modeled on the New Zealand system that has established effective government/industry cooperation in the development of standards. The establishment of a Seafood Safety Verification Body was also recommended, along with the periodic auditing and assessment of the verification and certification system by an independent third party.

In order to facilitate those recommendations, NZODA has provided funding enabling technical advisers to work with Fisheries Division in order to protect and sustain Samoa's seafood exports through the development and implementation of national seafood safety policies and procedures.

A tender process conducted by the Fisheries Division identified a consortium approach staged over an implementation timeframe of 12 months as most suited to the stated goals of the project, and a project team from a company, 41 South Limited, was selected in October 2001. The first round of four separate stages of consultant input within Samoa itself was completed in November 2001.

3.2 Seafood Safety for Fishing Industry

In October 2001, NZODA provided NZ\$100,000 in funding to enable technical advisers to work with Fisheries Division in order to protect and sustain Samoa's seafood exports through the development and implementation of national seafood safety verification and certification program. The National Seafood Safety Verification and Certification Program began in November 2001. To date three of the four stages of the project have been completed by the Fisheries Division and the consultancy team, 41 South Ltd., recruited from New Zealand. The project has completed the following:

- 1) Amendment Bill 2002, which includes: Regulations for fish processing, trading and marketing
Establishment of Samoa Seafood Standards Council
Role of the Council
Function of Council
- 2) Draft of Samoa Seafood Safety Standards Export Requirements
Design and Construction Requirements
Operation Requirements
Product Standard Requirements
- 3) Training of government and industry Hazard Analysis Critical Control Point
Regulations/ Standards
Seafood Handling, Spoilage, Quality
Inspection, auditing, certification and Licensing requirements

4. EXPLORATORY FISHING

Ulimasao fishing vessel completed 20 fishing trips and six trips for whale watching. The later six trips were undertaken as part of Fisheries participation in the regional whale-watching programme. Table 2 shows the catch distribution from July 2001 to June 2002. The catch started to decline in the month of January and fishing was suspended for the month of February. This was due to low catch rate and thus affected most of the small alia fleet.

Table 2. Monthly summary of fishing trips and landed catches of the FV Ulimasao

MONTH/ NO. OF TRIPS	CATCH (KG)	VALUE (\$\$)
July (3)	2310	12746
August (2)	1646	8986
September (1)	1251	7699
October (1)	701	3692
November (3)	2179	13127
December (2)	1715	9992
January (2)	967	5152
March (3)	862	4858
April (1)	611	3416
May (2)	2962	14303
Totals	15,204	\$ 83,971

5. TRAINING ACTIVITIES

Five training were conducted during this fiscal year. Training activities conducted by the Offshore Fisheries Section include sea safety training by the United States Coast Guard, Hazard Analysis Critical Control Point training by 41 South Ltd., Fishing Handling and Quality Control training by 41 South Ltd., and Seafood Safety Legislation and Regulations training by 41 South Ltd.

6. RECIPROCAL FISHING AGREEMENTS WITH NEIGHBOURING COUNTRIES

Reciprocal Fishing Agreement had been negotiated with neighbouring countries. Samoa has the smallest EEZ in the Pacific, 172,000 square kilometers. At present, there are over 150 tuna longline vessels fishing within the zone. Although most of the fishing fleet is comprised of small alias that fish within 70 nautical miles of the coastline, approximately 40 vessels over 10 meters in length fish to the limits of Samoa's boundaries. Some fishermen are now complaining that the fishing grounds are becoming crowded and fishing gear conflict is becoming a problem.

If the fishing industry is to continue to grow, Samoa simply has to have access to more fishing grounds. The fishing grounds in Samoa cannot support more fishing effort and remain economically viable.

Acting upon the recommendation of CF-MAC, the Assistant Director (Fisheries), Tanielu Sua, approached government representatives from Tokelau, Tonga, Niue, and the Cook Islands about establishing reciprocal fishing rights between Samoa and their countries. All countries expressed an interest, in particular Tonga.

7. ICE MAKING MACHINE

A ten-ton ice-making machine was constructed at Salailua Savaii. The fishermen in Savaii had been facing major problems of an inadequate ice supply. The production of the only two-ice supplier is far too low to satisfy the needs of the fishermen especially during the peak of the season. Most of them came all the way to Apia to bring their fish to the exporters/markets and at the same time take ice back to Savaii. The vast distribution of the fishing fleet had given them quite distance to travel for buying ice and by the time they arrived back home part of ice had melted. This resulted in difficulty to maintain the standard quality of their catch before selling to the local exporters.

Fisheries realizing the problem made a request to the Forum Fisheries Agency (FFA) for funding two ice-making machines. FFA responded positively and provided ?pay for the machines. A local company was contracted to order and construct the machines. One machine is installed at Salailua and now operating. And the other one will be installed at Asau in the next financial year.

8. FISHERIES WHARF MANAGEMENT PLAN

The congested condition of the Fisheries wharf requires a proper management plan for its safety and the smooth operation of its daily activities. Some of the bigger boats were never operational but they occupied most of mooring areas and the tied at the wharf and their owners never bother to take care of them. This is a problem, as these vessels cannot be maneuvered on their own in time of emergency cases. The management plan is also seen as a safe introducing factor in times of natural disaster an unexpected eruption of fire. Implementation of this management plan is put back until the next CFMAC meeting in early next financial year.

The proposed management plan is outlined below:

Time Frame 2 days to unload and load provision for the vessel, permission must be granted by the Assistant Director to moor at the after 2 days

Monitoring will be the responsible of the Regulation and Enforcement Section. Vessel will be required to report to the Fisheries Division when they arrived in port.

Fees for vessels moored at the wharf after 2 days:

Class A	under 11 metres	ST\$5. 00 /day
Class B	11 – 12.5 metres	ST\$20. 00/day
Class C	12. 5 – 15 metres	ST\$30. 00/day
Class D	15 – 20. 5 metres	ST\$50. 00/day
Class E	20. 5 & over	ST\$100. 00/day

Vessels will not be allowed to remain at the Fisheries Wharf for a period of 30 days.

Vessels that will violate this regulation will be removed from the Fisheries Wharf.

If the Fisheries Division has not received payment for mooring fees after 30 day period the vessel will not be permitted to use the Fisheries Wharf.

Vessel repairs: Vessels that are uplifted for repair onto the Wharf will be charged after 2 days (same fee schedule as above).

OUTPUT 16.0: AQUACULTURE SERVICES

(Prepared by: M. Lober & P. Tualofa)

1. VILLAGE GIANT CLAM LAGOON GROW-OUT NURSERIES

For the period July 2001 to June 2002, technical assistance in monitoring and maintenance services for giant clams were provided to communities currently in the Fisheries Community Management Programme. The purpose of the giant clam grow-out in the lagoons is to enhance giant clam stocks in our reefs which has been on the decline for several years mainly from over-harvesting.

Communities with lagoon grow-out nurseries were visited once a month by the Fisheries Division for maintenance and monitoring. Maintenance work is carried out by the community mainly in removing predatory snail's *Cymatium* sp., removal of algae growing on cages, thinning out clams when overcrowded and maintenance of damaged cages.

There are currently 31 communities in the programme with giant clam lagoon grow-out nurseries. During the fiscal period July 2001 – June 2002, twelve (12) new villages joined the Fisheries Community Management Programme both from Savaii and Upolu. Following the assessment of their lagoons, they were found suitable or near suitable for giant clam farming or grow-out. For new villages, 500 juvenile seeds or clams of the Smooth clam, *Tridacna derasa*, were distributed free of charge for farming. These new villages are shown in Table 1.

Table 1: New villages in the Fisheries community management programme.

Island	Village	Number of clams introduced	Species
Upolu	Aufaga	500	Tridacna derasa
	Faleapuna	500	<i>Tridacna derasa</i>
	Lepa	500	<i>Tridacna derasa</i>
	Leusoalii	500	<i>Tridacna derasa</i>
	Saleapaga	500	<i>Tridacna derasa</i>
	Savaia	500	<i>Tridacna derasa</i>
	Siufaga	500	<i>Tridacna derasa</i>
	Vaovai	500	<i>Tridacna derasa</i>
Savaii	Fatuvalu	500	<i>Tridacna derasa</i>
	Foailalo	500	<i>Tridacna derasa</i>
	Papa Sataua	500	<i>Tridacna derasa</i>
	Vaisala	500	<i>Tridacna derasa</i>

Communities that joined earlier in the programme were also given a second batch of juvenile clam seeds of 150, also free of charge, which will also be the last complimentary distribution. Villages were selected on their performance in the Programme, which is reviewed every six (6) months. These villages are shown in Table 2. Further requests for giant clams will be charged, although this is an issue to be further discussed as the commercialisation of the hatchery has yet to be determined. Clams distributed were from the November 2000 spawning, which yielded 11,000 seedlings.

Table 2: Villages restocked with giant clams.

<i>Island</i>	<i>Village</i>	<i>Number of clams introduced</i>	<i>Species</i>
Upolu	Fagalii	150	<i>Tridacna derasa</i>
	Fasito'o-tai	150	<i>Tridacna derasa</i>
	Fuailolo'o	150	<i>Tridacna derasa</i>
	Lepuia'i-tai	150	<i>Tridacna derasa</i>
	Safaatoa	150	<i>Tridacna derasa</i>
	Saleilua	150	<i>Tridacna derasa</i>
	Saluafata	150	<i>Tridacna derasa</i>
	Samatau	150	<i>Tridacna derasa</i>
	Tauao'o	150	<i>Tridacna derasa</i>
	Vailoa, Aleipata	150	<i>Tridacna derasa</i>
Savaii	Auala	150	<i>Tridacna derasa</i>
	Fagae'e	150	<i>Tridacna derasa</i>
	Manase	150	<i>Tridacna derasa</i>

The newly distributed *T. derasa* were eight (8) months old when they were given out to the villages. Their growth has been monitored by monthly sampling of their lengths and growth rates were estimated ranging from 0.6 – 7 mm/month. Growth variation is accrued to the physical factors of the ambient environment clams are placed in as well as anthropogenic influences in the area, e.g. freshwater runoff, rivers, and high sedimentation during the wet season.

Survival of giant clams in the lagoon grow-out nurseries varies from 88% to 19%. Communities who frequent their farms more than three times a week, as opposed to those who don't attribute higher survival to good maintenance. In other sites, high predation from rays, octopi and fish made the area highly unlikely for juvenile grow-out but probably more inclined for grow-out of larger clams.

The loss of clams or mortalities are owed mainly to poor maintenance from the village of the basic maintenance tasks as outlined earlier, poaching, washed away by waves/tides as a result of poor site assessment or failure to adhere to the result of the assessment. Juvenile mortality, for the newly stocked and restocked villages, on the other hand, can be very high if the maintenance work is not properly carried out. *T. derasa* is highly susceptible to predatory snails and suffer from high casualties when snails are not checked regularly, at least three times a week.

It is recommended that:

- For better survival of clams, frequent monitoring by the community should be re-inforced rather than dependence on Fisheries staff for maintenance. As we do not want the communities to rely on the government for services that can be carried out by themselves.
- Site assessments for giant clam grow-out is strongly encouraged. The result of the assessment should be used to advise whether the site is suitable for grow-out or not. Adherence to results of the assessment should also be encouraged and practiced, as survival of clams in sites that are not suitable have proven costly, time consuming and a waste of clams.

2. GIANT CLAM HATCHERY, TOLOA

During the fiscal year July 2001 – June 2002, the hatchery continued to produce giant clam seedlings. Seeds were produced from *T. derasa*, *T. maxima*, *T. squamosa* and *H. hippopus*. However, some of these seeds perished during the December – January holiday period from low salinity and high temperature's, factors, which do not favour growth for the clams. Spawning of *T. maxima*, *T. squamosa* and *H. hippopus* in 2001 were all obvious. These were settled in three (3) raceways.

Spawning of *T. maxima* on 8th August 2001 produced the most eggs and hence the most juvenile clams. Egg count recorded was estimated at 150M but larval count estimated was approximately 1% of this value. This spawning was held in two raceways together with a mixture of *T. squamosa* also spawned on the same day. The latter species was not counted. The raceways were checked for survivors by swimming through the tank using a mask and snorkel and only a few were salvaged from the second raceway (5) with a lower density and none from the higher density raceway (1). On the 10th of January 2002 the *T. maxima* batch was dumped at 129 days old.

Several reasons were put forward as to why this batch did not survive but could not be correctly accounted for. Possible explanations for the heavy mortalities are given as follows. (i). During the December – January holiday period, common knowledge as the wet season, heavy rains were common in Samoa and freshwater may have accumulated over the surface of the raceways. Clams cannot tolerate freshwater and die when exposed to it for too long; (ii). The aeration may have been accidentally turned on during the rainy period and allowed freshwater to mix with saltwater; (iii). The thick algal growth in side the tanks may have suffocated the clams by smothering over them preventing sunlight from reaching the clams. This could have been prevented by an algal sweep, which is fanning the water by hand to remove the algae, suspending it in the water column and flushing out the algal water; (iv) a combination of the previous may have contributed to the mortality of the clams.

In a separate raceway was *H. hippopus*. The latter species was harvested but only yielded only 150 juvenile seeds, 138 days old. These however did not survive long and perished shortly after in February 2002. As this species is a vulnerable species, it is recommended that for future spawnings, propagation trials should be carried out for better survival given that more broodstock is acquired.

Species, which survived the December – January period of annihilation, was *T. derasa*, which produced 18,000 juvenile seeds at 149 days old upon harvest. This spawning was carried out in December 2001. A second spawning of *T. maxima* carried out in April 2002 has just become obvious and will be harvested in the next fiscal year.

Operation of the hatchery has been hindered by several factors as experienced with the high mortalities in December 2001 - January 2002 and daily operation of the hatchery. Several recommendations would be of help in improving the operation of this facility as well as its reputation. As the hatchery is distant from the Apia FD Office and for staff to travel to daily, accommodation for a “live-in” hatchery manager would be highly recommended. The manager would supervise and manage the operation of the hatchery at all times and resolve any technical and practical problems that may arise such as that in Dec 2001 – Jan 2002 period.

Frequent power shortages are common throughout Samoa, especially during the rainy season. At the moment there is no back-up generator for alternative power supply and this, in any hatchery is a must to have. The availability of a generator is crucial when the power fails, to assist as a back-up power supply to draw continuous supply of fresh seawater into the raceways.

Since the hatchery started operation in 2000 the raceways have leaked several times. It is recommended that the construction and design of the raceways be re-examined to consider the sizes, hence volumes, of the tanks to be most economical in terms of water retention, exchange rate and heating rate.

Lastly, few broodstock clams for spawning have often affected propagation of giant clams. At the moment the current count of broodstock (7th June 2002) stands at *Hippopus hippopus* (6), *Tridacna maxima* (17), *T. derasa* (12 adults + 55 sub-adults), *T. squamosa* (7) and *T. gigas* (225 sub-adults). The sub-adults broodstock are not sexually mature and therefore not ready for spawning. In the spawning procedure a clam or clams are sacrificed to obtain the coloured mantle to blend with seawater, filtered and fed to days old clams. So the count of the clams decline with each spawning event. It is recommended that acquiring more broodstock for spawning purposes is important for sustainability of the hatchery.

3. BRACKISHWATER TILAPIA

3.1 Hatchery

The Fisheries Division Hatchery continues its fingerling propagation of tilapia (*Oreochromis niloticus*). Spawnings were conducted on the 4th April 2002 and 10th June 2002. Fry from the April spawning are now obvious, 2-3 cm, but a count of the fry produced could not be conducted, as they are still very small to be hand counted. However it is anticipated that these spawnings would suffice restocking and stocking purposes. Current broodstock for propagation is 23 females and 67 males and juvenile fingerling stock is 258 from the previous fiscal year 2000 – 2001.

For hatchery purposes, it is recommended that more broodstock for propagation should be acquired as the current broodstock is outdated. Introduction of new seedstock to phase out the old broodstock and distribution should diversify the genetic pool or variety of tilapia currently utilised in Samoa. This is also important for the health of the stock.

3.2 Distributions

Several water bodies were stocked and restocked during the fiscal period 2001 – 2002. Tilapia are farmed inside cages or stocked directly into natural water bodies usually of a brackish nature. Villages that were restocked included Auala, Fagamalo, Satoalepai, Salani, Fausaga and Tafitoala. Stockings are outlined in Table 3. An individual at Safai, Savaii constructed earthen ponds and stocked with tilapia on 17th July 2001.

Table 3: *Tilapia* fingerling distribution for July 2001 – June 2002.

Date	Village	Tilapia fingerlings stocked/restocked
17 July 01	Safa'i	100
16 Aug 01*	Salani	40
	Salani	100
23 Nov 01	Fausaga	50
	Tafitoala	500
12 Mar 02	Auala	500
20 Mar 02	Fagamalo	400
	Satoalepai	400

*Two separate ponds in one village.

The Chanel College *Tilapia* pond, which was the only existing pond of its kind, had been discontinued due to internal disputes amongst the caretakers and the school. The broodstock have died and would require re-introduction of new broodstock. They will notify FD as to when they would continue the activity. Several individuals expressed interest in *tilapia* farming and were in the process of construction of ponds but have yet to report to back to FD.

4. MUDCRAB FARMING TRIAL

As part of the Fisheries Division's attempts at income generation and food security, farming methods have been adopted, developed and modified to suit local conditions and availability of materials. There are no commercial aquaculture developments in Samoa. Small-scale aquaculture is being promoted amongst communities as an alternative means of livelihood to reduce fishing pressure on our reefs.

The local mudcrab or pa'alimago, *Scylla serrata*, was selected for trials to look into the economic viability of farming mudcrab in Samoa. A first attempt carried out at Sa'anapu village was discontinued as only a few members of the community were involved and participated in the trial. On two occasions poachers were caught inside the mudcrab pen and only two individuals actively participated in the maintenance, monitoring and security of the trial. As a result of the trial it was discovered that such high value commodities would not be ideal as a community managed activity.

A second trial was started at Vaimoso with a crab fisherman who expressed interest in the farming of mudcrab. Construction of the pen started in February 2002 and took two full working days. The pen size is 150m² and minimum-stocking density is 1 crab/m². In stocking the pen, we opted for 2crabs/m² for economic feasibility purposes. Stocking of the pen with under-size crabs (<15cm) caught by the fisherman while fishing commenced afterwards and is still on going. Large crabs caught by the fisherman are sold at the Apia Fish Market. Currently 207 crabs recorded have been stocked into the pen as of the 17th May 2002 however we believe that there are more crabs as the fisherman stocked crabs during weekends and holidays when staff were not available for recording data.

Monthly sampling of 30-40 crabs determines the growth rate and feed rate. Crabs are fed with trash fish (fish intestines, gonads, and baitfish) starting at 10% body weight (BW) reduced by 1% each month until 5% when the trials end. Survival of crabs reduces if the stocking density is high and should be checked frequently for dead crabs or shells from moults.

Partial harvesting starts when crabs have reached the legal minimum size of 15cm (~600g). Monthly samples have revealed that growth rate of crabs stocked into the pen was 3.09mm/month (23rd May 2002). It is anticipated the trial would end in July and a final report of the trial would be produced.

5. TRAINING

5.1 Overseas

- 1st SPC Aquaculture Meeting: “ Building Capacity for the Pacific”. 11th – 15th March 2002. Suva Fiji.
- Seminar on Integrated Inshore Resource Management in Tropical Island Countries. 27th October – 7th November 2001, Japan.

Training abroad included a seminar on resource management in Kanagawa, Japan, which was attended by Malwine Lober for a period of 6 weeks. Countries that participated were from the Indian, Pacific and the Caribbean. Sectors involved in this seminar were the fisheries, tourism and environment, which were identified as the major users of the coastal strip of island countries. Lectures, study tours and research site visits was the curriculum of the seminar where it gave the participants the opportunity to identify similar problems/constraints regarding resource management within Japan and their respective countries. The “log frame” was the tool utilised to invent problem trees and objective trees to identify core problems and possible solutions for each country and how projects are formulated using this tool.

The first meeting on aquaculture in the SPC region was held in Suva, Fiji 11th – 15th March 2002 attended by Malwine Lober. The meeting was well attended by heads of regional organisations, both technical and administrative, from the SPC region and Asia. The meeting was an opportunity for SPC island member countries involved in Aquaculture or undertaking some aquaculture activity to identify constraints, successes, and to improve aquaculture in the Pacific. Aquaculture commodities were prioritised according to suitability, availability and sustainability of resources to SPC member countries.

5.2 Local

- In-house Giant Clam Spawning Workshop. 18th April 2002.
- In-house Tilapia Spawning and Maintenance Workshop. 3rd April 2002.
- 2 Village workshops on Giant clam farming and maintenance.

Local in-house training and workshops were conducted for staff and communities on several topics. Staff were trained on giant clam and tilapia spawning methods in the hatchery to grow-out once they have reached juvenile stages. Two community workshops were conducted on life history, spawning and maintenance of giant clams. These workshops inform the communities about the basic farming tasks for clams before clams are distributed for grow-out in the village lagoon.

OUTPUT 17: FISHERIES ADVISORY SERVICES (EXTENSION)

(Prepared by E. Ropeti, A. Taua & U. Tiitii)

1. Future Activities

- Continue to work closely with Fisheries Management Committees in villages that have produced Management Plans.
- Introduce Community based fisheries management into new villages.
- 5% increase in village participation to the community-based management program.
- Produce 4 new village management plans
- Conduct six-monthly reviews for all villages in the program.
- 80% of total village fisheries management program with high performance
- Assist villages with processing and formulation of Village Bylaws.
- 68 existing village bylaws and 4 new bylaws (72)
- Keep the public informed of Fisheries related issues
- Produce quarterly newsletters for all villages in the program.

2. Introduction

The decline in inshore catches of fish and shellfish in the country due to human activities, overexploitation, destructive fishing methods and the aftermath of two recent major cyclones has greatly reduced the availability of marine protein resources, causing concerns for the nutritional status of village communities. Since government actions and national laws to protect fish stocks have not previously proved successful, a culturally appropriate extension process has been used to encourage and motivate village communities to manage their own marine resources.

The induction of Samoan villages into the Fisheries Extension program was initially facilitated by the AusAID Fisheries Extension and Training Project and the Fisheries Division, and has been in operation for the last 6 years.

Village management actions variously included the banning of chemicals, explosives and plant-derived fish poisons (ava niu kini), banning the smashing of corals (faamo'a and tu'iga) to catch fish, enforcing national laws on fish size regulations, controlling the use of nets and underwater torches for fishing at night, collecting and removing crown-of-thorns starfish, *Acanthaster planci*, banning the removal of beach sand and the dumping of rubbish in lagoon waters, and establishing fish reserves in parts of traditional fishing areas.

Reciprocally, to support community undertakings, the Fisheries Division has undertaken to provide various forms of assistance and technical training. For example, various species of giant clams such as *Tridacna derasa*, *Tridacna squamosa*, *Tridacna maxima* and *Hippopus hippopus* are provided to restock lagoon fish reserves and the introduction of tilapia (*Oreochromis niloticus*) to villages with suitable natural water bodies or ponds. In addition, regular demand-based technical training workshops in tilapia and clam aquaculture, fishing methods, gear technology, sea safety, fish handling and skills for small business management are held. The Fisheries Advisory Services Section has also undertaken to review all management plans after approximately six months of operation and then at appropriate intervals, to verify sustainability.

3. Status of Community-based fisheries management

To date, the Samoa Fisheries Division community-based fisheries extension program has assisted 76 coastal villages (Table 1) to develop Village Fisheries Management Plans. Management plans have specified the village resource management undertakings and conservation measures and, also the services and technical support required from the Government Fisheries Division. Most management plans have also included the establishment of small fish reserves within traditional fishing grounds. These fish reserves ranged in size from 5000 – 1500,000 square kilometres. Additionally, most of these villages have also posted bylaws to support their fisheries regulation actions.

4. New Village Management Plans

Five new villages have adopted community-based fisheries management measures following the approval of their Village Management Plans. These villages are Leusoalii, Saleapaga, Aufaga and Lepa in Upolu, and Si'ufaga, Savaii. The Management Plans contain a range of community undertakings designed to conserve and rebuild fish stocks and to protect the marine environment. Undertakings have differed from village to village and the most common are summarized below.

- Banning the use of dynamite and poisons to kill fish
- Banning smashing of corals to catch sheltering fish
- Minimum size limits on fish
- Banning underwater torches for spearfishing at night
- Collecting Crown of Thorns starfish
- Banning removal of beach sand and dumping of rubbish
- Establishment of fish reserves
- Production of village By-Laws.

Table 1: An overall summary of village communities in the Village/Community-based fisheries management program in Samoa

	UPOLU	SAVAII	Total
Total villages	48	28	76
Management Plans	48	28	76
MPA	46	25	71
Village with clams	21	12	33
Bylaws approved	38	17	55
Bylaws in process	07	08	15
Tilapia farms	05	03	08
Private farms	02	03	02

5. Program review (6 Monthly Reviews)

One of the major activities carried out by the Extension staff during this 12-month period was to review management performance at regular intervals (6 months since the date of Village Fisheries Management Plan approval) to provide feedback concerning issues or changes. An assessment procedure was developed which attempted to gauge community support by quantifying adherence to resource management and conservation undertakings; outcomes of enforcement procedures; and consequences of fish reserves, aquaculture and other community undertakings.

A total of 40 reviews have been carried out for 32 villages. Some have delayed the process due to many reasons. Some of these reasons included changes in Village Fisheries Management Committee members, village commitment to other activities (e.g. CCCS annual meeting, Independence celebration, etc) and village disputes. Table 2 & 3 summarises scores obtained from the program reviews in the past 12 months.

Table 2. Results of Management plan reviews carried out in July 2001 to June 2002 period for Upolu

Degree of success	No. of Villages	Achievement rate(%)
80 % and over	23	71.9
50 - 79	8	25
< 49	1	3.1

Table 3: Results of Management plan reviews carried out in July 2001 to June 2002 period for Savaii.

Degree of success	No. of Villages	Achievement rate(%)
80 % and over	18	69
50 - 79	16	28
< 49	2	2

6. Information Section

(a) Television Program

12th February 2002: TV Samoa's Atinae Samoa Program on the importance of Marine Protected Areas, the impact on the village lifestyle, problems and solutions to overcome them.

(b) Radio Program

9th August 2001 Etuati Ropeti presented an overview of the Community-Based Program on Marine Protected Areas and conditions of Clam Introduction to the villages.

14th August 2001 Atonio Mulipola and Vaauli Tulitua presented a program on the Research Section activities out in the community and also their service on issuing permits for fish export for consumption.

6th March 2002 - Atonio Mulipola on behalf of the Research Section delivered a message to inform the public on their roles and responsibilities in the management of fisheries and marine resources.

21st May 2002 Roseti Imo of the Development Section on the importance of boat safety in fishing operations. This was very useful for boat owners and fishermen in which they would take into consideration to avoid sea accidents.

(c) Information Dissemination

Fisheries Division's resource centre is one of the focal point of research students especially on marine resources and its protection, also on aquaculture issues. Information sheets and books were provided for students and the public for research purposes.

(d) Public Awareness Days

Information sheets and posters were displayed during these special events. The staff members were also involved to assist students on matters concerning marine environment.

16 th October 2002	World Food & Samoa Coconut Day Theme: “You ain’t hungry if you work”
15 th February 2002	Career Day for all Schools in Upolu—Raising awareness and developing initiatives related to gender, youth and development.
6 th July 2002	Seventh Day Adventist Primary School Science Fair (Lalovaea).

(e) Media Releases (Delivered to all radio stations and newspapers)

31 st July 2001	Giant Clam Farming workshop for Vaovai, Siufaga, Savaia and Sataoa.
12 th Sept 2001	Involvement of the village of Leusoalii in the Fisheries Community-Based Program.
24 th Sept 2001	Results of the Court Cases on fish regulation matters
8 th Oct 2001	Palolo Rising Predictions 2001
13 th Dec 2001	Fisheries Community-Based Program conducted Final Fono for Aufaga and Saleapaga.

7. Training:

10 th –13 th July 2001	Pacific Islands Marine Resources Information System Steering Committee Meeting and workshop on Marine Information Management. (held at USP Suva)
12 th –16 th Nov 2001	National Environment Resource Database of Samoa (NERDS) workshop on Environmental Information Sharing and Networking. (held in Apia)
26 th Nov – 7 th Dec 2001	Indigenous Language Skill Training for Lexicography on formulation a Samoan Dictionary. (held at the Ministry of Youth, Sports and Cultural Affairs Apia).
26 th 28 th Feb 2002	Global Coral Reef Monitoring Network Workshop (held at Fisheries Division, Apia)
22 nd Feb 2002	Review Community-Based Program (held at Fisheries Division, Apia)

29th –31st May 2002

Introduction of National Environmental Resource Database of Samoa (NERDS) to Librarians and Information Officers in American Samoa.
(held at the Department of Marine and Wildlife in American Samoa).

8. 2002/2003 Activities

- Promote Public Awareness Campaigns such as workshops, radio programs, and TV advertisements.
- Produce more copies of existing information sheets and posters.
- Produce extra information sheets on topics which are not on the existing list but they are vital on marine resources and its environment.

APPENDIX 6.

OUTPUT 18.0: FISH MARKET & ENFORCEMENT SERVICES

(Prepared by: T. Ualolo, T. Sasi & M. Lafaele)

1. FISH MARKET

1.1 Operation

The Fish Market Services implemented by the Fisheries Division is currently only on Upolu at the Apia Fish Market. The service centers on providing the public with a hygienic and available market place to sell and buy fishery products. Revenue is collected through table rentals to the fishermen that sell their products at the Fish Market.

The daily operation of the Apia Fish Market involves the management and maintenance of the open side of the market for the general public for the trade of fishery products. A Senior Fisheries Officer manages the operation and two permanent staff (rental collectors) who collect tables rental fees. The rental collectors also assist with the enforcement, at the Fish Market, of minimum size limits applied to certain fishes and invertebrates. 3 casual workers before and after the general public trade fishery products carried out cleaning and sanitation. They also ensure that the market is hygienically clean at all times.

The fish market operates everyday. The opening hours are 0600 hours to 1730 hours on Mondays to Fridays. For Saturday, the opening hours are 0600 hours to 1200 hours whereas Sunday the opening hours are 0400 hours to 1100 hours. Reasons behind Saturday fish market operations due to normal day for public shopping which some public will prefer to buy fishery product not only for consumption but Sunday food preparation as well. However the demand for fresh fishery products on Sunday is very high which leads to our operation. Most sales end around 0900 hours, leaving two hours for the staff to carry out their cleaning and sanitation process.

1.2 Revenue Collected

During our fiscal year which is from 01 July 2001 to 30 June 2002, the total revenue collected at the Apia Fish Market from table/block rentals amounted to ST\$60,509. Our projected or targeted revenue was ST\$60,000. To compare our collected amount with the projected amount reflects we have \$509 extra, which means we have achieved our purpose, but we also have extra money as well. The table rental during the year remained at ST\$4.00 and ST\$5 for outside block. The following table summarizes revenue collected on a monthly basis during the fiscal year.

Table 1: Monthly Revenue collected at the Apia Fish Market during the 2001/2002 fiscal year.

Year	Month	Revenue Collected (ST\$)
2001	July	\$5683.00
	August	4815.00
	September	4835.00
	October	4603.00
	November	4503.00
	December	\$4749.00
2002	January	5613.00
	February	5234.00
	March	6256.00
	April	4654.00
	May	5936.00
	June	3628.00
	TOTAL	\$60509.00

1.3 Future Activities

- Continue to operate and maintain the Apia Fish Market on a daily basis
 - Continue with the general maintenance of the Fish Market
 - Ensure that cleaning and sanitation are carried out at all time according to the Seafood Standard
 - Assist the Fisheries Division with the enforcement of minimum size limits of fish and invertebrates exposed for sale at the Fish Market
 - Ensure that the fish sold via the Fish Market is of good quality and safe for consumption
1. The overall aim of this Fish Market is to ensure that Samoa people are consuming safe and good quality seafood by means of promoting fish sellers to practice HACCP principles. These principles include storing of fish in ice after catching from sea and before selling it to the public.

2. FISHERIES REGULATION ENFORCEMENT

2.1 Size Limits regulation

The enforcement of Fisheries Regulation is carried out in accordance to the Local Fisheries Regulation 1995 and the Fisheries Act 1988. The main objective of the operation is to regulate the harvesting and in particularly the sales of undersized and egg-bearing fish, invertebrates and marine products. Enforcement and monitoring were carried out at Apia Fish-Market, Salelologa Market, Fugalei Market, Roadsides as well as Shops and Fish-exporters.

The Fish-Market is monitored daily every weekday on an hourly basis including weekends. Fugalei Market, Other outlets and the roadside are monitored twice or three times a week. The Fugalei market and roadside are regularly checked from 1400hrs to 1630hrs during sampling days. Fishery products sells along the roadsides from Moataa to Nofolii are monitored. Items intending

for export either for commercial or not are subjected to inspection and these were monitored at the Fisheries Division Office.

2.2 Reported and Prosecuted Size Limit Cases

A total of 222 cases of fishers / vendors reported to possess, expose for sale and selling illegal fishery products from July 2001 to June 2002. During the same period, six (6) cases were successfully trialed and prosecuted in court. Of all the reported cases, the most common incident was the selling of undersized fish, which accounted for 64% of cases. The other frequent cases were undersized and egg bearing lobsters and crabs which accounted for 13% and 15% respectively of the total. The selling of gonads belonged to the green sea hare resulted to about 8% of all the reported cases. Table 2 presented the summary of results given by the Apia District Court over the prosecution of the mentioned cases.

Furthermore, there are nine (9) cases that will be file with the Court Registrar for prosecution shortly after preparation. Seven (7) of the cases prompted from breaching the size limits regulation with two cases resulted from infringing Village Fisheries By-laws. Additionally, four (4) other cases are currently processed and prepared and this will follow by a prosecution.

2.3 Future Activities

Some future activities to be implemented during the 2002-2003 period.

- Complete review and amendment of the Fisheries Act (1988) and Fisheries Regulations (1996).
- Conduct Public awareness programs to inform the public (especially those in the fishery industry – aufaifaiva) about the Fisheries Regulations – offences, penalties etc.
- Continue effective enforcement of all Regulations pertaining to fisheries management and conservation to ensure sustainable usage of fishery resources.
- To broaden the areas of enforcement – roadside, fish market, retailers, sole traders, major exporters, fishing vessels.
- Strengthening collaborative enforcement of Bylaws with the villages – prosecution of such offences under the Bylaws.
- Boarding foreign fishing vessels to ensure they have not fished in our fishery waters without a license.
- Continue and maintain collaborative and cooperative enforcement with Police and MOT on fishing vessel licensing and safety.
- Facilitate training for staff on enforcement etc. – Regulation training, computer training etc.
- Training of staff on aspect of existing regulation relating to sustainable management of fishery resources.

Table 2. Summary of prosecuted cases and results of penalty handed down by the Apia District Court.

Sentencing Date	Defendant Name	Results	Offence
19/09/2001	Tivoli Lavea	Fined to pay \$150.00 before 1600hrs. In default six (6) weeks imprisonment \$150.00 tala fine for selling 2 undersize fish known as pone. In default 3 months imprisonment	1) Selling 3 undersize fish known as alogo 2) Selling undersize fish known as pone
20/09/2001	Vavao Afitu	Fined to pay \$100.00 before 1600hrs. In default 1 month imprisonment	1) Fishing for 1 egg bearing lobster (ula-sami) 2) Possessing 1 egg bearing lobster (ula-sami) 3) Exposing for sale 1 egg bearing lobster (ula-sami)
20/09/2001	Pueleo Faamoe	Fined to pay \$1000.00 within seven days from sentencing date. In default six (6) months imprisonment	1) Exposing for sale 1 soft-shelled lobster (ula-sami) 2) Exposing for sale 2 egg bearing lobsters (ula-sami)
27/08/2001	Pati Sumu aka Sauloa	Warrant of Arrest	1) Selling 3 egg bearing lobsters (ula-sami) 2) Selling 1 soft-shelled lobster (ula-sami) 3) Selling 7 undersize fish
27/08/2001	Pelema Galu	Warrant of Arrest	1) Fishing for 1 egg bearing lobster (ula-sami) 2) Exposing for sale 1 egg bearing lobster (ula-sami)
27/08/2001	Aigaga Tavita	Case Freezes by judge	1) Fishing for 3 egg bearing lobster (ula-sami) 2) Fishing for 1 soft-shelled lobster (ula-sami) 3) Exposing for sale 3 egg bearing lobster (ula-sami)