FISHERIES DIVISION

MINISTRY OF AGRICULTURE, FORESTS, FISHERIES & METEOROLOGY

1998/1999 ANNUAL REPORT

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HIGHLIGHTS

- Commercial Fish export in 1998/99 period was estimated to 5026 mt valued to about $35.1 million tala. This has provided about 127% more than fish exported commercially during the last period. Of this estimate about 94% were tuna. Approximately 4.7 mt of fish export were donations for overseas family consumption.

- The total fisheries harvested in 1998/99 at all levels (subsistence, artisinal and commercial) was estimated to about 9,750.2 mt valued to about SAT $54.4 millions.

- An estimate of the local fleet was close to 300 vessels. This included three monohalls classified under the 15 meter and over category. Of the 300 vessels about 136 vessels were constantly reported to Fisheries on their longline fishing activities.

- Fisheries has worked with seventeen (17) villages under its Extension program. Of these seventeen villages, fourteen (14) have produced Fisheries Management plans for managing their inshore fishery resources. Eleven (11) of them have established Marine Protected Areas and formulated village by-laws.

- There were eleven (11) tilapia sites which were stocked or restocked during the 1998/99 period. Over 4900 tilapia of various sizes were used. In addition twelve (12) giant clam farms have been established. Altogether they stocked with about 3750 baby clams.

- The proposed Tuna Management Arrangement for the region is still under negotiation through a Multilateral High Level Conference (MHLC) process. A fourth MHLC negotiation was held in February in Honolulu.

- The existing fisheries treaty between the Forum Fisheries Agency (FFA) member countries and the United States has reached its twelfth year (12). For this year Samoa has earned over $738,000 tala

PROGRAMMES

1. AQUACULTURE

Aquaculture development is an ongoing program involving the farming and stocking of natural lakes using the freshwater Nile tilapia, restocking of village lagoon giant clam nurseries and the release of green snail on suitable reefs, to create alternative sources of food and income for local communities. Moreso, the promotion of aquaculture is seen as one option of alleviating pressure on over-exploited inshore reef and lagoon fisheries and to increase fish production.

The 1998/99 aquaculture development program concentrated on culturing the fast growing species of tilapia, *Oreochromis niloticus* and several species of giant clams namely, *Tridacna derasa, T. squamosa, T. maxima* and *Hippopus hippopus*, and the release of green snail, *Turbo mamorrata*, on selected suitable reefs.

1.1 NILE TILAPIA

1.1.1 Fish Farms and Ponds

Three demonstration Nile Tilapia farms were initiated in 1996/97 by the Fisheries Division with funds provided by SPADP (II) and AusAID. Of these three farms, only one, Chanel College, was operational during the year. In addition to the demonstration farms, six single-pond projects, four of which belong to village communities and two belonging to individuals, were initiated during 1997 and 1998. Five of these ponds were either stocked or re-stocked during the 1998/99 year period. Another individual was also given Nile Tilapia during the year for stocking his small concrete pond used for ornamental and for food fish purposes. Table 1(a) lists Nile Tilapia stockings to the demonstration farm at Chanel College and village/individual ponds during the 1998/99 year period.

Table 1(a): *Demonstration Farm/Pond Nile Tilapia Stocking/Restocking in 1998/99*

Site/Village	Status	Date	Size	Number
Savaii				
Sapapalii	Village Pond	10 Nov 98		300
		10 Mar 99	20.0 g	250
Fogapoa	Private Pond	-	-	10
Upolu				
Fasitootai	Village Pond	20 July 98	29.3 g	312
Vailuutai	Village Pond	26 Aug., 98	26.5 g	500
Gagaifoolevao	Private Pond	16 Oct., 98		100
Leafa Vitale	Private Pond	03 Feb., 99	62.5 g	20
		04 Feb .,99	21.0 g	10
		08 Feb., 99	70.0 g	78
Chanel	Demo. Farm			

College	Pond 1	22 Jan., 99	52.5 g	250
	Pond 2	16 Feb., 99	12.0 g	800
Total				**2,630**

1.1.2 Natural Lakes Stocking

In an effort to enhance and/or create new fisheries in existing natural fresh or brackish water lakes in village communities, the Fisheries Division revived this program in 1996. Between April 1996 and April 1999, a total of 11 natural lakes (5 on Savaii and 6 on Upolu) that belong to village communities were stocked with Nile Tilapia. Of these sites, important fisheries, consisting of marine/brackish water fish species as well as *O. mossambicus* introduced into the lakes in the 1950's, already exists in at least four villages, mostly on Savaii. The introduction of Nile tilapia to these particular sites is to enhance existing fisheries and to replace *O. mossambicus* with a better tilapia species, *O. niloticus*. During the year 1998/99, only 4 natural lakes were stocked or re-stocked with Nile Tilapia as recorded in Table 1 (b). Appendix 1 of this report lists natural lakes and ponds stockings since 1996.

Table 1(b): *Natural Lakes Stocking with Nile Tilapia in the 1998/99 Period*

Island/ Village	Date Stocked	Ave. Size Stocked	Number Stocked	Status
Savaii				
Auala	2 Sept 99		156	Re-stocking
	21 April 99	15 g	200	Re-stocking
Upolu				
Poutasi	30 July 99		250	Re-stocking
Malaela	10 July 99	13.3 g	500	Initial
Fagalii	15 Jun 99		200	Initial
Total			**1,306**	

1.1.3 Hatchery

The Division continued to operate its Nile Tilapia hatchery at its headquarters in Apia. The hatchery continues to play a vital role in providing Nile Tilapia fingerlings for stocking farms, ponds and natural lakes. During the 1998/99 year period, a total of 3,936 Nile Tilapia fingerlings, juveniles and adults were produced and distributed from the hatchery for the Nile Tilapia program in communities.

1.1.4 Harvests

The ponds at the Chanel College farm are scheduled to be harvested earlier in the 1999/2000 year period. However, the results of the first harvests, as reported in previous reports, are comparable with those in other countries.

Of the six village and individual single ponds, only 2 have had a harvest since Nile Tilapia were introduced. The harvest was for the matais to taste Nile Tilapia.

Of the 11 village natural lakes stocked with Nile Tilapia from 1996 up to the end of the 1998/99 year period, five have had fish harvesting from within their lake. Four reportedly caught Nile Tilapia during their harvests with one village selling Nile Tilapia on strings. All of the 11 natural lakes have other fish species co-existing with Nile Tilapia.

1.1.5 Sales

One of the villages on Savaii has reportedly started selling Nile Tilapia caught from their natural lake which, was originally stocked by Fisheries Divison in 1996. A string of 5 Nile Tilapia, each fish measuring ~30cm in length, is sold for SAT 10. Two villages on Savaii, one of which claimed to be selling Nile Tilapia, continues to sell Mozambique Tilapia on strings, each string comprising of 18-20 MT each measuring ~25cm in length, for SAT 10. Mozambique Tilapia was introduced into these lakes around mid-1950. A string of reef fish is also sold in these villages for SAT 10 each.

Future Activities

- Continue programme of stocking additional natural lakes and pond to establish new fisheries or increase production of existing fisheries;
- Re-stock community natural freshwater lakes, ponds and streams which have the production potential to establish sufficient breeding stocks and to promote tilapia as an established food fishery;
- Encourage harvesting of fish in village ponds on a scheduled basis to maximize pond production;
- Conduct marketing promotion to establish marketing strategies and markets for farmed Nile Tilapia;
- Conduct Nile Tilapia mono-sex culture trials to increase yield from farms;
- Establish new procedures to increase production from the hatchery for distribution;
- Revitalize the other two demonstration farms.

1.2 GIANT CLAM VILLAGE FARMS

In an attempt by the Fisheries Division to replenish one of the depleted inshore resources of Samoa, giant clams, mainly *Tridacna derasa* and *T. gigas* have been introduced into the inshore areas. To date, approximately 42,186 giant clams have been imported and distributed to 56 villages with marine reserves since the beginning of the community-based fishery management programme in 1995. Four separate importation, with a total of approximately 10,564 giant clams for stocking village lagoon nurseries and establishing the Division's breeding stocks, were made during the 1998/99 period, as recorded in Tables 2(a).

Table 2(a). Summary of imported giant clams in the 1998/99 year period

Date of shipment	Country of origin	Species	Number introduced	Remarks
25th July 1998	Fiji	*T. derasa* & *T. squamosa*	2034	Funded by FAO Telefood
29th July 1998	American Samoa	*T. derasa*	1500	Funded by AusAid Fisheries Project
18th June 1999	Fiji	*T. gigas*	1,000 juveniles	Funded by
		T. derasa	1,000 juveniles	Fisheries Division
25th June 1999	American Samoa	*T. derasa*	5,000 juveniles	Funded by
		T. derasa	30 brood stock)	Fisheries Division

Table 2(b) records the distribution of giant clams imported during the 1998/99 year period. The remaining clams will be distributed in the early part of the next financial year to other new villages with Fisheries Management Plans and reserves.

The estimated growth rate for giant clam stocks introduced up to the end of 1998 is 4.2 cm/year. *T. derasa* and *T. gigas* growth rates recorded in Palau were 5-6 cm/year for the first 5 years. The Fisheries Division continues to conduct monthly monitoring of village giant clam nurseries. Demonstrations and workshops for the general maintenance have also been conducted to allow the villages to look after their own stocks at times between visits by the Fisheries Division.

The survival and growth rates vary due to factors such as water quality, predation by the snail (*Cymatium muricinum*), theft and maintenance, particularly during the juvenile stages.

Table 2(b): Giant Clam Stocks Distribution in the 1998/99 Period

		T. derasa		*T. gigas*	
Village	**Date of Introduction**	**Total Number**	**Ave. Lgth (mm)**	**Total Number**	**Ave. Lgth (mm)**
Savaii					
Sapapalii	6 July 1998	100	102.9		
	23 June 1999	289	65.3	150	70.1
Papa-I-Palauli	6 Aug., 1998	100	103.8		
	23 June 1999	250		150	
Falealupo	15 July 1998	200	94.0		
Upolu					
Saoluafata	7 Aug., 1998	127	145.9		
	22 June 1999			50	78.7
Solosolo	7 Aug., 1998	105	208.2		
	23 June 1999	250	74.9	150	70.0
Vailuutai	11 Aug., 1998	76			

Fasitootai	11 Aug., 1998	70 300	64.2		
	30 June 1999				
Utufaalalafa	23 June 1999	250	67.2	150	70.5
Samatau	30 June 1999	400	64.9		
Lalovi, Mulifanua	30 June 1999	427	63.5		
Fuailolo'o, Mulifanua	30 June 1999	407	63.3		
Faleula	30 June 1999	400			
FD Nursery				370	79.1

Future Activities

- Establish lagoon giant clam nurseries for new villages with Fisheries Management Plans and Reserves under the community-based programme;
- Continue monitoring growth and mortality in established giant clam village nurseries;
- Continue to provide technical assistance to villages in giant clam farming operation;
- Establish the giant clam hatchery to provide juvenile clams for village farms thus avoiding relying on overseas hatcheries and departing from risky importations.

1.3 GREEN SNAIL

The Green snail, *Turbo marmoratus*, is a large marine gastropod that belong to the family Turbinidae. It is the largest species of the family and grows to more than 20 centimetres in shell diameter and its weight often exceeds 2 kilograms. Its nacreous shell is highly prized for inlay material for lacquerware, furniture and jewelry. Its flesh provides a good source of protein and is considered a delicacy in some Pacific countries. It is not an abundant resource in the South Pacific. Green snail has been commercially exploited throughout its Indo-Pacific range for at least a century. Despite its scarcity, the relative value of green snail compared with other pearl shell species for inlay work, has resulted in green snail having a premium price. In Vanuatu e.g., shell processing factories will pay up to US$35.00/kg of green snail shell.

The green snail was introduced into Samoa to enhance depleted inshore resources. A feasibility study for its introduction into Samoa was carried out in 1996 by a consultant funded by the South Pacific Aquaculture Development Project (SPADP II). As a result, the first shipment, consisting of 300 three-year old green snails, was made from Tonga (funded by SPADP) on the 28 April 1999.

The *T. marmoratus* stocks were quarantined in the Fisheries Division raceway ponds and then introduced into three selected sites as follows:

	# Green	**Transfer**	**Green snail Ave.**

Site	Snails Planted	(Plant) Date	Aperture width
Papa-I-Palauli, Savaii	100	18 May 1999	Not measured
Namua Is.	150	27 May 1999	36.5 mm
Saoluafata, Upolu	50	10 June 1999	35.4 mm

These sites were selected because their suitability according to the criteria suggested by the FAO consultant, recommendation by the Aquaculture Adviser (AusAID) and also because of the villages having an active village management committee in the community-based management programme. The overall average aperture lengths for all specimens measured was 36.01mm.

One dead green snail shell was recovered by the village committee and Fisheries Extension staff the day after the introduction to Papa-I-Palauli. This mortality may be attributed to transportation stress, harsh handling, temperature shock or poor placement causing over-turning of the shell by waves before it established footing on the reef. On the 2 June 1999, 1 snail marked PT1 was recovered on the windward side of Namua Island.

It is planned that all sites will be assessed within 6 months of introduction to monitor the survival and growth of the Green snails introduced.

2. FISHERIES STATISTICS

The collection of fishery statistics and related information is one of the principal functions of the Research, Assessment and Management Section of the Division. Collected data are essential for monitoring of fisheries status over time as well as facilitating the identification of appropriate and practical measures to manage Samoa's fishery resources.
Data collection is an on-going programme involving sampling of fishery landings conducted on randomly chosen days of the week at various outlets, (i.e. Apia Fish market, Salelologa Market, retailers, landing ports, etc.). During sampling, major taxa (families to species) of fishes and invertebrates are identified and recorded. The lengths and weights are taken with numbers being counted for each species to determine relative species composition during each sampling day.

Additional information pertaining to economic values and fishing efforts (fishing hours, location, fuel consumption, number of crew, fishing methods, etc.) are also obtained from interviewing sellers, proprietors and vendors. Data and related information are verified and entered into a central database system developed using ACCESS.

In the 1998/98 period, data were gathered from the following sampling programs as was done in previous years:

(a) Offshore tuna fishery survey.

(b) Offshore bottomfish fishery survey.
(c) Inshore fishery survey.
(d) Apolima landing site survey.
(e) Shellfish survey (Apia to Vaiusu).
(f) Longline port samplings.
(g) Fugalei market fisheries survey.

2.1 COMMERCIAL/ARTISANAL FISHERIES LANDINGS (DOMESTIC SALES)

Historically, fish and invertebrates from the sea are important protein sources in the diet of many coastal communities in Samoa. Likewise, these fishery products also provide a primary source of income for many individuals and households. Recent studies (Zann 1991; Mulipola 1997) have indicated that between 35% and 40% of all households in Samoa are classified as subsistence fishers with only 12% categorised as primary fishers. Subsistence fishing contributes significantly in accommodating the numerous needs of many communities in rural areas.

In an effort to obtain the best annual estimates of fishery catches and applied fishing efforts in Samoa, the Fisheries Division has instituted an on-going sampling program whereby fisheries are sampled continuously and periodically. Catches, effort and fishery related data are mostly acquired from on-going samplings of artisanal and commercial fishing activities. The subsistence fishery is surveyed periodically, at every 5-6 year period when possible. All data obtained are subsequently used to generate the total estimates of fishery production from Samoa's fishery waters every year as well as the yearly input efforts.

Fisheries in Samoa can be divided into subsistence (village-level) fisheries and commercial/artisanal fisheries. Furthermore, the commercial/artisanal fisheries are separated into inshore fish (parrotfish, surgeonfish, etc.), bottomfish (mainly deepwater snappers, groupers, emperors, etc.), pelagic non-tuna fish (dolphinfish, marlin, etc.), and tuna (albacore, yellowfin, skipjack etc.).

2.1.1 Inshore fisheries

The 1998/99 commercial/artisanal annual production of fish and invertebrates from the reef and lagoon was estimated from the total volumes of inshore originated fishery products landed and sold at markets and along roadsides. Inshore fishery products were generally sold in fresh unprocessed and processed forms. Unprocessed products were normally sold at the Apia Fish Market, Salelologa Market and along roadsides. The processed products, mostly in traditional cooked forms, were mainly sold at the Fugalei Agriculture Market. The sub-headings (a) to (f) below detail the estimated total reef and lagoon harvested products sold at domestic outlets in the 1998/99 period by major groups.

(a) Fin-fish

Reef and lagoon fin-fish continued to be the dominant type of inshore fishery products sold through domestic outlets during the year. Finfish accounted for

approximately 65% of the total domestic inshore landing volume in 1998/99. [Note: this figure refers to those sold (mostly) in unprocessed forms]. The total value of fin-fish products sold in cooked forms was about SAT 71.2 thousands. Overall, fin-fish products landed and sold locally had a value of about SAT 363,000.

With regards to composition, Table 3 details the estimated total volumes and values of reef and lagoon fin-fish by most common types domestically sold in the 1998/99 period. Similar to previous years, parrotfish (*fuga*)-24.8%, unicornfish (*ume*)-17.6%, emperorfish (*mataeleele*)-11.8%, surgeonfish (*alogo, pone*)-11.4% and mullet (*anae*)-10.9%, were the dominant fish groups in 1998/99. Fin-fishes were commonly sold on strings at an average price of about SAT 18-25 per string. Overall, finfish was sold at an average price of SAT 5.50/kg during the year.

Cooked fin-fish and moray eels (in coconut cream) wrapped in leaves dominated the amount of processed fin-fish products sold at the Fugalei market.

Table 3: *Summary of the total inshore landing by species, weights and value for 1998/99 recorded from the Apia Fish Market and Other Outlets (Fugalei, Retailers, Roadsides, etc.)*

Fin-fish major groups	**Tot Wt (kg)**	**Tot Value (SAT)**	**1998/99 Wt (%)**	**1997/98 Wt (%)**
Bigeye scad (Atule)	545.63	3,137.37	1.1	1.7
Emperors (Mataeleele, Filoa)	6,012.05	34,569.29	11.8	13.1
Goatfish (Ululaoa, Vete, Taulaia)	1,461.26	8,402.25	2.9	2.4
Groupers (Gatala, Ataata, Papa)	1,904.70	10,952.03	3.8	2.6
Milkfish (Ava)	92.31	530.78	0.2	0.3
Mojarras (Matu, Mumu)	86.68	498.41	0.2	0.3
Moray eel (Pusigatala)	2,048.31	11,777.78	4.0	5.1
Mullets (Anae)	5,510.36	31,684.57	10.9	20.7
Other fish (Isi i'a)	570.14	3,278.31	1.1	1.4
Parrotfish (Fuga)	12,576.11	72,312.63	24.8	14.8
Rabbitfish (Lo, Malava)	490.53	2,820.55	1.0	1.2
Snappers (Malai, Tamala)	722.97	4,157.08	1.4	1.5
Soldierfish (Malau)	1653.8	9,509.35	3.3	1.5
Surgeonfish (Alogo, Pone, Palagi)	5,763.04	33,137.48	11.4	9.9
Topsail drummer (Ganue)	374.62	2,154.07	0.7	0.7
Trevally (Malauli, Lupo)	1,424.00	8,188.00	2.8	4.2
Unicornis (Ume)	8,917.25	51,274.19	17.6	18.1
Wrasses (Sugale)	598.03	3,438.67	1.2	0.7
*Cooked wrapped fish (Afi-i'a)**		*14,121.11*		
*Coconut cooked moray eel (Faiai-pusi)**		*57,029.03*		
Total	***50,751.79***	***362,972.95***		

**Processed and cooked fish and moray-eels wrapped in leaves were sold via Fugalei Market.*

(b) Crustaceans

Panulirus lobsters (*ulasami*) comprised 58% of the total estimated landings of crustacean sold at local markets. This was followed by *Scylla* mangrove crabs (*paalimago*) which comprised 35.1% of the crustacean estimated landing volume.

An estimated 14 mt of crustacean was sold via the Apia Fish Market in 1998/99, generating about SAT 115,000. Crustaceans were sold at an average price of about SAT 8/kg during the year. Processed or cooked lobsters, crabs and slipper lobsters sold at Fugalei market during the period, generated a total value of about SAT 3,400 in revenue for fishers. Overall, crustaceans landed and sold at domestic outlets in the 1998/99 period generated a total of about SAT 115,400 . The summary of the total volume of crustacean landed at the Apia Fish Market and Other Outlets, by major groups, is given in Table 4.

Table 4. *Estimated total landings of crustaceans by major species landed at the Apia Fish Market and Other Outlets (Fugalei, Retailers, Roadside, etc.) in 1998/99*

Species	**Total Wt** *(kg)*	**Total Value** *(Tala)*	**1998/99 Wt** *(%)*	**1997/98 Wt** *(%)*
Freshwater crayfish (*Ulavai*)	541.09	4,328.72	3.9	
Lobsters (*Ulasami*)	8,124.43	64,995.44	58.0	33.5
Mud crabs (*Paalimago*)	4,912.51	39,300.08	35.1	57.2
Reef crabs (*Kuku*)	219.34	1,754.72	1.6	7.1
Slipper lobsters (*Papata*)	206.43	1,651.44	1.5	1.8
Other crabs (*Isi paa*)	2.10	16.8		0.4
*Cooked lobsters (ulasami vela)**		*1,711.09*		
*Cooked crabs (Paa / papata vela)**		*1,677.37*	-	-
Total	***14,005.90***	***115,435.66***		

**Cooked crabs and lobsters are sold at the Fugalei market per pieces.*

(c) Bivalves

Once again, *faisua* and *tugane* were the dominant types of shellfish landed at domestic outlets in 1998/99. Both items accounted for about 90% of the total volume (shells and flesh) sold. *Faisuas* were mostly traded in whole shell with flesh (meat) and *tuganes* were sold in standard plastic bags at an average of SAT 5 per 4kg bag.

Fatuaua, fole, and other bivalves were sold at Fugalei market mostly in bottles or containers, in pieces of meat (flesh), mixed with other invertebrates.

Overall, about 11.6 mt of bivalves, worth about SAT 78,800, were sold domestically in the 1998/99 period. The summary of domestic landings of major bivalve types is presented in Table 5.

Table 5: *Total volume of main bivalves types landed and sold at the Apia Fish Market and Other Outlets (Fugalei, Retailers, Roadside, etc.) in 1998/99*

Species	**Total Wt** *(kg)*	**Total Value** *(SAT)*	**1998/99 Wt** *(%)*	**1997/98 Wt** *(%)*
Giant clams (*faisua*)	5,910.2	70,922.64	51.0	97
Cockle (tugane)	5,677.7	7,097.12	48.0	1.4
Other bivalves	0.92	11.04	1.0	1.6

*Bottled (fole/fatuau/tio)**	*items*	*743.06*	
Total	***11,588.82***	***78,773.86***	

**Processed items sold through the Fugalei Market*

(d) Other molluscs

Octopus (***fee***) again remained the principal type of other molluscs that was sold both in processed and unprocessed forms in 1998/99 period. Unprocessed *fee* accounted for about 98% of the total weight estimated for unprocessed items in this category. However, about SAT 88,000 was the total worth of *fee* (processed and unprocessed) sold at domestic outlets during the period.

On average, unprocessed octopus were stringed and traded at around SAT 4.4/kg. *Fee* cooked in coconut cream was sold on an average of about SAT 10/bundle. Other major types of molluscs sold at Fugalei were cooked *alili*, traded in piles and seahares cooked in coconut cream. The summary of major types of "other" molluscs landed and sold locally is presented in Table 6.

Table 6: *Total volume of mollusc by species landed at the Apia Fish Market and OtherOutlets (Fugalei, Retailers, Roadside, etc.) in 1998/99*

Mollusc species	**Tot Wt** *(kg)*	**Tot Value** *(Tala)*	**1998/99 Wt** *(%)*	**1997/98 Wt** *(%)*
Octopus (*fee*)	7,802.19	35,109.86	97.8	99
Turbo shell (*Alili*)	146.03	657.14	1.8	
Other	32.38	145.71	0.4	1
*Cooked alili**		*3,356.13*		
*Cooked octopus**		*52,770.35*		
*Cooked Seahare**		*8,140.53*		
Total	***7,980.6***	***100,179.72***		

**Processed items cooked in coconut cream and sold*

(e) Other processed invertebrates

Table 7 summarises the total values of processed invertebrates by major types sold mainly through Fugalei market. Generally these invertebrates were sold in whole, partial or in mixed forms. The processed forms include invertebrates cooked in coconut cream, cooked wrapped in leaves, chopped up and mixed in seawater containers or bottles or sold in bundles like *ofu-limu*.

The local trading of processed invertebrates yielded more than SAT 200,000 in income. The bottled *sea* (digestive tract of *Stichopus horrens*) and bundled seagrapes accounted for more than 70% in value of the total "Other processed invertebrates" sold in 1998/99.

Table 7: *Total volumes of other invertebrates sold in processed and cooked forms at Fugalei Market and Roadsides (Vaiusu) in 1998/99.*

Fishery Products	**Tot Value**	**Av price**
Jellyfish (*Ofu alualu*)	5,941.8	4.52

Gonads *(Fagu ape*)	3,527.0	11.70
Sea cucumbers (*Fagu fugafuga*)	14,862.6	9.80
Digestive of curryfish (*Fagu sea*)	90,667.8	15.00
Lollyfish (*Fagu loli*)	20.3	2.00
Scylomia/Anemone (*Ofu lumane/matalelei*)	33,715.1	6.00
Sea urchins (*Tuitui*, *Sava'e*)	555.1	3.60
Caulerpa/Seagrape (*Ofu limu*)	70,051.96	5.60
	219,341.66	***6.47***

(f) Total inshore fishery products landed and sold domestically

In most cases involving processed products, it was very difficult to estimate the quantities landed and sold as some of these items were sold wholly, partially or mixed cut pieces. Thus, the total quantity of inshore products landed and sold via domestic outlets in the 1998/99 period was generated only for items sold unprocessed and in whole forms.

Overall, approximately 76.88 mt of unprocessed inshore fishery products were commercially traded at the domestic outlets during the 1998/99 period. In terms of value, both processed and unprocessed inshore fishery products traded at the domestic outlets were worth an estimated SAT 879,300.

Fin-fish dominated the total amount and value of inshore fishery products sold via domestic outlets in the 1998/99 period. The summary of inshore fishery products by major groups is presented in Table 8.

Table 8: *Overall totals of inshore fisheries landed and sold at domestic outlets in 1998/99.* [Note: The values corresponding to fishery groups also include values for processed items of each particular fishery group].

Fishery groups	**Total Wt** *(Kg)*	**Total Value** *(SAT)*
Finfish (*I'a*)	50,751.79	362,972.95
Crustaceans (*Meaola faiatigi*)	14,005.90	115,435.66
Other Molluscs (*Fee, molusc*)	7.980.60	100,179.72
Bivalves (*Figota*)	11,588.82	78,773.86
Miscellaneous	522.77	2,613.83
*Other processed invertebrates (Isi)**	-	*219,314.66*
Total inshore products	***76,877.86***	***879,290.68***

** Added value items were sold in whole, parts or mixed forms in bottles, wrapped-leaves, plastic bags, etc and were difficult to quantified.*

2.1.2 Offshore fisheries

The local offshore fishery is predominantly based on the 9-12 meters outboard aluminium catamaran (*alia*) fishing for tuna, non-tuna pelagics and deepwater snappers. However, because of the significant development of the tuna fishery, 15+ meter fishing boats have entered the fishery using longline fishing methods targeting the high valued tuna species.

(a) Tuna fishery

Over the past five years, catches for tuna species have continued to increase significantly. This is associated with the meteorically development of the tuna longline fishery in which many local and foreign interests are actively engaged.

To estimate the total annual landing from the local tuna fishery, tuna disposed via domestic markets and those exported for overseas markets were combined. The following section details the total estimated amount of tuna landed and sold at domestic outlets. Species composition is also summarised in Table 9 together with other information.

Skipjack (*Atu*) was the primary tuna species sold via local outlets, accounting for 75.4% by weight. This is followed by yellowfin (22%). Albacore and other tuna species of high value were mostly cut up in pieces of about 1.5-2 kg and sold to the public. Overall, more than 200 mt of tuna, with an estimated value of SAT 600,000, were sold domestically.

Table 9: *Estimated total volume of tunas sold through local outlets (Apia Fish Market and Other) in 1998/99*

Tuna species	**Tot Wt** *(kg)*	**Tot Value** *(SAT)*	**$/lb**	**1998/99** *(%) wt*	**1997/98** *(%) wt*
Skipjack (*Atu*)	161,141.50	418,967.90	2.60	75.4	81.8
Yellowfin (*Asiasi*)	47,164.20	150,925.44	3.20	22.1	15.3
Albacore (*Apakoa*)	4,914.50	27,521.20	5.60	2.3	2.5
Bigeye tuna (*Pikiai*)	402.20	1,407.70	3.50	0.2	0.2
Other tunas	51.60	129.00	2.50	0.0	0.1
Total	**213,674.00**	**598,951.24**	**2.90**		

(b) Non-tuna pelagic fish

Swordfish, marlin and dolphinfish (*masimasi)* were the most common non-tuna pelagic by-catches of the longline fishery. These fish were usually cut up and sold as 1.5-2 kg pieces for about SAT 10-15/piece. Other small non-tuna pelagic fishes were normally sold wholly. Throughout the year non-tuna pelagics were sold at an average of about SAT 2.00 per lb weight. A total of about 7.7 mt of non-tuna pelagic fish were traded during the year, fetching around SAT 44,400 in revenues. The summary of non-tuna pelagic fish landed and sold through local outlets is given in Table 10.

Table 10: *Domestic landings of non-tuna pelagic fish at Apia Fish Market and Other Outlets in the 1998/99 period*

OTHER OFFSHORE PELAGICS	**Total Wt** *(kg)*	**Total Value** *(tala)*	**$/lb**	**98/99** *% wt*	**97/98** *% wt*
Dolphinfish (*Masimasi*)	1,965.5	$7,832.90	1.80	26	71.6

Marlin/Swordfish (*Sa'ula*, *Saulele, Malini*)	3,574.10	$25,752.20	3.00	46	1.4
Wahoo (*Pala*)	1,216.9	$6,683.20	2.50	16	20.4
Other Pelagic Fish (*O isi ituaiga ia-aluga*)	689.2	$2,869.3	2.00	8	2.5
Rainbow runner (*Samani*)	251.5	$1,294.10	2.30	3	4.1
Total	**7,697.2**	**$44,431.70**	**2.00**		

(c) Deepwater fisheries (Bottomfish)

Since most of the local fishing boats are engaged in the longline fishery, the production in bottomfish is still kept at a minimum level. An estimated 21 mt of deepwater fishes, valued at about SAT 123,800, were landed and sold through domestic outlets in the 1998/99 period.

Bottomfish was traded at an average price of about SAT 2.40/lb . *Lethrinus sp., Lutjanu gibbus* and *Pristipomoides* were the most common deepwater fish sold at domestic outlets. These groups accounted for more than 60% of the total volume. The summary of the annual total domestic landings of bottomfish by common fish groups in the 1998/99 period is presented in Table 11.

Table 11: Estimated total landings of common deepwater fish species sold through Apia Fish Market and Other Outlets (Apolima) during the 1998/99 period.

Major bottomfish types	Tot Est Wt (kg)	% Wt	$/lb	Tot Est Value (SAT)
Baracuda / *Sapatu*	1,336.7	6.3	2.50	7,351.85
Blue-striped snapper /*Savane*	857.6	4.1	2.90	5,660.16
Gry jobfish / *Utu*	691.6	3.3	2.00	3,043.04
Groupers / *Gatala, Ataata*	397.9	1.9	2.80	2,466.98
Humpback snapper / *Malai*	6,186.5	29.3	1.80	24,746.00
Lunartail grouper */ Papa*	424	2.0	2.60	2,501.60
Emperors / *Filoa, mataeleele*	4,075.9	19.3	4.00	39,943.82
Sharks / *Malie*	3,543.8	16.8	2.00	18,782.14
Silverjaw jobfish */ Palusina*	788.9	3.7	1.60	2,840.04
Pristipomoides snappers/ *Sinepa*	2,241.6	10.6	2.30	11,656.32
Trevally */ Malauli*	323.6	1.5	3.00	2,297.56
Bottomfish / *Isi iá-alalo*	273.9	1.3	4.00	2,519.88
	21,142.00	**7.7**	**2.42**	**123,809.39**

(d) Total offshore landings

Similar to the previous year, tunas again accounted for about 88% of the total weight of offshore fishery landings sold via domestic outlets in the 1998/999 period. Collectively, about 242 mt of offshore fish landing were sold locally generating a total of about SAT 767.2 in revenues to fishers. Offshore fishery products were sold at an average price of SAT 2.00 /kg, SAT 2.90/lb and SAT 2.60/lb for tuna, deepwater fish and non-tuna pelagic respectively. The summary of the total offshore fishery landings that were traded at local outlets is given in Table 12.

Table 12: Overall summary of offshore fisheries landed at domestic outlets in 1998/99

Fishery types	Total Wt (kg)	Total value (tala)	Avg $/lb	1998/99 *% wt*	1997/98 *% wt*
Deepwater	21,142.0	123,809.4	2..90	9	9
Tuna	213,674.0	598,951.2	2.00	88	88
Non-tuna Pelagics*	7,697.2	44,431.7	2.60	3	4
Total	**242,513.2**	**767,192.3**			

* *Billfish, swordfish, sailfish, masimasi, rainbow runner, etc.*

2.2 FISHERIES EXPORTS

Fishery product exports are categorised into commercial and *faaoso* (home consumption). Commercial exports refer to fishery products exported primarily for commercial purposes or for re-selling. The *faaoso* exports refer to items exported mainly for family consumption or as gift for relatives and families overseas. In monitoring commercial exports, a uniform certification process by the CBS/FD/Customs provides provisional volumes and values. Actual values are

submitted to the CBS after 30 days. For monitoring *faaoso* exports, a certification process is operated by the FD for which the shipment is sampled.

2.2.1 Fish

Based on provisional records of exports documented by the Fisheries Division, a total of 5,026 mt of fin-fishes, worth SAT 35.1 million, were exported during the 1998/99 period. In the same period, approximately 4.7 mt of fin-fishes, valued at SAT21,800, were exported for *faaoso*. Similar to the previous period, tuna (79% by weight) again dominated the total volumes of commercial exports. In the *faaoso* export category, inshore (32%) and tuna (48%) were the main fishery items exported. Table 13 summarises the total amount and value of fishery commercial and *faaoso* exports during the 1998/99 period.

Table 13: *Total fisheries exports for sale and for faaoso in 1998/99*

	COMMERCIAL			FAAOSO		
GROUPS	**Wt(kg)**	**Val(SAT)**	**% wt**	**Wt(kg)**	**Val(SAT)**	**% wt**
DEEPWATER	55,531.7	483,590.0	1.1%	211.4	1,238.8	4%
INSHORE	8,241.0	130,525.0	0.2%	1,525.1	9,425.1	32%
PELAGICS	116,992.02	1,002,537.3	2.3%	424.1	2,447.1	9%
TUNAS	4,756,648.3	32,935,003.0	94.6%	2,258.4	7,859.2	48%
Other types	88,662	591,979.0	1.8%	284.1	909.1	6%
	5,026,075.02	**35,143,634.30**		**4,703.1**	**21,879.3**	

For commercial tuna exports, about 4,756.6 mt, worth about SAT 33 million, were exported during the year. Albacore accounted for about 88% of the total tuna export weight, with yellowfin and bigeye tunas constituting about 10% and 2% respectively. Because of the limited cargo space available on commercial flights from Samoa, most of the tunas were exported to the two canneries in Pago Pago, American Samoa, for canning. Fresh chilled tuna exports, targeting the sashimi markets mainly in the USA, constituted about 22% of the total annual exports. A very minor portion of the tuna exports was directed to markets in Australia and New Zealand. Table 14 records the total volume of tuna fishery products exported for overseas markets between July 1998 and June 1999.

Table 14: *Tuna commercial exports for the 1998/99 period*

Tuna species	**Tot Wt (kg)**	***$/lb***	**Tot Value (SAT)**	**% wt**
Yellofin (*Asiasi*)	492,717.79	4.60	5492454.02	10.4
Skipjack (*Atu*)	8,380.40	2.60	129995.48	0.2
Bigeye tuna (*Pikiai*)	78,955.31	4.80	1505201.8	1.7
Albacore (*Apako*a)	4,176,594.80	3.50	25807351.84	87.8
	4,756,648.30	3.10	**32,935,003.14**	

A substantial volume of deepwater fish (bottomfish) was exported in the 1998/99 period when compared to the previous year. Most of the bottomfish were exported to the USA markets, fresh. A total of about 55.5 mt of mixed bottomfish, valued at about SAT 483,600 were exported during the year. Table 15 details the total volumes and values of bottomfish shipped to overseas markets in 1998/99.

Table 15: *Summary of bottomfish exported for commercial or re-selling in 1998/99.*

DEEPWATER SPECIES	**Tot Wt (kg)**	**$/lb**	**Total Value** *(tala)*	**1998/99** *% wt*	**1997/98** *% wt*
Blue stripe snapper (*Savane*)	132.1	2.90	1,438.79	0.2	3.0
Emperors (*Mataeleele, Filoa, etc.*)	716.2	2.40	4371.8	1.3	19.9
Snappers/Opakapaka (*Sinepa*)	335.1	2.10	2,381.08	0.6	13.3
Silverjaw jobifsh (*Palusina*)	225.6	2.70	1,371.04	0.4	4.5
Soldierfish (*Malau*)	246.3	3.00	1,667.73	0.4	
Flat tail grp (*Papa*)	294.6	2.40	1,546.95	0.5	
Lunartail grouper (*Gatala, Ataata*)	302.9	3.00	2,213.63	0.5	4.0
Longtail snapper (*Palu loa*)	476.4	4.00	4,521.00	0.9	
Grey Snapper (*Utu*)	490.2	3.30	3,248.14	0.9	3.3
Squirrelfish snapper	852.5	3.50	6,032.47	1.5	
Kusakar snapper/Other snappers	1,197.4	3.50	9,421.23	2.2	
Humpback snapper (*Malai*)	3,991.9	3.40	30,600.32	7.2	5.6
Bottomfish (*Isi iá-alalo*)	46,268.1	4.00	414,775.82	83.3	6.7
Total	**55,531.64**	**2.87**	**483,590.00**		

More than SAT 1 million worth of non-tuna pelagic fishes were exported in 1998/99. This is relatively substantial compared to 1997/98 as more non-tuna by-catch pelagic fish are exported commercially. Wahoo was the principal longline by-catch species highly demanded for commercial exports as summarised in Table 16.

Table 16: *Summary of pelagic non-tuna species exported in 1998/99.*

Species	**Tot Wt (kg)**	**$/lb**	**Tot Value**	**% wt**
Others	59.72	2.10	331.66	< .05
Masimasi	21,866.29	5.30	271,637.47	19
Marlin	13,837.51	2.80	87,509.08	12
Sailfish	1,115.99	2.80	7,397.61	1
Sharkfins	3,970.05	4.00	35,000.00	3

Swordfish	1,406.53	3.20		1
			13,683.44	
Wahoo	74,735.92	4.10	586,978.03	64
		3.04		
	116,992.02		**1,002,537.29**	

2.2.2 Aquarium

The exploitation of potential fishery and marine products for the aquarium trade was restricted only to the gathering of dead corals or bio-rock (trade name). The exploitation of bio-rocks is governed by special terms and conditions stipulated for the promotion of sustainable utilisation of exploitable and renewable resources.

Two local companies were permitted to harvest and export a maximum of 200 pieces of bio-rocks (12 inch by 12 inch by 12 inch in dimension) each per week. The main destination of the weekly shipment of bio-rocks was to the USA. A total of about 7,526 pieces were shipped by air, either direct or via Pago Pago, to the USA, during 1998/99. An estimated SAT78,800 of revenues was generated. The monthly summary of aquarium bio-rocks exported in 1998/99 is given in Table 17.

Table 17: *Monthly total exports of bio-rock for the aquarium Trade in 1998/99*

Month	**Tot Pieces**	**Tot Value(T)**
July 98	656	6,875
August 98	600	6,288
November 98	627	6,571
January 99	898	9,411
February 99	1,968	20,625
March 99	932	9767
April 99	1,068	11,193
May 99	777	8,143
Total	***7,526***	***78,873***

2.3 TOTAL COMMERCIAL AND ARTISANAL FISHERIES LANDINGS

Based on estimates determined from surveys undertaken by the Division, a total of about 5,350.2 mt of fishery products was harvested from Samoa waters in 1998/99 on the commercial/artisanal level. The total volume of combined fishery items earned close to SAT 36.8 millions of revenues. Of the total volume, tunas accounted for about 93%, with deepwater, reef and lagoon, non-tuna pelagics and other fisheries making up the remaining 7%. Moreover, about 94% of the total fishery landings was disposed predominantly as commercial exports, with the domestic markets and *faaoso* exports accounting for about 6%. The summary of the total fishery landings per major groups and fate of disposition for commercial and artisanal reasons is given in Table 18.

Table 18: Overall summary of fisheries that were commercially and artisanally landed in Samoa in 1998/99

	EXPORT		FAAOSO		DOMESTIC		OVERALL TOTALS	
GROUPS	Wt(kg)	Val(T)	Wt(kg)	Val(T)	Wt(kg)	Val(T)	Tot Wt(kg)	Tot Val(T)
Deepwater	55,531.7	483,590.0	211.4	1,238.8	21,142	123,809	76,885.10	608,637.80
Inshore	8,241.0	130,525.0	1,525.1	9,425.1	76,878	879,291	86,644.10	1,019,241.10
Pelagics	116,992.02	1,002,537.3	424.1	2,447.1	7,697	44,432	125,113.12	1,049,416.40
Tunas	4,756,648.3	32,935,003.0	2,258.4	7,859.2	213,674	598,951	4,972,580.70	33,541,813.20
Others	88,662	591,979.0	284.1	909.1			88,946.10	592,888.10
TOTAL	**5,026,075.02**	**35,143,634.3**	**4,703.1**	**21,879.3**	**319,391**	**1,646,483**	**5,350,169.12**	**36,811,996.60**

2.4 SUBSISTENCE OR VILLAGE-LEVEL FISHERIES

Obtaining subsistence estimates is relatively difficult because of the wide diversity of fishing communities and the enormous amount of effort required. Additionally, lack of manpower and resources also contribute to the complication of collecting subsistence landings. Nevertheless, the outcomes from subsistence surveys undertaken in 1990/91 on Upolu (including Manono) and 1991/92 and 1996/97 on Savaii Island, were applied to generate the estimates of subsistence landings.

Based on these subsistence assessments, King (1990) estimated the subsistence landing for Samoa as 4,600 mt. Likewise, Zann (1990) and Mulipola (1997) estimated subsistence landings to be 3,200 mt in 1990 and 4,200 mt in 1996 respectively. Again, King and Faasili (1997) estimated the subsistence landing for the whole of Samoa as 4,600 mt in 1997. Based on the estimates suggested by King and Faasili (1997) and Mulipola (1996), the subsistence landing for 1998/99 is estimated to be around 4,400 mt. Applying the average fish price of about SAT 4/kg, the estimated total value for the subsistence landings is SAT 17.6 millions for 1998/99.

2.5 OVERALL TOTAL FISHERY PRODUCTION FOR 1998/99

The overall total fishery production from Samoa waters for the 1998/99 period is generated from combining the total landings of commercial and artisanal fisheries and the subsistence estimates. A total of about 9,750.2 mt was estimated as the overall volume of fishery products landed, which generated around SAT 54.4 million. The summary of the overall total fishery productions from Samoa's waters is presented in Table 19.

Table 19: Overall estimated total fishery productions in 1997/98

Fisheries Landing Source	Estimated Total Wt (*mt*)	Estimated Total Value (*Million Tala*)
Artisanal & Commercial	5,350.2	36.81

Subsistence	4,400.0	17.60
Overall Totals	*9,750.2*	*54.41*

Future activities

- Continue collecting fisheries data and related information
- Review and modify fisheries sampling programs.
- Develop new and modify existing fishery database systems with assistance provided by SPC
- Train supporting and new staff on sampling, databasing and analysis methods and techniques.
- Upgrading the databasing and analysing systems for efficient generation of reports and information.
- Impose sampling program and data collection to gather information on biological, technical, social and economical implications of the newly developed longline fishery.
- Improve a uniform export certification process in conjunction with other authorities.
- Institute Observers on commercial local fishing vessels

3. RESOURCES ASSESSMENT AND FISH RESERVES

The establishment of fish reserves has been proven to be a practical management strategy in the protection of biodiversity and enhancement of depleted marine resources. Fish Reserves (also referred to as Marine Protected Areas or MPAs) serve to maintain ecological processes and life support systems, preserve genetic and species diversity, and encourage the sustainable use of marine resources. In an effort to replenish the depleted inshore fisheries resources of Samoa, several community-managed fish reserves have been set up around the islands of Upolu, Savaii and Manono. The main aim of setting this network of fish reserves is to facilitate the enhancement and recruitment of depleted fisheries stocks.

An elected Village Fisheries Management Advisory Committee (VFMAC), comprising of *matai*, *faletua*, *tausi*, *taulelea* and *aualuma*, manage the fish reserves with advise from the Fisheries Division. In the 1998/99 period, 11 new marine reserves were declared. Table 20(a) gives a summary of new village fish reserves by site, date of establishment and area coverage, for some sites. The establishment of village fish reserves is initiated under authorisation from the Village *fono* based on the technical advise of the Fisheries Division. The continued monitoring of existing reserves is carried out on the 6 – 12 monthly basis where by the Fisheries Division conducts a re-survey of an area to assess species diversity and abundance. During these re-surveys, the VFMAC is advised on the current condition of the reserves. The areas and sites selected for reserves vary from village to village. The sites re-surveyed in the 1998/99 period are given in Table 20(b).

Table 20(a): *Fish Reserves/MPAs established in the period 1998/99*

Village	Date of Survey
Vailuutai	28 July 1998
Papa-I-Palauli	5 August 1998
Sapapalii	5 August 1998
Utufaalalafa	24 August 1998
Samatau	14 September 1998
Fagalii	30 November 1998
Eva	2 December 1998
Lelepa	15 April 1999
Faleula	12 May 1999
Lalovi, Mulifanua	17 June 1999
Fuailolou, Mulifanua	17 June 1999

Table 20(b): *Fish Reserves (MPAs) re-surveys conducted in the 1998/99 Period*

Village	Date Re-surveyed	Approx. area (km^2)
Salua Uta	2nd March 1999	6 (area surveyed) + +
Saoluafata	30th March 1999	62
Safaatoa	14th April 1999	16

Future activities

- Continue to provide technical support for the establishment of fish reserves through area profile and biodiversity assessments.
- Continue monitoring of existing reserves in conjunction with communities.
- Extend and expand coral reef monitoring program to include monitoring of areas in and outside reserves.
- Further train other communities in monitoring techniques and encourage their participation through their involvement in monitoring activities.

4. FISHERIES ADVISORY SERVICE

The Fisheries Division Extension and Training Project (supported by AusAID) has been in operation for a total of 48 months (First phase of the AusAID Assistance: February 1995- February 1998, extended to August 1998. Second phase began in February 1999). The project was designed to promote the involvement of village communities in the management of their own marine environment and fisheries. It has achieved the medium-term goal to prevent further decline of near-shore fisheries resources. It has also gone much of the way towards the long-term goal of improving the standard of living for Samoan fishers and their families.

4.1 VILLAGE EXTENSION PROCESS

The project involves a community-focussed extension process and the development of alternative sources of seafood. The Fisheries Division Extension process (summarised in Figure 1) culminates in a fisheries management plan for each of the participating villages. The plan for each village sets out the resource management and conservation undertakings of the community and the support undertakings of the Fisheries Division.

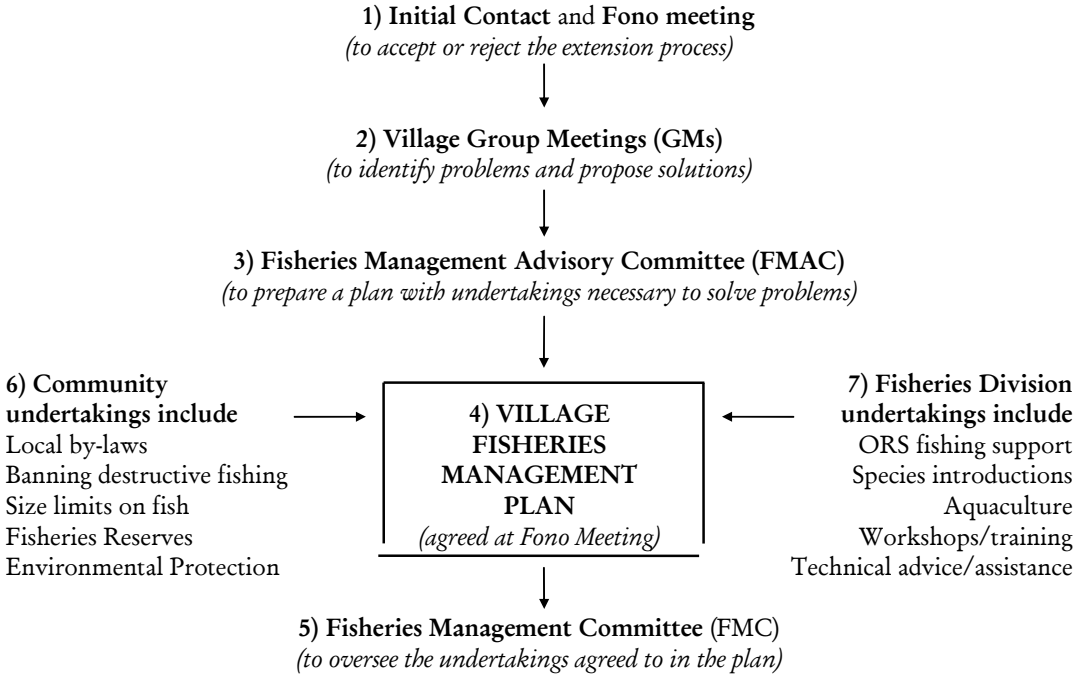

Figure 1. *The Fisheries Extension Process in Samoan villages*

4.2 VILLAGE MANAGEMENT PLANS AND UNDERTAKINGS

During the period July 1998 to June 1999, extension staff in the Fisheries Division have been active to assist 14 new villages to produce Village Fisheries Management Plans. The 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 summarised below.

- Banning the using 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

Table 21 (refer back page) lists the villages contacted during the period July 1998-June 1999. A total of 17 villages have been approached during this time and 3 have delayed or declined for a variety of reasons. These included village disputes, appointing of new mayors (*pulenuu*) and relocation of village sites. During the 1998/99 year, 11 new Fish Reserves were declared after they were all surveyed. A total of 11 villages submitted by-laws, related to their respective Fisheries Management Plans, to the Attorney General for approval. Eight of these were signed and are operational.

Public awareness has continued to be an important component of the work of Extension staff during this period. Presses as well as Television and Radio releases, relating to the extension program in villages have been produced regularly. Extension staff also assisted and supported schools in the Senior School Science Competition.

Extension staff continued to work with other agencies including DEC, FAO, IOI, and SPREP in projects such as the train the trainers workshop for the SPREP-funded Samoa Village level Coral Reef Monitoring Pilot Project. Under this project, communities are encouraged to survey and monitor the marine environment adjacent to their villages.

4.3 VILLAGE ALTERNATIVES FOODS AND INCOME GENERATION

Village-level fish farming, based on a fast-growing species of freshwater Tilapia continued to be supported. Tilapia have now been introduced into 21 locations.
The trial mullet farm at Satapuala continues to be supported, with Fisheries Division staff stocking fry on a regular basis. A second pond adjacent to the one already stocked will be stocked.

Giant clams have now been restocked into a total of 57 villages. Growth rates for different sites range widely (1.51-9.37mm/month, mean 4.2 mm/month). This rate is similar to other Pacific localities.
The giant clam mortality rate for Samoan sites range from total to about 50%. In some instances where total mortality has occurred, theft was the main cause. Heavy penalties have been imposed on the miscreants by respective Village Management Committees. Other losses have been attributed to inclement weather

conditions and predation by snails, octopuses and trigger fish. Surviving giant clams in some of the good village nurseries that were stocked first are starting reach maturity.

In addition village workshops on giant clam maintenance and tilapia farming have been conducted for over 50 villages. Community workshops on fishing, sea safety, outboard maintenance, fish handling, and small business management connected with the operation of village fishing boats have been completed in seven additional locations.
Extension staff have continued to promote the use of medium-sized, low-cost, boats and outboard engines in Outer Reef Slope (ORS) fishing from coastal villages during the period. Over 40 boats imported from Australia and assembled locally are in operation in villages. A Master fisher, employed by the AusAID project, conducted training associated with ORS fishing, with support from Extension staff. An analysis of the catch effort and costs of ORS fishing was completed.

4.4 TRAINING AND DEMONSTRATIONS

Extension staff have also involved in the introduction of Euchema seaweed at three selective sites around the country. The seaweed trial farms have been contacted at two sites in Upolu and one at Savai'i. Workshops have been conducted for the villages with active participation of the Village Advisory committee.

Training for extension personnel has been based on the requirement for a balanced understanding of both essential technical knowledge and community motivating/mobilising techniques. Eleven Extension staff have been sponsored to local and overseas workshops, short courses and formal tertiary training. Two Extension staff are undertaking undergraduate courses for science degrees and one is doing a diploma course in Tropical Fisheries.

During the period, a series of workshops on policy and strategic planning were also attended by the extension staff.

***Table 21**: Villages targeted by the Fisheries Extension Program during the period June 98 to July 99. Dates shown include those of the first village contact, the first fono meeting, group meetings, and FMAC meetings. Villages on Savaii are shown in bold italics.*

VILLAGE Bylaws *(Savaii in bold italics)*	First contact	First fono meeting	Group Meetings	FMAC meetings	Plan approved	Reserve declared	FRS conducted	 to AG	Bylaws signed
Fasito'otai	17 Mar.98	17 Apr.98	21 Apr-4 May 98	18 May-4 Jun.98	**15 Jun.98**	yes	22/06/98	29/9/98	17/12/98
Faleula	27 Mar.98	16 Mar 99	31Mar-21 Apr 99	14 Apr-21Apr 99	**28 Apr 99**	yes	14 Jul 99	26/5/99	04/06/99
Vailu'u tai	13 Apr.98	19 May 98	8 Jun-18 Jun.98	24 Jun-3 Jul.98	**15 Jul.98**	yes	28/07/98	29/9/98	17/12/98
Papa Palauli	29 Apr.98	07 May 98	15 May-17 Jun.98	22 Jun-1 Jul.98	28 Jul.98	yes	?Nov/98	29/9/98	17/12/98
Uta fa'a lalafa	24 Jun.98	06 Jul 98	16 Jul-98	23 Jul 98	**30 July 98**	yes	24/8/98	29/9/98	17/12/98
Samatau	29 Jun.98	24 Jul 98	28 July 98	4 Aug 98	**11 Aug 98**	yes	14 /9/98		04/06/99
Eva	10 Jul 98	23 Sept 98	02Oct-23Oct 98	27Oct-04Nov 98	25 Nov 98	yes	02/Dec 98	26/5/99	04/06/99
Fagali'i	08 Jun 98	24 Sept 98	22Oct 98	28 Oct 98	23Nov 98	yes	30 Nov 98	26/5/99	04/06/99
Lelepa	19 Aug 98	18 Sept 98	15 Oct 98	15 – 20 Nov 98	09 Dec 98	yes	15 Apr 99		
Mulifanua/Lalovi	08 Mar 99	01 May 99	05 May 99	21May-05Jun 99	11 Jun 99	yes	17Jun 99		
Mulifanua/Fuailoloo	08 Mar 99	01 May 99	05 May 99	21May-05Jun 99	11 Jun 99	yes	17Jun 99		
Manase	18 Mar 99	29 Mar 99	11 Jun 99	24 Jun-06 Jul 99	09 Jul 99	yes	21 Jul 99		
Sasina	18 Mar 99	*(delayed)*							
Fogapoa	29 Aug 99	*(delayed)*							
Fusi/Saoluafata	13 Apr 99	*(declined)*							
Saleilua	16 Apr 99	03 May 99	09 May 99	21Jun-23 Jun 99	05 Jul 99	yes	06 Jul 99		
Savaia	12 Jul 99	*(delayed)*							
Salani	03 Aug 99	09 Aug 99	18 Aug 99						
Fagaeé	04 Aug 99	31 Aug							

5. EXPLORATORY FISHING

The Tautai Matapalapala was finally put back into operation in the beginning of October, 1998. A short trip for bottom fishing off the Apolima area was taken to test it after it was tied up for a long period. This was also an opportunity to trial the new fishing crew after some onshore training. The Tautai Matapalapala was found to be in good operating condition and went on to complete eight long line fishing trips during the rest of the period, as recorded in Table 25. The counterpart for the skipper was also put into test and he proved his skill and capability to handle the boat. The results with the crew were not very encouraging as they were inexperienced. They have since undergone through a series of training, mainly in gear rigging and seamanship.

The programme also despatched its staff to conduct workshop on bottom fishing gear rigging and performed field demonstrations. This was done mainly during the off-season for the tuna long lining.

Table 25: *Tautai Matapalapala Fishing Expeditions during the 1998/99 Period*

Trip No.	Date	Catch Wt (lb)	Value (SAT)	Species
No. 1	13,14/10/98	176	264	Bottom fish.
No. 2	27,28/10/98	997.48	1645	Tuna.
No. 3	4,5,6/11/98	961.40	1276.55	Tuna.
No. 4	7.8,9,/4/99.	119	137	Tuna.
No. 5	20,22,23/4/99.	17 Trip was aborted due to engine problem		
No. 6	4,5,6/5/99	158	262	Tuna.
No. 7	11,12,13/5/99	1014	2623	Tuna.
No. 8.	29,30/6/99	958	2328	Tuna.
No. 9.	6,7,8,/7/99	360	878	Tuna.

Future Activities

- Conduct Trial fishing for sashimi Markets.
- Provide training for the local fishermen on fishing gear and method.
- Provide training on fish handling, storage on board and quality control.
- Continue to conduct longline fishing trial with collaboration of ARMS

6. FISH AGGREGATING DEVICES (FADs)

Funds were provided for the purchase, construction and deployment of five new FADs during the 1998/99 financial year. Deployment was planned towards the end of the period as the boat (Tautai Matapalapala) was attending to other field activities. The deployment was all prepared to take place but poor weather conditions, plus a trip to Pago Pago to bring over a shipment of baby clams, prevented the operation. Most of the components for FADs construction are not available locally so they had to be ordered from overseas.

Future Activities

- Construction, deployment and monitoring of four new FADs.
- Conduct trials fishing around the vicinity of the devises to test the productivity

7. MOTORISED ALIA FISHERY

The Fisheries Division has discontinued the issuance of permits to locally registered fishermen using motorised fishing vessels for the Government fuel subsidy scheme as the scheme has ceased. The development of the motorised fishing industry prompted the ceasing of eligibility of fishers to fuel subsidies. During the period of 1998/99, no fuel rebate subsidy was issued.

8. FISHERMEN SAFETY AT SEA RADIO COMMUNICATION NETWORK

The Fishermen Safety at Sea Communication Network is one of the most successful and useful undertaking the Fisheries Division had added to its numerous achievements in the past recent years. The continuous services provided by the network had been very efficient. The boat owners and fishermen have come to appreciate the services provided by the Network, not only on the safety of the fishermen but monitoring of the fleet movement daily weather forecasts and fishing ground conditions. With the availability of free communication they are well advised of the arrival time and be informed immediately should the vessels have problems while fishing. At present there are more than 300 fishing boats and boat owners having access to and utilizing the System.

Incidents of various nature have been assisted by the Base. This include arranging assistance from other fishing boats, communicating of navigational and mechanical advise and coordinating of search and rescue missions.

Future Activities

- Continue to provide the vital service to the fishermen/boat owners.
- Upgrade the System to minimize line congestion and put proper control on the use of the system.

9. LOCAL FISHING BOATS REGISTRATION

A total number of 32 fishing boats registered for the 1998/99 financial year. This is only a little more than 10% of the total estimated fleet, and a huge reduction from the previous year's figure of 173 boats.

A change in the responsibility from the Fisheries Division to the Ministry of Transport (MOT) for the survey of local fishing boats on the safety requirements before registration has created some unforeseen problems. The MOT regulation for Small fishing boats came into effect in the beginning of 1999. The requirements in the new safety regulation far exceeded what was originally required when the inspection was with Fisheries Division. Skippers and crew are also needed to be certified for safety and these have really slowed down the process. To issue a registration certificate, a boat owner has to present a safety and sea worthiness certificates from MOT and pay a fee of $200 for boats less than 15 metres and $5000 for vessels 15 metres and over.

Future Activities

- Maintain all records of registered local fishing boats.
- Liase with the Ministry of Transport on safety issues for vessel registration.
- Liase with the Police Department on enforcement of Fisheries regulations

10. SURVEILLANCE AND REGISTRATION OF FOREIGN FISHING BOATS

The surveillance and monitoring of the Fish Market and the Fugalei market for the sale of under-sized and prohibited fish species continued during the year.

Offshore surveillance were carried out jointly with the Police Department on their patrol boat *Nafanua*. A boarding team consisting Fisheries and Police Officers boarded a licensed Foreign fishing vessel that called into Apia harbour during the year. After an investigation, the team discovered that it had infringed the Terms and Conditions of the licensing agreement. The boat belongs to an American Samoan company, Faivaimoana Fishing Co.Ltd. It was released with a strong warning without penalty.

The aerial surveillance had been conducted by the Australian and New Zealand Royal Air Forces. There were no illegal fishing reported in our fishing zone during the year.

Only one foreign fishing vessel was licensed to fish in our EEZ during the year. The vessel, called Faivaimoana, belongs to an American Samoa fishing company known as Faivaimoana Fishing Co Lt.d.. The current license expires on 31 December 1999.

Future Activities

- Continue to monitor the sale of under-sized fish and prohibited fish species at the Fish Market and Fugalei Market.
- Cooperate with the Police on the off shore surveillance.
- Participate in aerial surveillance when required.
- Maintain good record of the Foreign fishing vessel licensing

11. FISH MARKET

The Apia Fish Market continued to operate under the management of the Fisheries Division in 1998/99. The daily operation involved the management and maintenance of the open side of the market for the general public to trade their fishery products. The market operates seven days a week and opens to the public from 0600 hrs to 1800 hrs every working day including Saturdays (sometimes) and 0500 to 0900 hrs on Sundays.

The Fish Market staff consists of a manager, 2 full-time staff and 3 casual workers who assist in the collection of rents and enforcing fish and invertebrates size limits regulations. The manager is responsible for the general administration and the management of the Fish Market. Apart from rent collection, the staff and casuals assist in the cleaning and the hygienic conditions of the Fish market..

11.1 REVENUES GENERATED FROM THE FISH MARKET

During the year, a total of SAT 76,087 was generated, based on the SAT 4 and SAT 5 per block occupied per day. This gives an average of about SAT 6,340 per month or SAT 1,417 per week. This accounts for approximately 1,537 sellers per month using the fish market for trading fishery products. Table 22 presents the summaries of the total revenue collected per month for the period of 1998/1999.

Table 22. *Monthly summary of revenues generated from the Fish Market through block renting.*

Months	**Total Revenue** (*SAT*)	**Weekly Avg** (*SAT*)
July 1998	$7,235.00	$1,808.75
August 1998	$6,975.00	$1,152.25
September 1998	$6,907.00	$1,726.75
October 1998	$7,421.00	$1,855.25
November 1998	$6,556.00	$1,639.00
December 1998	$5,142.00	$1,285.50
January 1999	$5,483.00	$1,370.75
February 1999	$5,144.00	$1,286.00
March 1999	$6,612.00	$1,653.00
April 1999	$6,198.00	$1,549.50
May 1999	$6,715.00	$1,678.75
June 1999	$5,699.00	$1,424.75
Total	***$76,087.00***	***$1,417.71***

Future activities

- Continue the daily operation, management and the general management of the market
- Continue collecting revenues from block renting
- Assist in the monitoring of size limits regulation on fish and invertebrates offered for sale

12. MECHANIC WORKSHOP

Although the motorised fishing industry has significantly developed, the Mechanic Workshop of the FD continued to provide services in outboard engine repairs. The service cost to local fishers is SAT20 per repair work regardless of the magnitude and nature of the job. In addition, the Mechanic workshop also provided other services such as providing the crane for lifting up repaired boats.

The bulk of repair works in 1998/99 was dominated by high-powered engines in the ranges of 30-120 HP of the brand Mecury, Yahama and Suzuki. The increases in distance travel, frequent fishing trips, poor maintenance and over-loading are possible parameters contributing to the breakdown of engines.

13. VECHICLES

The Fisheries Division continued to use the four pickup vehicles, donated by the USAID in 1991, for its activities during 1998/99 period. Six more vehicles, donated by the AusAid last year, were also transferred to the FD and were used during the mentioned period. All vehicles are in good condition and were extensively used for the Division's operation on both Upolu and Savaii Islands. Two vehicles are based in Savaii and eight are based in Apia and more details are given in Table 23.

Table 23: Details on Fisheries vehicles use during the 1998/99 period.

Vehicle No.	Location / Base	Type & Model	Year	Funding Source	Remarks
9031	Asau	Isuzu SC	1991	USAID	Village Extension
10035	Apia FD	Suzuki	1996	AusAid	Communities Advisory
10036		Suzuki	1996	AusAid	Services
10040		Suzuki	1996	AusAid	
9029	Apia	Isuzu	1991	USAID	Fisheries surveys, Resources
10038	Aquaculture	Single cap			Assessment,
10037	Research,	Toyota DC	1995	AusAid	Fisheries reserve assessment
	Assessment	Suzuki	1996	AusAid	Giant clams, Fish farming
	Statistics				
9479	Apia	Isuzu SC	1991	USAID	Exploratory fishing trials,

10037	Exploratory fishing	Suzuki	1996	AusAid	Safety at Sea, Vessel Inspection, Fishing training, CF-MAC
9030	Apia Fish Market	Isuzu DC	1991	USAID	Market management and maintenance

14. TRAINING AND WORKSHOPS ATTENDED BY STAFF

During the 1998/99 period, several Fisheries staff had the opportunities to undertake further training in their field of work both locally and overseas. These long, short and on-going training were made possible through financial assistance provided by various funding agencies. Five staff have continued to undertake degree and Diploma courses at USP, Fiji for three years and anticipated to complete within the timeframe allocated. Training was ranging from three years to few weeks in duration as given in Table 24.

During the period, a series of local workshops on fish and invertebrates size restrictions, Nile Tilapia maintenance and management were conducted in selected areas to further enhance understanding of these to assist in the enforcing of these policies??. Furthermore, several staff from the Research, Development and the Extension Sections attended various appropriate training courses overseas to further their understanding with respect to their line of work.

Table 24: Summary of training courses and workshops attended by Fisheries Staff in 1998/99

Course	Period	Location	Duration	Attendees	Sponsors
4th Technical Meeting on Aquaculture	Mar98	Fiji	1 wk	Atonio Mulipola	SPADP (II)
SCBA Diving Training	Jul99	Apia	3 wks	Pouvave Faineelelei Anne trevor Vaauli Tulitua Susau Siolo	Fisheries Division
Certificates in Ocean	Feb99-Jul99	Apia	4 months	Extension staff Research staff	AusAid
Fisheries Officer Extension Training	Feb99-Jul99	Nelson, NZ	6 months	Tavita Sasi	SPC
Degrees & Diploma	Feb98	Fiji, Suva	3 years	Malama, Mikaele, Joe, Nofo & Tauvae	AusAid
Seaweed Workshop	Jun99	Suva, Fiji	1 wk	Iulia Kelekolio	SPADP(II)
Giant Calms Maintenance	Jul99	Upolu & Savaii	2 days	Villagers	AusAID/ Fisheries
Deep-sea & Coastal Technology	Aug99	Korea	1 month	Mamoe	KOICA
Community Based Resources Workshop	Jul99	Suva, Fiji	1 wk	Autalavou	MSP-MRAG
Seaweed Demonstration	Jul99	Saluafata, Mulifanua & Asau	1 wk	Research, Extension & Villagers	Fisheries Division & SPADP(II)

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- Government of Australia (AusAID)
- Food and Agriculture Organization (FAO)
- Forum Fisheries Agency (FFA)
- South Pacific Aquaculture Development Project (SPADP)
- Secretariat for the Pacific Community (SPC)
- United Nations Development Program (UNDP)
- Japan International Cooperation Agency (JICA)
- Korean Organization for International Cooperation Agency (KOICA)
- South Pacific Regional Environment Program (SPREP)
- University of the South Pacific – Marine Studies (USP)

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Finally thanks go the AusAID project staff and all the Fisheries staff for the tremendous efforts put in throughout the 1998/99 period which has brought Fisheries to where it is at present.

May God bless you all. Faafetai lava

Ueta Fa'asili
ASSISTANT DIRECTOR-FISHERIES