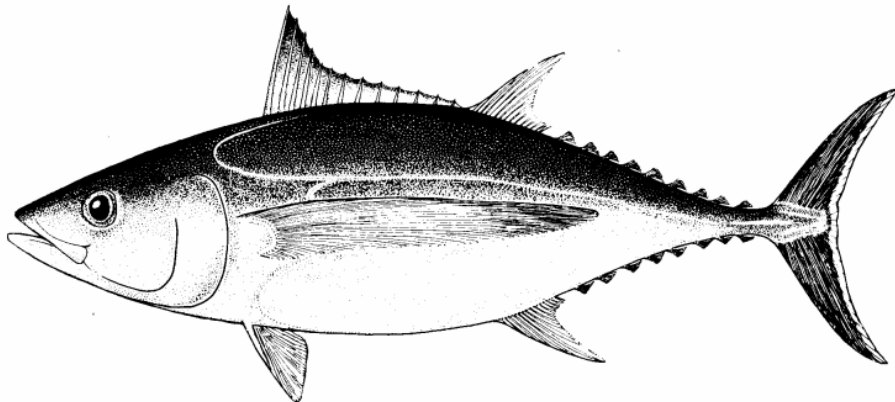




SCTB17 Working Paper

NFR-23

Samoa Tuna Fisheries Report



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1. Background

Fisheries play an extremely important role within Samoa's economy. The tuna longline fishery in recent times has been the major export earner in the country, with exports of 4633 t in 2002, worth an estimated SAT\$31.6 million (Watt & Imo 2003). This was a considerable increase from exports of 2,092 t in 1996, worth an estimated SAT\$13.8 million (Su'a & Watt, 2000).

The main species targeted are large (>15 kg) albacore, while large (>20 kg) yellowfin and bigeye tunas are of less importance. The composition of the tuna longline catch in Samoa is approximately 79% albacore, 3% big eye, 8.6 % yellowfin and 9.4% by-catch. These estimates are determined from port sampling and data from fishing vessel logsheets.

Most of the tuna longline fleets in the Pacific Island countries target higher value large yellowfin and big eye for export to the sashimi markets in the United States and Japan. In Samoa, as the majority of the catch is albacore and there is a ready market at the two canneries in Pago Pago. An estimated 3700 metric tonnes of albacore were exported frozen to the two canneries while 933 metric tonnes of fresh chilled fish including big eye, yellowfin, mahi mahi, wahoo and albacore were exported air freight to Hawaii and the United States mainland in 2002.

2. Fleet Structure

The fleet structure of the Samoan fleet fluctuated in recent years mainly due to the changes in the alia fleet. These fluctuations are due to the versatility of the alia design that can enable it to change from longline to bottomfish gear in a few hours.

Retrospectively, it is always difficult to calculate a reliable estimate of the vessels active in each class category in the earlier years of the fishery (from 1990 – 1999) since the Tuna Management Plan (TMP) just came into effect in 2000. The total number of vessels in the fleet as reported by Su'a and Watt (2000) to SCTB14 from 1994-2000 is the best estimate to date of the earlier years of the fishery.

The TMP categorized the fleet initially into four length categories, and in 2002 introduced another category to cater for the introduction of larger vessels coming into the fleet.

The annual variations within each category became easier with the conduction of daily visual boat counts.

Table 1. Breakdown of active domestic longline vessels from 2000-2004 in each class category.

Year	Class A (>11m)	Class B (>11-12.5m)	Class C (>12.5-15m)	Class D and E (>15m)
2000	119	20	9	6
2001	116	14	8	11
2002	31	15	8	14
2003	6	4	5	9
2004	2	1	5	9

From 2000-2004 there was a dramatic decline in the number of vessels actively fishing especially in the alia category. This was seen as a direct result of the low catch rates that prevailed from 2002 onwards where vessels have found fishing uneconomical.

3. Annual catch estimates by the domestic fleet

3.1 Annual catch estimates for 1999–2003

Table 2. Annual catch estimates (metric tons) for the main species by the domestic fleet, 1999–2003 (based on port sampling and other sources).

Species	1999	2000	2001	2002	2003	Grand Total
ALBACORE	4027	4067	4820	4222.869	2252.964	19389.833
YELLOWFIN TUNA	681	1120	470	368.953	292.588	2932.541
BIGEYE TUNA	283	177	185	136.995	110.035	892.03
WAHOO				78.485	41.133	119.618
DOLPHINFISH				92.041	52.695	144.736
SKIPJACK TUNA				114.398	69.412	183.81
BLUE MARLIN				25.296	9.472	34.768
GREAT BARRACUDA				10.536	13.415	23.951
BROADBILL SWORDFISH				13.432	1.438	14.87
SAILFISH				13.874	0.219	14.093
BLACK MARLIN				10.51	0.018	10.528
SUNFISH					1.746	1.746
SHORTBILL SPEARFISH				1.639		1.639
DOGTOOTH TUNA				1.36	0	1.36
STRIPED MARLIN					0.785	0.785
SILKY SHARK				0.48		0.48
BIGEYE BARACUDA				0.269	0.131	0.4
SOUTHERN BLUEFIN TUNA				0.208		0.208
BIGEYE THRESHER SHARK				0.181	0	0.181
RAINBOW RUNNER				0.02		0.02
TOPSAIL DRUMMER				0.045		0.045
Grand Total	4991	5364	5475	5091.591	2846.051	23767.642

Source: 1999 – 2000 data was from Sua and Watt (2000). Mulipola quoted the value of the catches for 2001 to SPC in March 2002. Data from 2002-2003 were obtained from the Samoa Fisheries database port sampling data.

The Samoan fishery is known for the high amount of catches that it accumulates on a yearly basis compared to adjacent countries that have larger EEZ's. The three main species caught in the fishery is albacore, yellowfin and bigeye tuna.

Sua and Watt (2000) alluded to this fact in their report to SCTB 14, that the fishing fleet in Samoa mainly target albacore. This again is reiterated when looking at the quantity of albacore that has been caught from Samoa's EEZ from 1999-2003 (Table 2). The difference in the total quantity harvested between albacore and the yellowfin, the second most abundant species is 85%.

Large quantities of albacore were harvested in the early years of the fishery. The abundance of the albacore in the early years could be attributed to longline fishing being relatively new to Samoa and resident albacore stocks quantities are high.

3.2 Size distribution of catches by the Samoan fleet 2001- 2003

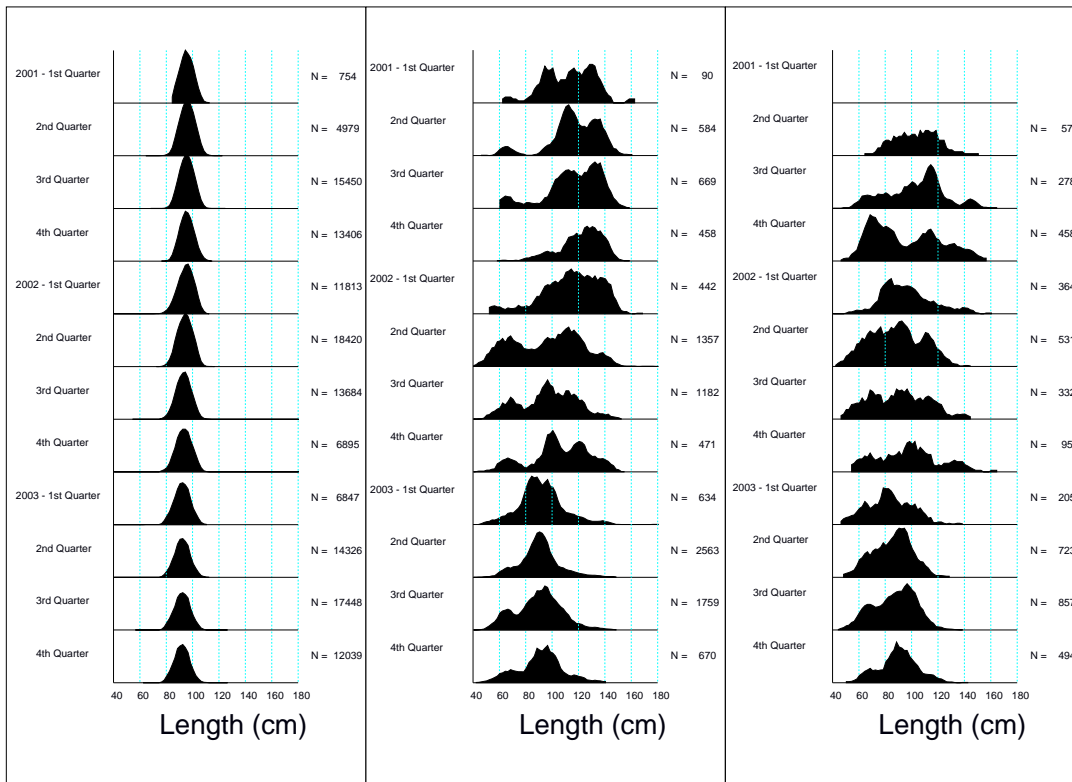


Figure 5. Quarterly size composition of the longline catch (left–albacore; middle–yellowfin; right–bigeye)
 (Source: Samoa Fisheries Port sampling programme)

The structure of the population of albacore typically reflects the common structure in subtropical fisheries. The decrease in the mode in 2001 from 95 cm to 92 cm in 2003 suggests a decrease in the average length of the albacore sampled. For yellowfin and bigeye there is a wide range of sizes depending on interannual and to some extent seasonal variability in size. There is evidence of modal progression in some of the months for YFT (e.g. 60cm 1st quarter of 2001 to 120cm 1st quarter of 2002). Three modes are clear from the 4th quarter 2002. Interestingly enough large modes (yellowfin > 120cm) that appear 1st quarter of 2002 do not appear in the catch in 2003. Bigeye tuna are smaller in 2003 although tropical longline fisheries catch larger fish of this species (120-140cm) in general.

3.3. 2003 domestic longline catch by vessel class

Table 3. Composition of catches by the Samoan tuna fleet in 2003.

SPECIES	A	B	C	DE	Grand Total
ALBACORE	88.255	120.772	605.594	1438.343	2252.964
YELLOWFIN TUNA	15.305	25.393	84.423	167.467	292.588
BIGEYE TUNA	3.369	7.542	21.826	77.298	110.035
SKIPJACK TUNA	8.242	6.48	18.669	36.021	69.412
DOLPHINFISH	3.109	4.544	13.599	31.443	52.695
WAHOO	2.695	4.06	11.345	23.033	41.133
GREAT BARRACUDA	1.677	2.284	4.712	4.742	13.415
BLUE MARLIN	0.241	0.898	4.384	3.949	9.472
SUNFISH	0.049	0.369	0.561	0.767	1.746
BROADBILL SWORDFISH	0	0.296	0.528	0.614	1.438
STRIPED MARLIN		0.111	0.104	0.57	0.785
SAILFISH	0.035	0.044	0.085	0.055	0.219
BIGEYE BARACUDA	0.048	0.03	0.029	0.024	0.131
BLACK MARLIN	0	0	0.004	0.014	0.018
Grand Total	123.025	172.823	765.863	1784.34	2846.051

Trends and species composition does not vary much from composition of overall catches over the years. The main species that is caught are the four commercially important species of tuna albacore, yellowfin, bigeye and skipjack.

Occasionally some of the commercially important tuna species finds its way to the local market if exporters rejected it. Most of the other species in the table frequently find their way to the fish market either as fillets or fish and chips.

Some hotels and local restaurants regularly place orders to the owners of larger vessels for the species of fish that they require. A famous hotel in Apia for example, is understood to order only dolphin fish for its restaurant.

3.3 Exports

2002-2003 has been a difficult year because of low catches for many fishermen in Samoa. The albacore catch rates have declined dramatically leaving many fishermen wondering about their future.

Reports from SPC suggests that abundance (CPUE) show strong correlations to some oceanographic conditions. Langley (2004) reports that catch rates of albacore in other domestic fisheries (e.g. Fiji and Tonga) have been related to oceanographic conditions and lower catch rates have been attributed to higher sea surface temperature and lower frontal activity (currents and eddy features). Furthermore, the report states that in 2002 and 2003 seasurface temperatures in the Samoa EEZ were significantly higher during the main fishing season. Similarly altimetry data (seasurface height anomalies) indicate a lower level of frontal activity during the same period. These factors may explain the low catch rates during the same period. The time series of oceanographic data and catch effort data is too short to determine the frequency of these low catch events.

A comparison of fish exports shows that there is a sharp decline in exports in 2003 compared to the same months in 2002.

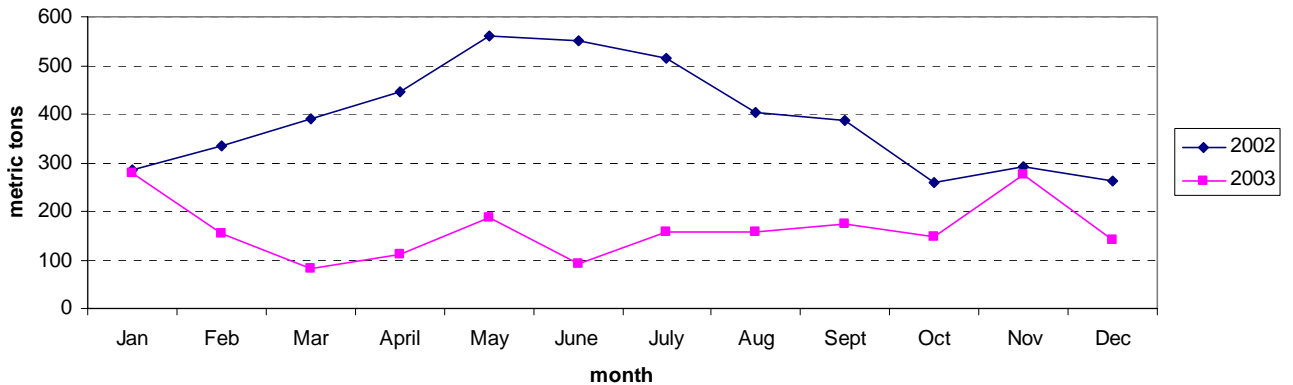


Figure 6. Monthly Exports (all species) for the domestic longline fishery, 2002–2003

Table 4. Species composition of longline-caught fish in 2003

Yr	SPECIES	MT	\$	kg	%
2003	ALBACORE	1846.569	14289989	1846569	89.7
	YELLOWFIN TUNA	94.752	1311649	94752	4.6
	BIGEYE TUNA	42.878	591324	42878	2.1
	WAHOO	32.001	442519	32001	1.6
	DOLPHINFISH	16.583	229026	16583	0.9
	YELLOWFIN/BIGEYE MIX	7.46	98652	7460	0.4
	BROADBILL SWORDFISH	7.135	99792	7135	0.3
	MOONFISH	5.661	78383	5661	0.3
	ALBACORE/YELLOWFIN MIX	4.23	55938	4230	0.2
	MOONFISH/OILFISH MIX	0.446	5898	446	0.02
	WAHOO/DOLPHIN/MOONFISH MIX	0.418	5532	418	0.02
	POMFRET	0.142	1986	142	0.006
	SHORTBILL SPEARFISH	0.118	1566	118	0.005
	TREVALLY	0.004	31	4	0.0002
	RAINBOW RUNNER	0.001	7	1	0.0004
	Total	2058.398	\$17,212,292	2058398	100

Source of data: Provisional exports form and the Seafood Safety Verification forms for 2003.

Data in Table 4 includes on data from fish pelagic fish exported in 2003. The data in use was extracted from the Fisheries database reports.

COMPOSITION OF PELAGIC FISH EXPORTS 2003

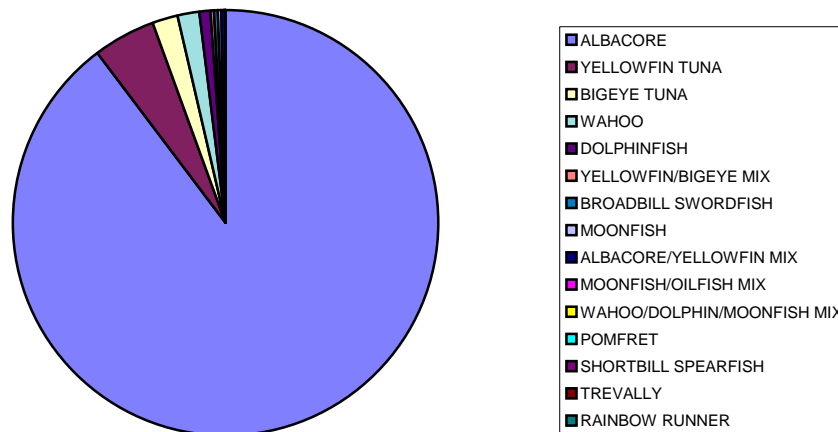


Figure 7. Species composition of exports from the longline fishery, 2003.

The exported figures for 2003 suggests that more than 87% of fish exports were albacore, a majority of these would presumably be frozen albacore that were sent to the canneries.

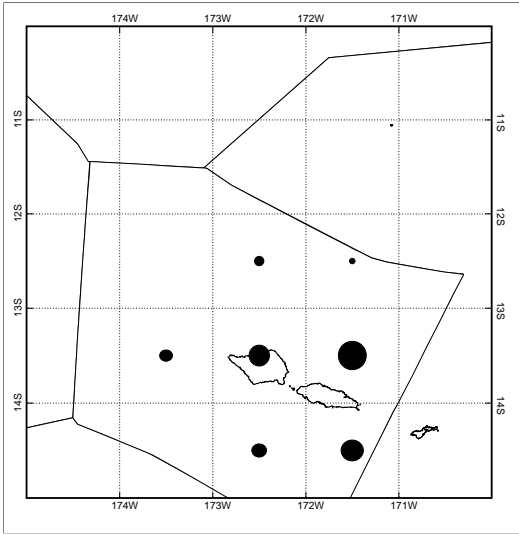
4. Distribution of catch by vessel class in Samoa's EEZ for 2003.

The distribution of effort as depicted in Figure 8 suggests that Class C, D and E deploy more hooks and travel further from shore on their fishing trips. The major factor that separates the effort of the alia from larger vessels is that larger vessels have a higher carrying capacity for ice and sufficient storage for catches.

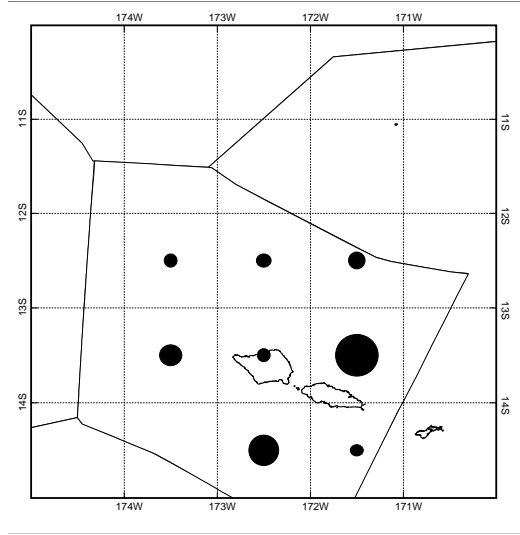
In 2003, it was noted from our boatcounts that the number of alia has declined dramatically. Various efforts by Samoan Government have been put into place to revive the alia fleet but its effect on the fleet will only become clear in next few years.

In Samoa, vessels more than 12.5 m (i.e. Class C-E) are prohibited to fish 50 miles from shore. The distribution of effort for 2003 (Figure 8), suggests that some alia are still venturing out beyond 50 nm. This highlights that alia owners/skippers getting desperate for a good catch are venturing dangerously out beyond the limits of the alia.

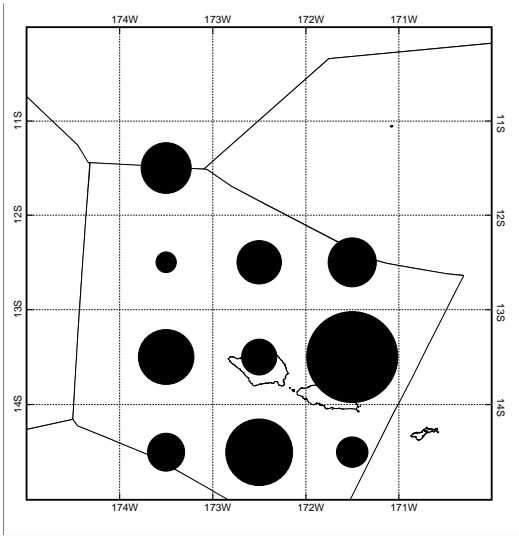
It must also be noted that a single vessel in Class E owned by a local also periodically fish in the Tokelau EEZ and offloading to their headquarters in Apia, this could explain the large proportion of effort that appears on the boundary of Samoa and Tokelau in the north. Some of the larger vessels that have acquired fishing licenses to fish in the Cooks offload all of their catch to American Samoa.



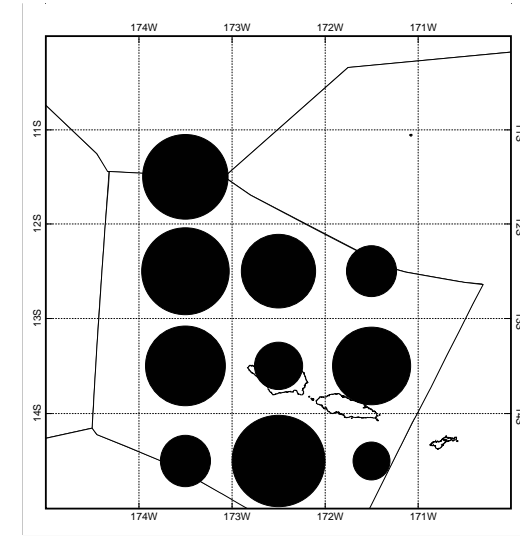
Class A (<11m)



Class B (>11m - 12.5m)



Class C (>12.5m - 15m)

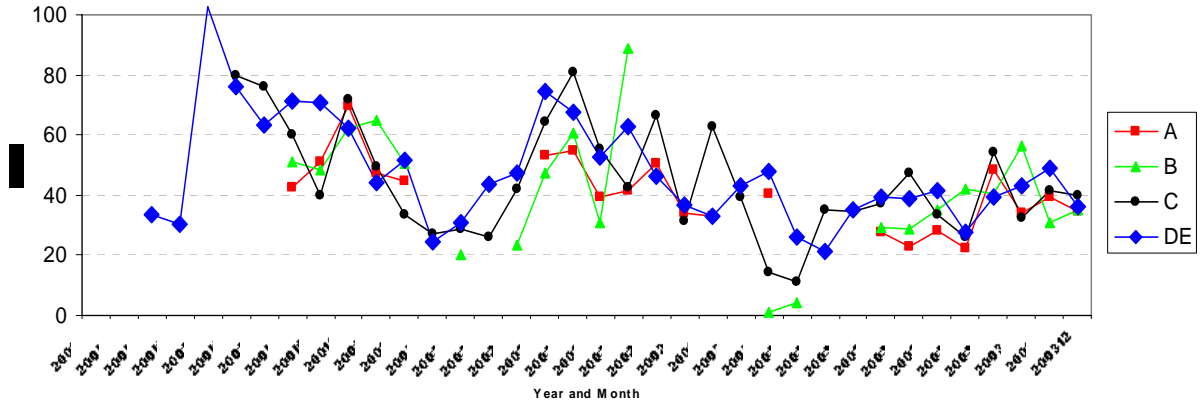


Class D and E (>15)

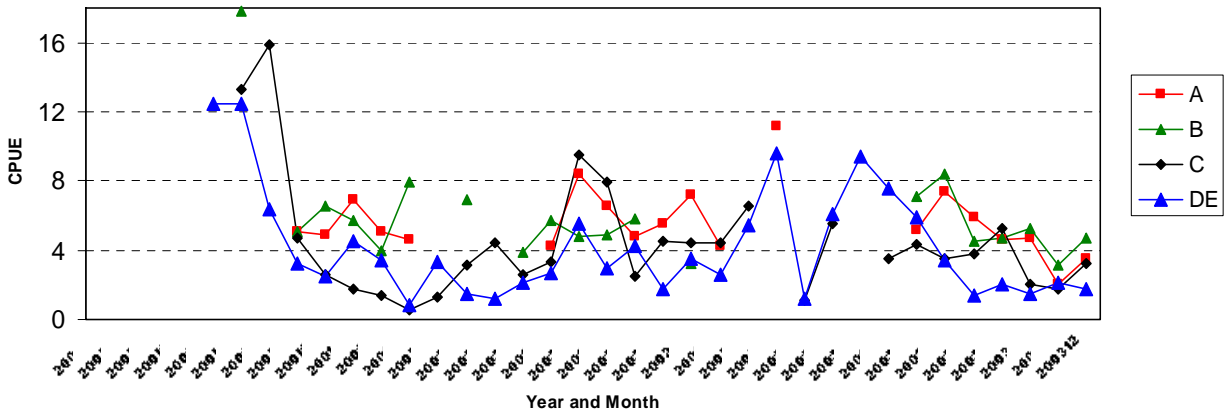
Figure 8. Distribution of effort (100s of hooks) by vessel class in 2003 in Samoa's EEZ.

5. Longline Fishery catch rate trends

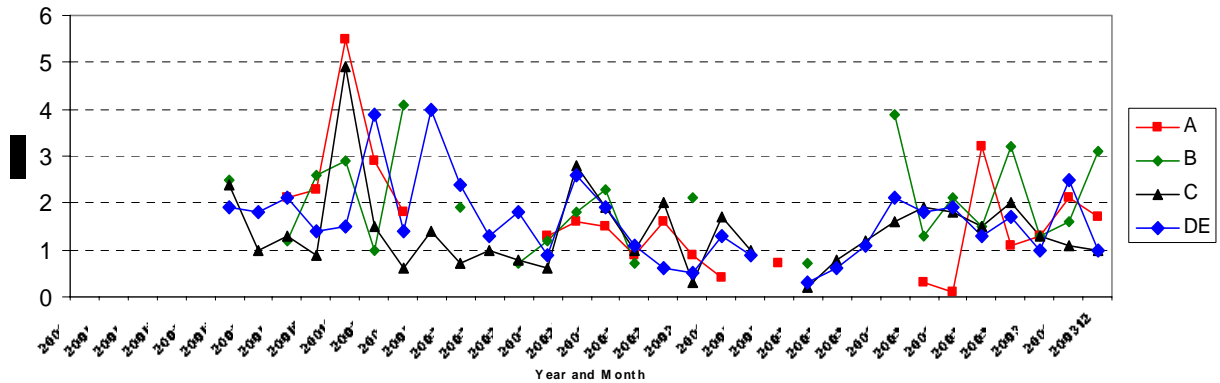
Figure 9. Nominal Catch Rate Trends by vessel class (2001 – 2003). (Source Samoa Fisheries Database: Port Sampling Data.) (monthly effort < 2,000 hooks were excluded)
a. Albacore Tuna



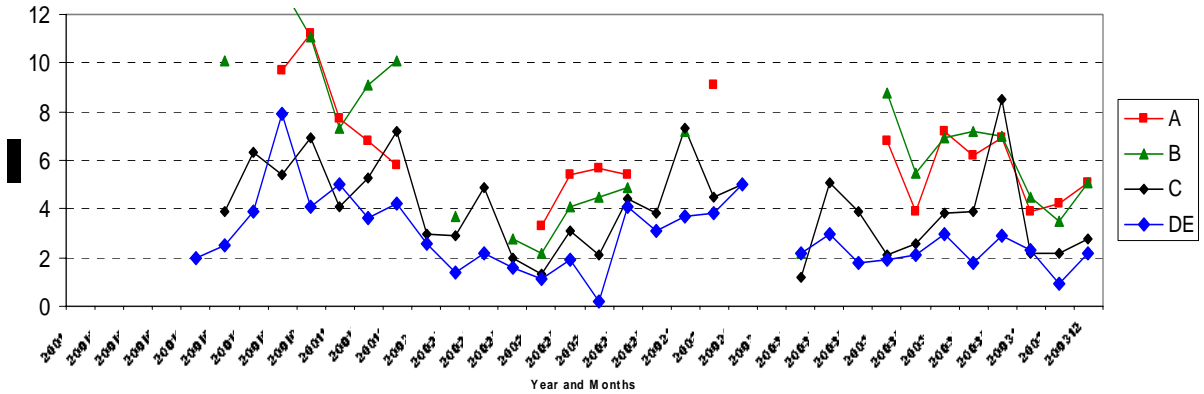
b. Yellowfin Tuna



c. BET Tuna



d. Others (by catch)



The catches for different vessels for each species reported were scanned to remove outliers which is why catch lines appear disjointed in Figure 9. In any month where the coverage for port sampling, was below 10%, that data point was removed from the analysis, as it would unnecessarily mask the true value of the catch in months that sampling coverage was high. When the trendlines (not shown) for each species is applied, it generally shows catches to be decreasing (2001-2003).

Interestingly, Class A (alia) has very high catches for all species including by-catch. Because of the small size of the alia they cannot be fitted with shooters, so most sets are often shallow. This may be the reason why Class A do not catch a lot of albacore in comparison to other classes.

Because alia outnumber the larger vessels in the fleet, coupled with the fact that they can do shorter trips and take less time to prepare, they may actually catch a lot more fish as collectively reflected in Figure 9. Generally because of their small size they have smaller capacity to carry ice, hence, few of the fish that they catch would actually be exported compared to larger vessels that have a greater ice capacity.

6. Monitoring Activities

6.1 Port Sampling

Port sampling started in Samoa in the late 1990's this was a project started by SPC (Procfish) and has provided the most reliable data to estimate total catch of the fleet. More importantly port sampling data provides the basis of data collection from Class A vessels. Logsheets provided by alia fishermen were unreliable hence they were excluded from data entry, and the practice of distributing and collecting logsheets from Class A vessels were discontinued.

Table 7. Summary of Port Sampling Activities (longline vessels) for 2003.

Month	CLASS A			CLASS B			CLASS C			CLASS D/E		
	Boats	Cov1	Cov2	Boats	Cov1	Cov2	Boats	Cov1	Cov2	Boats	Cov1	Cov2
Jan	19	71%	7%	3	71%	7.80%	6	71%	9.40%	11	71%	2.60%
Feb	2			4	92.90%	14.70%	4	92.90%	208.50%	11	92.90%	34.30%
Mar	2			2			6	93.50%	90.50%	11	93.50%	97.60%
Apr	1			1			6	100%	160%	11	100%	113%
May	1	77.40%	9.20%	1	77.40%	13.50%	6	77.40%	41.40%	11	77.40%	54%
Jun	2	76.70%	14.10%	2	76.70%	48.30%	7	76.70%	26%	11	76.70%	56.40%
Jul	4	77.4	62.2	6	77.40%	84.80%	8	77.40%	42.40%	12	77.40%	37.10%
Aug	5	71%	51.20%	4	71%	69.40%	8	71%	68.50%	11	71%	87.80%
Sep	3	76.70%	153.30%	5	76.70%	39%	7	76.70%	46.60%	12	76.70%	74.80%
Oct	4	58.10%	71.90%	4	58.10%	27.60%	5	58.10%	48.20%	8	58.10%	55.10%
Nov	6	73.30%	62.50%	5	73.30%	34.80%	6	73.30%	49.40%	9	73.30%	45.90%
Dec	5	38.70%	27.60%	5	38.70%	34.00%	6	38.70%	33%	8	38.70%	43%

Cov 1 – Coverage of boat census.

Cov 2 – Coverage of port sampling.

The effectiveness of the work of the port samplers is judged according to its coverage of the fleet every month. This coverage is also reliant on daily visual boatcounts. However, it should be mentioned here that boat counts cover the whole of the Apia area while the port samplers only sample boats unloading at the fisheries wharf. To their advantage, the effort from the wharf is almost 99% of the total amount of hooks that are deployed by the Samoan fleet (Imo, 2003).

6.2 Data collection

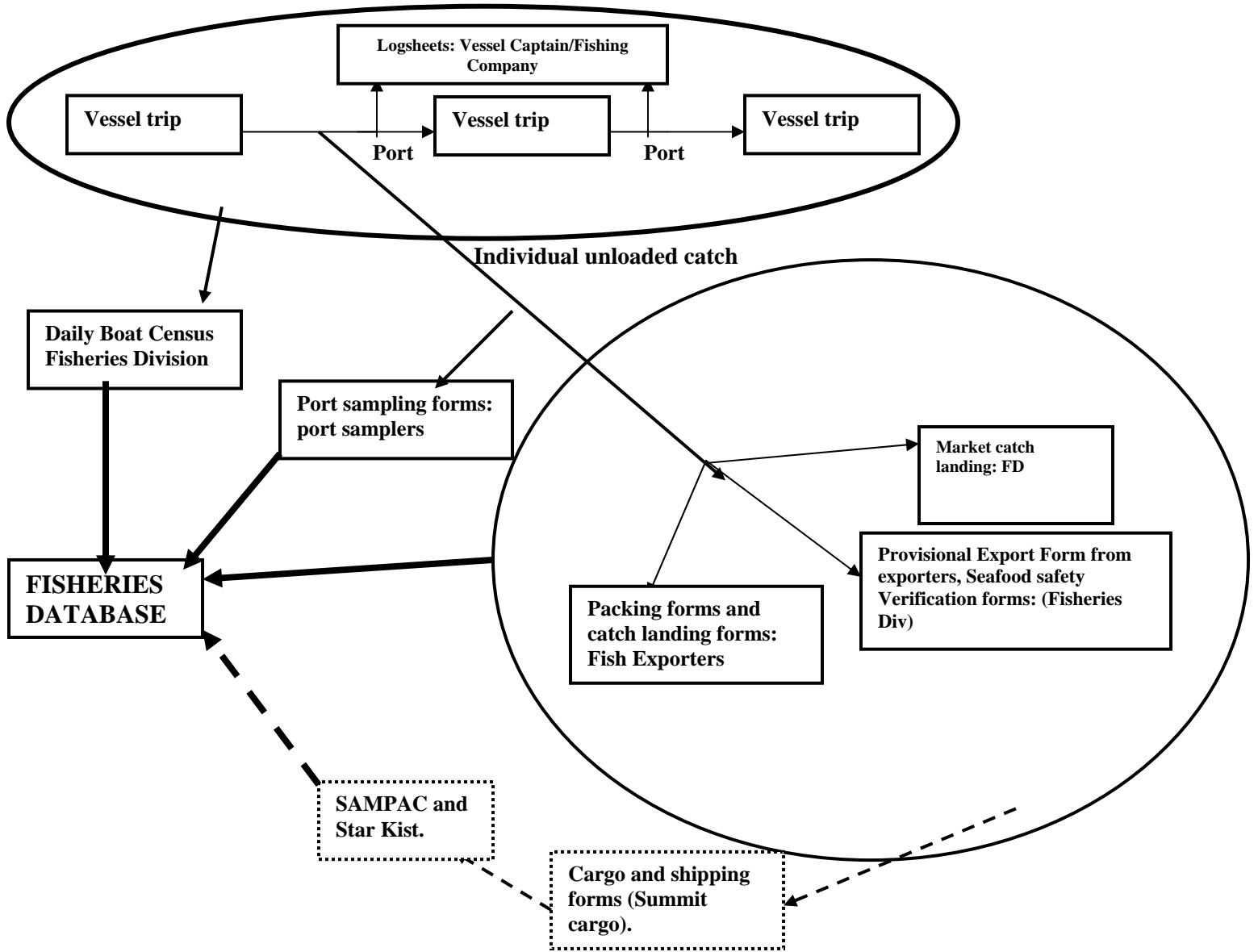
6.2.1 Statistics Section

The Statistics section of the Samoa Fisheries Division is where fisheries data is recorded. It has four data entry personnel however two are assigned to enter all of the offshore data. Sources of data include, portsampling, fish exporters, visual boat counts, logsheets, catch landing (exporters) and the provisional export form from Central Bank (refer to section 2.2.2 for more information).

Although the Samoa Fisheries statistics section also deal with data from inshore areas, aquaculture and advisory services, the majority of the data is from offshore fishery. Most of the logsheets and other offshore related data are collected by the offshore fisheries section and then delivered to the data entry personnel for action.

The turnover of staff in the statistics section has made it difficult to achieve consistency in the quality of the data. SPC Statistics (OFP) has often had to step in to deal with some of the problems that have arisen in the past.

6.2.2 Flow of information from the Offshore Fishery



Note: The dotted lines represent data the Fisheries Division request for on an annual basis. Although the same information is presented on provisional export forms, these data allow the fisheries personnel involved to reconcile data from different sources.

7. Market Destination of catches

Most of the catches from the offshore fishery go to Los Angeles, Honolulu (freshchilled) while all the frozen catch goes to Pago pago to either the Star Kist cannery or SAMPAC. There was a shipment to Japan last year by one of the exporters where the initial returns were favorable.

The Fisheries Division with the blessing of the Government has been working towards having Samoa's fish gain access into the lucrative EU markets. A dossier containing all the relevant

documents of our new seafood safety system has been sent to EU headquarters and we are still awaiting a reply.

Since 2002, the Fisheries Act (1998) has been amended to provide legal basis for establishing Seafood safety systems. The authorities in Samoa have approved the Fish Processing and Export Regulations 2002 and Industry Agreed Standards. All of the exporters in Samoa have upgraded their quality systems to HACCP to assure trading partners that quality fish is consistently being exported from Samoa.

8. Onshore Developments related to the tuna fishery

There are currently plans to build a jetty to allow fishing boats to moor safely. This plan supported by the Government came about when the wharf was dangerously congested when the catches were low.

Part of the Government's plan to revive the alia fleet was to install ice making machines and FADs on strategic locations around the island where fishers can easily access. Presently two ice machines have been installed. Four FAD's have been deployed around Upolu and one is intended for Savaii in the next financial year.

In the month of June 2004, due to pressure from fishermen, the Government have agreed to provide nearly a million tala as a Disaster relief fund for the fishermen.

There are also plans to improve the data coverage from alia fishermen by subsidizing the cost of ice in return for reliable logsheets.

9. Tuna Fisheries Research Projects

The albacore tuna-tagging project started late 2002 and it's almost in its third year. This project was partly funded by SPC with most of the finance coming from PDF administered by FFA. So far there have been ten tagged fish but no recoveries. Coupled with the low catches and defective equipment, the staffs have struggled to tag many fish or recover the tags from the ten fish that have been released. In this financial year, the offshore fisheries section has revised the tagging project to make it more robust considering the tremendous influence of outside factors on the project.

10. References

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- 2. Sua, T and Watt, P., 2000. *Samoa National Tuna Fishery Report*. SCTB 14 Working Paper (NFR 12). Samoa Fisheries Division. Apia**
- 3. Langley, A., 2004. *The influence of oceanographic conditions on recent trends in catch rates from the Samoa Longline Fishery*. SPC Report. Noumea.**
- 4. Imo, R., 2003. *Effort of the Longline fleet*. Longline Fisheries Newsletter No 11. Commercial Fisheries Section. Apia.**