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A REVIEW OF SPC's DWFN CATCH COVERAGE IN THE SPC REGION

(Paper prepared by the Secretariat)

Since the commencement of the Tuna and Billfish Assessment Programme, the establishment of a regional data base for tuna catch and effort statistics has been the highest priority of the programme. An ongoing problem that has been raised in connection with the accumulation of the data base is the completeness of the data or the existence of major gaps in the data. The meeting of DWFN and coastal states held in June 1984 was convened primarily to address this question. Significant progress has been made in obtaining more thorough data coverage. The number of countries supplying data to the SPC has increased over the years and data has been added from local fleets. However, serious concerns and uncertainties remain about the adequacy and level of data coverage. For example, for almost all fleets, no data is supplied on activities within international waters in the SPC region. It is unclear if this represents a significant gap in the catch and effort statistics. While obviously such questions cannot be completely answered without access to more data, a number of analyses and cross-checks can be done with the available data being supplied to the SPC. One type of check involves comparing published catch statistics on total landings with all catch data reported on the SPC catch forms. Another involves procedures to estimate catch within gear types not being reported on the SPC forms. The purpose of this paper is to present these analyses so that the seriousness of the present data gaps can be rationally evaluated.

Reported Catch to SPC Versus Other Published Estimates

Tuna catch data abstracted from the 1983 FAO Yearbook of Fishery Statistics (Anon. 1984), adjusted to contain a common area bound by 20°N, 30°S and 130°E, 170°W; were compared to SPC tuna landings for this same region for the years 1979 through to 1982. Overall coverage of catch reported to SPC increased during this time period from roughly 21 percent in 1979 to 43 percent by 1982 (Table 1).

Comparing published reports compiled by Habib (1984) of Japanese purse seine catches with the SPC region catch reports show a substantial increase in coverage by the SPC, growing from 15 percent of the catch by these vessels reported in 1979 to 75 percent by 1982 (Table 2).

**Table 1.** FAO area 71 landings data, adjusted to exclude area outside of the SPC region, compared to SPC reported catch. Units are metric tonnes.

<u>Year</u>	<u>FAO Reported Catch</u>	<u>SPC Reported Catch</u>	<u>Percent SPC Coverage</u>
1979	242,927	51,672	21%
1980	291,822	100,993	35%
1981	290,266	105,851	36%
1982	289,430	128,918	43%

**Table 2.** Catch of Japanese purse seiners in the SPC region as reported by Habib (1984) compared with catch by Japanese purse seiners reported to the SPC. Units in metric tonnes.

<u>Year</u>	<u>Reported Catch</u>	<u>SPC Reported Catch</u>	<u>Percent SPC Coverage</u>
1979	37,066	5,801	15.6%
1980	39,740	17,390	43.8%
1981	54,291	27,549	50.7%
1982	93,415	70,728	75.7%

Taiwanese published statistics of longline catches in the SPC region compared to catches reported on the SPC forms ranged from less than one percent in 1980 to eleven percent by 1982. The published summaries are relatively complete and are now incorporated into the database, however, vessel positions are for five-degree squares. These vessels unload their catch within the region at the following locations (approximate percentages of landings given in parentheses, based on 1982 catches) : American Samoa (52%), Fiji (12%), Vanuatu (22%), and French Polynesia (14%).

#### Analysis of Internal Consistencies in SPC Daily Catch Forms

##### Total fishing trip length versus number of fishing days reported to the SPC

The date of departure and date of return to home port are given on the catch report forms supplied to SPC. Since all days within a country's EEZ are supposed to be reported, an indication of the completeness of our data can be achieved by comparing the total number of days reported versus the number of days that a vessel spends away from port, allowing for transit time spent not fishing. Japanese vessels were analyzed as their reporting is considered the most complete. Transit times to and from the fishing grounds were assigned to each trip individually, allowing for analysis at 10, 15 and 20 day transit times. Based on observer reports, round trip transit times rarely exceed 15 days between Japan and the SPC region and average around 11 or 12 days.

The raw values and percent coverage based on trip lengths and the various transit time allowances for the years 1982 - 1985 are given in Table 3. The least amount of coverage, within their respective categories, are with the group purse seine operations. For group seine operations, the range of worst to best plausible ways of interpreting how much of a trip the SPC covers is from 22% to 44%. Normal single seine operations include a much greater portion of the trip reported through SPC catch forms with a range of 67% to 91% of the entire trip. Pole and line reporting is somewhat less with a worst case to best case range of 29% to 67% during this time period.

**Table 3.** Percentage of days reported to the SPC versus individual total trip length, adjusted for allowing 10, 15, and 20 day periods for travel to and from the SPC region.

<u>Gear</u>	<u>DWFN</u>	<u>Year(s)</u>	<u>Number of Trip days</u>	<u>Number of Reported days</u>	<u>Av. Trip Length (days)</u>	<u>10d Travel % Cover</u>	<u>15d Travel % Cover</u>	<u>20d Travel % Cover</u>
<b>Single</b>								
Seine	Japan	1982	8188	4252	46	66%	76%	84%
"	"	1983	9181	4698	39	69%	81%	89%
"	"	1984	9895	5482	40	74%	84%	91%
"	"	1985	9658	4818	40	67%	78%	87%
"	Taiwan	82-85	2560	1641	66	69%	72%	76%
"	Korea	81-85	3429	1623	75	54%	58%	63%
<b>Group</b>								
Seine	Japan	1982	835	270	119	35%	37%	39%
"	"	1983	784	156	112	22%	23%	24%
"	"	1984	808	293	115	40%	42%	44%
"	"	1985	762	258	109	37%	39%	41%
<b>Pole &amp; Line</b>								
"	Japan	1982	20120	4802	54	29%	33%	38%
"	"	1983	18325	5680	47	39%	45%	53%
"	"	1984	13840	5309	45	49%	57%	67%
"	"	1985	10851	3871	50	45%	51%	58%

**Total catch per trip versus vessel storage capacity**

In order to cross check analysis of total trip reporting based on known trip length and the number of days actually reported, a procedure to estimate total reporting based on total catch per reported trip as a proportion of each individual vessel's storage capacity was developed. Again the test was only applied to Japanese vessels and of them, only purse seine vessels operating individually were considered. For pole and line and longline vessels, it is not reasonable to assume that a trip is not completed until the vessel is substantially loaded so they were not included. The procedure involved examining the total reported catch for an entire trip and categorizing the trips based on the degree to which the vessel was full. Vessels that had reported catches greater than 80 percent of their storage capacity were considered to have reported 100 percent of their trip. Trips with catches below this percentage were assigned to successively smaller categories of vessel fullness, from which trip coverage was calculated by individually weighted trips.

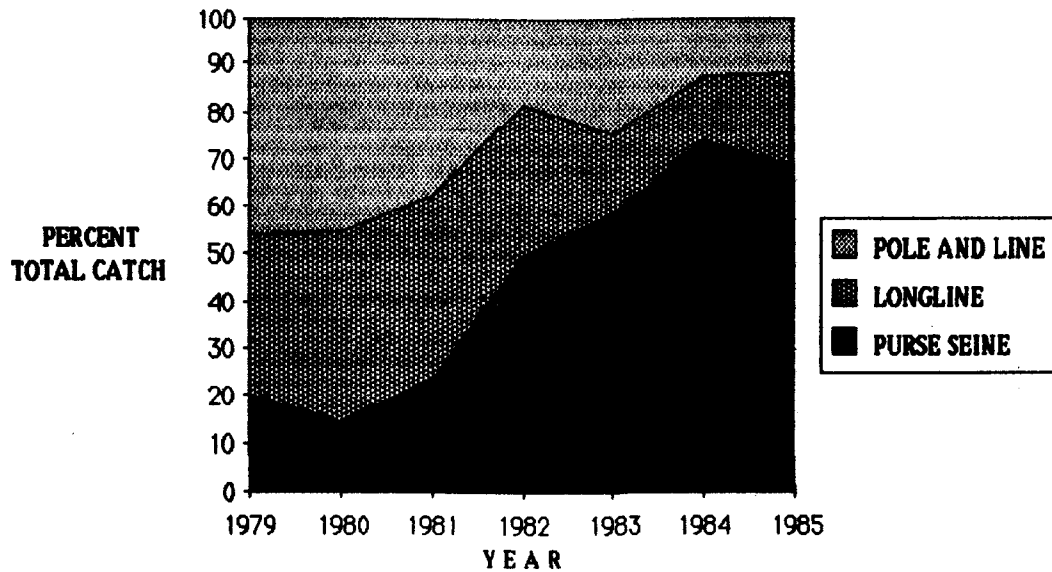
The results of SPC catch coverage based on vessel fullness are presented in Table 4. The estimated percent trip coverage measured by the degree of purse seine fullness fell within the ranges estimated by the number of days reported.

**Table 4.** SPC percent coverage of Japanese purse seine vessels based on the SPC reported catch per trip as a proportion of the vessels holding capacity.

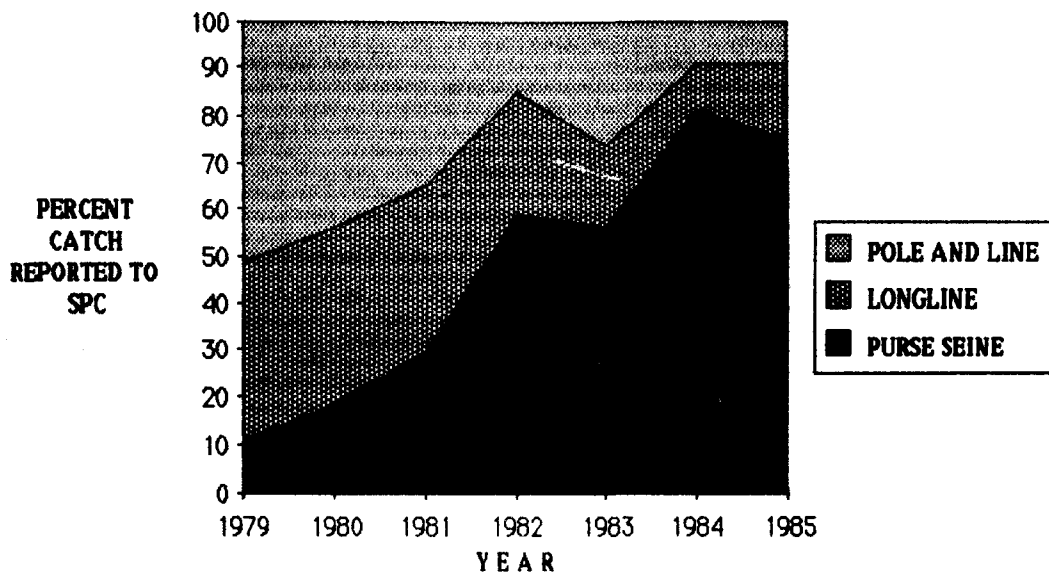
Year	Number of trips by fullness categories					Total Trips	Est. Percent Coverage
	>80% (Full)	80-60%	60-40%	40-20%	20-0%		
1982	107	29	21	14	9	180	79%
1983	123	29	27	26	24	229	72%
1984	171	31	21	20	8	251	84%
1985	113	45	34	26	31	249	69%

**Analysis of catch report coverage between fishing gear types**

In order to assess possible differences in catch reporting between different types of gear, total estimated landings were compared with SPC reported catch, each partitioned by gear type. The total landings were taken from published reports for the early years (Anon 1984) and estimated from catch coverage within the SPC database for the latter years. Relative proportions of total catch between gear types are illustrated in Figure 1. Figure 2 represents the relative proportions of the SPC reported catch by gear for comparison.



**Figure 1.** Proportion by gear type of total catch in the western Pacific



**Figure 2.** Proportion by gear type of catch reported to the SPC

Comparing the trends of the above two figures suggests that the SPC coverage has been relatively consistent between the three principal types of tuna fishing gear. Inferences between gear types, using the SPC data base, are thus of comparable reliability.

**Comparison of U.S. vessels within and outside of agreement areas**

Data supplied to the SPC directly by the ATA (American Tuna Boat Association) represent complete reporting of catches within the SPC region. According to the ATA, coverage of its members in their data is close to 100%. Positional information is given with the supplied catch statistics only for catches within the Micronesian and Polynesian agreement areas. For fishing activity outside these two agreement areas, the SPC knows whether it occurred east or west of the dateline. Less than 50% of the U.S. purse seine catch information is provided with positions (Table 5).

**Table 5.** Summary of purse seine data provided to the SPC from the ATA for 1984. Data with positions are from within the agreement areas and data without positions are from outside agreement areas. Catch units are in metric tonnes.

	<u>With Positions</u>	<u>Without Positions</u>
% of Total annual Catch	42%	58%
Avg catch/Day fishing and/or searching	14.6	19.6
Av. no. sets/Day fishing	1.30	1.14
% days spent searching	45%	32%
Set success rate	68.8%	82.9%
Av. catch per successful set	29.5	30.5

Catch rates of ATA purse seiners in 1984 were somewhat different between data reported from within the agreement areas and data outside these areas (Table 5). Differences may be due to fewer number of sets per day fishing, a higher success rate per set, and proportionately less time spent searching outside the agreement areas. Systematic differences of this sort may cause biased conclusions from analyses based on such data.

### Analysis of observer versus catch-form reported information

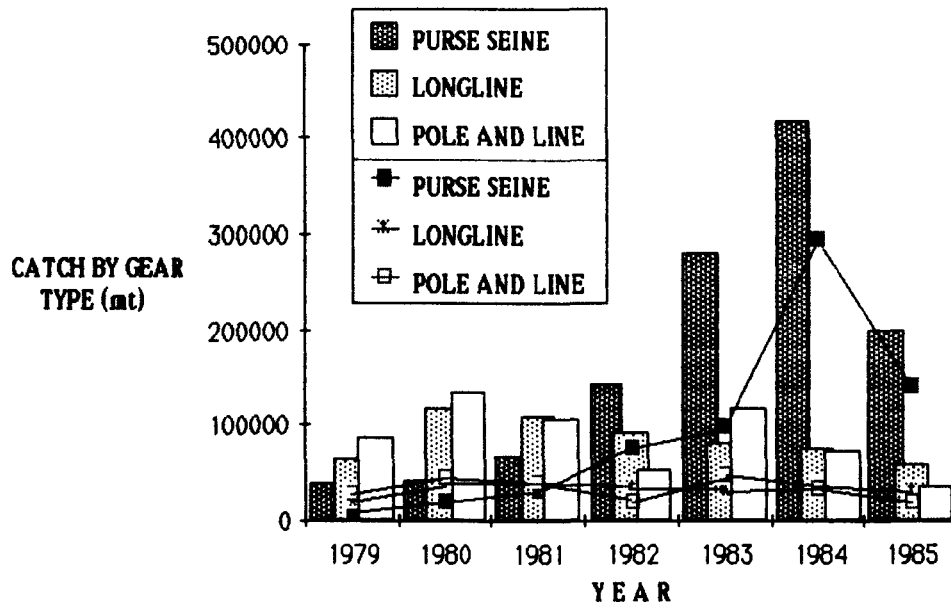
Analyses of the observer reported data have begun by comparing it with data reported to the SPC from logsheets filled out by distant water vessels. Direct comparisons were made between the two drawn from the same trip. Results of the number of days covered, catch, and species composition of the catch, are shown in Table 6. Clearly, the amount and quality of information reported by observers is higher, and as trip numbers accumulate, more analyses will be forthcoming.

**Table 6.** Summary of observer reported trips compared with the same trip as reported on the SPC daily catch report forms. Units of catch are in metric tonnes.

<u>Trip</u>	<u>Gear</u>	<u>Year</u>	<u>Reported Days</u>	<u>Trip Length</u>	<u>Days Fished</u>	<u>Skipjack</u>	<u>Yellowfin</u>	<u>Bigeve</u>	<u>Total</u>	<u>Catch/Day</u>
OBS	PL	85	57	57	46	82.2	2.5	10.1	94.8	2.06
LOG	PL	85	24	57	17	41	5	0	52	3.06
OBS	PL	84	48	48	27	-	-	-	194	7.19
LOG	PL	84	14	48	10	23	0	0	23	2.3
OBS	PL	85	23	23	15	178	0	0	178	11.8
LOG	----- N O T   R E P O R T E D -----									
OBS	PS	85	19	29	16	450	80	2	532	33.25
LOG	PS	85	6	29	6	130	20	0	150	25.0

### Discussion

The above analyses suggest that there are substantial amounts of fishing occurring in the western Pacific that are not being reported to the SPC. Based on the comparison with other published sources, available for the years up to 1982, the results suggest that recent SPC coverage ranges from around 30 to 45% for the entire DWFN fleet. Taking into account the proportion of non-reporting within trips for which we have data, the component of non-reporting for which no records at all are available, is highly variable between years, gear type, and nationality of the DWFN. Figure 3 shows the estimated catch by gear type in recent years and the amount of that catch that has been reported to the SPC.



**Figure 3.** Catch in metric tonnes by gear type, estimated totals (columns) versus amount reported to the SPC (line characters). Catches are from FAO area 71, central western Pacific, adjusted to include only data from within the SPC region.

The purse seine catch data supplied by the ATA are for 1984 and 1985 only. Consequently, the overall coverage has increased considerably from 1983. The data supplied, however, are limited in their use due to the lack of positions for about half of the sets. Without more precise position information, it is not possible to include these data in any but very general stock assessment or interaction analyses.

The Japanese purse seine fleet has shown a substantial increase in coverage by the SPC in these early years (1979 -1982) for which published statistics are available. Since then, this fleet seems to have stabilized report coverage at around 70 - 80% based on analyses of trip length versus days reported and the fullness of vessels relative to total catch reported per trip. These internal types of analyses agree well with the published reports of catches for the years that overlapped.

Japanese longline and pole-and-line catch data reported to the SPC ranges around 50-65% of actual catches within the SPC region, based on trip length versus reported number of days to the SPC. Part of this non-reporting may be due to the time these vessels spend in international waters and in areas where licencing agreements, and thus, logsheet report forms, are not required.



Details of Taiwanese catches by longline vessels within the region go largely unreported to the SPC. Approximately 11% of the total landings are reported on SPC catch forms. Published statistics have been incorporated into the database, but are provided only by 5° square areas.

If meaningful stock assessments are to be done, it is essential that relatively complete catch and effort statistics be available. For example, the surplus production model, which has been the most commonly used approach for stock assessment in the eastern tropical Pacific and Atlantic requires complete estimates of catch and effort. Assessments of interaction between areas and gear types require consistent catch statistics across EEZ boundaries and between gear types. It is clear that current statistics are far from complete.

It is in the long range interest for both coastal states and DWFNs that realistic and meaningful stock assessments be performed. If stock assessments are based on incomplete data, the detection of overfishing and fisheries interactions is extremely difficult. Yield estimates based on incomplete data will be biased, and therefore misleading. Rational planning and development of the fishery cannot occur. In the event that some form of limits is considered necessary, the limits set are likely to be smaller than what would be set if more complete data were available.

A major problem with the collection of data for the regional data base has been that the provision of data negotiated in access agreements has polarized the relationship between DWFN's and coastal states. In part, this stems from the fact that the same data that are designed for stock assessments, are also directly being used for setting licence fees. It is often possible to obtain the full cooperation of fishermen for supplying information for stock assessment since they can perceive that this is in their long term interest. It is only natural that they should balk when the data may directly affect their current earnings. In order to serve as an initial starting point in seeking an acceptable solution to this problem, some possible courses of action are as follows :

- 1) SPC countries could agree that, as part of all licensing agreements for fishing within the EEZ of any SPC country, a vessel would have to supply a set of log sheets covering the vessel's entire trip, not only that portion within a country's EEZ. Countries could further require that a copy of all unloading receipts be supplied with the data.
- 2) The SPC could seek to set up a direct system for data collection with individual vessel operators similar to the approach used by the IATTC. These data would strictly be used for stock assessment.
- 3) In order to become more actively involved in the collection of catch statistics, the SPC could establish sampling programmes located at the major unloading ports. Such a programme would require an explicit agreement with the fishing industry to co-operate in providing catch statistics and sampling opportunities.

- 4) Countries could exercise their option under most licensing agreements which allows for the placement of observers on vessels. If observers were placed on most vessels requesting licences, a reasonably complete set of data could be obtained.
- 5) For Japan, Korea, and Taiwan, cooperative agreements could be sought for supplying, directly to the SPC, data that are being collected at the national level by these countries. Again, the data would be strictly for stock assessment purposes and some form of cooperative research programme with the scientists from these countries would greatly encourage the agreement.

#### LITERATURE CITED

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