South African Tuna Fisheries.

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ABSTRACT

South Africa has been fishing tuna since the early 1960s. Initially this was a longline fishery, but it later developed into an albacore-directed pole fishery, predominantly in the Atlantic Ocean. Japanese and Taiwanese, Province of China, have been fishing in the South African EEZ for approximately 40 years with longlines. Their fishing effort is primarily concentrated in the Indian Ocean portion of the SA EEZ. An experimental tuna longline fishery was initiated in South Africa, with large catches of Swordfish, yellowfin tuna and bigeye tuna.

Data collection for the tuna fishery, both foreign and domestic, is based on logbook data, however South African export figures are used as an estimate of the total catch in the pole fishery. Observer and port sampling schemes are at present being implemented to supplement the logbook data.

Brief review of the Fishery

INTRODUCTION

South African interest in tuna started in the 1960s, when longline fishing surveys were conducted between 1960 and 1963 (Talbot and Penrith 1968). The results of these surveys prompted the establishment of a tuna longline fishery and by 1962 approximately 2,000 t of tuna was being caught, with southern bluefin (*Thunnus maccoyii*) dominating the catch in the southern hemisphere winter and yellowfin (*Thunnus albacares*) in summer. By 1963, bluefin and albacore tuna (*Thunnus alalunga*) were contributing 40 % each to the total South African catch, while the Japanese catches consisted of 2 % blue fin and 95 % albacore (Nepgen 1970). By 1965 the South African catch had declined to 1,500 t and interest dwindled because of poor prices for the low quality fish. As South African fishermen were starting to develop the rock lobster fisheries on Vema seamount (west of South Africa) and west coast hake trawl, interest in tuna since 1965 was restricted to albacore poling.

Interest in tuna longlining started again in 1995 and the first experimental tuna long line fishing permits were issued in 1997. Initially trying to target bigeye tuna (*Thunnus obesus*), fishers recorded a high swordfish (*Xiphias gladius*) bycatch. This encouraged fishers to target this species because the price tended to be more stable than the high priced tunas. In addition, it was a more robust product, capable of lasting more than 14 days on ice.

The Japanese fishery has operated in the waters of southern Africa since the early 1950s. Initially targeting albacore, they changed about the late 1970s to deep longlines, targeting bigeye and southern bluefin tuna. Taiwan(China) started fishing the southern African waters late 1960s, primarily targeting albacore. Since then, there has also been a move to deploy more deepwater longlines, targeting bigeye tuna.

Catches by Gear

POLING

Albacore contributes the most to the annual South African tuna fishery with the highest reported landing of 8,406 t in 1998. The contribution of other species to the poling catches were: yellowfin 204 t, bigeye 50 t, skipjack (*Katsuwonus pelamis*) 2 t

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and swordfish 1 t. The catch is preserved on ice and landed whole, with trips lasting up to 18 days and the majority of the catches are made within 80 nm from land. Some larger vessels have recently started to install freezers to enable them to stay at sea longer and fish further.
The South African albacore catch is probably consists entirely from the Atlantic Ocean albacore stock (Penny, Yeh, Kou, Leslie 1998), therefore the pole fishery should be seen as falling outside the IOTC area. However, the statistical procedures and data gathering methods of this fishery are discussed below.

DOMESTIC LONGLINE

The local tuna pole-and-line fleet requested tuna longline permits in the early 1990s. During this period the access to resources underwent a transition period and the first exploratory fishing permit was issued only in 1995. In 1997, 30 experimental tuna longline permits were allocated. At the end of the first phase of the experimental fishery on 15 February 1999, 17 boats had geared up and started fishing. This effort level will not be increase until substantial data collection has been undertaken during Phase two of the experimental fishery.
Although intended as a tuna-directed fishery, swordfish were landed as by-catch in increasing numbers as boats changed to American styled monofilament gear and light sticks. A 1,000 tonne swordfish by-catch allocation was allowed inside the South African EEZ.
Approximately 70 % of the total landed catch consisted of swordfish (467,809 kg) and only 25 % was made up of tuna (169,770 kg). Yellowfin tuna made up the largest component of the tuna catch, 50 %, 84,353 kg, followed by bigeye (28 %) and albacore (8 %) (Figure 1). About 150 t of swordfish were caught west of 20° East (i.e. the ICCAT area), with a further 140 t caught east of 20° East. The catch position of the rest of the catch is unknown, but it was probably caught off the Agulhas bank, in the IOTC area.
Total effort for the fishery is estimated at approximately 358,970 hooks deployed, with 110,000 hooks the most deployed in a month. When the average CPUE of the first 3 months of the fishery (3.4 kg/hook) is compared to that of the last 3 months of the fishery (1.0 kg/hook) a decline is evident (Figure 2). This may not be in response to stock abundance, but rather that effort has reached saturation levels in areas of high fishing effort. In particular, towards the end of 1998, many additional vessels, with inexperienced skippers, started operating. They all fished in the area preferred by experienced skippers, the southeastern shelf edge, or Agulhas bank area, possibly leading to saturation of this area.
Swordfish appears to be increasingly targeted in the southwestern Indian ocean. Foreign longline vessels targeting swordfish in the south western Indian ocean discharged approximately 700 t of sword fish through South African ports in 1998 to February 1999. These fish were probably caught outside the SA EEZ, off southern Madagascar. Japan and Taiwan(China) have a maximum allowable swordfish by-catch in the South African EEZ of 450 t under the Bi-national fishing agreements. Most of their fishing activity in the South African EEZ takes place east of 20° East. Management recommendations have included that all foreign vessels wishing to land swordfish in SA shall be equipped with Vessel Monitoring Systems (VMS). The local fleet participating in the experimental tuna longline fishery is managed through effort control (limited entry) and a total allowable swordfish catch of 1,000 t dressed weight. A percentage of the local fleet may be required to have an observer on board.

FOREIGN LONGLINE FISHERIES.

At present only two nations, Japan and Taiwan(China), have fishing rights in the South African EEZ. Both nations have a long history of fishing within the SA EEZ. Around the late 1980s, South Africa entered into bilateral fishing agreements with this countries. There are approximately 86 Japanese and 24 Taiwanese vessels licensed to fish under bilateral fishing agreements in the South African EEZ for 1999.

Japan

Japanese fishing permits have either a duration of half a year or a year. There are 44 annual permits and 31 permits for July to December and 5 for January to June. Reported Japanese catches peaked in 1994 when 6,187 t catch was reported in 3,973 days fished (Figure 3). There appears to be two peaks in the Japanese catches in the SA EEZ, one from January to June, and the other from July to October, which record the highest catches (Figure 4). The highest catches during the first half of the year are yellowfin, followed by bigeye tuna. During the second half the catch is dominated by either bigeye or yellowfin tuna (Figure 4 A). There also appears to have been an increase in the southern bluefin tuna catches in the EEZ. Another important component of the catch is albacore with most of the catch being made in the latter half of the year.

As far as other bycatch is concerned, swordfish make up the biggest portion followed by sharks and marlin species (Figure 4 B & C).

Within the SA EEZ, the bulk of the catch and effort is distributed in the Indian Ocean (Figure 5 and Figure 6).

TAIWAN

Fewer data on catch per species per month are available for Taiwan (ROC). Reported catches and effort have been declining in South African waters from 1992. Effort has been less than 2,000 days fished since 1996 (Figure 7). Analysis of 2 years of data show a similar trend to the Japanese fishery in that there are peaks in landings for the first and second half of the year (Figure 8A). From January to June the bulk of the catch appears to be albacore, while from June to December, bigeye tuna is the biggest catch. Very little southern bluefin tuna is reported. Bycatch of swordfish and billfish is high from April to August, with shark catches also higher in the second half of the year (Figure 8 B & Figure 8 C).

The bulk of the catch and effort in the South African EEZ is distributed in the Indian Ocean (Figure 9 & 10).

Gear

DOMESTIC FISHERIES

Poling: There has been little in the way of gear changes in the pole/baitboat fishery and fishing methods are still the same as at the inception of the fishery. Fish are located either by observing schools on the surface, searching for bird feeding activity or trolling lures. Fish are then enticed to the vessels by spraying water on the surface, combined with throwing bait in the water. There are very few live bait boats in the fishery. Bamboo poles, baited with either fish bait or artificial lures are then used to catch fish attracted to the surface. Fish are then gaffed, landed and packed on ice.

Longlining: The domestic longline fishery has begun using monofilament lines. Sets are deployed at night, with the mainline being set at 15-30 meters. The use of light sticks has increased considerably and all fishers are using them at present. The few

fishermen that initially used the Japanese regular mainline longline systems have also changed over to monofilament mainlines.

FOREIGN VESSELS.

We are not aware at present of any major changes in gear type or gear configurations. There are however anecdotal accounts of some foreign longline vessels changing to monofilament mainlines.

Data collection systems.

ESTIMATION OF NOMINAL CATCHES

Poling

Estimates of the total South African albacore catch is obtain by the South African SA Revenue Service (SARS), from all tuna exports from SA. Since almost all domestically caught tuna in SA is exported because there is virtually no domestic market, it was decided to use these figures as an estimate of total catch. Albacore has as specific export code, and the total number of cans can thus be estimated in this way. These figures exclude catches from other countries that are transhipped in SA. Prior to 1997, catch data from vessel logbooks was used by M&CM to determine total catch per species. It was found that the SARS figures provided a better estimate of the average catch than the logbook data.
At present, no surveys are being conducted and no raising factors are applied to the data.

Local longline

The catch data from vessel logbooks are supplied to M&CM. All discharges have to be monitored by Compliance Control officers and this data together with the factory declaration data are used to estimate the total catch per species.
At present, no surveys are being conducted and no raising factors are applied to the data.

Foreign longline effort

The catch of foreign vessels fishing in the SA EEZ under international bilateral fishing agreements, is reported to the SA Government by the vessels' flag state.
At present, no surveys are being conducted and no raising factors are applied to the data.

CATCH ESTIMATION PROCEDURES.

Poling

Unfortunately, not all vessels report their catch information to the same resolution. Data are available at four levels of resolution:

- Logbooks giving daily fishing position (statistical grid) and catch per species per day.
- Logbooks giving daily fishing position (statistical grid) and total catch of "tunas" per day.
- Landing reports giving area fished, start and end dates of trip and total catch per species for the trip.
- Landing reports giving area fished, start and end dates of trip and total catch of "tunas" for the trip.

Data reported at a trip level (levels 3 & 4): Daily catch rate is assumed constant over the trip, so that catches can be apportioned per month on a proportional basis. Data

are then summarised to give the catch per species (data of levels 1 and 3) or catch of "tunas" (levels 2 and 4) per month and area, where areas are defined as:

- South west Cape: South of 33°S latitude.
- West Cape: Between 30°S and 33°S latitude.
- Namibia and North Cape: North of 30°S latitude.

The catch of "tuna" per month and area is then divided among albacore, yellowfin, bigeye and skipjack according to the reported catch per species month and area.
Logbooks are mandatory and all catch and effort data must be reported, including zero effort. Observers are not deployed on the vessels due to the lack of accommodation on the vessels and as it is possible to collect all the necessary catch, length frequency and biological data in port. Port Sampling is conducted on an opportunistic basis through out the main poling season, from September to April. Length frequency data are collected for use in stock assessment work.
Detailed descriptions of procedures used to estimate raising factors are described in Punt, Penny and Leslie 1996d ICCAT Coll. Sci. Vol. XLIII.

Domestic longline

Various procedures are currently under review to determine their suitability for catch estimations by time-area strata.
All fishery participants are require to complete logbooks with all catch and effort data. An observer scheme has also been implemented and a 25 % coverage of the fleet is required. Port sampling is done on a random, opportunistic level and length frequency, species composition and genetic samples of the catch collected.

Foreign Longline.

Various procedures are currently under review to determine their suitability for catch estimations by time-area strata.
No Port sampling is being conducted. An observer scheme has been agreed to through the bilateral agreements and will be implemented in 1999.

PROCEDURE FOR SIZE FREQUENCY, SAMPLING STRATEGY

Opportunistic, random sampling is conducted for domestic poling and long line vessels. There are no sampling procedures for foreign fishing vessels currently in place.

FISHING CRAFT STATISTICS, BYCATCH AND DISCARDS

All vessels participating South African fisheries must supply details of the craft to M&CM. Fishing craft statistics are being collected for all fishing vessels entering the South African EEZ. All fishing vessels wishing to enter the SA EEZ must apply to the Department of Environmental Affairs and Tourism for a permit to be in possession of fishing gear in the SA EEZ. All vessels wishing to re-enter the SA EEZ shall be fitted with a SA approved VMS system before they are allowed re-entry to SA port facilities.
Transhipments can only be made after permission is received from the DEA&T. The species composition and total catch transhipped have to be supplied to the DEA&T.
The pole/baitboat fishery has almost no, or very little by-catch of other fish species. Bycatch and discard estimates are only available from observer collected data in the domestic longline fishery. Of concern to SA is the practise of finning and discarding of shark carcasses. SA is evaluating several options to attempt to dissuade this practice.

Foreign fishing vessels supply catch and bycatch statistics, but no discard information is available. A future observer program is envisaged to collect data on the fishing activities of foreign vessels.

Period of activity and data collection.

Data collection for the domestic tuna pole fishery has been ongoing since 1960, however, logbooks became a permit condition only in 1985. Prior to that, data were collected opportunistically in harbours from poling vessels.
Japan has been reporting catch data since 1987 and Taiwan(China) from 1992. Japanese data is per vessel, with position, catch and effort, while Taiwanese data initially was total catch per vessels per year. This was changed in 1996, and from 1997 Taiwanese vessels also reports position, catch and effort data.

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