OBSERVATIONS MADE DURING TRIP ONBOARD THE SOUTH PACIFIC COMMISSION'S TAGGING VESSEL 'TE TAUTAI' WITH SPECIAL REFERENCE TO THEIR IMPLICATIONS TO POLE-AND-LINE FISHING VESSELS IN KIRIBATI.

by
Nick Rawlinson
ACIAR/CSIRO Baitfish Project Scientist

Introduction

The Tuna and Billfish Assessment Programme (TBAP) of the South Pacific Commission (SPC) is currently undertaking a Regional Tuna Tagging Programme (RTTP) in the Western and Central Pacific Ocean. The tagging vessel being used by SPC for the work is a Japanese built, 31 meter pole-and-line vessel 'Te Tautai' which has been chartered from its owners NAFICOT of Tuvalu for the duration of the survey.

The RTTP has been catching, tagging and releasing yellowfin (Thunnus albacares), skipjack (Katsuwonas pelamis) and bigeye (Thunnus obesus) tuna in order to study the growth and migration of these species, and also to make estimations of their stock sizes. Other biological data including length, weight, sex, gonad weight, otoliths for ageing, stomach contents and morphometric measurements of the tuna are also being collected.

This report covers the trip made by 'Te Tautai' within Kiribati waters from 3rd October to 12th October 1990. It should be noted that the author did not get onboard the vessel until 6th October when it came to Tarawa.

Trip Details

3/10/90 - Three schools of tuna found North West of Butaritari. Fish bit the chum but would not approach the boat. Two Fish Aggregating Devices (FAD's) off Butaritari checked and they were loaded only with big rainbow runners (Elegatis bipinnulatus) and dolphinfish (Coryphaena hippurus). Steamed towards Tarawa.

4/10/90 - Arrive Tarawa wharf, 08.00 hours. In Port at Betio all day.

5/10/90 - In Port at Betio all day.

6/10/90 - 140 kg of milkfish (Chanos chanos) live bait loaded onboard.
13:00 hours departed Tarawa. Two schools sighted but did not respond to chum.
Anchored off northern end of Maiana atoll.

7/10/90 - Number of schools spotted of south-west coast of Maiana Bank and 66 mixed skipjack and yellowfin tuna tagged.

Many large yellowfin in the schools and they were double poled using milkfish baited on the hooks.
Steamed south to Abemama and entered lagoon.

8/10/90 - Baitfishing produced mainly rainbow sardine (Dussumieria Sp) which are a very fragile species and they died very quickly.
Steamed towards Tarawa - one school of large skipjack found and 25 were tagged.
School sighted just off Betio but no bait.
Moored at Betio wharf - two loads of milkfish bait put onboard.

9/10/90 - Two more loads of milkfish bait taken.
11:00 - Depart wharf and checked FAD north of Betio but no bite.
Two areas of yellowfin schools located on South East side of Maiana Bank - 17 tagged.
A skiff was used to try to catch fish using trolling lines - 2 tagged.
Drifted on Maiana Bank at night with lights set.
Only a small amount of bait came to the lights.

10/10/90- Fishing took place at dawn amongst at least 20 local skiffs on Maiana Bank - not very productive.
Several yellowfin schools found on eastern side of Maiana Atoll feeding on the anchovy (Stolephorus punctifer).
Schools did not respond well to milkfish. More trolling was tried from a small skiff. Total of 96 tag releases, 75% yellowfin.
Bait finished so steamed towards Tarawa and anchored outside entrance to lagoon for the night. Schools of bait were seen around the vessel so the underwater lights were set. Three hauls of the bait net were made for a total of over 200 buckets of the anchovy Stolephorus punctifer and the gold-spot herring, Herklotsichthys Sp. Large numbers of barracudas and trevallies also caught.

11/10/90- Steamed to Maiana Bank before dawn and fished among the local skiffs catching 104 skipjack and 23 yellowfin. More searching of east coast of Maiana and towards Tarawa. Found skipjack school biting off Betio to total 403 releases for the day.
Anchored outside lagoon and tried baiting again. Only one bucket of Stolephorus punctifer caught but many barracuda and trevallies.

12/10/90- Worked along west coast of Tarawa. Nothing on FAD but several schools found on North West coast. Schools would not respond to chum. Only 2 fish tagged, one from trolling skiff.
Steamed back to Betio wharf to collect milkfish bait, water, food and clear customs from Kiribati.

Details of the daily fishing log and school sightings plus the tag releases are given in Tables 1, 2 and 3. The key for these tables are given in Appendix 1. The biological data and stomach contents of the tuna are detailed in Tables 4 and 5 respectively. The baitfishing details for the trip are shown in Table 6. A general summary of trip is in Table 7.

Size frequencies of the skipjack and yellowfin tuna tagged and released are shown in Figures 1 and 2.

OBSERVATIONS MADE RELEVANT TO POLE-AND-LINE FISHERY IN KIRIBATI

1. Use of Milkfish as Bait

Te Mautari Limited pole-and-line vessels have used milkfish as bait on only a few occasions during the last couple of seasons for primarily the following reasons:-

1) Milkfish is considered not to survive well in the bait tanks.
2) Milkfish is considered not to act as an effective 'chum' - tuna are not attracted to the boat by it.
3) That the milkfish bait is expensive.

From the results of a study undertaken in Kiribati by the Food and Agriculture Organisation of the United Nations in 1983 (FAO, 1983) and from observations made during this trip the milkfish, when handled correctly, will survive in the baitwells in excess of 3-4 days and will attract tuna to the boat and encourage them to 'bite'.

During a trip I made onboard the Nei Kaneati last year, milkfish bait was carried onboard the vessel from Tarawa to Abemama. The milkfish survived well in the bait wells, over 4 days, but was not effective as a chum and could actively be seen swimming away from the vessel with the tuna following them. However, the milkfish on that occasion were in the size range of 20 - 30 cm in length.

The size of milkfish loaded onto the Te Tautai was much smaller, between 5 cm - 15 cm. The bait used during the trip could be seen to swim back to the vessel and act as on effective chum. When the stomach contents of some of the tuna caught were examined the size of the chum that were being eaten was between 6 cm and 9 cm fork length. This small sized milkfish also seemed to survive well in the bait-wells.

From my observations, milkfish is an effective baitfish species both in respect to its survival and its attractiveness to tuna, if the right size of fish are used (between 6 cm and 9 cm

fork length) and if they are handled correctly.

If the milkfish can be produced at a price that is affordable to the pole-and-line industry then the production of milkfish of the optimum size should again be actively encouraged in order to provide a source of baitfish for the Te Mautari fleet.

2. Capture of Anchovies

During the trip, the Te Tautai was able to catch a large quantity of anchovies, the species being Stolephorus punctifer. This species has been noted in the stomach contents of tuna in Kiribati waters before (Kleiber and Kearney, 1983) but have never been recorded in the bait catches of pole-and-line vessels in Kiribati. The Stolephorid anchovies are highly prized as one of the best baitfish species in other Pacific Island Countries e.g. Solomon Islands, Papua New Guinea, Hawaii, Palau and Fiji.

The anchovies were caught while the Te Tautai was anchored in a depth of 40 meters on the ocean side of the entrance to Tarawa Lagoon. Deck lights were seen to attract schools of tarabuti, Herklotsichthys Sp, to the surface so the underwater lights were lowered into the water and turned on. When a haul of the bait net was made in the normal procedure, the catch was approximately 80 buckets of mainly Stolephorus punctifer and Herklotsichthys Sp. Two further hauls produced more bait and the final total for the night was 200 buckets. A total of 88 barracudas and trevallies weighing 110.2 kg were also caught.

The next night the procedure was tried again but this time only about one bucket of bait was taken along with 95 barracudas and trevallies weighing 62.55 kg. Large marks were seen on the echo sounder before hauling but this was probably these large predatory fish which scared away the baitfish.

The anchovies lasted between 2-3 days in the bait tanks and worked well as `chum'. It is also interesting to note that the stomach contents of 36% of tuna analysed, contained Stolephorus punctifer as there natural food item, see Table 5.

Effort should now concentrate on finding the extent of this resource and its availability to the pole-and-line fishery. It may be that Stolephorus punctifer occur around the non-lagoon islands and fishing grounds for bait may be able to be extended over a greater geographical area than at present. This would allow a greater fishing range for the Te Mautari fleet.

3. Handling of Baitfish

The handling of the wild baitfish catch onboard Te Tautai was good and how I have observed the operation on pole-and-line vessels in Solomon Islands.

The Herklotsichthys Sp. taken in the bait catch by the Te Tautai were still alive in the baitwells two days later. In Kiribati, it has been recently reported that this species can not be kept alive for greater than 15 hours (MacInnes, 1989).

The handling methods used by Te Tautai should be encouraged onboard the Te Mautari pole-and-line fleet which would mean incorporating the suggestions made in my report of 5th July 1990 after a trip on Nei Kaneati between 27/6/90 and 1/7/90.

4. Baitfishing Techniques

The general fishing method used on Te Tautai for capturing baitfish is the bouke-ami technique in conjunction with underwater lights and is the same as that utilised by Te Mautari vessels. One difference however which seemed to be very effective was the use of two echo-sounders to monitor the movement of the baitfish into the net.

The echo-sounder connected to the transducer on the hull of the ship was used to monitor the build up of baitfish schools during the lighting operation. Once it was considered that sufficient bait had been aggregated, the 'bouke-ami' net was set.

A long bamboo boom was then extended out over the starboard side of the vessel, the end stretching above the middle of the baitnet. A bait light was suspended from this boom and could be manoeuvered by a series of pulleys and ropes by a man standing next to the flying bridge. A similar arrangement was set up for a transducer to hang from the boom, the echo-sounder being housed in the wheel-house. After the light had been lowered to the desired depth in the middle of the net, it was turned on and all other lights extinguished. The transducer was set at the surface of the water and the echo-sounder turned on. The movement of the fish towards the light could be monitored by the disappearance of marks from the boats main echo-sounder and appearance of marks on the sounder aimed over the light. The light could be raised and its illumination dimmed in order to optimise the amount of bait around the light. When the fishing master was sure that all the bait was aggregated around the light, the command to haul the net was made.

This method worked well and the transferral of the bait from the light under the boat to the light in the net could easily be monitored. The use of a skiff to manoeuvre the light was not required, which speeded up the operation. It also had the advantage that the baitfish deep underwater could be monitored coming to the light and only when all the bait had risen was the net hauled. This can not be seen with the naked eye, especially if underwater viewfinders are not being used.

An external overhead light was also employed by Te Tautai, see my trip report on Nei Kaneati of 5th July 1990 regarding this. The light caused the bait to school in the middle of the net and the fish remained calm within the bait net. This facilitated the loading of the bait into the wells and helped reduce scale-loss, one of the main causes of mortalities to baitfish.

5. School Sightings

From the School Sightings/Fishing Log, Tables 1, 2 and 3 it can be seen that many schools of tuna were spotted during the course of the trial. This maybe a function of the fact that there were a lot of tuna about at the time, but it should also be considered as being due to a number of other factors.

Te Tautai during the course of the trial spent many hours at sea searching for fish, see Table 7. On a number of nights the vessel either drifted or was anchored outside the lagoons. This meant that the vessel was on the fishing grounds at dawn and searching could commence at first light. If baitfishing was not necessary, due to the fact that there was still an adequate supply of bait onboard the vessel for the next days fishing, then searching could continue until the end of the day.

Te Mautari vessels generally have to return to the baitgrounds every evening and this results in the vessels not being able to start searching until at least two hours after day-break and finishing at about the same time period before dusk. Therefore at least four hours or approximately a quarter of the daylight hours are lost to searching and therefore fishing.

On the flying bridge of the Te Tautai there were at least two men using binoculars to observe tuna schools at all times. This is more effort than I have seen on the Te Mautari vessels and increases the chances of spotting schools.

6. Fishing (Time of Day)

By referring to Tables 1, 2, and 3 the time of day that fish were caught can be seen.

Figure 3 shows the time of day when fish were caught for the days fished between 6th and 12th of October. Figure 4 shows the number of times during these days that the boat was actually fishing at a particular time, the number of times a school was spotted at that time of day and the number of days that at that time of day tuna were caught.

It must be realised that this is a very small data set and that not too many conclusions can be drawn from it, but some interesting observations can be made:-

a) Tuna were caught on at least one occasion during all the daylight hours (except between 09.00 and 10.00 hours for this trip). This shows that it is possible to catch tuna during any stage of the daylight hours so the longer the vessel is at sea the more chance it will have of catching fish as long as there are live-baitfish onboard.

b) The most fish were caught during 15.00 to 16.00 hours. However fish only bit on one occasion at this time of day but it happened that the school was feeding well and many fish were caught. The next most profitable time for the capture of tuna was between 06.00 and 08.00 hours, the early hours of daylight. Not only were relatively higher catches made at this time of day but also the tuna seemed more willing to bite.

The data therefore suggests that the best time for fishing is during the first hours of daylight and that tuna are more likely to bite at this time. It also shows that tuna can be caught right throughout the daylight hours.

From my observations of the operations of Te Mautari vessels, they are not on the fishing grounds until after 08.00 hours because of difficulties of navigating their way out of the lagoons during darkness. The vessels also usually complete their fishing and enter lagoons for baitfishing in the middle of the afternoon. This means that hours of fishing are lost to the vessels each day and that they are not fishing at the best time of day. Some ways to overcome this maybe:-

1) Marking the entrance and exits of the lagoons with good navigational beacons allowing the safe passage of the vessels at night. Generator boats could be positioned in the baitgrounds using their lights to aggregate baitfish before the pole-and-line vessel arrives. This will mean that no time should be lost for lighting for baitfish and the vessel can move in and out of the lagoons at any time of the day.

2) Using baitfish species which are sufficiently hardy to last two or three days. This will mean that the pole-and-line vessel will not require to baitfish every night and can remain at sea for extended periods, either anchoring or drifting at night in close proximity to the grounds for the next days fishing. All the daylight hours can therefore be utilised for fishing.

In order to keep bait alive for this length of time there seems to be certain options available:-

i) Employ good handling techniques for the wild baitfish onboard the pole-and-line vessels.

ii) Use milkfish bait, which when properly handled, seems to survive well in the bait tanks for a number of days.

iii) Harden up wild bait species by holding the fish in cages for a certain length of time before they are used by the pole-and-line vessels.

c) Do not enter the lagoons to capture bait but instead exploit the baitfish species which are found on the ocean side of the islands eg. Stolephorus punctifer.

Conclusions

The SPC Tagging Cruise on Te Tautai was a successful one even though it was hoped that more tuna would have been released during the course of the trip.

A number of interesting points arouse from the trip which may have implications on the way Te Mautari vessels might try to operate when fishing in Kiribati waters. Suggestions have been made in this report which need to be looked at and developed, as is considered suitable and necessary in order to attempt to improve the performance of the Te Mautari vessels.

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