ELECTRONIC TAGS (ARCHIVAL, POPUP & SONIC): REVIEW OF THE CURRENT STATUS OF RTTP-IO USING THESE ELECTRONIC TAGS

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1. CONTEXT

These expensive tags offer the possibility to collect data on a fine scale related to the behaviour of the tuna: depth, temperatures (internal and sea water) and light (for the geolocation). These data offer the possibility to know what tagged fish are doing between the time they are tagged and the time they are recovered (for archival) or pop off (for popup). While from dart tags we just know the dates and positions of tagging and recovery but nothing between.

2. TAGS

Within the RTTP-IO budget, funds available were limited and permitted the purchase of 150 Archival tags and 40 popup tags (Wildlife MK10). The ex-TAGFAD DG-FISH funded project that took place in 2004 was not able to deploy all their archival tags; they generously donated 132 tags to the RTTP-IO. Tags donated were MK9 from Wildlife while those 150 purchased were Lotek LTD-2310.

60 Sonic tags were purchased by the IOTC with funds from Japan.

For administrative reasons, electronic tags paid on the RTTP-IO budget could not be available to the project before beginning of July 2007, i.e. 1 month before the end of the tagging operations. In order to have a chance to release these tags before the end of the tagging operations, the charter contracts of the vessels were extended for one month. Therefore the tagging operations ended on August 29th 2007 which offered the possibility to release all archival tags but only 6 of the popup tags. The reasons for the low release of the popup tags is the large size of the tag which requires large tuna (30-35 kg) not abundant in pole-and-line catch in general and in the Tanzania area where the vessels could fish at that time of the year (SE monsoon).

3. ARCHIVAL TAGS

With the MK9 and LTD-2310 tags, 216 YFT (76%) and 66 BET were tagged and released. We gave the priority to YFT because we were getting a lower recapture rate for BET than for YFT especially for OTC tagged bigeye and 121 of our archival tagged fish have received OTC injection (43%).

By area the fish were tagged as follows:

- 147 YFT & 66 BET in Tanzania

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- 63 YFT in the Arabian Sea
- 4 YFT in the Mozambique Channel
- 2 YFT in International waters (SE of the Arabian Sea).

All BET were tagged in Tanzania which is not surprising as almost BET tagged were tagged in this area. While YFT were better distributed between the different areas with still a large predominance of the Tanzania area.

The size distributions of both YFT and BET tagged are given in figure 1. Most fish were between 60 and 85 cm for both species. For YFT, fish larger than 88 cm were tagged but in small numbers while the largest tagged BET was 88 cm. Unfortunately the RTTP-IO archival tags were not available when the vessels were fishing in the Arabian Sea where large YFT were abundant.

The implantation procedure was as follows:

- We implanted the tags slightly on the side of the abdominal cavity,
- We didn't cut the membrane of the abdominal cavity but we break it with the finger;
- We use a hose pipe with slight running sea water;
- We use but not all the time Betadine for immersing the tag body into it before implantation;
- Sterile gloves were used but not systematically;
- Scalpels and needles were kept in Betadine;
- We inject part of the fish with OTC;
- We release 49 fish with 1 stitch (17.4%), 213 with 2 stitches (75.5%), 4 with 3 stitches (1.1%) and 16 are unknown (6%);
- We add a dart red tag at the usual back place;
- We tried to keep the duration of the all process as short as possible.

The distribution of the duration of the implantation of the archival tags is given in figure 2. It is mainly between 2 and 3 minutes. Eleven taggers implanted the archival tags but 6 of them are accounting for 96% of all releases

So far, 5 YFT and 2 BET are recovered as follows:

- 2 YFT tagged in Oman were recaptured in Oman after 18 and 31 days but apparently no archival tags were reported; we don't know if the tags were shed or just not reported;
- 1 YFT tagged in Tanzania and recaptured after 32 days off Kenya by an artisanal fisherman apparently without the archival tag;
- 1 YFT tagged off Tanzania and recovered by the tagging vessel after 20 days off Tanzania; the tag was shed;
- 1 YFT tagged off Tanzania and recovered after 120 days by a purse seiner but found at the Seychelles cannery; the tag was shed;
- 1 BET tagged off Tanzania and recovered by a purse seiners west of the Seychelles remained 255 days at sea with the archival tag but the memory of the tag was empty following a bug in the Wildlife software; since Wildlife has issued a new update of the MK9 software in order to correct this bug.
- 1 BET tagged in the Mozambique Channel was recaptured after 344 days by a purse seiner north-west of Seychelles, the fish was discovered at the cannery; the archival tag was shed;

The recovery rate stands at 2.4% which is much lower than the other types of tag. The most probable explanation seems to be a higher tagging mortality rate. However the procedure we followed is very standard and the duration for the surgical implantation of the tag are average.

4. POPUP TAGS

We released during the RTTP-IO 6 popup tags implanted on YFT all off Tanzania in July and August 2007. The popup times programmed were 60, 90 and 180 days. The YFT size was a bit too low with 2 of 114 cm, 2 of 115 cm, 1 of 118 and the last one of 125 cm. We could not get bigger sizes and the attempts made to catch larger fish deeper with handline (YFT and BET) were not successful probably because the current was so strong that we cannot get the line deep when we fished at night.

We have premature releases for 3 of the fish and the data show that they die after 30 hours, 3 days and 7 days. Two other tags transmit very briefly in advance. The emission was too short to give any position. Data were sent to Wildlife whose experts think that the fish might have been caught but the tags were either destroyed or put inside the vessel quickly stopping the emission.

The popup tags were mounted on leaders with a metal head at the end. This metal head together with the tag itself and the leader on which we set a guillotine system (it cuts the leader if the tag dives down to more than 1,800 m) measured about 40 cm long. Therefore we have to set it on the back of large fish. The implantation was made at exactly the same place as the dart tag through the bones of the second dorsal fin. In order to avoid too many movements from the tags, the body of the tag was attached with another small metallic tag set into the muscle of the fish.

The large metallic head together with the large tag might be responsible of the death of 3 of the fish we noticed from the data received. The two tags which remain 3 and 7 days popup close to the point of release: the two YFT have remained in the same zone.

Since the end of the RTTP-IO tagging operations, 2 popup tags were released in Maldives during a small-scale tagging operation. They were programmed for 90 and 180 days. For the first one supposed to popup on 23/04/2008 we did not received any signal; the second is due on 23/07/2008.

5. SONIC TAGS

The objective was to assess the residence time of the fish swimming in a school associated to the vessel. In October 2006 (from 9 to 24), the three species were implanted with sonic tags in the same way as the archival tag; a white tag was added and the fish received an OTC injection. Altogether 40 fish were released: 14 YFT, 14 SKJ and 12 BET. YFT measured between 49 and 76 cm, BET between 51 and 55 cm and SKJ between 46 and 58 cm. None of the fish were recaptured but their emissions were detected. However, they disappeared quickly, in a matter of hours or a few days; the maximum being 7 days for SKJ. None of these fish were recaptured later by purse seiners. These data confirmed the low time of residence of the fish in the associated school, an aspect already evident from the low numbers of tagged fish that were caught every day during this period.

We kept 20 sonic tags to be used in 2007. However bad weather and strong currents experienced between June and August 2007, while fishing the AS, do not permit the deployment of these remaining tags. In our case, the vessels are not drifting but kept steaming between 1 and 3 knots almost all day and sometimes even during the night. While steaming, the vessels generally moved

against the current. The Argos Voice Receivers we used (lent to us by FADIO, an EU-DG Research project) are expensive and has to be in tow permanently at the stern of the vessel. The risk of losing the receivers was too high in 2007 to risk them at sea.

6. CONCLUSIONS

The RTTP-IO so successful in normal dart tagging has experienced very disappointing results with the electronic tags. We have followed the normal procedure for the implantation of the archival tags and we make sure the equipments we use for surgery were adequate. However the tagging mortality seems to be very high and the shedding of the tag very frequent. The shedding of the tag at sea has been noticed by other projects and even for tuna kept in tanks but never at our high level. Tagging mortality is also known for archival tag implantation but not to the high level we seem to experience. For future survey, the use of dummy archival tags is advised in order to ascertain these two factors that can be responsible for the very low recovery rate we have experienced during the RTTP-IO.

Regarding popup tags, we still have 32 tags left. We plan to use them during small-scale tagging in Maldives or South Africa in the coming months with different attachment heads.

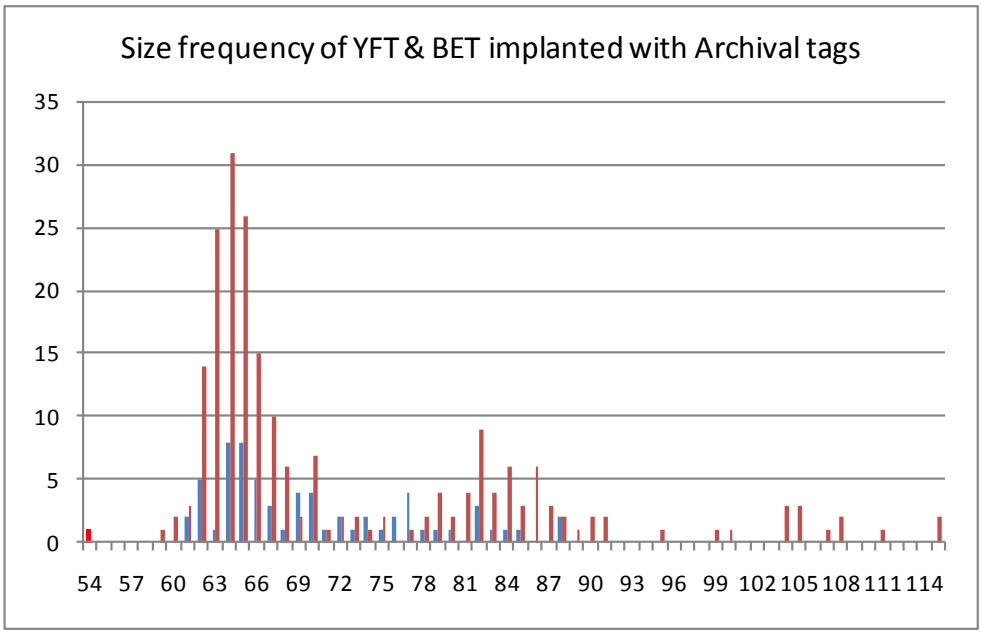

Figure 1: Size distributions of YFT and BET implanted with archival tags by the RTTP-IO

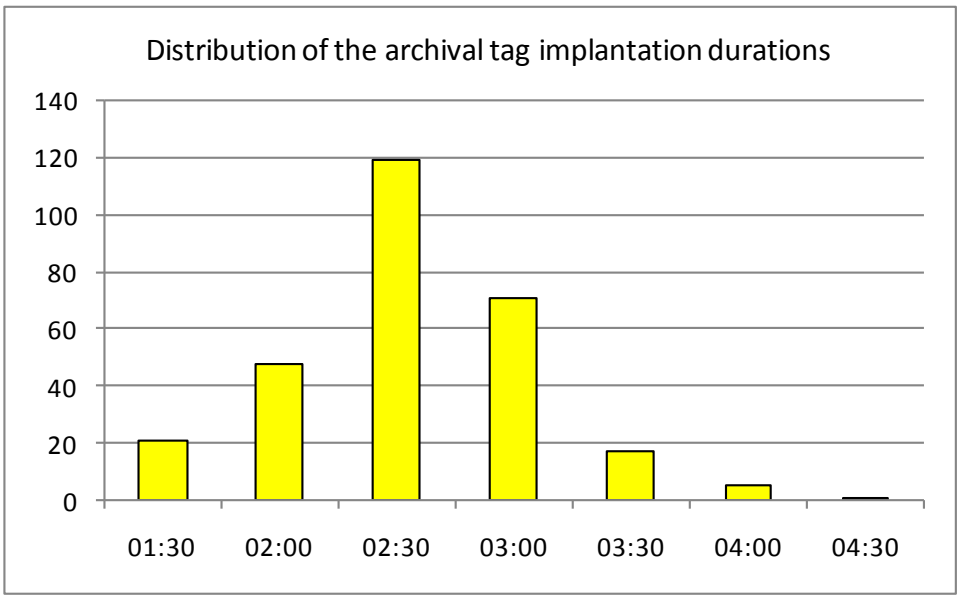

Figure 2: Distributions of durations of the surgical implantation of archival tags by the RTTP-IO