Revised final report on the activities of the ICCAT/GBYP – Phase 3 Tagging Program (2012)

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Summary

In the framework of the ICCAT/GBYP Phase 3 – Program, tagging activities were led onboard baitboats (and secondarily recreational vessels) in four areas of the Eastern Atlantic and of the Mediterranean Sea: the Bay of Biscay, the Strait of Gibraltar, the Gulf of Lions and Balearic Sea, and the Central Mediterranean Sea (i.e. Southern Tyrrhenian, Western Ionian and South Adriatic Sea). The tagging objective was reached in the Bay of Biscay (3413 tunas tagged), but not in the three other areas. We noticed a particularly scarce abundance of juvenile bluefin tunas in the Gulf of Lions (only 109 tunas tagged by baitboats) compared to the three previous years in the same period. In the Balearic Sea (South West of the Gulf of Lions), age-1 to age-3 individuals were also scarce this year compared to the previous years and only 203 tunas could be tagged by the sport fishermen. Juvenile tunas (except age-0) were absent at surface in the Central Mediterranean Sea (97 tunas tagged only). The tuna aggregations encountered in the Strait of Gibraltar (1473 tunas tagged by baitboats and 16 by sport fishermen) had a relatively low proportion of juvenile individuals, which made the tagging operations tedious and not time-efficient.

This report presents the tagging methodology used, the work carried out in each of the four areas, the maps of the tagging activities, the size distributions of the fish tagged, and the data input worksheets from the ICCAT tagging database.

The global achievement of the project, in terms of conventional tagging, was 44,5% (5233 tunas tagged vs 11750 planned), with particularly low percentages of achievement in the Gulf of Lions and Balearic Sea as well as in the Central Mediterranean Sea where the presence of juvenile tunas was unexpectedly low. The percentage of double tagging was over the target of 40%, reaching 51% (2700 double tagged tunas). MiniPATs tagging reached 100% (40 tunas) and internal archival tags reached 76% of the objective (38 implanted tags).

The reasons why the tagging activity was more successful in the Bay of Biscay than in the other areas are also discussed, and some suggestions for adjusting the tagging strategy for conventional tagging in GBYP Phase 3 are also given.

1. Methodology and tagging protocols

<u>1. 1. Standardization workshop – tagging protocols</u>

A workshop was held in AZTI-Tecnalia (Pasaia) on July 19th in order to standardize the protocols of tagging, sampling and information recording.

The participants were:

- Bernardo Perez (Instituto Español de Oceanografía, Santander), tagger in the Gulf of Lions and Gibraltar Strait

- Eduardo Belda (Universidad Politécnica de Valencia), tagger in the Gulf of Lions and Gibraltar Strait

- Nicolas Goñi (AZTI-Tecnalia, Pasaia), local coordinator for the Bay of Biscay and general coordinator

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- Igor Arregui (AZTI-Tecnalia, Pasaia), tagging expert

- Iñigo Onandia (AZTI-Tecnalia, Sukarrieta), local coordinator for the Central Mediterranean Sea

- Noureddine Abid (Institut National de la Recherche Halieutique, Tanger M'Diq), tagger in the Gibraltar Strait

- José Miguel de la Serna (Instituto Español de Oceanografía, Fuengirola), local coordinator for the Gulf of Lions and Gibraltar Strait

- Mª Dolores Godoy (Instituto Español de Oceanografía, Fuengirola), local coordinator for the Gulf of Lions and Gibraltar Strait

The subjects of the workshop were:

Conventional tagging

- Tag, applicator and form preparation before tagging
- Tag insertion techniques (with practicing on a juvenile tuna, figure 3)

Electronic tagging

- Material for pop-up tags
- Pop-up tag programming
- Pop-up tag insertion techniques (with practicing on a juvenile tuna)
- Material for internal archival tags
- Internal archival tag programming
- *Tag insertion and suturing techniques (with practicing on a juvenile tuna, figures 1-2)*

Sampling

- What to sample and how
- Sample storage at ports
- RMA forms

The resulting protocols (in Spanish) for conventional, internal archival and pop-up tagging are given in **Annex 1**.



Figure 1: practicing the insertion of internal archival tags



Figure 2: practicing suturing after insertion of archival tags



Figure 3: practicing the insertion of spaghetti tags

1.2. Data recording

All participants agreed to use submersible paper and pencils as the most reliable way to record data during tagging.

Forms to be filled during tagging will be printed on submersible paper. Each form will correspond to a given series of 50 tags, or to two series in the case of double tagging (figure 4).

In addition, a form for the general activities of the vessel will be filled in the deck.

The protocols and corresponding forms are in Annex 2.

The format of the data to be transmitted to the coordinator was the one detailed in the final offer, also corresponding to the excel form sent by the coordinator of ICCAT/GBYP on July 13th.

In addition to these general protocols, the settings and anchorage of miniPAT tags were discussed, as well as the settings of internal archival tags (see points 1.3 to 1.5).



Figure 4: example of form to be completed onboard during tagging operations, packed here before a tagging trip with the corresponding tag series

1.3. Settings for miniPAT tags

As specified by ICCAT/GBYP, the miniPAT tags will be set for the maximal possible recording time. The template we will use is given in **Annex 3**.

1.4. miniPAT anchors

Following the recommendations of the ICCAT/GBYP coordinator, the anchorages of the miniPAT tags were modified, with removing of a rivet, replacement of the white dart by a Domeier umbrella dart (considered the most reliable one in terms of attachment time), and joining the cable with a new rivet. In order to have standardized anchorages, all these operations were done by the same person, i.e. Igor Arregui.



Figure 5: miniPAT tag 11P0509 with the original dart replaced by a Domeier umbrella dart

<u>1.5. MK9 archival tags</u>

The MK9 tags are programmed in a standard way: data recording every minute, the pasword is not changed, they are kept in *stand-by* mode.

2. Description of the work carried out in the four areas

A total of 5311 bluefin tunas were tagged in the four areas prospected (figure 6), considering the Balearic Sea and Gulf of Lions as one area and including those tagged with miniPATs and internal archival tags.

- 3413 of them were tagged in the Bay of Biscay: 1987 by single conventional tagging, 1399 by double conventional tagging, 14 with miniPATs and 13 with internal archival tags.

- 312 were tagged in the Western Gulf of Lions and Balearic Sea (109 by baitboats and 203 by sport fishermen): 221 by single conventional tagging, 86 by double conventional tagging and 5 miniPATs.

- 97 were tagged in the South Tyrrhenian Sea (all single conventional tags).

- 1489 were tagged in Gibraltar Strait (1473 by baitboats and 16 by sport fishermen): 229 by single conventional tagging, 1214 by double conventional tagging, 21 miniPATs and 25 internal archival tags).



Figure 6: geographical distribution of the 5313 releases of tagged bluefin tunas in the Bay of Biscay, Gibraltar Strait, Gulf of Lions and Balearic Sea, and Tyrrhenian Sea.

2.1. Bay of Biscay

The tagging activities onboard the F/V Attalaya Berria started on July 13^{th} and ended on August 18^{th} . A total of 3413 juvenile bluefin tunas ranging from 50 to 107 cm FL (figure 7) have been tagged, including conventional and electronic tagging. All fish except 3 were tagged with at least one spaghetti tag (table 1).

The weather conditions were overall very good. The concentrations of age-1 individuals were exceptionally high, particularly in July.

Most of the tagging activity occurred around the Canyon of Capbreton (figures 8 and 9), where the commercial bluefin catches of the baitboat fleet also occurred. During the tagging period no juvenile bluefin tuna (only albacore) was observed and caught by other vessels west from 3°W and north from 44°30N. This geographical distribution of juvenile bluefin tuna is relatively usual in the

Bay of Biscay.

On the other hand the seasonal variation of their abundance followed a less usual pattern, with a higher abundance in July than in August, and a scarce abundance in the second half of August and in September (according to information by other baitboats and by sport fishermen).

The tagging (and recapture, when any) data of each tagged fish are included in the databases. The data of individuals tagged with internal archival and with miniPAT tags appear in their corresponding files.

Note: for the individuals tagged on August 14th and August 16th, we used BYP spaghetti tags that were sent to us in 2011.



Bay of Biscay, released #: 3413

Figure 7: size distribution of the 3413 individuals tagged in the Bay of Biscay

The activity started on July 12th, the F/V Attalaya Berria went out in search for live-bait. A correct amount of small horse mackerel could be found in a usual area well known by the fishing captain.

-on July 13th, the weather was calm (state 2), the cloud cover varied between 20 and 100%. 3 fishing events occurred, mainly composed of age-3 individuals that were kept for the commercial quota of the boat. One age-2 individual occurring among them was tagged. Two age-1 individuals caught by trolling lines were tagged too. On July 14th and 15th there was no tagging activity.

- on July 16th the weather remained calm (state 2) with variable cloud cover (0 to 50%). 354 age-1 individuals were tagged (of which 100 by double conventional tagging) in 7 fishing events and 2

individual catches by trolling line.

- on July 17th the weather remained calm (state 2) and was sunny. 293 age-1 individuals were tagged (of which 150 by double tagging) in 5 fishing events. One age-1 fish was recaptured (tag AAA002087) and sampled.

- on July 18th the weather remained calm (state 2) with variable cloud cover (0 to 90%). 533 age-1 individuals were tagged (of which 250 by double tagging) in 12 fishing events.

- on July 19th the weather was still calm (state 2) with important cloud cover (70 to 90%). 634 age-1 individuals (of which 177 by double-tagging) were tagged in 8 fishing events.

- on July 20th the weather was still calm (state 2) with important cloud cover (70 to 80%). 94 age-2 and 5 age-3 individuals were tagged in 6 fishing events. The age-3 individuals occurred within a school of age-2 individuals.

- on July 21st the weather was very calm (sea state 1) with variable cloud cover (35 to 70%). 100 age-1 individuals (of which 23 by double-tagging) were tagged in one fishing event.

- on July 22nd the weather was calm (sea state 2) with 20% of cloud cover. 172 age-1, 15 age-2 and 37 age-3 individuals were tagged in 3 fishing events. Age-3 fish were also caught for the boat's quota.



BFT Tagging 2012, Bay of Biscay

Figure 8: Geographic distribution of the 3413 tag releases in the Bay of Biscay

- on July 24th the weather was calm (sea state 2) with little cloud cover (15%). 6 fishing events occurred, in which age-3 individuals were caught for the boat's quota. 3 of them were tagged.

- on July 25th the weather was very calm (sea state 1-2) and clear (0 to 15% cloud cover). 5 fishing events occurred. 138 age-1 and 28 age-2 individuals were tagged during 3 of them, and the 2 other ones (age-3 individuals) were for the boat's commercial catch.

- on July 26th there was no fishing activity, the boat entered to its usual landing port to land its catch as well as the sampled individuals to be donated.

- on July 27th the weather was calm (sea state 2) with variable cloud cover (40 to 75%). In three fishing events 116 age-1 (all double-tagged) and 131 age-2 (of which 93 double-tagged) were tagged. Both age-groups occurred mixed, except in the first part of the first fishing event (age-2 only)

- on July 29th the weather was calm (sea state 2) and quite cloudy (85%). Five fishing event occurred, all corresponded to age-3 or larger fish that were kept for the commercial quota of the boat. No tagging could be done on that day (no juvenile fish). One fish wearing the tag AZ00145 was recaptured.

- on July 30th the weather was very calm (sea state 1-2) with variable cloud cover (10 to 75%). The boat had to land the fish caught the day before so we stayed at sea only in the morning. 100 age-2 individuals (of which 90 by double tagging) were tagged in a first fishing event. In a second fishing event, 100 age-1 individuals were caught by double tagging.

- on July 31^{st} the weather was good (sea state 2-3) and clear (10% cloud cover). Age-3 individuals were caught for the boat's quota.



GBYP tracks 2012, Bay of Biscay

Longitude (°)

Figure 9: Tracks of the F/V Attalaya Berria during the tagging activity in the Southeastern Bay of Biscay in July and August 2012

- on August 2nd, the weather was lightly agitated (sea state 3) with 90% cloud cover. 64 age-2 individuals (of which 14 by double tagging) were tagged in 2 fishing events.

- on August 3rd, the weather was good (sea state 2-3) with important cloud cover (70 to 90%). 144 individuals (138 age-1 and 6 age-2) were double-tagged in 4 fishing events. Age-3 individuals were caught in another fishing event for the commercial quota of the boat.

- on August 4th, the weather was calm (sea state 2) with important cloud cover (80 to 90%). Age-3 individuals were caught in two fishing events for the commercial quota of the boat. In the afternoon age-2 individuals were found, 50 were double-tagged in one fishing event.

- on August 5th, the weather was calm (sea state 2) at the beginning of the day but turned stormy. No fish was detected during that day.

- on August 7th, the weather was calm (sea state 2) and partly clouded (50%). 10 age-1 individuals (of which 9 by double tagging) were tagged in a first fishing event. In two other fishing events age-3 individuals were caught for the commercial quota of the boat, and 3 were tagged with miniPAT tags. The tagger omitted to implant them a spaghetti tag too.

- on August 8th, the weather was calm (state 2) and clear (15% cloud cover). 12 age-1 individuals were tagged (double tagging) in a first fishing event. Age-3 individuals were caught in a second fishing event and kept for the boat's quota. On a third fishing event 86 age-1 individuals (of which 24 by double tagging) were tagged.

- on August 9th, the weather was calm (state 1-2) and clear (10% cloud cover). 101 age-2 individuals were tagged (of which 11 by double-tagging) in 3 fishing events.

- on August 14th, the weather was calm (state 2) with light cloud cover (10 to 60%). Age-2 and age-3 fish were caught for the boat in a first fishing event. An age-2 fish wearing the tags BYP000865 and BYP050265, implanted in the same boat by us last year, was recaptured. In a second fishing event, 65 age-1 fish were tagged, of which 13 by internal archival tags.

Note: the spaghetti tags used that day were tags from the series BYP005101 and BYP005201, received in in 2011.

- on August 16th, the weather was good (state 2-3) with light cloud cover (10 to 60%). 11 age-1 individuals were tagged

Note: the spaghetti tags used that day were tags from the series BYP005101 and BYP005201, received in 2011.

- on August 17th, the weather was good (state 2-3) with light cloud cover (0 to 10). A few age-3 individuals were caught, none of them was adequate for tagging (mouth or eye injured). They were kept for the boat's quota and landed.

- on August 18th, 11 age-3 individuals were tagged, all of them with miniPAT tags. This was the final GBYP tagging event for the Bay of Biscay this year. 6 other fishing events occurred, with a few age-3 individuals kept for the boat and landed on the next Monday.

- on August 19th the tagging team was still at sea due to the ongoing fishing activity of the boat (not coming back to port at night the previous day). Age-3 individuals were caught as commercial catch.

2.2. Central Mediterranean Sea

The tagging activities onboard the F/V Tuku Tuku in the Ionian, South Tyrrhenian and South Adriatic Sea started on October 1st and ended on October 16th. A total of 97 age-0 bluefin tunas were tagged in the Southeastern Tyrrhenian Sea by single conventional tagging (table 2, figures 10 and 11). Age-1 to age-3 individuals were absent at surface in the areas prospected (Western Ionian Sea, South Tyrrhenian Sea, South Adriatic Sea). The size range of the youngs-of-year was 32 - 42 cm (figure 12).

BFT Tagging 2012, Tyrrhenian S.



Figure 10: Geographic distribution of the 97 tag releases in the Tyrrhenian Sea

Saturday, 29/09/2012 (last part of the route): We sailed through the south of the Ustica and Eolian Islands and pass the strait of Messina with calm weather. In the Afternoon we arrive to Riposto. No sights of tuna.

We met the captains of the trawlers "*Estela del Mar*" and "*Francesco*". They told us that in this season in the surroundings we would only find class 0 bluefin tuna and we agree a channel in the VHF radio for communication.

Sunday 30/09/2012 (search of live bait): At 7:00 am we filled the tanks of fresh water. In the afternoon we departed Riposto heading Catania to try to catch live bait. The little fish we found was very small anchovy and we didn't try to catch it.

Monday 01/10/2012: We check the waters in the south of capo Spartivento (37.14N 16.65E) where some days ago the albacore long-liners bycaught class 1 and class 2 bluefin. Calm weather. No sights of tuna.

Tuesday 02/10/2012: We received remote sensing maps from Azti (SST and CHLA) that showed good plankton concentration at 20 miles north from Messina. We checked again the strait of Messina and the spots with favourable oceanographic conditions. Calm weather. No sights of tuna. In the afternoon we arrive to the port of Vibo Valentia where we met local purse seining skippers and the manager of "Mare Nostro", Vincenzo Ceravolo who contacted with tuna fishermen to obtain information. They told us the more frequent spots for class 1 and 2 in the gulf of Santa Eufemia and Eolian Islands. They also inform us that it was very difficult to find small horse mackerel (*Trachurus spp*) for bait, and that in this period only sardinella or anchovy are available.

Wednesday 03/10/2012: During the morning we checked the spots told us the day before by the fishermen of Vibo around the Gulf of Santa Eufemia, between Capo Vaticano and Amantea. Calm weather. No sights of tuna. At 15:00 we met at the sea a trawler "Regina di Cuore" and contact by radio. The skipper was from Galicia (Spain) so the communication was very fluid, during the last

week he was fishing in the area and he didn't see any tuna. We gave each other the vessel phone numbers for further communication. In the afternoon we anchored in the Gulf of Policastro (40.00 N 15.32E) with the intention of catching bait, but we didn't succeed.



Figure 11: track of the F/V Tuku Tuku during the tagging activity in the Central Mediterranean Sea in October 2012 (map from the software MaxSea)

Thursday 04/10/2012: We departed from the Gulf of Policastro at 6:00 am to Eolian islands. We arrived to the islands (38.54 N 15.03 E) in the midday from the western part of Stromboli and Panarea. Calm weather. No sights of tuna. We moored in the little harbour of Pignataro in Lipari Island. We met two captains of touristic vessels that daily sailed around the islands; they didn't see any tuna in the last week. We get their mobile phones for further communication.

Friday 05/10/2012: We departed from Pignataro at 6:00 am and sailed around the islands till Alicudi Island (38.34 N 14.15E) and back to Lipari passing through the southern part of Vulcano. During the day we checked around 40 FADs used by the local fishermen for fishing Coryphaenas, were small pelagic and tunas used to aggregate. Calm weather. No sights of tuna. The Vulcano and Lipari harbours were not deep enough for the Tuku Tuku so we anchored in the bay of Lipari.

Saturday 06/10/2012: During the sunrise we caught anchovy for bait (100 kilos aprox). We sailed again to the Gulf of Santa Eufemia and checked the surroundings waters. Calm weather. No sights of tuna. At 18:00 we moored in Vibo Valentia. We called the contacts in Lipari and they didn't sight any tuna.

Sunday 07/10/2012: During the morning we met local a tuna purse seine skipper, we visited his

boat and he explained how was the tuna season. He told us that it was late for class 1 and class 2. Enzo Ceravolo (Mare Nostro) sent us a local fisherman and at 10:30 we departed from Vibo to the surrounding waters of the Capo Vaticano, very close from the cost at 30 fathoms of depth (38.47N 16.00E). We found class 0 and we tagged 19 tunas between 35 and 42 cm fork length. There were about 20 small boats catching illegally class 0 bluefin tunas, some of them had maybe more than 100 individuals onboard (visual estimation). At 18:00 we moored in Vibo.



Tyrrhenian Sea, released #: 97

Figure 12: size distribution of the 97 individuals tagged in the Tyrrhenian Sea

Monday 08/10/2012: We departed from Vibo at 6:00 am. At 8:50 am we had an accident onboard with two injured fishermen. The "Guardia Costera" of Vibo helped us in the evacuation of the two crew members.

Tuesday 09/10/2012: We departed from Vibo at 7:00 am to the spots that local fishermen told us the day before. At 38.51N 16.06E we tagged 26 age-0 bluefin tuna and collected 19 other ones for genetic sampling. At 38.47N 16.00E we sampled 26 other age-0 individuals. At 13:00 we met a trawler at the sea, they told us they only saw class 0 tunas. In 38.44N 15.58E we tagged 29 age-0 bluefin tuna and collected 11 other ones for biological sampling. At 19:00 we moored in Vibo.

Wednesday 10/10/2012: We departed from Vibo at 06:30 am. At 38.40N and 16.00E we tagged 30 age-0 individuals, and collected 5 other ones for genetic sampling. In the area more than 20 small boats were fishing this class of fish. During the fishing operation 4 boats came very close to the Tuku Tuku (less than 10 meters) despite we were wearing a large ICCAT code on both sides of the boat, and they started to fish illegally age-0 individuals, using the live bait we were throwing. This lack of respect was impressive indeed.

We received more remote sensing maps that suggested good oceanographic conditions close to the

Eolian islands and at 10 miles to the east of Taormina. We checked the spots around the islands with calm weather. No sights of tuna. We anchored in the bay of Lipari and contacted the Galician skipper of the "Regina di Cuore" and the passenger boats skippers we met days ago. They didn't see any tuna.

Thursday 11/10/2012: We departed from Lipari at 6:00 am to check the spots in near Taormina and Catania. At 10:00 am we passed the strait of Messina. Calm weather. No sights of tuna. We moored in Catania at 16:00 where we met a swordfish long-line skipper, he told us that in this season the Adriatic is the unique option. At 20:00 we departed to the south Adriatic.

Friday 12/10/2012: All day navigation with 15-20 knots ESE wind. We arrived to Otranto (40.10N 18.30E) at 20:00. Despite of notifying previously the coastguards of Puglia (Bari subdivision), the entry to the port of Otranto was denied; we anchored in the outside of the bay.

Saturday 13/10/2012: We checked the edge of continental shelf between Otranto and Brindisi. No sights of tuna. While navigating the weather became very rough with 35 knots of SE wind (Sirocco), 2-3 meters waves and very heavy rains. We tried to enter in the Port of Brindisi to get a shelter and to buy provisions and water, again the entrance to the port was denied because we didn't have a local agency. The entrance to Monopoli was also denied because of lack of space in the port. We had no other option than heading back south, to find a shelter and to provision the vessel. We arrived to Otranto (40.09N 18.29E) and requested refuge due to the bad weather. They accepted our request but only for 24 hours.

Sunday 14/10/2012: After analysing the weather predictions and getting the last notifications of bycatch from the ALB longliners (bycatch only at 70m depth and in Croatian waters) we decided to leave the Adriatic due the bad perspectives both in terms of weather and of potential catches. At 7:30 am we departed from Otranto to the Gulf of Taranto where age-3 and larger tunas were detected some days before. We checked the waters of the Gulf, no sights of tuna. At 22:30 we anchored in the Gulf of Squillace (38.34N 16.35E).

Monday 15/10/2012: We started the navigation at 07:00 am and arrived to Riposto (Sicily) at 18:15, no sights of tuna, except a few age-0 individuals not interested by live bait. We filled the fresh water tanks and other supplies. At 22:00 we departed from Riposto through the strait of Messina.

Tuesday 16/10/2012: We passed the strait of Messina at 0:00 am. At 0:30 am we request refuge in the harbour of Milazzo due to the bad weather, 50 knots of south wind. We departed from Milazzo at 07:30 am heading to Sardinia. Navigation all day in the Tyrrhenian Sea, no sights of tuna.

Wednesday 17/10/2012 (out of the tagging area): Navigation all day in the western Tyrrhenian Sea, no sights of tuna. We arrived to Cagliari in Sardinia at 16:00.

Tuesday 23/10/2012: Shortly after leaving Cagliari, we caught a last age-0 individual by trolling line and sampled it.

2.3. Gulf of Lions and Balearic Sea

The tagging activities onboard the F/V Arcangel San Rafael and Yalobey Primero in the Gulf of Lions started on September 7th (after searching for live-bait on September 6th) and ended on October 8th. A total of 109 tunas (table 3), ranging from 74 to 108 cm FL (figure 13) have been tagged, of which 104 individuals tagged with conventional tags only and 5 individuals tagged with conventional tags and pop-up tags.

The local abundance of juvenile bluefin tunas in the area was extremely low compared to the 3 previous years in the same period. This unexpected scarcity of tuna could not allow tagging the expected number of individuals. Moreover, the presence of suitable small pelagic fish to be used as live bait was also very scarce.

Most tagging by the baitboats occured East from Cap de Creus (figures 14 to 16), which is a usual

zone of high concentration of juvenile bluefin tunas in late summer.



Figure 13: size distribution of the 109 individuals tagged from baitboats in the Gulf of Lions



Figure 14: spatial distribution of the 312 tag releases in the Balearic Sea and Western Gulf of Lions by baitboats (eastern releases, 109 tunas) and recreational vessels (western releases, 203 tunas)

The activity was suspended and the boats moved back to their home port on October 9th. The summary of activities (in Spanish) by both baitboat vessels in the area is enclosed as **Annex 4**.



Figure 15: tracks of the F/V Yalobey Primero during the tagging activities in the Gulf of Lions (map from the software Garmin)



GBYP tracks 2012, Balearic Sea

Lonaitude (°)

Figure 16: tracks of the F/V Arcangel San Rafael during the tagging activities in the Gulf of Lions

In addition to these baitboats, recreational fishermen (CEPRR) tagged 203 bluefin tunas between June 30th and November 2nd in the Balearic Sea (table 4). The size-range of the fish tagged by sport fishermen was broader, from 37.5 to 235 cm (figure 17).

Unlike in 2011, very few juvenile bluefin tunas were found this summer by the sport fishermen, who caught and tagged mainly large fish (age 4 and older) and some age-0 fish.



Balearic Sea (CEPRR), released #: 203

Figure 17: size distribution of the 203 individuals tagged from recreational vessels in the Balearic Sea

We can clearly see from this size distribution the absence of age-1 to age-3 individuals from the area during the whole period.

2.4. Gibraltar Strait

The tagging activities in the Gibraltar started on October 5th on the F/V Fernandez y Moreno, followed by the Union Vazquez Blanco on October 9th and by the Nuevo Adrian, Arcangel San Rafael and the Yalobey Primero on October 17th and 18th. On November 21st (last day of activity) a total of 1473 tunas have been tagged by these boats in the Strait of Gibraltar, including 1427 individuals tagged with conventional tags only, 25 individuals tagged with conventional tags and internal archival tags and 21 individuals tagged with conventional tags 5 to 9).

An important mixing in size-classes (with 10-12kg fish occuring together with up to 60 kg fish in the same school) made the tagging very slow and tedious, as the fishermen needed to filter the tunas they hooked. Moreover, the absence of age-1 fish and the scarcity and late occurring of age-2 individuals did not allow a massive tagging, usually possible on this age-group.

Most of the activity was concentrated on the Strait itself (figures 18 and 20 to 23b). The size range of the individuals tagged was from 45 to 189 cm (figure 19).

The weather was overall good at the beginning of the periods, and more days of bad weather (with impossibility to work properly) occured in the late part.

The summary of activities (in spanish) by the 5 baitboats in the area can be found in Annex 4.

As a complement, in order to clarify the activity done by each of the 5 boats, an excel file summarizing the tags implanted and the days of activity can be found in **Annex 5**.



Longitude (°)

Figure 18: Geographic distribution of the 1489 tag releases in the Strait of Gibraltar by baitboats (n=1473) and recreational vessels (n=16)



Figure 19: Size distribution of the 1473 tunas tagged by baitboats in the Strait of Gibraltar

Sport fishermen completed the tagging by 16 individuals in Gibraltar area (table 4).

- 305 tunas were tagged on the F/V Fernandez y Moreno, of which 8 by miniPAT tags and 5 by internal archival tags (table 5).

Figure 20: tracks of the F/V Fernandez y Moreno during the tagging activities in the Strait of Gibraltar

FERNANDEZ MORENO. tracks 2012, Gibraltar



Figure 21: tracks of the F/V Union Vazquez Blanco during the tagging activities in the Strait of Gibraltar

- 192 tunas were tagged on the F/V Union Vazquez Blanco, of which 6 by miniPAT tags and 7 by internal archival tags (table 6). The activity logbook of this boat is included as **Annex 6**.

NUEVO ADRIAN. tracks 2012, Gibraltar





- 282 tunas were tagged on the F/V Nuevo Adrian, of which 2 by miniPATs and 1 by internal archival tag (table 7) **ARCANGEL SAN RAFAEL. tracks 2012, Gibraltar**



- 319 tunas were tagged on the F/V Arcangel San Rafael, of which 3 by miniPATs and 6 by internal archival tags (table 8)

Arcangel San Rafael during the tagging activities in the Strait of Gibraltar

Figure 23a: tracks of the F/V

Yalobey. tracks 2012, Gibraltar



- 375 tunas were tagged on the F/V Yalobey Primero, of which 2 by miniPAT and 6 by internal archival tags (table 9)

2.5. Recaptures and pop-offs

7 of the miniPATs deployed in the Bay of Biscay popped off and sent their recorded information (figures 24 to 27).



Figure 24: tracks of the tunas tagged with the miniPATs 11P0449 (33days, left panel) and 11P0517 (53 days, right panel) in the Bay of Biscay



Figure 25: tracks of the tunas tagged with the miniPATs 11P0546 (38days, left panel) and 11P0550 (55 days, right panel) in the Bay of Biscay. The tag 11P0550 was physically recovered.



Figure 26: tracks of the tunas tagged with the miniPATs 11P0588 (45 days, left panel) and 11P0592 (63 days, right panel) in the Bay of Biscay.



Figure 27: non corrected geolocations of the miniPAT 11P0589 (11 days) in the Bay of Biscay

Up to now we were notified in 2012 of 13 recaptures of bluefin tunas tagged in the Bay of Biscay in 2011 and 2012 (table 10). The recovered information of each recapture of BYP tags has been added to the final databases (corresponding to tags sent in 2011 and in 2012 respectively).

In the Balearic Sea, two fish tagged this year were recaptured.

In the Tyrrhenian Sea, one fish tagged this year was recaptured.

In the Gibraltar Strait, two fish tagged in the Phase 2 activities were recaptured, one of them was tagged on February 5th 2012 in the Strait of Gibraltar.

3. Suggestions for adjusting the tagging strategy for conventional tagging in GBYP Phase 3

The use of pole and line with live bait, which takes advantage of the feeding frenzy behaviour of tunas, is an appropriate way to tag tunas massively. But several important conditions make it work significantly better:

- Local knowledge

In an unknown zone, even though with reliable information by local contacts on the presence and distribution of small pelagic fish and of tunas, a fisherman cannot perform as well as in an area (Bay of Biscay or Gibraltar Strait) in which he has 20 years of personal experience regarding the best zones and periods to catch the best live bait, the migration of juveniles bluefin tunas, their interannual variability and the differences between spatial distributions of the different age-groups. This qualitative difference has very important implications on the success of a tagging survey.

More generally, we think it would be useful to discuss the design of tagging activities with experienced fishermen whose local empirical knowledge can provide helpful advice.

- Efficient real-time information

Due to the patchiness and the potentially fast variation of the spatial distribution of tunas, an important helpful factor in the success of tuna fishing activity is the communication of real time information between a sufficient number of actively fishing boats. One boat alone getting only reports of bycatch or of occasional observations by boats targetting other species cannot perform as efficiently as a group of actively searching boats sharing real-time information.

- Temporal flexibility

Due to the absence of local baitboat fishery in the Gulf of Lions and in the Central Mediterranean Sea, baitboats had to be displaced from Gibraltar Strait and from the Bay of Biscay to these areas, in the periods with most likely presence of age-1 to age-3 individuals according to the information gathered during the GBYP operational meeting (april 17th and 18th 2012, Madrid). Due to the other activities of the boats in their respective areas, the tagging periods had to be defined and did not allow much flexibility (they can only be extended in case some days are not completed due to bad weather conditions for instance). This solution is not resilient in case of an important anomaly in the presence of juvenile tunas.

On the contrary, a boat performing commercial fishing in its area during a period of two or three months can adapt more easily to temporal variations in the presence and availability of age-1 and age-2 tunas, starting earlier if relevant or being able to continue fishing later in function of the detections of tunas.

Together with the temporal flexibility of local boats versus displaced boats, the possibility to do either commercial fishing or tagging in a given area and period in function of the size-classes encountered allows a more efficient use of the time at sea, as the boat can either fish for its own quota (if adult fish is found for instance) or tag (if age-1 or small fish are found). This option supposes a payment by fish tagged (+ diets of scientific personnel onboard), which motivates an efficient tagging.

- Age-groups focused

An important focus on age-1 fish, in addition to allowing a longer time-frame for possible recaptures, also allows a more efficient tagging, as age-1 individuals usually appear in larger aggregations than older individuals.

Of course this focus can actually be done only if age-1 fish are present. Their absence this year in Gibraltar, as well as the scarcity of age-2 individuals (appearing only in the late part of the tagging activity) are the main reasons that prevented reaching the tagging objective in this area.

- Adaptive number of tunas tagged by fishing event

The recommendation of not tagging more than 100 individuals by school generated some worries for the fishermen implied into tagging in the Bay of Biscay. The fishermen understood the meaning of this limitation for a better repartition of the tags among the population, but underlined that it could prevent reaching the tagging objective in case juvenile tunas are present during a short time-frame.

Enough aggregations could be found this year, but the fishermen insisted that these conditions were exceptional (particularly in July) and that in a more normal year this limitation of 100 tagged individuals by school could prevent reaching the tagging objective.

An adaptive use of this limitation should therefore be discussed, so as to combine a good repartition of the tags within the population and the ability to take advantage of important tuna aggregations in a given time.

- Presence of stable feeding resources at surface

In the Bay of Biscay, juvenile bluefin tunas feed mainly on epipelagic fish and are therefore usually present at surface. In other areas the availability of tunas at surface can vary in function of their feeding strategy. This is for example the case in the Ligurian Sea (comment by Fulvio Garibaldi) where according to the year juvenile tunas can be present either at surface (if feeding on anchovy) or in deeper waters (if feeding on krill).

This could be one of the factors explaining the absence of age-1 to age-3 tunas at surface this year in the Gulf of Lions and in the Tyrrhenian and Ionian Sea, where it was also very difficult to find correct amounts of live bait.

Thus, the choice of the tagging areas should maybe be done taking into account the interannual (relative) stability of epipelagic feeding resources that keep juvenile tunas present at surface.

Table 1: tagged tunas released from the F/V Attalaya Berria in the Bay of Biscay, by day, age-group (left columns) and type of tags used (right columns). Note: all tunas were tagged with at least one spaghetti tag, except 3 age-3 individuals tagged with miniPATs on August 7th

		indivic	luals			ta	ıgs	
Date	Age-1	Age-2	Age-3	Total by day	spaghetti tag	small billfish tag	internal archival tag	miniPAT tag
July 12 th				0				
July 13 th	2	1		3	3			
July 16 th	354			354	354	100		
July 17 th	293			293	293	150		
July 18 th	533			533	533	250		
July 19 th	634			634	634	177		
July 20 th		94	5	99	99			
July 21 th	100			100	100	23		
July 22 th	172	15	37	224	224			
July 24 th			3	3	3			
July 25 th	138	28		166	166			
July 26 th				0	0			
July 27 th	116	131		247	247	209		
July 29 th				0	0			
July 30 th	100	100		200	200	190		
July 31 st				0	0			
August 2 nd		64		64	64	50		
August 3 rd	138	6		144	144	144		
August 4 th		50		50	50	50		
August 5 th				0	0			
August 7 th	10		3	13	10	9		3
August 8 th	98			98	98	36		
August 9 th		101		101	101	11		
August 14 th	65			65	65		13	
August 16 th	11			11	11			
August 17 th				0	0			
August 18 th			11	11	11			11
August 19 th				0				
Total by age-group	2764	590	45	3413	3410	1399	13	14

	Age-0, spaghetti tag only	notes
2012/10/01	0	
2012/10/02	0	
2012/10/03	0	
2012/10/04	0	
2012/10/05	0	
2012/10/06	0	
2012/10/07	19	
2012/10/08	0	(activity on morning only, due to an accident injuring two fishermen)
2012/10/09	53	
2012/10/10	25	
2012/10/11	0	
2012/10/12	0	
2012/10/13	0	
2012/10/14	0	
2012/10/15	0	
2012/10/16	0	
total	97	

Table 2: tagging activity onboard the F/V Tuku Tuku in the Central Mediterranean Sea

Table 3a: tagging activity onboard the F/V Arcangel San Rafael in the Gulf of Lions, by day, agegroup (left column) and type of tagging (right columns). Note: in four of the five individuals tagged with miniPATS (on October 1st, 2nd and 8th) the associated conventional tag was a small billfish tag instead of a spaghetti tag. Therefore only 17 of the 21 individuals were tagged with a spaghetti tag

	individuals		tags		notes
	Age 3	spaghetti tag	small billfish tag	miniPAT	
06/09/2012					searching for bait
07/09/2012					vessel at port
08/09/2012					
09/09/2012					
10/09/2012					
11/09/2012					
12/09/2012					
13/09/2012					vessel at port
14/09/2012					vessel at port
15/09/2012					vessel at port
16/09/2012					
17/09/2012					
18/09/2012					
19/09/2012					vessel at port
20/09/2012					
21/09/2012					vessel at port
22/09/2012					
23/09/2012	2	2			
24/09/2012					vessel at port
25/09/2012					vessel at port
26/09/2012					vessel at port
27/09/2012					
28/09/2012					
29/09/2012					vessel at port
30/09/2012					vessel at port
01/10/2012	8	7	8	1	
02/10/2012	2	1	1	2	
03/10/2012					vessel at port
04/10/2012					
05/10/2012					vessel at port
06/10/2012					vessel at port
07/10/2012					vessel at port
08/10/2012	9	 7	6	2	
total	21	17	15	5	

Table 3b: tagging activity onboard the F/V Yalobey Primero in the Gulf of Lions, by day, age-group (left columns) and type of tagging (right columns).

	individ	uals		tags		notes
	Age 2	Age 3	total/day	spaghetti tag	small billfish tag	
06/09/2012						searching for bait
07/09/2012		1	1	1		
08/09/2012						
09/09/2012						
10/09/2012						
11/09/2012						
12/09/2012						
13/09/2012						vessel at port
14/09/2012						vessel at port
15/09/2012						vessel at port
16/09/2012						
17/09/2012						
18/09/2012						
19/09/2012						vessel at port
20/09/2012						
21/09/2012						vessel at port
22/09/2012	1	20	21	21	20	
23/09/2012		40	40	40	29	
24/09/2012						vessel at port
25/09/2012						vessel at port
26/09/2012						vessel at port
27/09/2012						
28/09/2012						
29/09/2012						vessel at port
30/09/2012						vessel at port
01/10/2012		24	24	24	24	
02/10/2012						
03/10/2012						vessel at port
04/10/2012						vessel at port
05/10/2012						vessel at port
06/10/2012						vessel at port
07/10/2012						vessel at port
08/10/2012		2	2	2	2	
total	1	87	88	88	75	

Table 4: Tagging activity onboard the CEPRR recreative vessels in the Balearic Sea and in Gibraltar area. Note: in the Balearic Sea 11 tunas were tagged using a billfish tag only, and 2 tunas were tagged, recaptured and released a second time. Therefore spaghetti tags were implanted only on 208 of the 221 released individuals.

	In P	ndividual	ls –	Indiv	iduals –		tags		
			$\Lambda q_0 > 2$			total/day/	spaghotti	small billfish	notos
20/06/2012	Aye U	Aye 3	Aye >3	Aye 3	Aye >3	total/uay	spagnetti		notes
07/07/2012			ו ר			1	1	0	
07/07/2012			2			2	2	0	
08/07/2012			2			2	2	0	
14/07/2012			2			2	2	0	
15/07/2012			3			3	3	0	
21/0//2012			1			1	1	0	
22/07/2012			1			1	1	0	
27/07/2012			1			1	1	0	
28/07/2012			1			1	1	0	
03/08/2012			2			2	2	0	
08/08/2012			4			4	4	0	
09/08/2012			2			2	2	0	
12/08/2012			2			2	2	0	
13/08/2012			2			2	2	0	
14/08/2012			2			2	2	0	
15/08/2012			5			5	5	0	
16/08/2012			5			5	4	1	(a)
17/08/2012			6			6	6	0	
18/08/2012			5			5	4	1	(a)
20/08/2012			3			3	3	0	
21/08/2012			3			4	4	1	(b)
22/08/2012			5			5	5	0	
23/08/2012			1			1	1	0	
25/08/2012			9			9	7	2	(a)
02/09/2012			1			1	,	1	(a)
03/09/2012			2			2	2	0	()
06/09/2012		1	2 1			2 3 ± 1	3	0	(c)
08/09/2012		י ר	20			22	30	2	(a)
00/09/2012			10			20	10	2	(a)
10/09/2012		1	17			20	17	1	(a)
11/09/2012			14			14	14	2	(u)
11/09/2012			10	1	0	10	10	0	(2)
16/00/2012			1	4	8	13 E	2 		(α)
10/09/2012			10		4	5	5	0	
18/09/2012			10.1			10.1	10	0	(c)
23/09/2012			10+1			10+1	10	0	(0)
02/10/2012			5			5	5	0	
03/10/2012	2					2	2	0	
06/10/2012		-	2			2	2	0	
0//10/2012		1	1			2	2	0	
09/10/2012	1					1	1	0	
12/10/2012			1			1	1	0	
14/10/2012	15					15	15	0	
16/10/2012	3					3	3	0	
02/11/2012			3			3	3	0	
Total	21	5	177+2	4	12	219+2	208	12	

(a): small billfish tags were used for single tagging

(b): one double-tagged fish

(c): including the second release of a fish previously tagged in the Balearic Sea in 2012

Table 5: Tagging activity onboard the F/V Fernandez y Moreno, by day, age-group (left columns) and type of tagging (right columns). Note: five of the released individuals were tagged with a miniPAT and a small billfish tag, and one of them with a small billfish tag only. Therefore spaghetti tags were implanted only on 299 of the 305 released individuals.

		individuals		tags						
	Age 3	Age >3	total/ day	spaghetti tags	small billfish tags	internal archival tags	miniPAT			
2012/10/05	12	17	29	29	0	0	0			
2012/10/06	7	8	15	15	0	0	0			
2012/10/07	2	2	4	4	0	0	0			
2012/10/08	4	7	11	11	0	0	0			
2012/10/09	2	6	8	8	7	0	0			
2012/10/10	9	7	16	16	16	0	0			
2012/10/11	14	5	19	19	19	0	0			
2012/10/12	41	8	49	49	41	0	3	(a)		
2012/10/13	4	12	16	14	16	1	2	(b)		
2012/10/14	1	3	4	2	4	0	2	(c)		
2012/10/15	4	0	4	4	4	0	0			
2012/10/16	0	1	1	0	1	0	1	(d)		
2012/10/17	0	6	6	6	6	0	0			
2012/10/18	0	0	0	0	0	0	0			
2012/10/19	14	3	17	17	17	0	0			
2012/10/20	0	4	4	4	4	1	0	(e)		
2012/10/21	2	6	8	8	8	2	0	(f)		
2012/10/22	0	6	6	6	6	0	0			
2012/10/23								(g)		
2012/10/24								(g)		
2012/10/25	1	6	7	7	5	0	0			
2012/10/26	38	0	38	37	38	0	0			
2012/10/27	10	32	42	42	42	1	0			
2012/10/28	0	1	1	1	1	0	0			
2012/10/29								(g)		
2012/10/30	0	0	0	 0	0	0	0			
Total	165	140	305	 299	235	5	8			

(a): 3 miniPATs implanted with both a spaghetti and a billfish tag each

(b): 1 internal archival tag implanted with a green (non-BYP) spaghetti tag and a BYP billfish tag; 2 miniPATs implanted with billfish tags but no spaghetti tag

(c): 2 miniPATs implanted with billfish tags but no spaghetti tag

(d): 1 miniPAT implanted with a billfish tag but no spaghetti tag

(e): 1 internal archival implanted with a green (non-BYP) spaghetti tag and a BYP billfish tag

(f): 2 internal archival tags implanted with both a spaghetti tag and a billfish tag each

(g): vessel at port

Table 6: Tagging activity onboard the F/V Union Vazquez Blanco, by day, age-group (left columns) and type of tagging (right columns). Note: four of the released individuals were tagged with a miniPAT and a small billfish tag, and two of them with a small billfish tag only. Therefore only 186 of the 192 released individuals were tagged with a spaghetti tag.

		individuals	-	tags					
	Age 3	Age > 3	total/ day	spaghetti tag	small billfish tag	internal archival tag	miniPAT tags		
2012/10/09	0	1	1	1	0	0	0		
2012/10/10	4	8	12	12	4	0	0		
2012/10/11	6	6	12	12	4	0	0		
2012/10/12	2	2	4	4	4	0	0		
2012/10/13	15	9	24	23	15	1	2	(a)	
2012/10/14	10	20	30	29	24	1	2	(b)	
2012/10/15	1	0	1	1	0	1	0		
2012/10/16	0	0	0	0	0	0	0		
2012/10/17	1	13	14	14	13	0	1		
2012/10/18	8	3	11	10	11	0	0	(c)	
2012/10/19	0	1	1	1	1	0	0		
2012/10/20	0	1	1	1	1	0	0		
2012/10/21	9	11	20	20	20	0	0		
2012/10/22	7	0	7	7	3	0	0		
2012/10/23								(d)	
2012/10/24								(d)	
2012/10/25	0	1	1	1	1	0	0		
2012/10/26	8	9	17	16	5	0	0	(C)	
2012/10/27	17	7	24	24	0	0	0		
2012/10/28	0	0	0	0	0	0	0		
2012/10/29								(d)	
2012/10/30	0	1	1	1	0	0	1		
2012/10/31	1	8	9	7	5	2	0	(e)	
2012/11/01	0	0	0	0	0	0	0		
2012/11/02	0	2	2	2	2	2	0	(f)	
2012/11/03	0	0	0	0	0	0	0		
Total	89	103	192	186	113	7	6		

(a): 1 miniPAT implanted with a billfish tag but no spaghetti tag

(b): 1 miniPAT implanted with a billfish tag but no spaghetti tag

(c): 1 individual tagged with a billfish tag only

(d): vessel at port

(e): 2 internal archival tags implanted with billfish tags but no spaghetti tag

(f): 2 internal archival tags implanted with BYP spaghetti tags and green billfish tags

Table 7: Tagging activity onboard the Nuevo Adrian in the Gibraltar Strait, by day, age-group (left columns) and type of tagging (right columns). Note: five of the released individuals were tagged with a small billfish tag only, and one individual was tagged with a miniPAT and a small billfish tag. Therefore only 276 of the 282 released individuals were tagged with a spaghetti tag.

		iı	ndividua	ls		tags				
	age 1	age 2	age 3	age >3	total/ day	spaghetti	small billfish	internal archival	miniPAT	
2012/10/16	0	0	0	0	0	0	0	0	0	
2012/10/17	0	0	0	2	2	2	2	0	0	
2012/10/18	0	0	1	3	4	4	4	0	0	
2012/10/19	0	0	3	10	13	13	13	0	0	
2012/10/20	0	0	13	1	14	14	14	0	0	
2012/10/21	0	0	0	1	1	0	1	0	0	(a)
2012/10/22	0	0	0	4	4	4	4	0	0	
2012/10/23										(b)
2012/10/24										(b)
2012/10/25	0	0	0	2	2	1	2	0	0	(a)
2012/10/26	0	0	22	6	28	27	28	0	0	(a)
2012/10/27	0	0	27	11	38	37	35	0	0	(a)
2012/10/28	0	0	0	0	0	0	0	0	0	
2012/10/29										(b)
2012/10/30	0	0	0	0	0	0	0	0	0	
2012/10/31	0	0	0	9	9	9	9	0	0	
2012/11/01	0	0	0	0	0	0	0	0	0	
2012/11/02	0	0	7	0	7	7	7	0	0	
2012/11/03	0	0	0	0	0	0	0	0	0	
2012/11/04										(b)
2012/11/05	0	0	0	1	1	1	1	0	0	
2012/11/06										(b)
2012/11/07										(b)
2012/11/08										(b)
2012/11/09										(b)
2012/11/10	0	0	39	31	70	68	69	0	1	(c)
2012/11/11	0	0	0	0	0	0	0	0	0	
2012/11/12	0	0	1	0	1	1	1	0	0	
2012/11/13	7	31	0	3	41	41	36	0	0	
2012/11/14	0	18	16	7	41	41	41	1	1	(d)
2012/11/15										(b)
2012/11/16										(b)
2012/11/17										(b)
2012/11/18	0	1	5	0	6	6	6	0	0	
Total	7	50	134	91	282	276	273	1	2	

(a): 1 individual tagged with billfish tag only

(b): vessel at port

(c): miniPAT implanted with a billfish tag but no spaghetti tag; 1 individual tagged with a spaghetti tag only; 1 individual tagged with a billfish tag only

(d): internal archival tag implanted with a green (non-BYP) spaghetti tag and a BYP billfish tag

Table 8: Tagging activity onboard the Arcangel San Rafael in the Gibraltar Strait, by day, age-group (left columns) and type of tagging (right columns). Note: three of the released individuals were tagged with a miniPAT and a small billfish tag but no spaghetti tag. Therefore only 316 of the 319 released individuals were tagged with a spaghetti tag.

		in	dividuals			tags					notes
	age 1	age 2	age 3	age >3	total /day		spaghetti	small billfish	internal archival	miniPAT	
18/10/2012	0	0	3	1	4		3	4	0	1	(a)
19/10/2012	0	0	0	0	0		0	0	0	0	
20/10/2012	0	0	2	9	11		10	11	0	1	(a)
21/10/2012	0	0	2	1	3		2	3	1	1	(b)
22/10/2012	0	0	0	0	0		0	0	0	0	
23/10/2012											(c)
24/10/2012											(C)
25/10/2012	0	0	1	0	1		1	1	0	0	
26/10/2012	0	0	9	2	11		11	11	0	0	
27/10/2012	0	0	0	0	0		0	0	0	0	
28/10/2012	0	0	0	0	0		0	0	0	0	
29/10/2012											(c)
30/10/2012	0	0	3	8	11		11	11	0	0	
31/10/2012	0	0	0	6	6		6	6	0	0	
01/11/2012	0	0	3	0	3		3	3	0	0	
02/11/2012	0	0	5	0	5		5	5	0	0	
03/11/2012	0	0	0	0	0		0	0	0	0	
04/11/2012											(c)
05/11/2012	0	0	12	6	18		18	18	0	0	
06/11/2012											(c)
07/11/2012											(c)
08/11/2012											(c)
09/11/2012											(c)
10/11/2012	0	0	13	33	46		46	46	0	0	
11/11/2012	0	0	0	0	0		0	0	0	0	
12/11/2012	0	0	0	1	1		1	1	0	0	
13/11/2012	0	0	1	5	6		6	6	0	0	
14/11/2012	0	0	44	54	98		98	76	0	0	
15/11/2012											(c)
16/11/2012											(c)
17/11/2012											(c)
18/11/2012	1	57	0	1	59		59	59	0	0	
19/11/2012	0	0	0	0	0		0	0	0	0	
20/11/2012	0	0	0	0	0		0	0	0	0	
21/11/2012	0	0	18	18	36		36	36	5	0	(d)
Total	1	57	116	145	319		316	297	6	3	

(a): miniPAT implanted with a billfish tag but no spaghetti tag

(b): miniPAT implanted with a billfish tag but no spaghetti tag; archival tag implanted with a green spaghetti tag and a billfish tag

(c): vessel at port

(d): 5 internal archival tags implanted with a BYP spaghetti tag and a green (non-BYP) billfish tag

Table 9: Tagging activity onboard the Yalobey Primero in the Gibraltar Strait, by day, age-group (left columns) and type of tagging (right columns). Note: one of the released individuals (on October 31st) was tagged with a miniPAT and a small billfish tag but no spaghetti tag, another one (on November 9th) was tagged with a billfish tag only. Therefore only 373 of the 375 released individuals were tagged with a spaghetti tag.

		Individ	luals		tags				notes
	age 2	age 3	age >3	total/ day	spaghetti	small billfish	internal archival	miniPAT	
18/10/2012	0	0	0	0	0	0	0	0	
19/10/2012	0	0	0	0	0	0	0	0	
20/10/2012	0	0	2	2	2	2	0	0	
21/10/2012	0	17	11	28	28	28	0	0	
22/10/2012	0	0	5	5	5	5	0	0	
23/10/2012									(a)
24/10/2012									(a)
25/10/2012	0	18	2	20	20	20	0	0	
26/10/2012	0	49	8	57	57	45	0	0	
27/10/2012	0	29	10	39	39	0	0	0	
28/10/2012	0	0	0	0	0	0	0	0	
29/10/2012									(a)
30/10/2012	0	0	0	0	0	0	0	0	
31/10/2012	0	1	5	6	5	5	0	1	(b)
01/11/2012	0	7	0	7	7	7	1	0	(c)
02/11/2012	0	20	6	26	26	26	0	0	
03/11/2012	0	0	0	0	0	0	0	0	
04/11/2012									(a)
05/11/2012	0	16	7	23	23	23	0	0	
06/11/2012									(a)
07/11/2012									(a)
08/11/2012									(a)
09/11/2012	4	49	0	53	52	50	4	1	(d)
10/11/2012	0	0	3	3	3	3	0	0	
11/11/2012	0	0	0	0	0	0	0	0	
12/11/2012	29	0	1	30	30	30	0	0	
13/11/2012	16	0	1	17	17	17	0	0	
14/11/2012	5	17	3	25	25	24	0	0	
15/11/2012									(a)
16/11/2012									(a)
17/11/2012									(a)
18/11/2012	0	33	1	34	34	34	1	0	(e)
19/11/2012	0	0	0	0	0	0	0	0	
20/11/2012									(f)
Total	54	256	65	375	373	319	6	2	

(a): vessel at port

(b): miniPAT implanted with a billfish tag but no spaghetti tag

(c): 1 internal archival with a green (non-BYP) spaghetti tag and a BYP billfish tag

(d): 2 archival tags implanted with green (non BYP) spaghetti tags and BYP billfish tags, 1 archival tag implanted with a BYP spaghetti tag and a green (non-BYP) billfish tag, 1 archival tag implanted with a BYP spaghetti tag, 1 miniPAT implanted with BYP both spaghetti and billfish tags, 1 individual tagged with a billfish tag only

(e): archival tag implanted with a BYP spaghetti tag and a green (non-BYP) billfish tag

(f): accident at sea, the boat had to go back to port

Table 10: recaptures corresponding to fish tagged and/or recaptured during the GBYP tagging activities in the Bay of Biscay, Balearic Sea, and Central Mediterranean Sea

activi	ties in the bay	of Discay, Da	liearic Sea, and Co	entral Mediterra	anean Sea	
1 st spaghetti	Tagging	Length at	Region of	Recapture	Length at	Region of
tag number	date	tagging	tagging	date	recapture	recapture
BYP000728	09/08/2011	60 cm	Bay of Biscay	03/07/2012	75.2 cm (CFL)	Western Atl.
						(NY, USA)
AAA002087	30/06/2012	64 cm	Bay of Biscay	17/07/2012	63.8 cm	Bay of Biscay
		(CFL)				
AZ00145	07/08/2010	72 cm	Bay of Biscay	30/07/2012	106.3 cm	Bay of Biscay
BYP000219	04/08/2011	60 cm	Bay of Biscay	17/07/2012	81.3 cm	Western Atl
						(NJ, USA)
BYP000386	06/08/2011	84 cm	Bay of Biscay	16/07/2012	105 cm	Bay of Biscay
BYP000865	12/08/2011	61 cm	Bay of Biscay	14/08/2012	86.5 cm	Bay of Biscay
BYP007209	18/07/2012	59 cm	Bay of Biscay	29/07/2012	61 cm (CFL)	Bay of Biscay
BYP007352	18/07/2012	63 cm	Bay of Biscay	19/09/2012	Not correctly	Bay of Biscay
					measured by	
					fisherman	
BYP008571	08/08/2012	67 cm	Bay of Biscay	16/10/2012	Not measured	Bay of Biscay
					(weight 7kg)	
BYP009092	19/07/2012	60 cm	Bay of Biscay	16/12/2012	Not measured	Bay of Biscay
					(weight 6kg)	
BYP009318	27/07/2012	81 cm	Bay of Biscay	22/09/2012	87 cm (CFL)	Bay of Biscay
BYP009420	19/07/2012	60 cm	Bay of Biscay	31/10/2012	67.5 cm	Bay of Biscay
BYP009696	22/07/2012	62 cm	Bay of Biscay	29/10/2012	Not properly	Bay of Biscay
					measured by	
					fisherman	
BYP005673	14/07/2012	160 cm	Balearic Sea	06/09/2012	160 cm	Balearic Sea
					(estimated)	
BYP005818	15/07/2012	160 cm	Balearic Sea	23/09/2012	Not measured	Balearic Sea
BYP016483	10/10/2012	38 cm	Tyrrhenian	29/10/2012	Not measured	Tyrrhenian
			Sea		(weight 1.2kg)	Sea
BYP001272	(Phase 2 data	a)	Strait of	20/10/2012	96 cm	Strait of
			Gibraltar			Gibraltar
BYP005081	05/02/2012	104 cm	Strait of	26/10/2012	119 cm	Strait of
			Gibraltar			Gibraltar

Table 11: pop-offs corresponding to 7 of the miniPAT tags implanted in the Bay of Biscay. The tag #11P0550 was physically recovered

Argos ID	Serial ID	Tagging	Length	Region of	Pop-off	Number of
		date		tagging	date	days recorded
120114	11P0449	8/18/2012	108	Bay of Biscay	19/09/2012	33
120117	11P0517	8/7/2012	105	Bay of Biscay	28/09/2012	53
120118	11P0546	8/18/2012	105	Bay of Biscay	24/09/2012	38
120119	11P0550	8/18/2012	105	Bay of Biscay	11/10/2012	55
120123	11P0588	8/18/2012	105	Bay of Biscay	01/10/2012	45
120124	11P0589	8/18/2012	105	Bay of Biscay	28/08/2012	11
120125	11P0592	8/18/2012	107	Bay of Biscay	19/10/2012	63