UNUSUAL PRESENCE OF SMALL BLUEFIN TUNA YOY IN THE ATLANTIC OCEAN AND IN OTHER AREAS

A. Di Natale[1], P.G. Lino[2], J.A. López González[3],
M. Neves dos Santos[4], A. Pagá García[1], C. Piccinetti[5], S. Tensek[1]

SUMMARY

Spring 2017 was characterised by extremely high sea-surface temperatures both in the Mediterranean Sea and in some parts of the eastern Atlantic Ocean, with high anomalies. The unusual presence of very small Bluefin tuna YOY was firstly noticed in the second part of August in some areas where these small sizes are not present, like in the southern part of the Iberian Peninsula (both in Atlantic Spain and Portugal), in the Canary Islands and in the central-northern Adriatic Sea. The exact natal origin of this very young fish is unknown, but the GBYP has been able to collect some samples, which will be analysed in the future.

RÉSUMÉ

Le printemps 2017 a été caractérisé par des températures à la surface de la mer extrêmement élevées aussi bien en mer Méditerranée que dans certaines parties de l'océan Atlantique oriental, avec de grandes anomalies. La présence inhabituelle de très petits thons rouges de l'année (YOY) a tout d'abord été remarquée dans la seconde partie du mois d'août dans certaines zones où ces petites tailles ne sont pas présentes, comme dans la partie méridionale de la péninsule ibérique (à la fois dans l'Atlantique espagnol et portugais), dans les îles Canaries et dans le centre-nord de la mer Adriatique. On ne connaît pas l'origine exacte de ces très jeunes poissons, mais le GBYP a été en mesure de recueillir des échantillons, qui seront analysés à l'avenir.

RESUMEN

La primavera de 2017 se caracterizó por temperaturas extremadamente elevadas de la superficie del mar, tanto en el mar Mediterráneo como en algunas partes del océano Atlántico oriental, con fuertes anomalías. La presencia poco usual de atún rojo muy pequeño YOY se detectó primero en la segunda parte de agosto en algunas áreas en las que las tallas pequeñas no estuvieron presentes, como en la parte meridional de la península ibérica (en Portugal y España del Atlántico), en las islas Canarias, en el Marruecos Atlántico y en el mar Adriático central septentrional. Se desconoce el origen natal exacto de estos peces muy jóvenes, pero el ICCAT GBYP ha podido recoger algunas muestras, que se analizarán en el futuro.

KEYWORDS

Bluefin tuna, juveniles, YOY, climate impact,
size frequencies, spawning areas, Mediterranean, East Atlantic

[1] ICCAT, GBYP – Calle Corazón de Maria 8, 6ª – 28002 Madrid (España); antonio.dinatale@iccat.int, stasa.tensek@iccat.int, alfonso.paga@iccat.int
[2] IPMA, - Instituto Português do Mar e da Atmosfera Avenida 5 de Outubro s/n, 8700-305 Olhão, Portugal; plino@ipma.pt
[3] Muy Noble Asociación de los Amigos del Atún *Thunnus thynnus* y Amantes del Vino, Cine Victoria 2, 21410 Isla Cristina, Spain. amigosdelatun@amigosdelatun.com
[4] ICCAT – Calle Corazón de Maria 8, 6ª – 28002 Madrid (España); miguel.santos@iccat.int
[5] Laboratorio di Biologia Marina e Pesca, Università di Bologna in Fano, Viale Adriatico no. 1/n, 61032 Fano (PU), Italy; corrado.piccinetti@unibo.it

1. Introduction

Besides the well-known distribution of the main Bluefin tuna juvenile aggregation for the eastern stock (Mather *et al*., 1995; Piccinetti *et al*., 2013), there are some additional areas where very small Bluefin tuna YOY were noticed in the past. This is very relevant for the eastern Atlantic areas, namely those between the southern Moroccan coast and the Canary Islands, where the possible presence of a spawning area for the Bluefin tuna was reported by some authors (de Buen, 1925, 1926; Mather et al., 1995, Di Natale *et al*., 2013) and also where very small Bluefin tuna YOY were found in the past and in few others in more recent years (Aloncle, 1964, 1966; Rodriguez Roda, 1975; Mather et al., 1995; Idrissi and Pascual, pers.inf.). EU-Portugal reported to the ICCAT Statistical Department size data on small Bluefin tuna bycatch on a tuna trap set off the southern Portuguese coast in 1996, from 38 cm on, while in 1995 the size classes were from 50 cm on (pers. com. M. Neves dos Santos). The sporadic presence of small YOY individual was also reported in 2013 and 2015 in the Atlantic southern Spain, but always without noticing large aggregations.

2. Unusual presence of YOY in some areas in 2017

Thanks to the large network set by ICCAT GBYP, since the very last part of August 2017 it was possible to have very precise information about the presence of important aggregations of very small Bluefin tuna between the eastern part of the province of Cadiz and the province of Huelva (Spain), and the western part of the southern Portuguese coast. After several cross-checks of the information, all confirming the massive presence of many thousands of Bluefin tuna YOY, quite often in areas where the mackerels were aggregating, it was finally possible to obtain some fish samples that were collected thanks to the ICCAT Rec. 11-06 (Anon., 2012) and duly registered on RMA certificates. The samples were shipped to AZTI, who is in charge of maintaining the ICCAT GBYP Tissue Bank. The samples collected in the Atlantic coast in southern Spain on 24 August ranged from 25.3 to 26.7 cm (having a weight between 200 and 210 gr) (**Figure 1**, left), while the single sample collected on 28 August in southern Portugal measured 29.1 cm and weighted 363 gr (**Figure 2**). Additional YOY were noticed in the province of Cadiz on September 14; in this case, the YOY were 2 specimens of 280 gr, 1 of 340 gr and 1 of 370 gr (**Figure 1**, right).

About one week before those dates, a specimen of Bluefin tuna YOY of about 20 cm was incidentally fished in the Canary Islands, but it was impossible to collect this sample. Many small tunas of about the same size were noticed in the last part of August and for about one month in the area of Larache (Atlantic Morocco), but even in this case was not possible to obtain any sample.

Several fishermen, either professional or sport fishermen, reported the massive presence of very small Bluefin tuna YOY (about 20 cm FL) in the central-northern part of the Adriatic Sea, about across the mid-line, in the week between 21 and 27 August. The presence of so small Bluefin tuna individuals in this area is unusual, even if anecdotic information reports that it was noticed in some years in the past. Furthermore, there is the evidence that the evidence that those Bluefin tuna YOY remained along the southern Spanish Atlantic coast up to the autumn, reaching the size of 39 cm SFL and the weight of 1,050 kg on October 31, 2017.

3. The unusual SST temperatures in 2017

ICCAT GBYP usually follows the evolution of SST, anomalies, salinity, currents, winds and waves during the potential Bluefin tuna spawning season, collecting daily maps, aiming at correlating the behaviour of Bluefin tuna with the natural environment. This year the SST showed quite important anomalies in the eastern Atlantic areas and in the Mediterranean Sea, including a different distribution of high SST. Most of the remarkable events were noticed in June, where usually the peak of the Bluefin tuna spawning season occurs. **Figure 3** shows some examples of SST anomalies and one image for the SST on 25 June 2017. It was very clear that high anomalies were present in the western-central Mediterranean Sea, including the Adriatic Sea, while SST higher than 24°C were present also in the southern part of the Iberian Peninsula and in the area between the Canary Islands and southern Morocco. As noticed in recent years (Di Natale *et al*., 2016), the Bluefin tuna is quite able to take immediate advantage of any environmental opportunity for spawning in any area crossed during the spawning season.

4. Discussion

Several peculiar situations have been noticed about the Bluefin tuna YOY in recent years (Di Natale *et al*., 2017, in press a, in press b) and the SCRS Bluefin tuna species Group recommended that these situations should be always noticed with the objective to improve our scientific understanding of this species. The presence of very

small Bluefin tuna YOY in the eastern Atlantic waters is quite unusual, even if it was already noticed in some years the past years (Aloncle, 1964, 1966; Rodriguez Roda, 1975; Mather *et al*., 1995). Such occurrence was previously reported as a possible indicator of an additional spawning area in the eastern Atlantic, between the southern Morocco and the Canary Island. In 2017, the small YOY were massively found mostly along the southern Spanish and Portuguese coast in the Atlantic, with a sporadic presence in the Canary Islands and a prolonged presence along the coast of the Atlantic Morocco.

Considering the small size of these YOY found in 2017, we consider two possible hypotheses: a) there was a Bluefin tuna spawning activity in the eastern Atlantic, where the oceanographic conditions were suitable (either in the southern cost of the Iberian peninsula, along the Atlantic coast and/or between the Canary Islands and the central-southern Morocco), and b) there was an unusual migration of extremely young Bluefin tuna YOY from the most western part of the Mediterranean Sea to the Eastern Atlantic.

Both hypotheses are plausible, even if, considering the strong currents in the Strait of Gibraltar, it is unusual that so small YOY cross the Strait. Anyway, it is to be noted that in Spring and Summer 2017 there was a prevalence of wind from the East (Levantine wind) in the Strait of Gibraltar, reaching strong peaks in July, and this might have helped the fish movement in superficial waters, even if we have no information about any massive presence of Bluefin tuna YOY in the Alboran Sea. At the same time, the unusual warm waters noticed in June and afterword in the southern part of the Iberian Peninsula along the Atlantic coast (but also in the area between the Canary Islands and central-southern Morocco, where these warm water conditions are not unusual) might have induced some Bluefin tuna spawners to take advantage of the situation.

More light on these events may arise from the microchemistry analysis of the available otoliths and the genetic analyses of the tissues already collected. Such analyses can provide possible evidence about the natal origin of these very small Bluefin tuna YOY.

Bibliography

Aloncle H., 1964, Note sur le Thon rouge de la Baie Ibero-Marocaine (II). Bull. Ins. Pech. Marit. Maroc, Rabat, 12: 43-59.

Aloncle H., 1966, Note sur le Thon rouge de la Baie Ibero-Marocaine (II). Bull. Ins. Pech. Marit. Maroc, Rabat, 14: 29-41.

Anonymous, 2012. Recommendation by ICCAT concerning the Atlantic-wide Research Programme for Bluefin Tuna. ICCAT Report for Biennial Period, Part II (2011), vol. 1: 231.

De Buen F., 1925, Biologia del Atún *Orcynus thynnus* (L.) Resultado de las campañas realizadas por acuerdos internacionales. Instituto Español de Oceanografía, Madrid, 1: 1-118.

De Buen F., 1926, Catalogo ictiológico del Mediterráneo Español y Marruecos. Res. Camp. Acuerd. Intern., 2: 150, 159, 167.

Di Natale A., Idrissi M., Justel Rubio A., 2013, The mystery of Bluefin tuna (*Thunnus thynnus*) presence and behavior in the Central-South Atlantic in recent years. Collect. Vol. Sci. Pap., ICCAT, 69 (2): 857-868.

Di Natale A., Tensek S., Pagá García A., 2016, 2015: is the Bluefin tuna facing another 2003? Collect. Vol. Sci. pap., ICCAT, 72 (6): 1614-1630.

Di Natale A., Tensek S., Celona A., Garibaldi F., Oray I., Pagá García A., Quilez Badía G., Valastro M, 2017, A peculiar situation for YOY of Bluefin tuna (*Thunnus thynnus*) in the Mediterranean Sea in 2015. Collect. Vol. Sci. Pap., ICCAT, 73 (6): 2099-2111.

Di Natale A., Tensek A., Celona A., Garibaldi F., Macias Lopez D.A., Oray I., Ortega García A., Pagá García A., Potoschi A., Tinti F. (in press b), Another peculiar situation for YOY of Bluefin tuna (*Thunnus thynnus*) in the Mediterranean Sea in 2016. Document SCRS/2017/040: 11 p.

Di Natale A., Tensek S., Paga García, A. (in press a). The disappearance of Young-Of-The-Year Bluefin Tuna from the Mediterranean coast in 2016: is it an effect of the climate change? Document SCRS/2017/041: 11 p.

Mather F.J.III, Mason J.M., Jones A.C., 1995, Life History and Fisheries of Atlantic Bluefin Tuna. NMFS-SEFSC 370: 1-165.

Piccinetti C., Di Natale A., Arena P., 2013, Bluefin tuna (*Thunnus thynnus*, L.) reproduction and reproductive areas and season. Collect. Vol. Sci. Pap., ICCAT, 69 (2): 891-912.

Rodríguez Roda J., 1975, Expedición científica para la identificación de zonas de puesta del atún, *Thunnus thynnus* (L.) (Campaña "Maroc-Iberia, I" del "Cornide de Saavedra"). Res. Exp. Cient. Buque Ocean. "Cornide de Saavedra", Barcelona, 4: 113-130.

Sarà R., 1983, Tonni e Tonnare. Una Civiltà, una Cultura. Libera Università di Trapani Ed., Trapani : 1-128.

Sarà R., 1998, Dal mito all'aliscafo. Storie di Tonni e Tonnare. Banca Aegusea Ed., Favignana-Palermo: 1-271.

Figure 1. Small Bluefin tuna YOY found along the southern coast of Spain in the Atlantic in August (left) and in September 2017 (right).

Figure 2. Small Bluefin tuna YOY found along the southern coast of Portugal in August 2017.

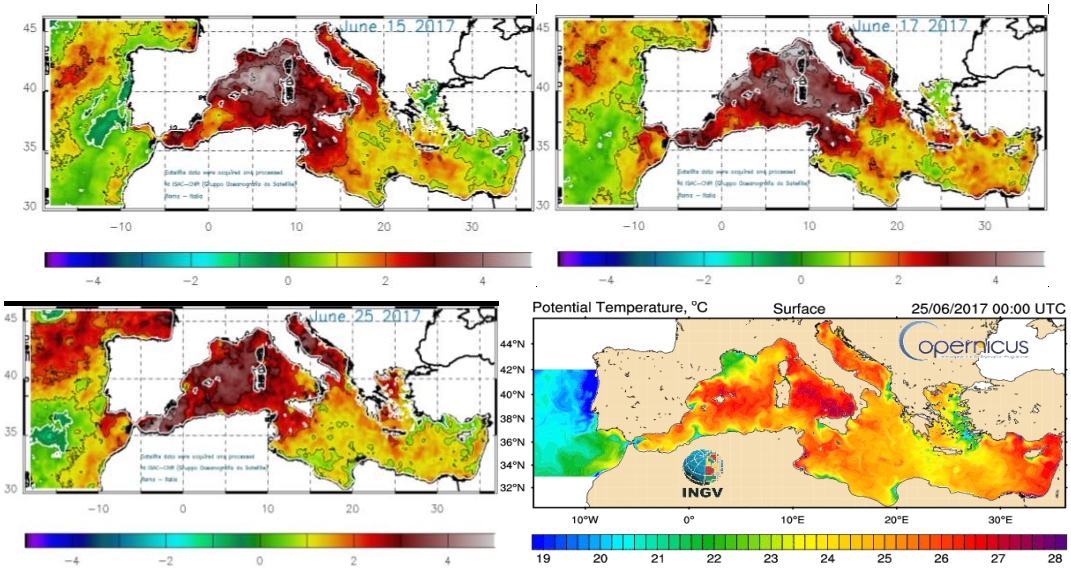

Figure 3. SST anomalies in the eastern Atlantic and Mediterranean Sea on June 15, 17 and 25 (http://gosweb.artov.isac.cnr.it/viewer/viewer.php) and SST on June 25, 2017 (http://medforecast.bo.ingv.it/mfs-copernicus/).