Aerial survey on spawners aggregations of the Atlantic-wide research program on bluefin tuna (GBPY - 2010) South Tyrrhenian Sea (Sub-area 2)

Final report

Participants

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Summary

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Aerial surveys have been carried out with the aim of providing fishery-independent indices to improve the knowledge of bluefin tuna population in the Mediterranean, particularly for what is concerning the spawners aggregations. The surveys have been performed in June 2010 in an area comprised between Sicily and Calabria (South Tyrrhenian Sea), one of the traditional fishing area in Central Mediterranean. Probably due to the abnormal meteorological situation of that season, sightings of bluefin tuna were quite poor, even if with some schools of huge dimensions. Data contribute to the knowledge of the species in the area, and gather with other data at the same time collected for the whole Mediterranean in the framework of the general programme. Methodology has been checked and tuned for future activities.

Keywords

Atlantic bluefin tuna, Thunnus thynnus, Mediterranean, South Tyrrhenian Sea, aerial survey

1. Background and objectives

The policy of conservation of Mediterranean bluefin tuna requires to improve the scientific knowledge regarding biology, reproductive behaviour and the broodstock status.

The situation of the stock is under close observation, and great care is paid by scientists and national and international organisations. Many elements can contribute to a better knowledge of the species and the stock situation, and one of this is the development of fishery-independent indices of abundance.

The programme "Aerial survey on spawning aggregations of the Atlantic-wide research programme on bluefin tuna (GBYP - 2010)" has been undertaken with the goal of improving basic data collection, understanding of key biological and ecological processes, assessment models and management.

With this aim, the programme has identified in the Mediterranean six different zones to carry out aerial surveys for the detection of spawners aggregations.: the Balearic Sea (1), the South Tyrrhenian Sea (2), the area south of Malta with the Strait of Sicily (3), the area off the Libyan coast (4), the area off the Egyptian coast (5) and the Eastern Mediterranean off the Turkish and Cyprus coasts (6).

The present report describes activities and results relative to the South Tyrrhenian Sea (Sub-area 2).

2. Methodology and activities

Methodology strictly followed the methodology of the general project, because of the crucial importance of common operative standards with the other operative units.

Aircraft and equipment

The aircraft was a Partenavia P68C previously used for professional activities in support of bluefin tuna fishing. Stickers with "ICCAT2" on the left side and under the right wing have been applied (Figure 1).

- Brand: Partenavia
- Model: P68C
- Code: I-DMPL

Figure 1 - Aircraft

The aircraft has upper wings, good forward visibility, and capable of flying at a spotting altitude of 300 m and a speed of 100 nm. Flying autonomy is over six hours.

Equipment made up of:

- GPS Garmin Map 60CSx whit statistical survey design reported (the same route were sent to the pilot to be transferred in the aircraft GPS as well).
- Camera Nikon D3000 with 1600 ISO maximum sensitivity, lenses 18-55 and 55-200, and polarised filter.

On board was a professional tuna spotter and a scientific spotter. Effort and eventual sightings were registered through specific forms, as well as GPS recording of all flights and sighting positions. During a survey, the GPS recorded every 30s the exact position of the plane as well as all the waypoints entered by the operator. All the information is directly sent to the PC, in which route and track of the plane are simultaneously plotted.

Survey period indicated was comprised between 17 May and 18 July 2010.

Adverse weather conditions have been considered like conditions which prevents a reliable observation of tuna schools close to the sea surface (winds over 3 or 4 on the Beaufort scale, or low clouds less than 300 m high, or heavy rain).

Study area

The study area was comprised between Sicily and Calabria (area 2) (Figure 2) corresponding to South Tyrrhenian Sea (Table 1).

A detailed map of the study area is reported in Figure 3. It is an area comprised approximately between the perpendicular of Ustica island to the west until Calabria coasts to the east, with an approximate area of 52,461 Square kilometres.

Table 1 - Features about the area 2

area (sq km)	52,461
mean length of trackline on effort (km)	1,751
expected number of 2-day surveys	4.4
proportion of total area	30%

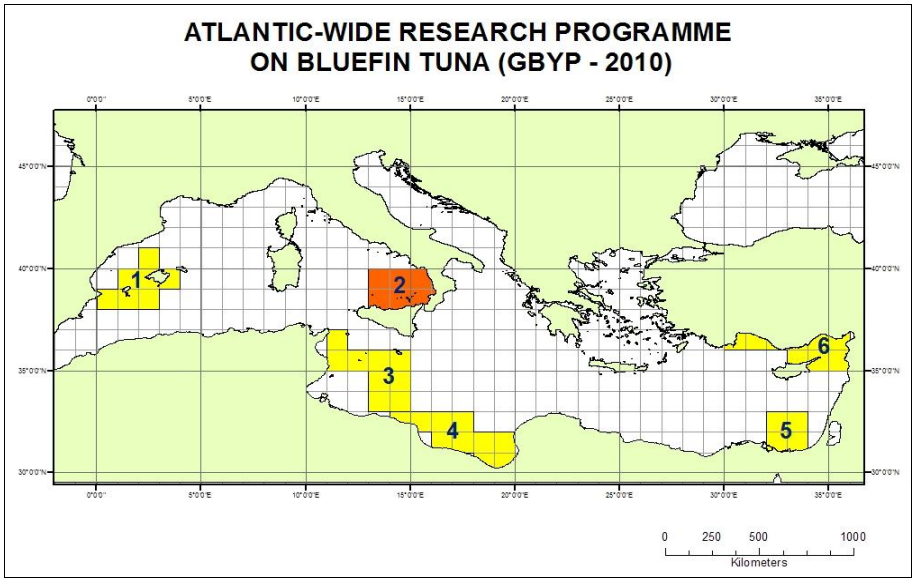

Figure 2 - Mediterranean blocks

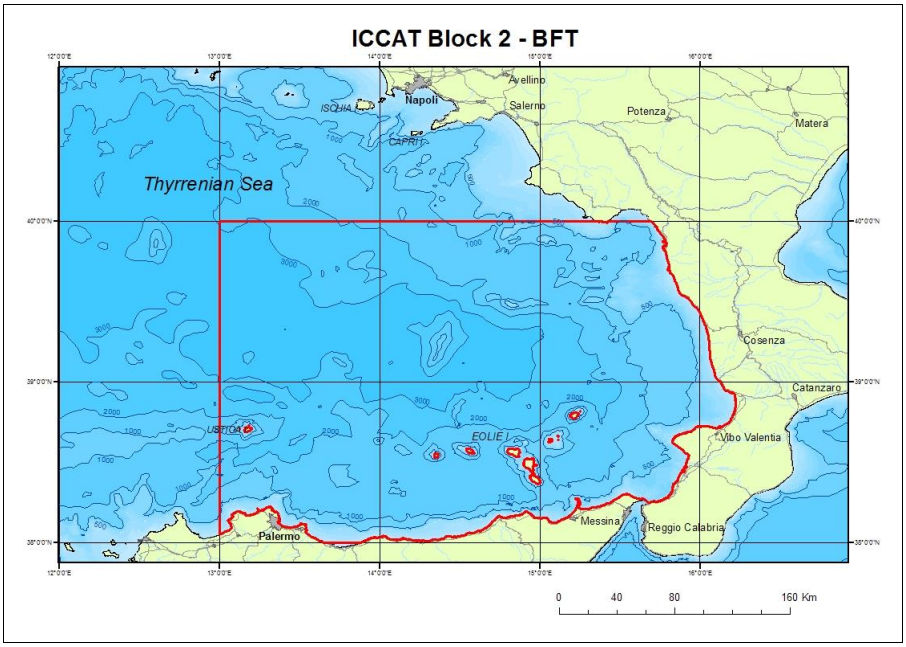

Figure 3 - Sub-area 2

From an hydrological point of view, the area is characterised during springtime by the presence of a main cyclonic current of Atlantic origin, as well as anti-cyclonic and other local currents, creating a mixing of water masses of different origin (Figure 4, from Arena, 1990)

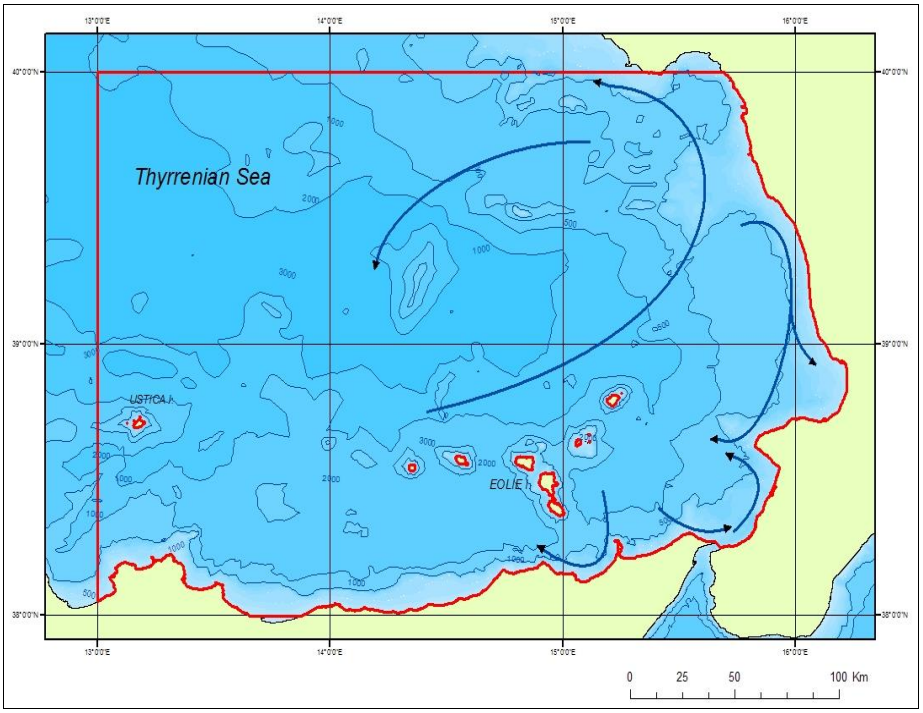

Figure 4 - Main currents in South Tyrrhenian sea during springtime

It is one of the main fishing areas of bluefin tuna, historically well known for the genetic concentration of big size adults (Arena, P. 1978, 1982). A series of fixed fish traps ("*tonnare*") were present as well, but none of them are still in place. On the contrary, an intense activity of purse seine fishing has developed starting from the early Seventies (Arena, P. 1990) . The area was important until the last season of Italian purse-seiners , as witnessed by Figure 5, in which the positions of fishing operations and catches are reported for the Italian purse seine fishery in 2009 (Unimar, 2009).

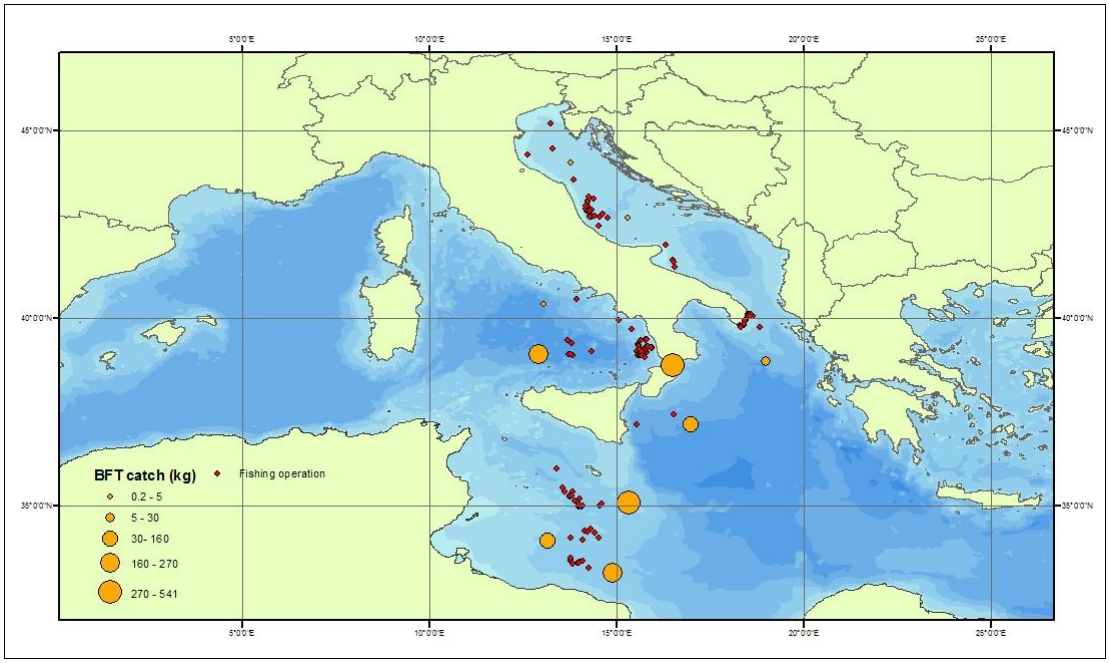

Figure 5 - Position of fishing operations and catches for the Italian purse seine fishery in 2009

Survey design

Aerial surveys were designed using program "DISTANCE". In each block, a series of transects have been created, based on the amount of flying time available and the dimensions of the area, to achieve the approximate coverage indicated. Surveys are designed as equal spaced parallel lines rather than zigzag lines. Parallel line designs achieve equal coverage probability (Hammond P. et al, 2010).

Statistical design identified for the Sub-area 2 six possible surveys, each one with its specific characteristics. Among this, four surveys have been chosen. Figure 6 to 8 represent the transects for each survey obtained by statistical method (Table 2).

Table 2 - features of the surveys

Data	**survey 1**	**survey 2**	**survey 3**	**survey 4**
lines generated	11	11	12	11
sampler width (km)	1	1	1	1
estimated on effort trackline length (km)	1885.047	1885.047	1885.047	1885.047
realised on effort trackline length (km)	1705.956	1709.366	1854.335	1766.066
expected sampler area coverage (sq km)	3411.911	3481.731	3708.67	3532.133
line spacing (km)	30	30	30	30
line angle (degrees)	90	90	90	90
total trackline length (km)	2025.587	2027.286	2210.39	2069.762
total cycling trackline length (km)	2346.874	2348.818	2547.625	2405.628
realised sampler area coverage (sq km)	3391.44	3398.219	3667.875	3528.601
stratum area (sq km)	52460.607	52460.607	52460.607	52460.607
proportion of stratum sampled	0.065	0.065	0.07	0.067

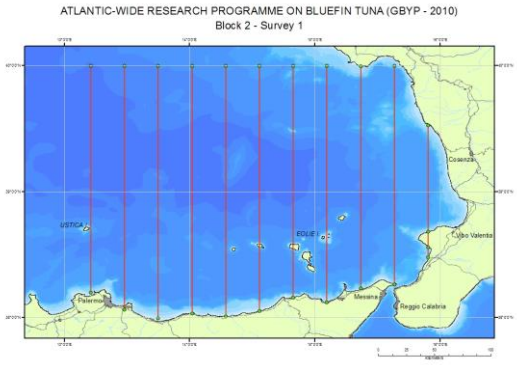

Figure 6 - Transects survey 1

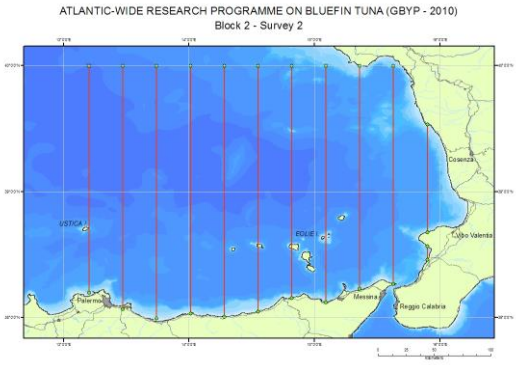

Figure 7 - Transect survey 2

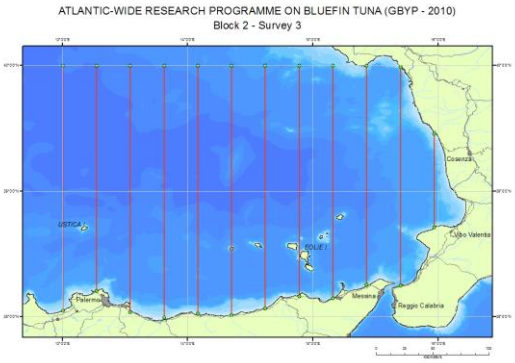

Figure 8 - Transcess survey 3

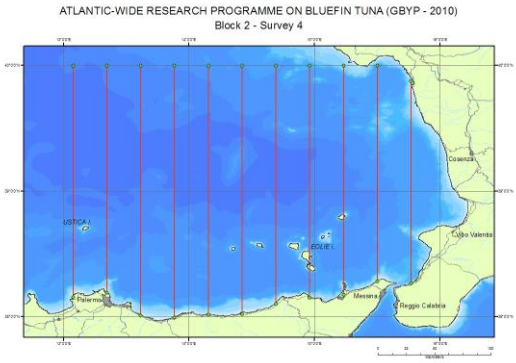

Figure 9 - Transect survey 4

Organisation of field activities

Activities have been carried out taking into account what foreseen by the methodology and according to the behaviour of bluefin tuna in respect to the season and water temperature. This behaviour was reported in detail by Arena (Arena, P. 1979, 1982 a/b/c/d) for the South Tyrrhenian; at the beginning of the season (April - May), first individuals start to aggregate in small schools widespread in the whole area. In this phase, they tend to stay deeper (10 - 50 m) and moving to the surface only for feeding. With the increase of temperature (more than 18°C) and the development of sexual maturation, they aggregate in bigger schools. The maximum aggregation occurs when water temperature exceeds the 20 °C, variable according to the season trend but typically situated around the first ten days of June; in the meantime, a thermocline forms and stabilises at a depth of 15 - 30 m, inducing bluefin tuna schools to remain in the superficial layers.

According to this, activities were organised registering the evolution of surface temperatures in the area (Figure 10): 20°C were reached constantly only after the beginning of June.

Four surveys, chosen among those identified by the statistical design, have been therefore organised, subdivided in two periods, before and after the middle of June. The days around the middle of June are also a traditional point of reference for bluefin tuna fishermen. The decision of concentrating the flights in two periods, instead of spreading them in the whole period, was taken as a compromise with the need of concentrating the flights when meteorological conditions were suitable.

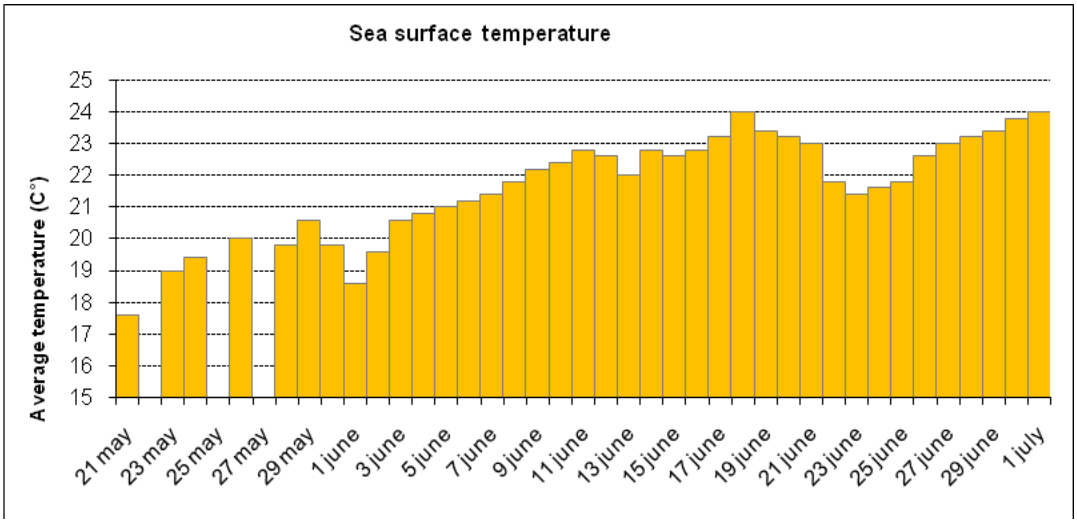

Figure 10 - Sea surface temperature

3. Results

The surveys have been organised in two periods in the month of June, the first one from 3rd to 9th and the second one from 25th to 29th. In each period, two surveys of two days each have been performed (Table 3). Operative airport was Pontecagnano, on the south of Salerno. The flights have been organised with an intermediate landing in Palermo or Reggio Calabria airports for refuelling.

From a chronological point of view, activities started with survey n. 2, due to military activities taking place near the transect 10 of survey 1 on June 5th.

Table 3 - Time series of the surveys

survey	date	flight transfer total times	survey total times (on effort)	flight total times
	04/06/2010	0	stand by because of bad time	
2	05/06/2010	2.50	4.40	7.30
	06/06/2010	3.15	7.00	10.15
	survey 2 total	**6.05**	**11.40**	**17.45**
1	07/06/2010	3.00	6.47	9.47
	08/06/2010	2.28	4.54	7.22
	survey 1 total	**5.28**	**11.41**	**17.09**
3	26/06/2010	2.33	6.33	9.06
	27/06/2010	2.28	5.34	8.02
	survey 3 total	**5.01**	**12.07**	**17.08**
4	28/06/2010	2.27	6.28	8.55
	29/06/2010	2.37	5.08	7.45
	survey 4 total	**5.04**	**11.36**	**16.40**
	Sub-area 2 total times	**21.38**	**47.04**	**68.42**

Flights were generally performed at the altitude and speed (300 m, 100 nm/h) requested; any difference has been registered as well.

For all the performed flights, the tracks get by GPS have been registered and checked with aircraft GPS as well. Written forms about effort and sightings have been filled. Whereas have been taken, the pictures have been identified according to frame numbers.

Each survey has been performed with one or two scientific observers, and the professional spotter.

In Figure 11 to 13 are represented the maps with the tracks of each aerial survey.

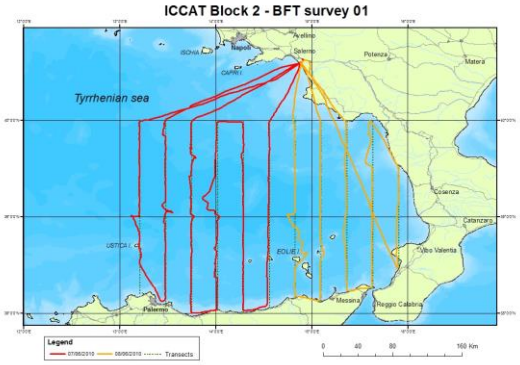

Figure 11 - Tracks survey 1

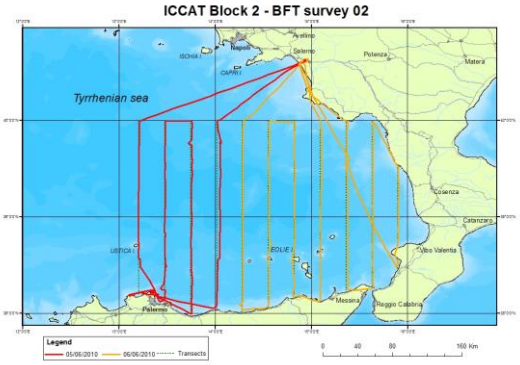

Figure 12 - Tracks survey 2

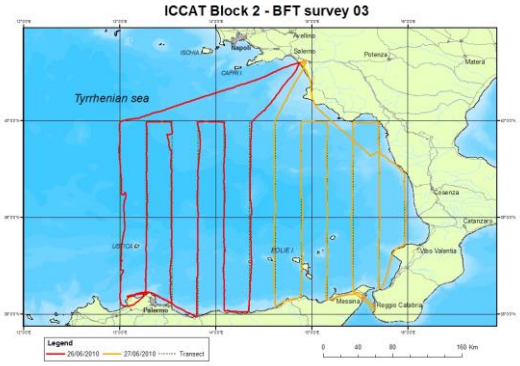

Figure 13 - Tracks survey 3

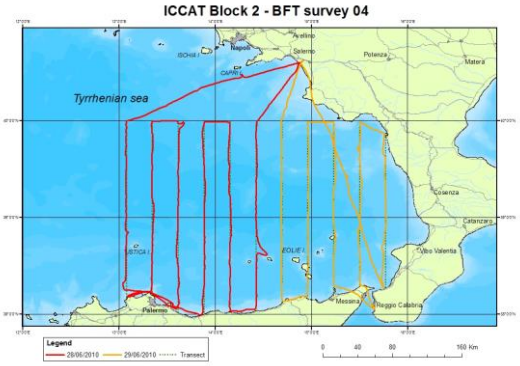

Figure 14 - Tracks survey 4

In Figure 15 to 18 are represented the maps with the sightings of bluefin tuna.

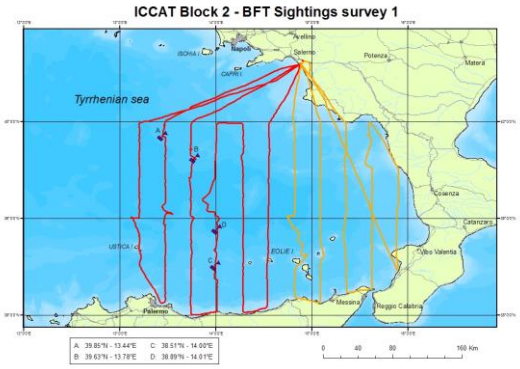

Figure 15 - Sightings survey 1

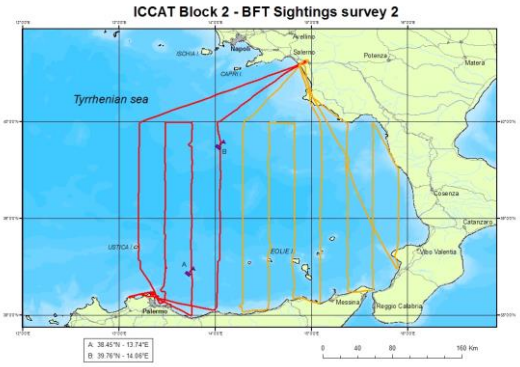

Figure 16 - Sightings survey 2

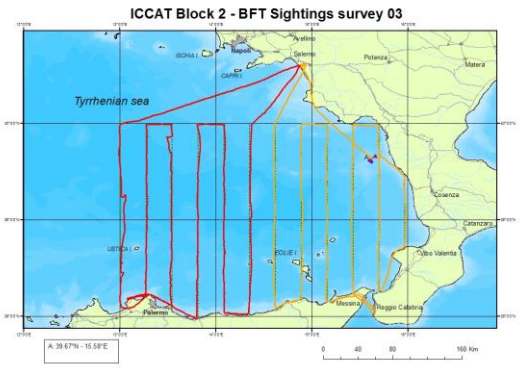

Figure 17 - Sightings survey 3

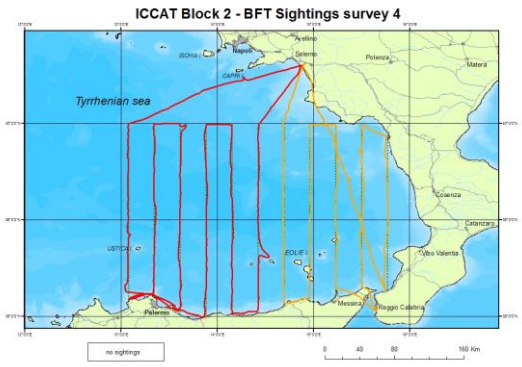

Figure 18 - Sightings survey 4

In Table 4 are reported data about the sightings of bluefin tunas.

Table 4 - Data collected for sightings

Date	Time	Sub-area	Survey	Transect	Lat	Lon	Cue	School size	Estimated weight	School heading	School Components			
											% small	% medium	% large	% giant
05-06-10	12.39	2	2	3	38.45	13.74	splash	1	40	Random		100		
05-06-10	17.12	2	2	4	39.76	14.06	shining	1	60	"		100		
07-06-10	11.47	2	1	2	39.85	13.44	shining	800	150000	"			100	
07-06-10	13.54	2	1	3	39.63	13.78	ripples	1700	227000	"		40	50	10
07-06-10	15.22	2	1	4	38.51	14	ripples	1100	40000	"		90	10	
07-06-10	15.35	2	1	4	38.89	14.01	ripples	800	48000	"		100		
27-06-10	17.01	2	3	off effort	39.67	15.58	ripples	1500	150000	"		67	33	

Figure 19 represents a summary of the bluefin tuna sightings in every single survey.

As it could be seen, not many sightings occurred: some of them are of huge schools, a few others of isolated individuals. Even the sightings of marine mammals have been generally scarce.

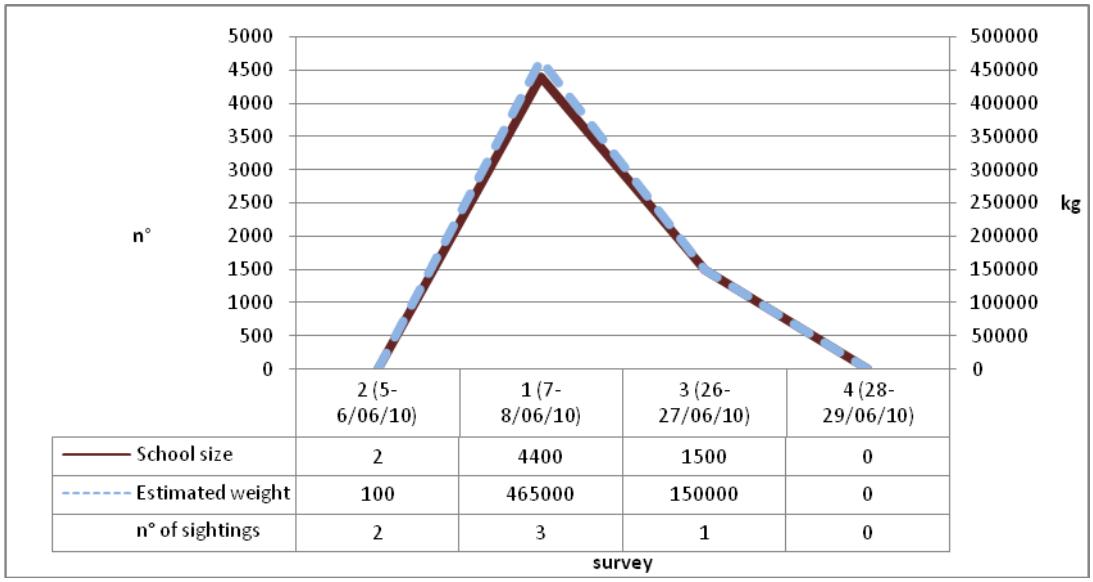

Figure 19 - Summary of the bluefin tuna sightings in every single survey

4. Discussion

As concerning the results, we report some qualitative remarks, while a common statistical analysis will be more properly implemented for the whole macro-area. For this purpose, the work has been carried out following the standard methodology.

The meteorological trend of the Spring 2010 has been very peculiar and for sure has deeply influenced the movement and behaviour of Bluefin Tuna schools in the spawning season, particularly for what is concerning their presence at the surface. Even if many fishermen with other fishing methods, as well as the fixed fishing traps ("*tonnare*") registered an abundant and widespread presence of tunas, the spawners aggregations at the surface were not frequent.

Only a few sightings have occurred, some of which of schools of huge dimensions, with fishes arranged in more than one layer below the surface. The sightings of other marine mammals were generally scarce as well.

Many factors are known to influence the behaviour and aggregation of tunas, and therefore their accessibility to aerial surveys; among them, maturity and surface temperatures are the main ones, but the meteorological conditions, the sea state, and sometimes the hour of the day can also influence their behaviour.

Other factors could be related to fishing activity; it has been reported (Arena, 1990) a change in tuna tracks and behaviour probably related to the presence of drifting gill-nets, as long as this gears were allowed, and many fishermen in the last years report an apparent change in the behaviour of tuna schools, that tend to stay at or near the superficial layers for a shorter period.

According to other authors (Fromentin, et al 2003) it is quite common that spawners, particularly the big ones, stay in the layers between the sub-surface (1 - 2 m depth) down to 10 meters, resulting therefore hardly detectable from the plane. In this case it is worth to remind that important factors are also related to the personal experience of professional spotters, who normally can detect the schools even at the sub-surface; in fact, an intense activity of aerial spotting, as long as it was permitted, had always been performed in support of the purse seine fishery.

It seems therefore more probable that a central role has been played by meteorological factors, such as a delay in the reaching of temperatures suitable for the reproduction, bad weather conditions and a lack of stabilisation of the thermocline at the right depths.

Moreover, a delay in sexual maturation and an uneven presence and behaviour have been reported for the South Tyrrhenian corresponding to a season with features similar to the 2010 ones (Arena, P. 1981).

The methodology has been checked and tuned, and modifications and/or integrations have been carried out or proposed as a focus base for possible future activities.

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List of the tables

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6.Appendix

Effort

PAGE 1

		Observer					Start			End		
Date	Time	Port	Starboard	Subarea	Survey	Transect	Time	Lat	Lon	Time	Lat	Lon
05-06-10			X	2	2	1	9.20	39.98	13.21	10.20	38.58	13.2
05-06-10		X		2	2	2	10.25	38.3	13.47	11.40	40	13.48
05-06-10			X	2	2	3	11.45	39.99	13.76	12.55	37.99	13.75
05-06-10		X		2	2	4	16.10	38.05	13.99	17.25	39.99	14.02
06-06-10			X	2	2	5	9.10	40	14.3	10.20	38.04	14.28
06-06-10		X		2	2	6	10.30	38.07	14.55	11.40	39.99	14.56
06-06-10			X	2	2	7	11.45	39.98	14.83	12.45	38.18	14.81
06-06-10		X		2	2	8	12.53	38.12	15.08	14.00	40	15.09
06-06-10		X		2	2	9	15.48	40	15.36	16.45	38.25	15.38
06-06-10			X	2	2	10	16.53	38.27	15.64	17.52	39.99	15.64
06-06-10		X		2	2	11	18.05	39.53	15.9	18.42	38.48	15.89
07-06-10		X		2	1	1	9.33	39.94	13.2	10.27	38.44	13.24
07-06-10			X	2	1	2	10.42	38.12	13.44	11.55	40.01	13.49
07-06-10				2	1	3	13.38	40	13.75	14.55	38	13.75
07-06-10		X		2	1	4	15.03	38.06	14.01	16.17	40	14.01
07-06-10			X	2	1	5	16.23	40	14.28	17.27	38.03	14.3
07-06-10		X		2	1	6	17.33	38.07	14.52	18.38	39.99	14.56
08-06-10		X		2	1	7	9.15	40.02	14.8	10.29	38.19	14.83
08-06-10			X	2	1	8	10.37	38.14	15.09	11.43	40	15.05
08-06-10				2	1	9	13.53	40.01	15.35	14.50	38.24	15.36
08-06-10		X		2	1	10	14.57	38.28	15.63	16.00	40	15.61
08-06-10				2	1	11	16.15	39.54	15.9	16.49	38.47	15.9
26-06-10		X		2	3	1	9.55	40	13	11.04	38.1	13
26-06-10			X	2	3	2	11.12	38.2	13.27	12.12	39.98	13.28
26-06-10		X		2	3	3	12.17	39.99	15.53	13.22	38.12	13.52
26-06-10		X		2	3	4	15.07	38	13.8	16.15	39.99	13.81
26-06-10			X	2	3	5	16.22	39.99	14.09	17.25	38.04	14.1
26-06-10		X		2	3	6	17.32	38.04	14.34	18.40	40	14.37
27-06-10		X		2	3	7	9.12	39.99	14.62	10.15	38.09	14.63
27-06-10			X	2	3	8	10.22	38.18	14.88	11.27	39.99	14.88
27-06-10		X		2	3	9	11.33	39.99	15.16	12.38	38.16	15.15
27-06-10		X		2	3	10	14.00	38.23	15.43	15.00	39.98	15.43
27-06-10			X	2	3	11	15.07	39.99	15.69	16.05	38.27	15.69
27-06-10		X		2	3	12	16.22	39.71	15.95	16.45	39.45	15.97
28-06-10		X		2	4	1	9.29	40	13.08	10.29	38.27	13.05
28-06-10			X	2	4	2	10.37	38.23	13.33	11.38	39.95	13.38
28-06-10		X		2	4	3	11.44	40	13.61	12.52	38.05	13.61
28-06-10		X		2	4	4	14.37	38.01	13.87	15.41	39.99	13.89
28-06-10			X	2	4	5	15.47	39.99	14.15	16.53	38.03	14.17
28-06-10		X		2	4	6	16.59	38.04	14.42	18.08	39.99	14.43
29-06-10		X		2	4	7	9.10	40	14.69	10.15	38.14	14.69
29-06-10			X	2	4	8	10.22	39.18	14.95	11.23	39.99	14.96
29-06-10		X		2	4	9	11.29	39.99	15.23	12.27	38.3	15.24
29-06-10		X		2	4	10	13.45	38.29	15.51	14.56	39.99	15.5
29-06-10			X	2	4	11	15.02	39.87	15.75	15.55	38.27	15.76

				Glare			Notes	
Altitude	Sea State	Haze	Turbidity	Side	Sector	Intensity	Fishing vessels	Other
300	calm (rippled)	Clear	Clear	Left		STRONG		Transect not finished because there is the "No fly zone" near Airport of Palermo "Punta Raisi"
300	calm (glassy)	Clear	Clear	Right		STRONG		Low clouds
300	calm (glassy)	Clear	Clear	Left		STRONG		12.35 A tug boat sail with empty cage in SW direction
300	calm (glassy)	Clear	Clear	Right		SLIGHT		
300	calm (rippled)	Slight	Clear	Left		STRONG		Low clouds (200-300 m) in the north part of transect.
300	calm (rippled)	Clear	Clear	Right		STRONG		Low clouds (200-300 m) in the north part of transect.
300	calm (rippled)	Clear	Clear	Left		SLIGHT		
300	calm (glassy)	Clear	Clear	Right		SLIGHT		
300	calm (glassy)	Clear	Clear	Right		STRONG		
300	calm (glassy)	Clear	Clear	Left		STRONG		
300	calm (glassy)	Slight	Clear	Right		SLIGHT		
300	smooth (wavelets)	Slight	Clear	Right		STRONG		Transect not finished because there is the "No fly zone" near Airport of Palermo "Punta Raisi".
300	calm (rippled)	Slight	Clear	Left		SLIGHT		
300	calm (rippled)	Slight	Clear			SLIGHT		
300	smooth (wavelets)	Slight	Clear	Right		SLIGHT		
300	calm (rippled)	Slight	Clear	Left		SLIGHT		
300	calm (rippled)	Slight	Clear	Right		STRONG		
300	calm (rippled)	Heavy	Clear	Right		STRONG		
300	calm (rippled)	Slight	Clear	Left		SLIGHT		
300	calm (rippled)	Slight	Clear					
300	calm (rippled)	Slight	Clear	Right		SLIGHT		
300	calm (rippled)	Heavy	Clear	Left				Clouds.
300	calm (rippled)	Slight	Clear	Right		STRONG		Transect not finished because there is the "No fly zone" near Airport of Palermo "Punta Raisi".
300	calm (glassy)	Clear	Clear	Left		STRONG		
300	calm (glassy)	Slight	Clear	Right		STRONG		
300	calm (rippled)	Slight	Clear	Right		STRONG		
300	calm (glassy)	Slight	Clear	Left		STRONG		
300	calm (glassy)	Slight	Clear	Right		STRONG		
300	smooth (wavelets)	Slight	Clear	Right		STRONG		
300	calm (rippled)	Slight	Clear	Left		STRONG		
300	smooth (wavelets)	Slight	Clear	Right		STRONG		
300	calm (rippled)	Slight	Clear	Right		STRONG		
300	calm (rippled)	Slight	Clear	Left		STRONG		
300	calm (rippled)	Slight	Clear	Right				
230	calm (rippled)	Heavy	Clear	Right		STRONG		Lower altitude due to haze. Transect not finished because there is the "No fly zone".
300	calm (rippled)	Heavy	Clear	Left		STRONG		
300	calm (rippled)	Slight	Clear	Right		SLIGHT		
300	calm (rippled)	Slight	Clear	Right		SLIGHT		
300	calm (rippled)	Slight	Clear	Left		STRONG		
300	smooth (wavelets)	Slight	Clear	Right		STRONG		
150	calm (rippled)	Heavy	Clear	Right		SLIGHT		Lower altitude due to haze.
300	calm (rippled)	Heavy	Clear	Left		STRONG		
300	calm (rippled)	Heavy	Clear	Right		SLIGHT		
300	calm (rippled)	Heavy	Clear	Right		SLIGHT		
300	calm (glassy)	Slight	Clear	Left		SLIGHT		

Sightings

Date	Time	Observer	Subarea	Survey	Transect	Lat	Lon	Cue	Species	School size	Estimated weight	Declination angle
05-06-10	10.31	De Martino Salvatore	2	2	2	38.26	13.43		common			
05-06-10	10.49	De Martino Salvatore	2	2	2	38.48	13.49		common			
05-06-10	10.53	De Martino Salvatore	2	2	2	38.83	13.48		common			
05-06-10	11.54	De Martino Salvatore	2	2	3	39.76	13.73		common			
05-06-10	12.35	De Martino Salvatore	2	2	3	38.54	13.75		common			
05-06-10	12.39	De Martino Salvatore	2	2	3	38.45	13.74	splash	BFT	1	40	
05-06-10	17.12	De Martino Salvatore	2	2	4	39.76	14.06	shining	BFT	1	60	
06-06-10	10.18	De Martino Salvatore	2	2	5	38.11	14.28		common			
06-06-10	10.51	De Martino Salvatore	2	2	6	38.67	14.55		common			
06-06-10	11.54	De Martino Salvatore	2	2	7	39.68	14.82		common			
06-06-10	12.22	De Martino Salvatore	2	2	7	38.86	14.82		common			
06-06-10	12.44	De Martino Salvatore	2	2	7	38.22	14.81		common			
06-06-10	13.26	De Martino Salvatore	2	2	8	39.11	15.09		common			
06-06-10	13.54	De Martino Salvatore	2	2	8	39.88	15.1		common			
06-06-10	16.34	De Martino Salvatore	2	2	9	38.58	15.38		common			
07-06-10	10.10	De Martino Salvatore	2	1	1	39.01	13.13		stenella			
07-06-10	11.07	De Martino Salvatore	2	1	2	38.8	13.47		common			
07-06-10	11.12	De Martino Salvatore	2	1	2	38.95	13.46		common			
07-06-10	11.47	De Martino Salvatore	2	1	2	39.85	13.44	shining	BFT	800	150000	
07-06-10	13.47	De Martino Salvatore	2	1	3	39.74	13.74		common			
07-06-10	13.54	De Martino Salvatore	2	1	3	39.63	13.78	ripples	BFT	1700	227000	
07-06-10	15.22	De Martino Salvatore	2	1	4	38.51	14	ripples	BFT	1100	40000	
07-06-10	15.35	De Martino Salvatore	2	1	4	38.89	14.01	ripples	BFT	800	48000	
07-06-10	17.13	De Martino Salvatore	2	1	5	38.41	14.28		common			
07-06-10	17.22	De Martino Salvatore	2	1	5	38.21	14.28		SWO	2		
08-06-10	10.02	De Martino Salvatore	2	1	7	38.82	14.86		common			
08-06-10	14.14	De Martino Salvatore	2	1	9	39.28	15.36		common			
27-06-10	17.01	De Martino Salvatore	2	3	off effort	39.67	15.58	ripples	BFT	1500	150000	

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		Photo No		Notes	School Components					
Break track?	**Photos taken?**	**1st**	**Last**	**School heading**	**% small**	**% medium**	**% large**	**% giant**	**Cetaceans**	**Seabirds**
FALSO	FALSO					100				
FALSO	FALSO					100				
VERO	VERO	124	142	Large			100			
VERO	VERO	143	189	Large		40	50	10		1 Larus michahellis
FALSO	VERO	190	200	Medium		90	10			
FALSO	VERO	201	211	Medium		100				
FALSO	VERO	230	237	Medium		67	33			