

BLUEFIN TUNA JUVENILES TAGGING IN CROATIA – SOME SUGGESTIONS FOR IMPROVEMENT

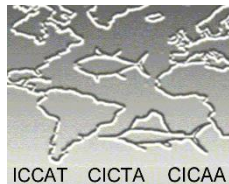
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IZOR SPLIT



ICCAT CICTA CICAA



HRVATSKA GOSPODARSKA KOMORA
CROATIAN CHAMBER OF ECONOMY

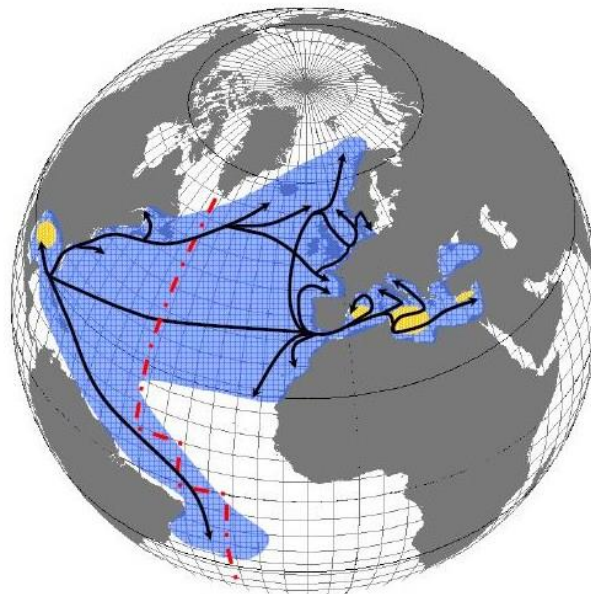
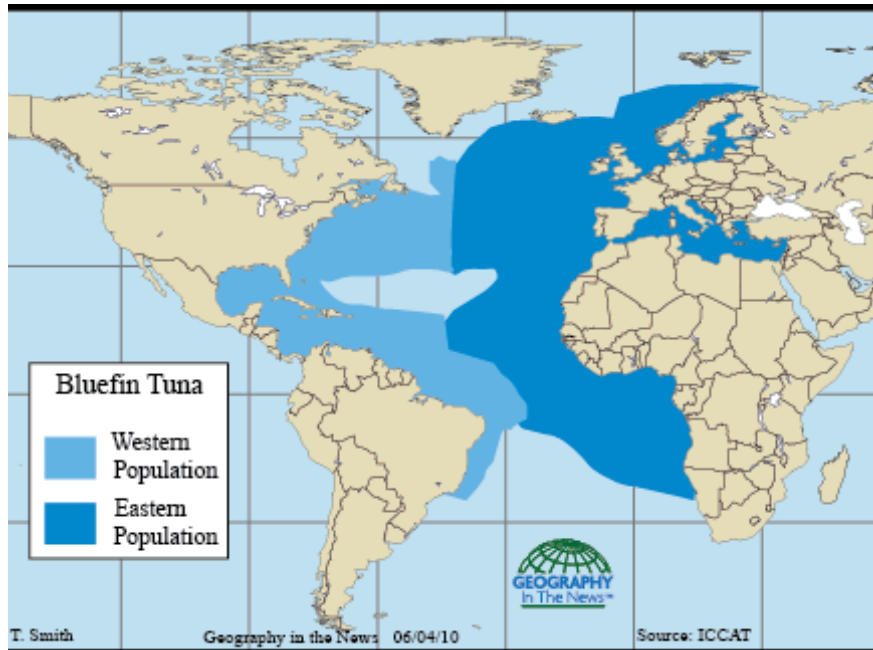
12.MGZSA 24.-25. studeni 2016. Vukovar



WHY BLUEFIN TUNA ??

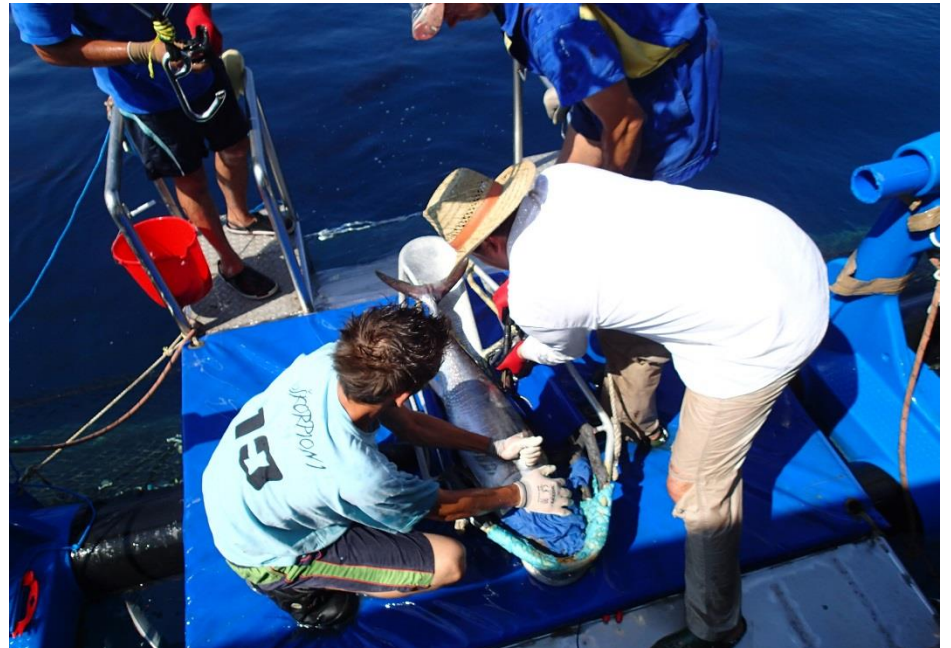


\$1.7m
cca \$7.600/kg
<http://www.bbc.com/news/world-asia-20919306>

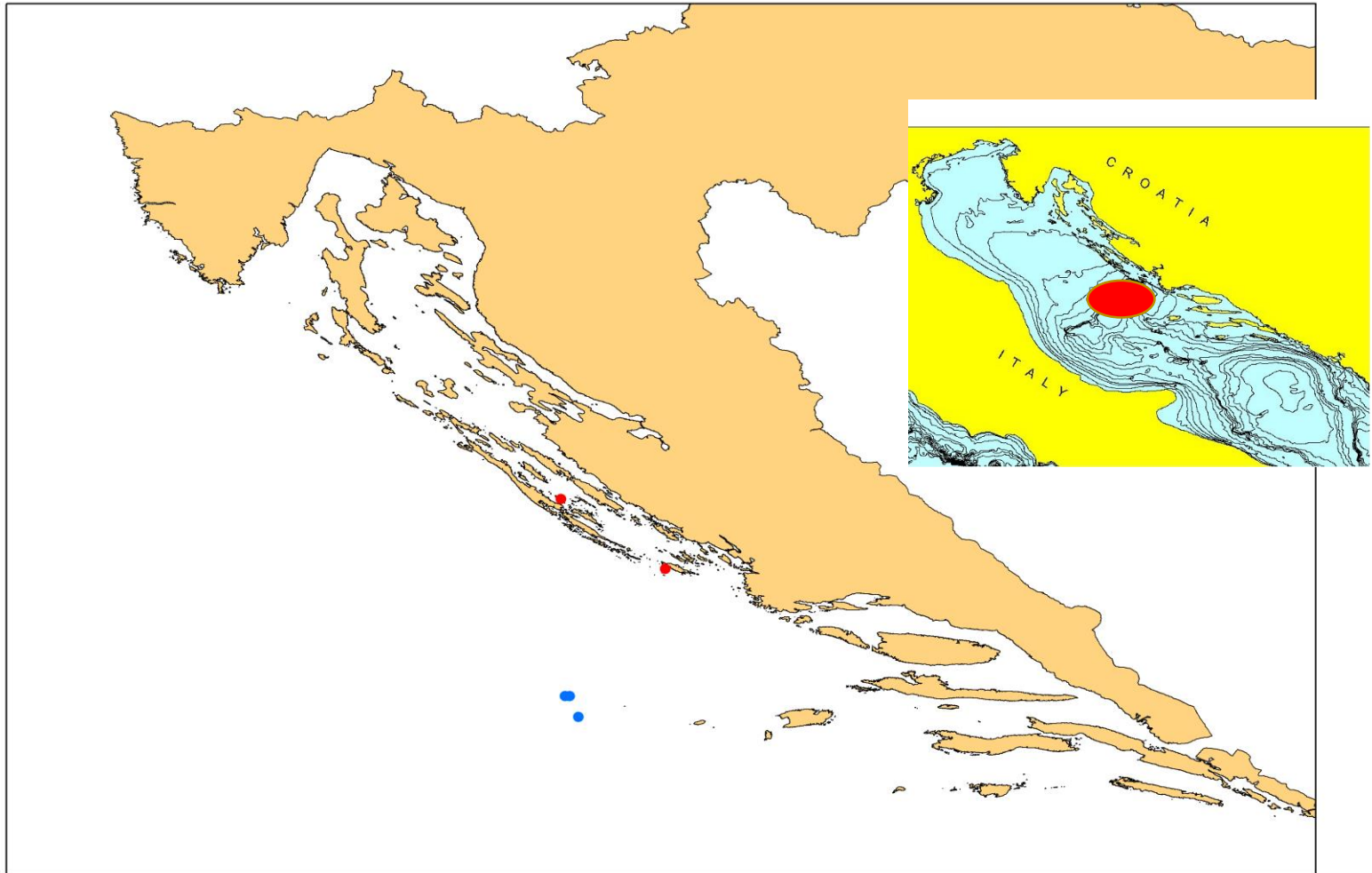


ICCAT/GBYP objective (among others):

„Define the most appropriate tagging techniques and approaches, by testing the tagging possibilities with various gears, in different areas and for different fish size”



Fishing and tagging area





Fishing vessel involved in the tagging program: Kali Tuna d.o.o: F/V NEPTUN I, F/V OŠLJAK DVA,

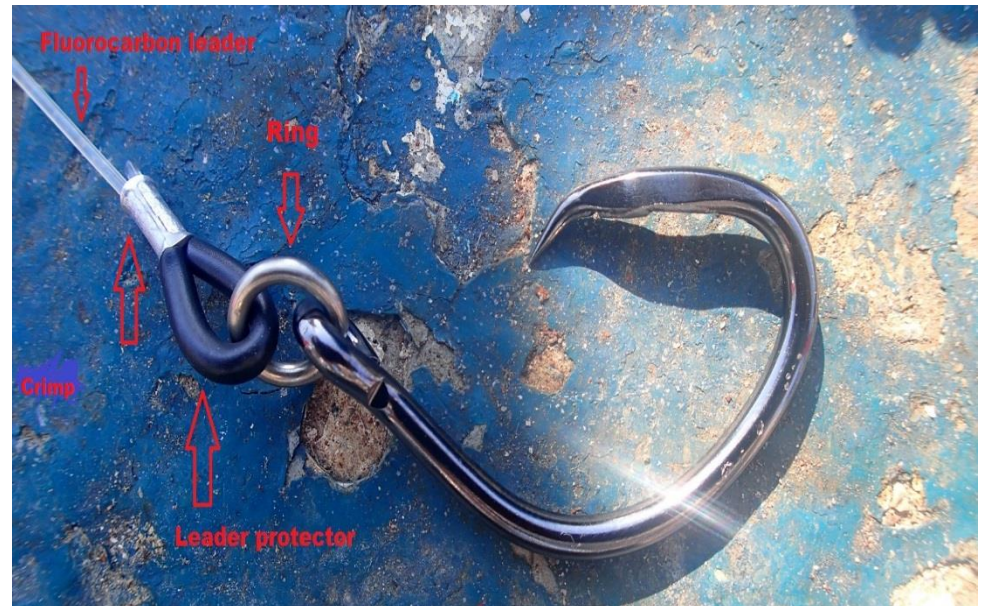


Date	Estimated number of BFTs	Estimated average weight per BFT (kg)	Mortality during fishing and transferring operations
15.06.2013	1100	20	none
15.06.2013	850	10	none
16.06.2013	450	10	none
TOTAL:	2400	14,58	none

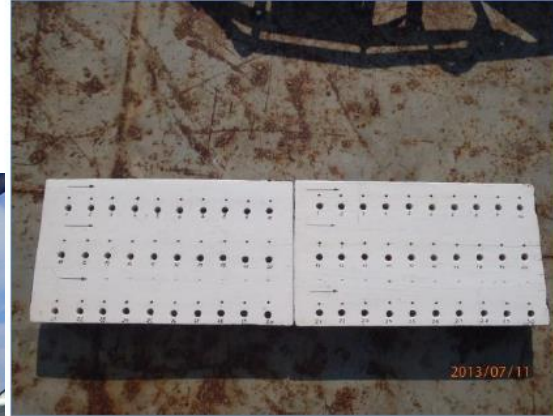
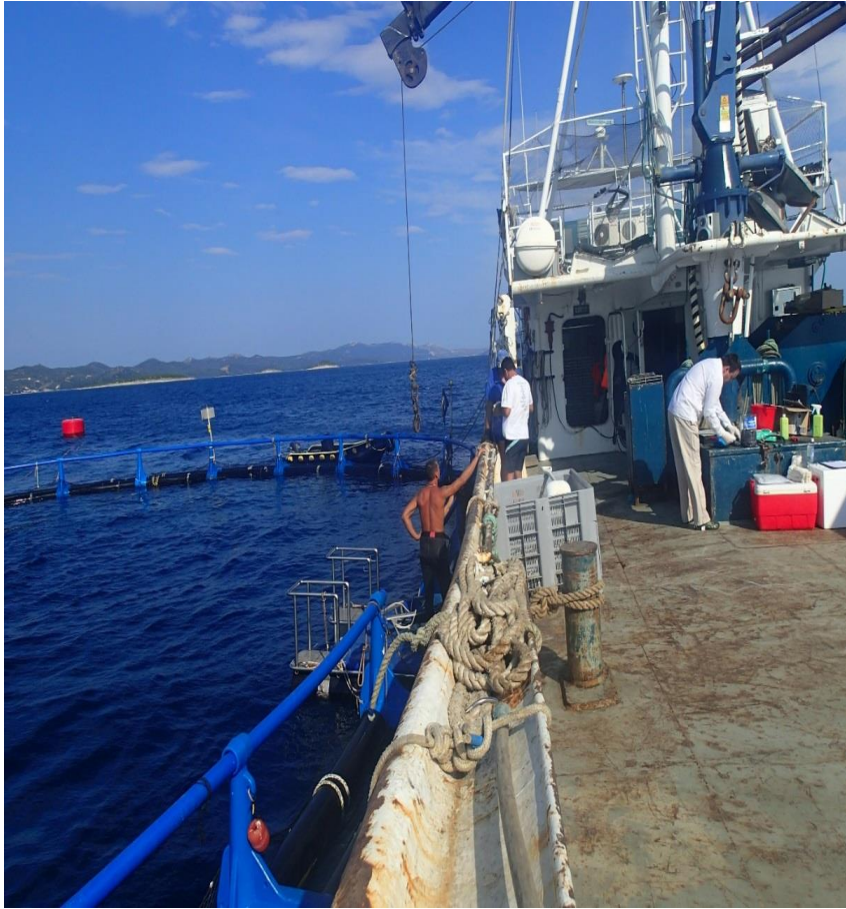
Date	Feed	Feeding	Feeding results	Daily quantities (kg)	Morts
24.06.2013	Small pelagic	1 time/day	Did not eat	300kg	none
25.06.2013	Small pelagic	1 time/day	Did not eat	300kg	none
26.06.2013	Small pelagic	1 time/day	Did not eat	300kg	none
27.06.2013	Small pelagic	1 time/day	Did not eat	300kg	none
28.06.2013	Small pelagic	1 time/day	Did not eat	300kg	none
29.06.2013	Small pelagic	1 time/day	Did not eat	300kg	none
30.06.2013	Small pelagic	1 time/day	Started to eat, 5-10kg	300kg	none
01.07.2013	Small pelagic	1 time/day	Approximately 20kg	300kg	none
02.07.2013	Small pelagic	1 time/day	Approximately 50kg	300kg	none
03.07.2013	Small pelagic	1 time/day	Approximately 100kg	300kg	none
04.07.2013	Small pelagic	1 time/day	Approximately 200kg	500kg	none
05.07.2013	Small pelagic	1 time/day	Approximately 250kg	500kg	none
06.07.2013	Small pelagic	1 time/day	Approximately 300kg	500kg	none
07.07.2013	We did not feed the fish.				
08.07.2013	Small pelagic	1 time/day	Approximately 500kg	500kg	none

Tagging equipment used:

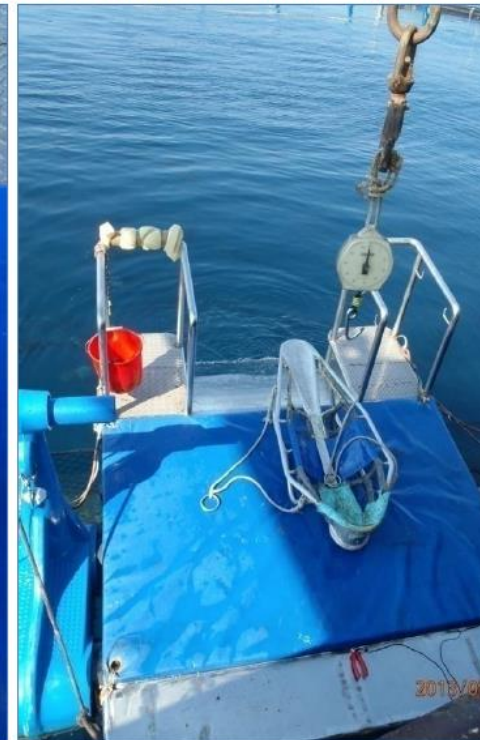
- Fishing rod (PENN VS3080ARD56 line 30-80 lb), and reel (PENN 50VSW)
- Leaders: - Fluorocarbon leader Seaguar dia. 1,25 mm, 175 Lb
- Fluorocarbon leader Seaguar dia. 1,05 mm, 125 Lb
- Circle hooks: - Owner Super Mutu circle hooks size 7/0, and 8/0
- VMC Hook 763OR dynamic, size 13/0
- Equipment for mounting of the hook on the leader: - Jinkai Leader crimp
- Jinkai loop protector tubes
- Swivels: - Okuma RB Solid Ring no. 10
- Jinkai Bullet Swivels SBS



TAGGING ENVIRONMET



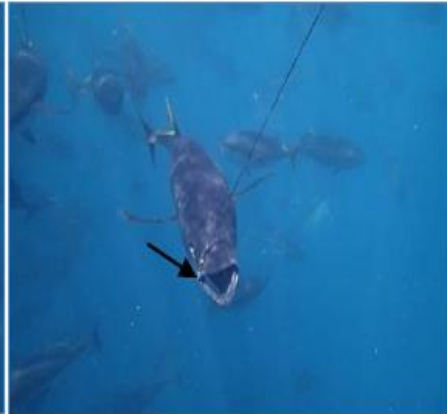
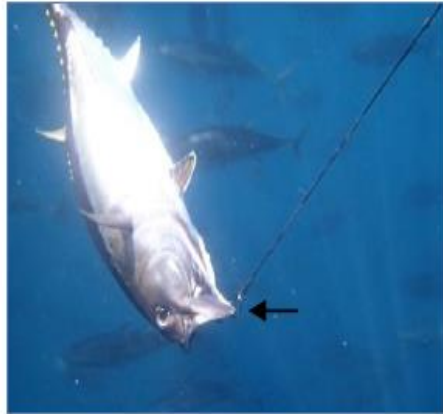
Aluminum cradle; rigid stainless steel tagging platform fixed inside of the cage frame.



Adjustment of fishing tools



Hooking location



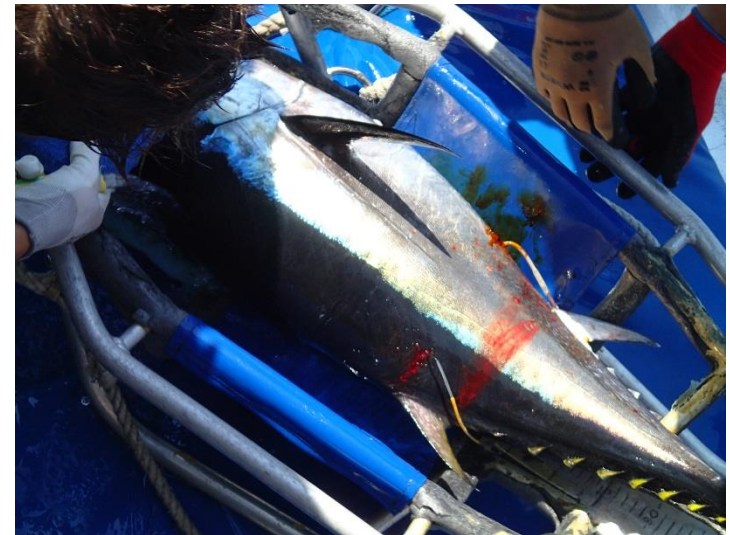
Preparing pop-up tag for the implementation; miniPAT tag.



Preparing pop-up tags for implementation.



Implanting of internal archival electronic tag (MK9-SN)



Tagging efficiency (tags/day)★

	Spaghetti tags	Spaghetti and SBF tags	Spaghetti and LBF tags	Mini PAT and LBF tags	Internal and LBF tags	TOTAL:
09.07.	200					200
10.07.	299					299
11.07.	100	100		7	12	219
12.07.	1	150	99			250
15.07.	70		131			201
TOTAL:	670	250	230	7	12	1169

★ 233 tagged fish per day

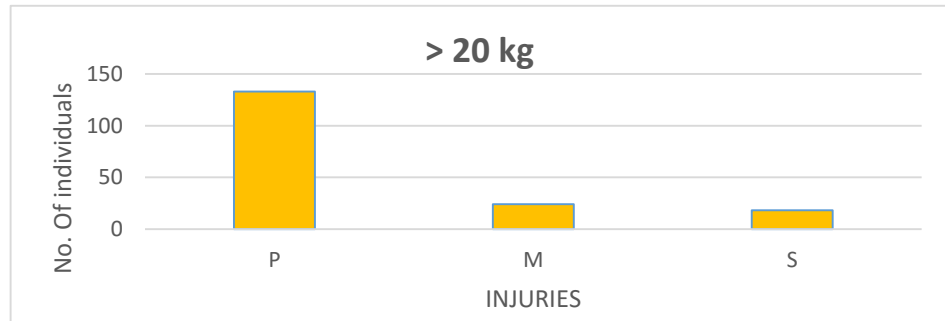
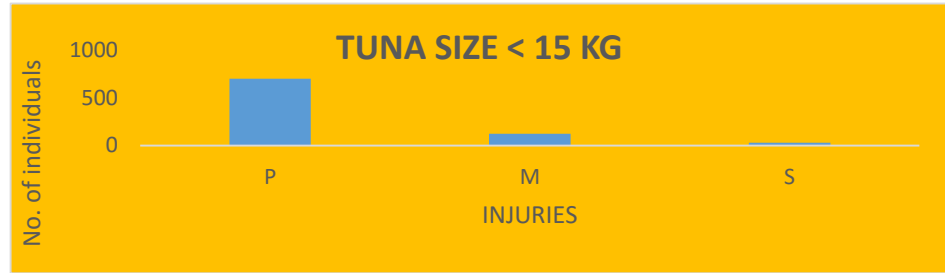
Injuries recorded

Tag type	No.	FL-cm (SD)	Wt-kg (SD)	Handling time (min.)	Fish conditions (injures)						
					Global	Head	Mouth	Eyes	Skin	Fins	Body
Spagetti	40	84.225 (3.711)	12.225 (1.788)	1.56	14%	2%	12%	5%	7%	2%	Global
Spagetti & SBF	42	93.904 (9.746)	16.928 (4.683)	2.20	21%	5%	19%	5%	10%	2%	7%
LBF& int.archival	12	104.166 (2.702)	21.916 (1.719)	3.58	8%		8%				

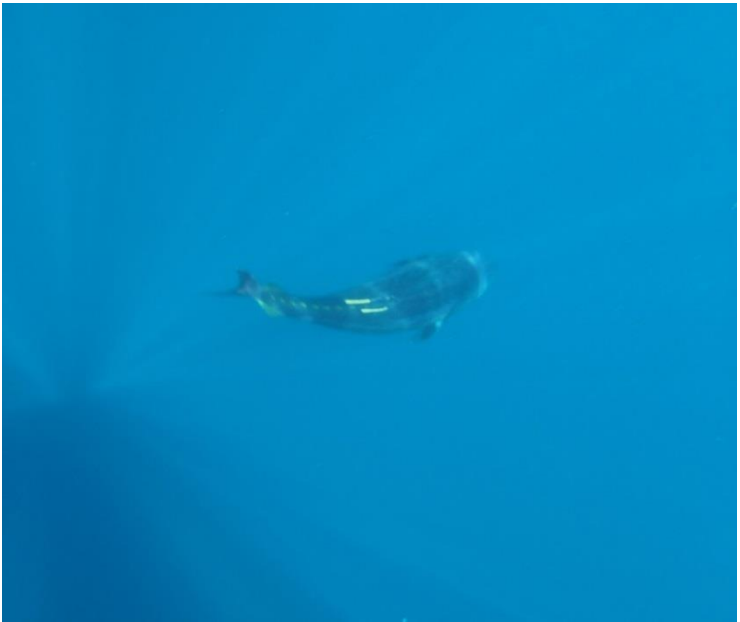
**Mouth
injures?**

Injuries related to the size of fish

INJURIES	<15 kg		15 – 20 kg		>20 kg	
	No	%	No	%	No	%
Non	629	82.04	97	78.81	133	76.00
Moderate	123	14.44	22	17.89	24	13.71
Severe	30	3.52	4	3.25	18	10.29
Total	782	100 %	123	100 %	175	100 %



Tagged fish inside the holding cage feeding with the rest of the school



Manipulating and measuring fish

- Cradle that has been used shown to be optimal and easy for the manipulation and measuring procedures



Tagging team

- As for number of persons involved in the tagging procedure it was found that 4 persons are needed to perform hand-line fishing, measuring and conventional tagging procedure. There is a need for two additional persons on board of the tagging vessel, one to take recordings, and other to assist and pass prepared tags to the tagger.



Communication campaign is going on !




„a reward per tag”

**PRONADI I VRATI MARKER
OSVOJI NAGRADU!!**

Leđa

Trbuh

**UZ MARKER OBAVEZNO
POŠALJI PODATKE:**

- Broj markera
- Dužinu ribe u  cm
- Ukupnu težinu ribe u kg
- Datum ulova
- Alat
- Mjesto ulova (lat. & long)
- Tvoje ime i adresu
povjerljivi podatak!

RESULTS

❑ Conventional tagging – since tagged fish were juveniles, there will be possible to evaluate number of the tags recaptured in the future years

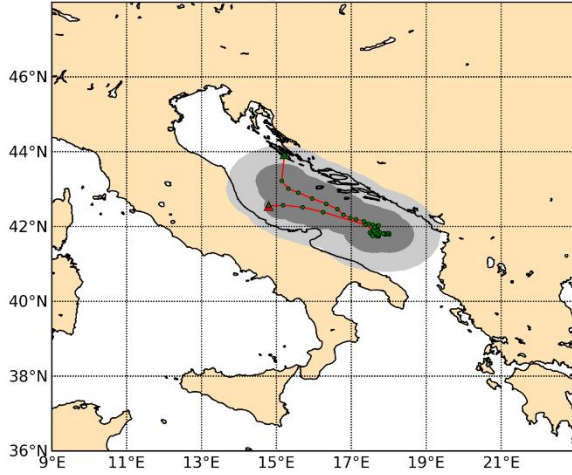
➤ Some results of the electronic tagging i.e. mini PATs have been already available

Electronic miniPAT Tags

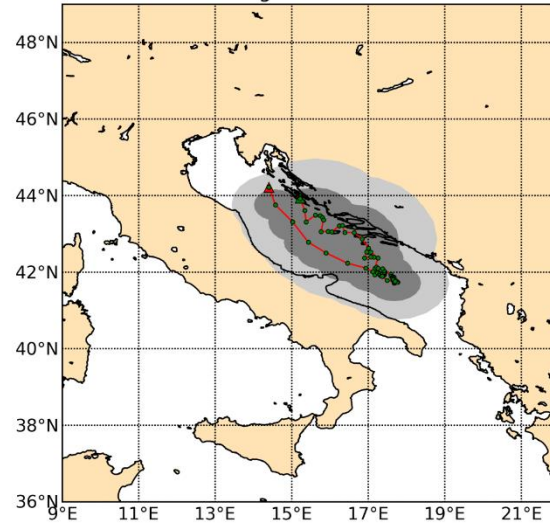
Data requested on:	Argos ID	miniPAT	LBF tag	Tagging date	Release time	Latitude	Longitude	Fork length (cm)	Weight (kg)	Days at sea:		
4.9.2013	130555	12P0145	BYP071917	11.7.2013	10:39	φ43°56'	λ15°13'	103	21,5	52	applied: 11.7.2013	popped of: 1.9.2013
4.9.2013	130557	12P0147	BYP071914	11.7.2013	9:52	φ43°56'	λ15°13'	102	21	12	applied: 11.7.2013	popped of: Corrupted
15.10 2013	130554	12P0099	BYP071916	11.7.2013	10:15	φ43°56'	λ15°13'	105	22	76	applied: 11.7.2013	popped of: 25.9.2013
15.10 2013	130558	12P0149	BYP071915	11.7.2013	10:10	φ43°56'	λ15°13'	100	20	65	applied: 11.7.2013	popped of: 14.9.2013
4.11.2013	130553	12P0142	BYP071919	11.7.2013	10:44	φ43°56'	λ15°13'	105	23	116	applied: 11.7.2013	popped of: 2.11.2013
	130559	12P0150	BYP071913	11.7.2013	9:45	φ43°56'	λ15°13'	102	19,5		applied: 11.7.2013	popped of:
3.2.2014	130556	12P0146	BYP071918	11.7.2013	10:41	φ43°56'	λ15°13'	102	20,5	176	applied: 11.7.2013	popped of: 3.1.2014

Days of liberty 52 to 116 days

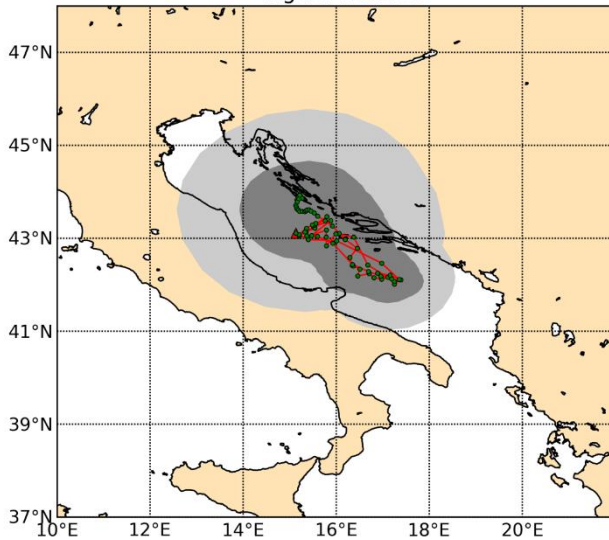
Light Track
Tag ID: 130555



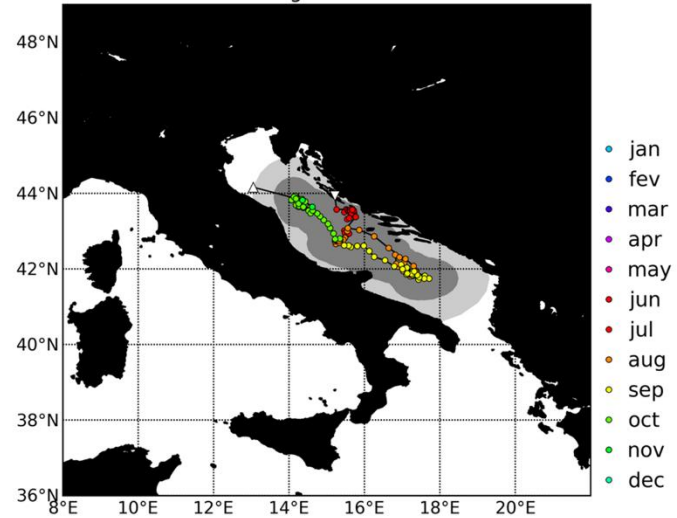
Light Track
Tag ID: 130554



Light Track
Tag ID: 130558



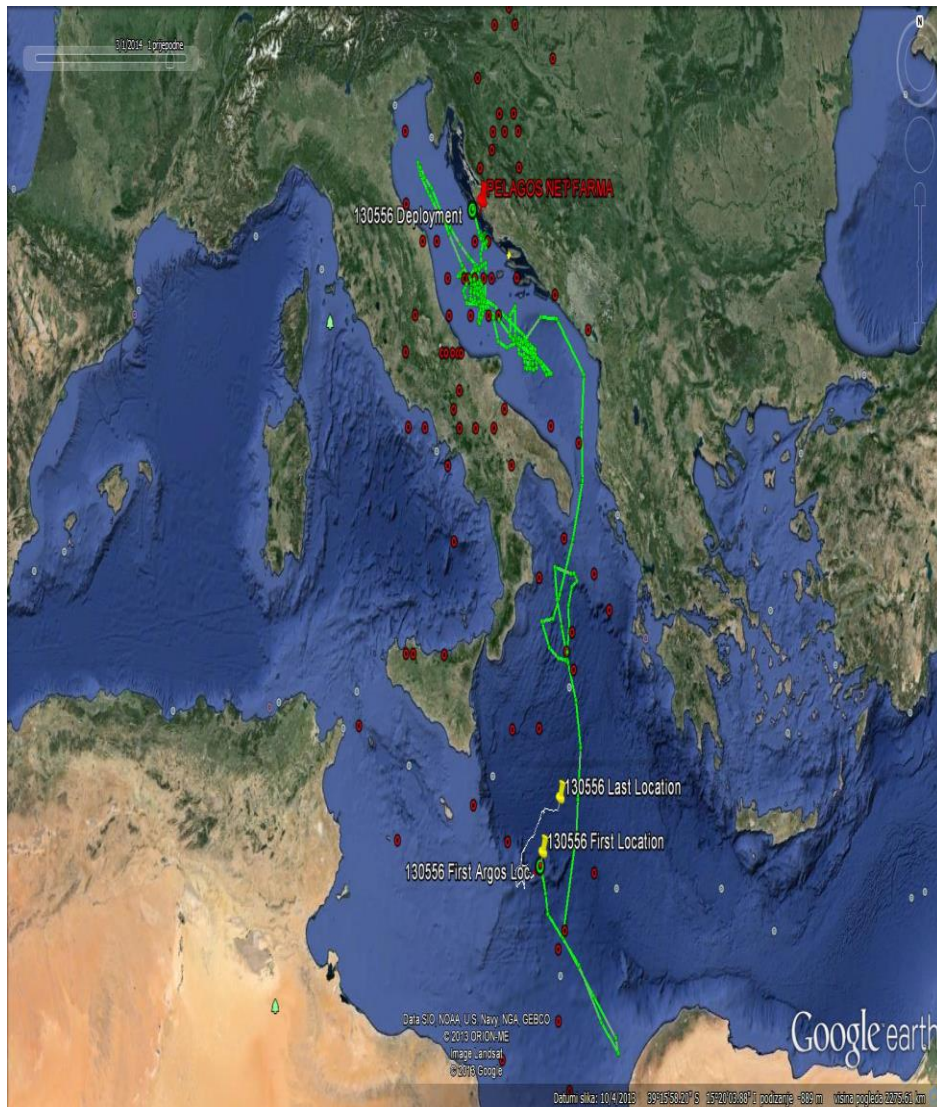
Light Based Estimated Track
Tag: 130553



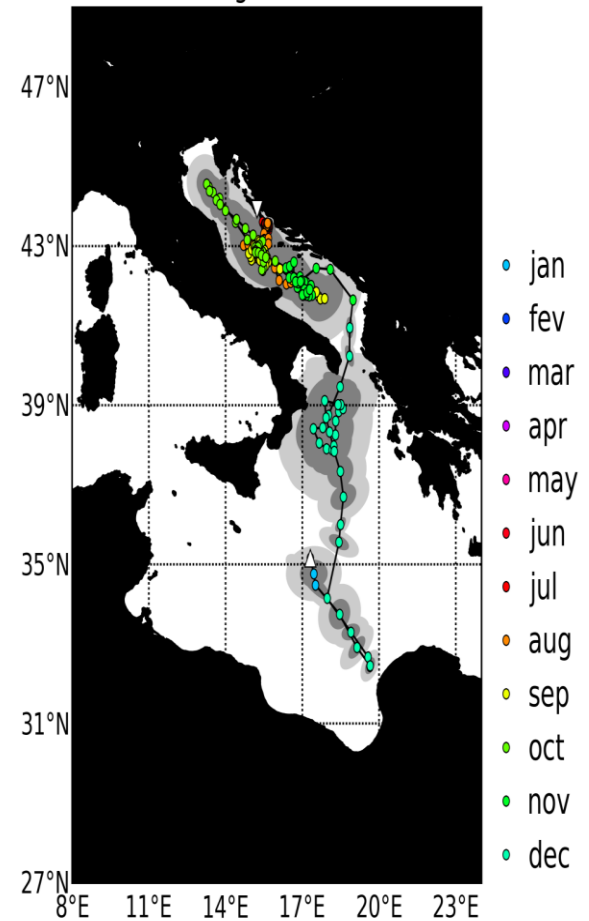
BFT no. 130556

Released 11/7/2013, LT 102cm WT 20,5 kg

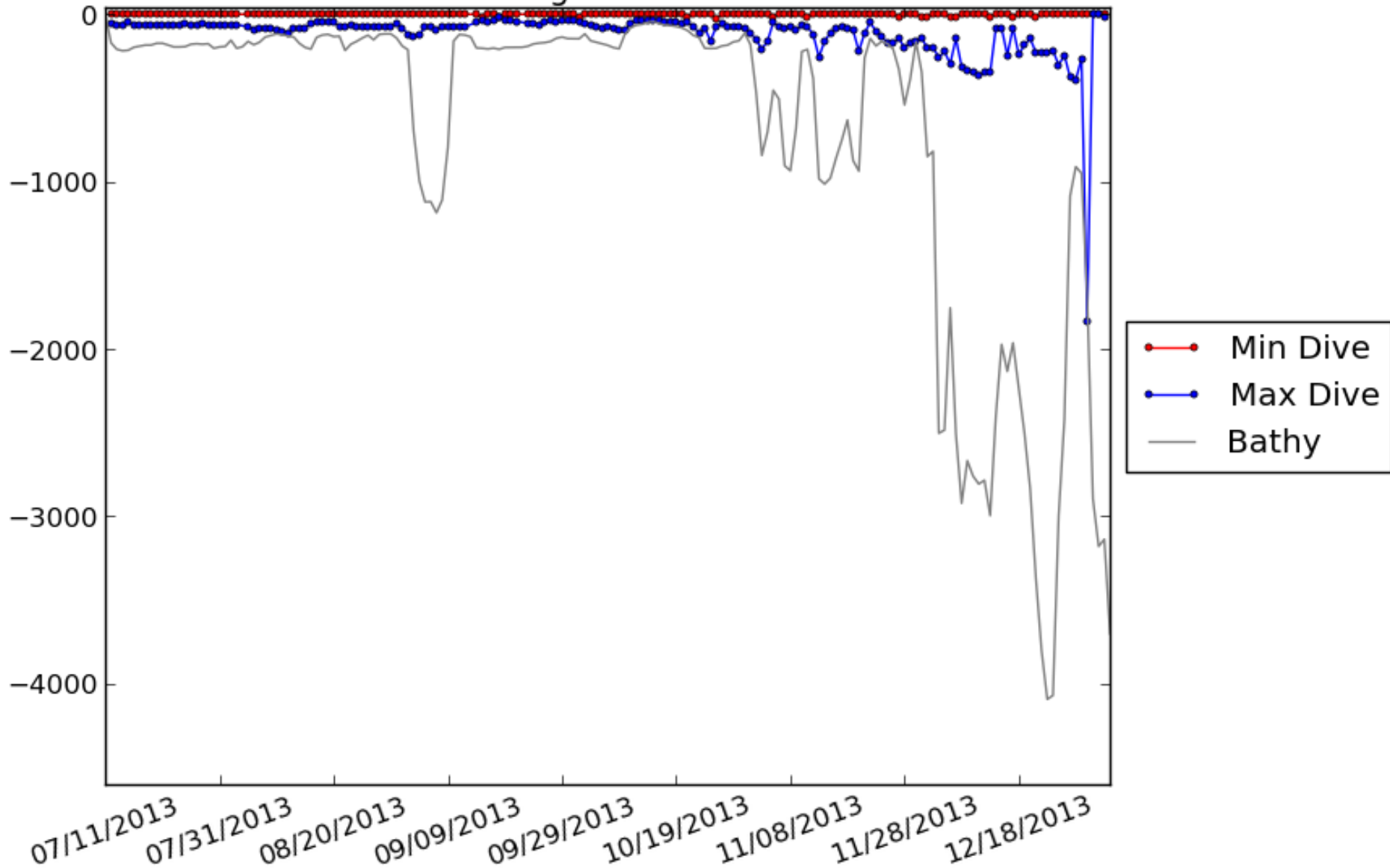
PAT: 03/01/2014 after **176** days



Light Based Estimated Track
Tag: 130556



Min/Max Dive (130556-MinMaxDepth.csv)
Tag: 130556



Some recommendations for further improvement of tagging procedures



Quantity of the fish to be captured

For a smooth tagging operation there would be need to accomodate at least double quantity of the captured fish in relation to the number of the fish to be tagged.

Date	Estimated number of BFTs	Estimated average weight per BFT (kg)	Mortality during fishing/transferring operations
15.06. 2013.	1100	20	none
15.06. 2013.	850	10	none
16. 06. 2013.	400	10	none
Total	2400	14.6	

Otherwise, limited number of the fish in the holding cage may influence feeding behavior and fish motivation to take a bait

Sampling after the initiation of the feeding

- It is impossible to start sampling procedure immediately after the fish is captured by purse seine. Captured BFT needs 7-10 days to demonstrate typical feeding behaviour in a holding cage.



- Furthermore, when the fish is manipulated by replacing or transferring, or any type of disturbance, the time of starvation can be even prolonged. Tagging is recommended to start at the moment when at least 50% of the captured fish is eagerly taking bait.

Size of the fish

- Tagging with more „brutal“(billfish and pop-up) tags is recommended to be applied to larger size fish (>2+) and performed at the end of tagging operation, as to get bigger specimens from the school;



- it is noticed that during first days of tagging average weight of the tagged fish was smaller in relation to the last tagging days.

Sampling improvement

- It is highly recommended that ringed circle hooks without barb are used as to minimize injuries of the mouth cavity.



- Hand-line fishing may be significantly improved if fluorocarbon leader is replaced with adequate PP rope.

Modified hand-line fishing gear with 3,5 mm rope; Banded VMC hook



Broken fluorocarbon leader; Broken Owner Mutu hook



Releasing the tagged fish

- It is highly recommended to place tagged fish into an acclimatization cage for recovering. Once fish starts to take bait -holding cage can be towed to the open sea, and fish could be **recorded by stereoscopic camera system** and released in different time and space as to satisfied fish dispersion. Morts could be inspected, remeasured, tags removed, and eventually reused.

