

original scientific article
received: 2005-11-11

UDC 597.3.084:591.9(262.3)

SHARK CHUMMING IN THE EASTERN ADRIATIC

Alen SOLDO

Institute of Oceanography and Fisheries, HR-21000 Split, P.O. BOX 500, Croatia
E-mail: soldo@izor.hr

Richard PEIRCE

Richard Peirce Shark Conservation, Dulverton House, 8 Crooklets, Bude, Cornwall, EX23 8NE, United Kingdom

ABSTRACT

*In the period July 18 – August 9, 2005, an expedition involving sharks was conducted in the central Eastern Adriatic. The expedition, organized by Richard Peirce, had an objective of obtaining new information on the population status of large pelagic predatory sharks in the Eastern Adriatic. It was conducted in the general area of the Jabuka Pit (Blitvenica area). For attracting sharks, chumming with various baits was conducted. On the basis of a 23 days at sea expedition, a total of 308.5 hours chumming were achieved. As result, there were only 9 confirmed records of blue shark, *Prionace glauca*, which is a truly alarming result, indicating that shark populations in the central Adriatic are even more depleted than previously thought.*

Key words: sharks, chumming, Adriatic

PASTURAZIONE DI SQUALI IN ADRIATICO ORIENTALE

SINTESI

*Nel periodo dal 18 luglio al 9 agosto del 2005 una spedizione incentrata sugli squali è stata condotta nell'Adriatico centro-orientale. La spedizione, organizzata da Richard Peirce, aveva lo scopo di raccogliere nuove informazioni sullo stato delle popolazioni di grandi predatori pelagici, quali gli squali, nell'Adriatico orientale. Lo studio si è svolto nell'area della cavità di Jabuka (area di Blitvenica). Per attirare gli squali con la pasturazione sono state adoperate varie esche. La spedizione è durata 23 giorni per un totale di 308,5 ore di pasturazione. Con tale tecnica sono stati avvistati solo 9 esemplari di verdesca, *Prionace glauca*, risultato allarmante che indica che le popolazioni di squali nell'Adriatico centrale sono più impoverite di quanto si pensasse in precedenza.*

Parole chiave: squali, pasturazione, Adriatico

INTRODUCTION

The general objective of the expedition was to obtain new information on the status of large pelagic shark populations in the Eastern Adriatic. As large sharks, which are apex predators of the marine ecosystem and therefore considered as K – species, they are highly vulnerable to overfishing, both as target species or bycatch. In the Mediterranean, their decline has already been observed, which raised a concern for their status (Soldo, 2003). In the Adriatic, most of the large shark species (e.g. Lamnidae, Odontaspidae and even Carcharhinidae) have been considered as rare or very rare, although, previously, for example the great white, *Carcharodon carcharias*, and the shortfin mako, *Isurus oxyrinchus*, were believed to be constantly present in that area (Soldo & Jardas, 2002). Lately, even those species that were considered as most abundant, such as the blue shark, *Prionace glauca*, are showing considerable decline in catches and sighting. Although there are no direct shark fisheries in the Eastern Adriatic, except fishing of various small demersal chondrichthyans with gillnets (Cetinić & Soldo, 1999), many of the shark species were caught as bycatch by longlines, driftnets and other fishing gear used in tuna, small pelagic fish and sword fisheries. Hence, smaller shark species are also often bycatch of trawls. Comparison of catches of chondrichthyan fishes caught by research trawls in 1948–49 with the data from "MEDITS" program in 1997–98 shows considerable decline in abundance of 26 species of chondrichthyans, as well as major reductions of their distribution. For example, the thornback ray, *Raja clavata*, has gone from high abundance and widespread distribution throughout the Adriatic Sea to being restricted to a small area with low abundance (Soldo, 2002). Therefore, there is a general agreement that more investigations are necessary to know population status of all shark species, and especially the large species that are mainly cosmopolitan, migratory species, the status of which is therefore harder to assess.

MATERIAL AND METHODS

The expedition was conducted in the area of Jabuka Pit (Blitvenica area) (Fig. 1), which is probably the most important fishing area in the Adriatic. Hence, this is also the area of most intensive big game fishing, targeting bluefin tuna, *Thunnus thynnus*, albacore tuna, *Thunnus alalunga*, swordfish, *Xiphias gladius*, amberjack, *Seriola dumerili*, dorado, *Coryphaena hippurus* and sharks, mainly blue shark and thresher shark, *Alopias vulpinus*. Although reports from big game fishing indicated that best season for shark encountering is end of May – beginning of June that is also a season with bad weather conditions on the sea. Therefore, in order to maintain day-by-day chumming it was decided to conduct the

expedition in period July 18 – August 9, 2005, with the calmest days at sea in the area. It was planned to have 400–425 hours of chumming at six different sites. Later on, the area of Kornati – Dugi otok was added, since the authors had received reports by several fishermen that this area is a possible pupping area for blue sharks.

Two boats were used: Baracuda, as main vessel, had six berths and 15 m in length and supported by the 8.5 m Lucia, with three berths.

The expedition used various chum techniques with chum stations sunk to various depths, including below the thermocline. Hooks were used hoping for captures and tagging. These were also deployed at various depths with various different baits. For chumming, sardines were the main material used. Two blue fin tuna were caught by boat skippers, and tuna blood, heads, tails and guts were also used as chum. Richard Peirce and Craig Ferreira each led a team of four volunteers and alternated working 24 hour shifts. Two pairs each worked 3 hour watches from 08.00 – 20.00 and then 2 hour watches through the night. During darkness, the area astern of the main boat was illuminated. Overall, there were 2 expedition leaders and 14 volunteer researchers.

In case a great white shark was to be encountered, a Pop off Archival Tag set for 90 days would have been deployed. Furthermore, tissue samples were to be taken from any white sharks, porbeagles, shortfin makos or threshers encountered and return tags were to be fitted to as many specimens as possible. The main vessel was equipped with shark steel cage in order to allow underwater recording in case a white shark was to be encountered.

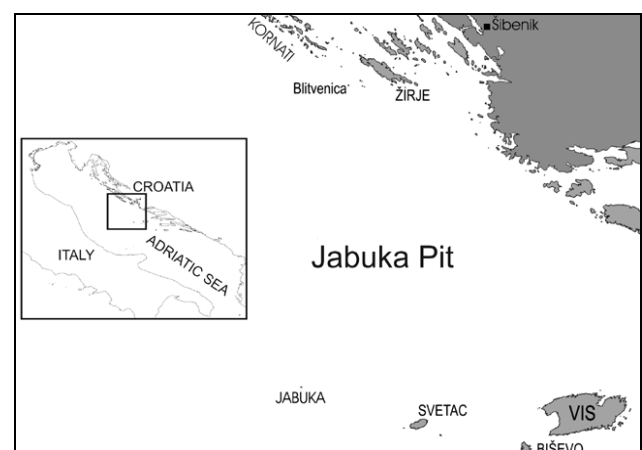


Fig. 1: Investigated area of the Jabuka Pit (Blitvenica area).

Sl. 1: Raziskovani predel kotline Jabuka (območje Blitvenice).

RESULTS AND DISCUSSION

Of the previously planned 400–425 hours of chumming, a total of 308.5 hours was achieved. Eight complete 24 hour periods were chummed with eleven further days of chumming activity between 3.5 and 23 hours.

Results of the chumming were as follows:

- nine (9) blue sharks (*Prionace glauca*) were caught and released or sighted round boats,
- several (at least 18) eagle rays, *Myliobatis aquila*, were seen,
- four (4) confirmed incidents (species unknown) of attacks on bait bags and chum stations were recorded (Tab. 1).

In addition to the expedition results, it is possible to add credible reports of a further seven (7) records of blue sharks, *P. glauca*, that were caught or seen and identified by other angling boats operating in near area.

Thus, the expedition's 308.5 hours chumming produced only nine records of blue sharks. If the 7 blue sharks identified by angling boats are added, the total number of observed blue sharks is 16 with the total chumming time increasing to something over 400 hours. Important data was also collected from the Dugi otok – Kornati area, which was considered as potential pupping area of blue shark. Nine hours and fifty minutes chumming was done in this area from two boats covering a drifted area of 3.5 NM. The only specimen identified was a 0.6 metre blue shark female pup that was tagged and released. Although the record of only one specimen is not a conclusive proof of a pupping ground, given that the only specimen encountered was a pup, the indication is that the reports considering this area as pupping ground of blue shark are probably correct, but need more thorough investigation for support of such presumption.

Overall result of this expedition is that out of 28 shark species inhabiting the Adriatic (Lipej *et al.*, 2004), there were only 16 confirmed records of only one species, the blue shark, in more than 400 hours of chumming at 7 different sites, which is a truly alarming result.

Regarding the great white shark, these results were probably expected, as Soldo & Jardas (2002) suggested that apparent lack of records of great white shark, since 1974, was related to the decline of tuna abundance in coastal waters of the Eastern Adriatic. Absence of great marine mammals in the Eastern Adriatic placed tunas as a mayor prey for the great white shark. Same authors also presumed that any future records of the great white shark in the Eastern Adriatic would probably be in the open Adriatic and related to tuna. A new record in the

summer of 2003 confirmed such theory as a female shark was caught in tuna purse seine 15 NM southwest offshore the island of Jabuka (Soldo & Dulčić, 2005). Data on shortfin mako have shown even severer decline of this species in the Eastern Adriatic. This species was considered as very common in the Eastern Adriatic at the end of the 19th century, as 43 records were reported in that period. During the 20th century, only 5 new records were reported, and since 1972 there have been no more records of this species in the Eastern Adriatic (Soldo & Jardas, 2002). Although the same authors indicated that the shortfin mako probably still occurs in open waters of the Adriatic, where it can be, because of its size and shape, misidentified by fisherman as the blue shark, or some other shark species, this expedition has not found any evidence of presence of this species in the Eastern Adriatic area. Similar case was for porbeagle, *Lamna nasus*, which latest authors also considered as probably occurring in the Adriatic's open waters, but unfortunately no records of this species were obtain by this expedition, although there have been recent reports on capture of this species in same area.

However, regarding thresher shark, a common shark of the Eastern Adriatic, and blue shark, the most common species of large sharks in the Adriatic, as indicated by Soldo & Jardas (2002), these results clearly point out that their common species status is no longer valid, as their populations are probably more depleted than previously thought.

Results of this expedition have to be used as part of efforts to establish protection for some species and sustainable fisheries management plans for the Adriatic Sea. Therefore, it is of great importance to identify critical habitats, namely mating areas, spawning and nursery grounds of all shark species, especially large, in the Adriatic. Management programs should be developed in the way that would ensure precise fisheries statistics of catches and landings by species.

Furthermore, for large migratory species it is of essential importance that shark management programs should be developed in the entire Mediterranean, followed by local ones (Adriatic). These programs should respect the principles of sustainability, precautionary principle and conservation measures as defined in the FAO Code of Conduct for Responsible Fisheries and in the International Plan of Action for the Conservation and Management of Sharks.

Hopefully, such approach, which should be very fast, will ensure conservation of shark populations and biodiversity of marine ecosystem of the Adriatic, as well as in the Mediterranean Sea.

Tab. 1: Records of shark occurrences obtained by chumming in the period from July 18 to August 9, 2005, in the areas of Jabuka Pit and Kornati archipelago (eastern Adriatic).

Tab. 1: Zapisi o pojavljanju morskih psov na podlagi privabljanja z deli razkosanih rib v obdobju od 18. julija do 9. avgusta 2005 na območju kotline Jabuka in Kornatov (vzhodni Jadran).

Date	Location	Depth (m)	Chummed hrs.	Species	Comments
18 Jul	18 NM from shore, edge of Jabuka pit 43°N, 15°E	200	7	-	Bad weather forced to run for shelter
19 Jul	18 NM from shore, edge of Jabuka pit 43°N, 15°E	200	7	probable sharks	Chum station left at sea overnight. Evidence of attack. Deep chum station attacked at 2200 hours. Bag ripped open.
20 Jul	18 NM from shore, edge of Jabuka pit 43°N, 15°E	200	24	-	-
21 Jul	18 NM from shore, edge of Jabuka pit 43°N, 15°E	200	24	AM, tuna astern in chum slick.	The marine environment around the boats starting to change significantly with large numbers of various fish ever present.
21 Jul	18 NM from shore, edge of Jabuka pit 43°N, 15°E	200	24	PM, blue fin tuna strike, 120 kg fish	Just after tuna strike as the 20 m chum station was being retrieved the line was cut and we lost it. Tuna, or shark chasing tuna?
22 Jul	18 NM from shore, edge of Jabuka pit 43°N, 15°E	200	24	-	-
23 Jul	18 NM from shore, edge of Jabuka pit 43°N, 15°E	200	24	rays	Eagle rays regularly in chummed area.
24 Jul	18 NM from shore, edge of Jabuka pit 43°N, 15°E	200	24	rays	-
25 Jul	18 NM from shore, edge of Jabuka pit 43°N, 15°E	200	14	tuna breaking surface, rays.	We set 150 hooks on a bottom longline at 190 m in the chummed area. 3 small European congers – nothing else.
25 Jul	2 NM SW of Blitvenica lighthouse	200	8.25	blue shark	New location considerably larger numbers of bait fish immediately present. 2000 hours our shuttle boat fishing near our slick caught and released a 0.6 m juvenile blue shark.
26 Jul	Drifting SW Blitvenica approx 6 NM	200	17	blue shark, several small ray	0025 hrs a 1.5–2 m shark swam through the floodlit area astern of Baracuda
27 Jul	Drifting SW Blitvenica approx 6 NM	200	17	female blue shark 2.5 m	Specimen caught to tag, lip hooked on a monofilament leader, bit through and lost. Wrong leader fitted!
27 Jul	Location 8-10 NM SW Blitvenica	200	-	report of a 120 kg blue shark caught 2-3 NM SW Blitvenica	Location and size estimate as reported to us.

28 Jul	Drifting 10-12 NM SW Blitvenica	200	7	-	-
29 Jul	Drifting 4-5 NM SW Blitvenica	160	10	rays	-
30 Jul	Drifting 4-5 NM SW Blitvenica	140-160	24	blue shark 2205 hours	1.5-2 m specimen swimming in chummed area astern of Baracuda.
30 Jul	Drifting 4-5 NM SW Blitvenica	140-160	24	blue shark 2234 hours	Second specimen 2.5–3 m hooked to tag. Bit through line-lost.
31 Jul	Drifting 4-5 NM SW Blitvenica	140-160	24	blue shark 542 hours	Small shark 1–1.5 m swimming eastern of Baracuda.
31 Jul	Drifting 4-5 NM SW Blitvenica	140-160	24	2 x blue sharks caught and released by our shuttle boat, 1830–1900 hours. Sizes est. 2 and 2.5 m	1 NM north of our position. Sexes unknown.
1 Aug	Same general area, drifting	170	24	2 x blue sharks caught and released, untagged by Baracuda skipper	1 m and 1.5 m: one male and one female.
2 Aug	Same general area, drifting	170	12	-	-
2 Aug	2.5 NM south of Jabuka	150	3.5	-	Severe weather forced to stop chumming after only 3.5 h and run for shelter.
3 Aug	-	-	-	-	Due to storm warnings steamed back to mainland from Vis.
4-5 Aug	-	-	-	-	In port waiting for clear weather.
6 Aug	43°49.62'N, 15°12.47'E junction Dugi Otok and Kornati, drift chumming	90	3	-	We drift 3.1 NM. 10x blue sharks seen in this location yesterday – none today.
7 Aug	43°48.58'N, 15°11.46'E drift chumming working south of the day before position	90	9-50 min	female blue shark pup. 1015 hours, Baracuda	Two boats chumming separately drifted 3.5 NM. Shark of 0.6 m tagged and released.
9 Aug	43°41.77'N, 15°26.18'E	> 110	11	blue shark 1828 hours	2.5 m specimen swam round Lucia for 15–20 min.

ACKNOWLEDGEMENTS

Richard Peirce and Craig Ferreira, the expedition leaders and organisers, would like to thank the following for their help and advice: Jacqueline Peirce, George Blanic, Boris Jezina, Denis Klarin, Gernot Frase, Jorg-

Dieter Hasselhorst, and the volunteer researchers - Mark Boothman, Steve Brigg, Andy Currie, Vanessa Evans, Mark Flight, Gary Gardner, Tom Hird, Naomi Julian, Wendy Mauchline, Stuart Nicholls, Bob Pennington, Sanja Peterka, Andy Sweeney and Claire Watterson.

PREUČEVANJE POPULACIJ MORSKIH PSOV, PRIVABLJENIH Z DELI RIB, V VZHODNEM JADRANU

Alen SOLDI

Inštitut za oceanografiju in ribištvo, HR-21000 Split, P.O. BOX 500, Hrvatska
E-mail: soldo@izor.hr

Richard PEIRCE

Richard Peirce Shark Conservation, Dulverton House, 8 Crooklets, Bude, Cornwall, EX23 8NE, United Kingdom

POVZETEK

Glavni namen ekspedicije, ki jo je med 18. julijem in 9. avgustom 2005 v srednjem vzhodnem Jadranu vodil Richard Peirce, je bil dobiti kar največ novih informacij o pelagičnih plenilskih morskih psih v tem delu Jadrana. Raziskave so potekale v širšem predelu kotline Jabuka (območje Blitvenice). Za privabljanje morskih psov so bili uporabljeni deli razkosanih različnih rib. Med 23 dnevi, ki jih je ekspedicija prebila na morju, so bili psi privabljeni 308,5 ur, rezultat pa je bil ta, da je bilo zabeleženih le 9 sinjih morskih psov *Prionace glauca*, kar je izredno zaskrbljujoče, saj kaže, da so populacije morskih psov v srednjem Jadranu še bolj zdesetkane, kot je bilo pričakovati.

Ključne besede: morski psi, privabljanje z razkosanimi ribami, Jadransko morje

REFERENCES

- Cetinić, P. & A. Soldo (1999):** Some basic characteristics of Croatian marine fisheries and its legal regulation, *Acta Adriat.*, 40(Suppl.), 91–97.
- Lipej, L., A. De Maddalena & A. Soldo (2004):** Sharks of the Adriatic Sea. Knjižnica Annales Majora, Koper, 254 pp.
- Soldo, A. (2002):** Status of cartilaginous fish in the Eastern Adriatic (Croatia). Report of the meeting of experts for the elaboration of an action plan for the conservation of Mediterranean species of cartilaginous fish. UNEP(DEC)/MED/WG. 211, 4, p. 4–9.
- Soldo, A. (2003):** Status of sharks in the Mediterranean. *Annales Ser. Hist. Nat.*, 13(2), 191–200.
- Soldo, A. & I. Jardas (2002):** Large sharks in the Eastern Adriatic. Proc. 4th Elasm. Assoc. Meet., Livorno (Italy), 2000. ICRAM, ARPAT & SFI, p. 141–155.
- Soldo, A. & J. Dulčić (2005):** New record of a great white shark, *Carcharodon carcharias* (Lamnidae) from the eastern Adriatic Sea. *Cybium*, 29(41), 89–90.