

Blue lines indicate the area meeting the ISRA Criteria; dashed lines indicate the suggested buffer for use in the development of appropriate place-based conservation measures

NORTHWEST ADRIATIC ISRA

Mediterranean and Black Seas Region

SUMMARY

Northwest Adriatic is located in the western part of the North Adriatic Sea basin. The area is characterised by shallow waters and is under the strong influence of the Po River plume which results in high marine productivity. The area includes mobile sandy substrates, seagrass meadows, hard substrate associations, and unique rocky outcrops. This area overlaps with the Northern Adriatic Ecologically or Biologically Significant Marine Area. Within this area there are: **threatened species** (e.g., Spiny Dogfish *Squalus acanthias*) and **reproductive areas** (e.g., Common Smoothhound *Mustelus mustelus*).

CRITERIA

Criterion A - Vulnerability; Sub-criterion C1 - Reproductive Areas

—	—
ITALY	—
CROATIA	—
—	—
0-50 metres	—
—	—
5,852 km²	—
—	—





DESCRIPTION OF HABITAT

Northwest Adriatic is located in the western part of the North Adriatic Sea basin. It is characterised by shallow waters, with an average depth of 35 m. The strong influence of the Po River plume results in low salinity, low water temperature, and high productivity (Fonda Umani 1996; Marini et al. 2008; Lipizer et al. 2014). The area has been recognised as a region of high marine productivity at several trophic levels from phytoplankton to fishes (Fonda Umani 1996).

The area includes a diversity of benthic and pelagic habitats (CBD 2023) including mobile sandy substrates, seagrass meadows, rocky outcrops, and open waters. These outcrops play an important ecological role because they are the only hard substrates in the area offering shelter and reproductive sites for several fish and invertebrate species (Casellato et al. 2007).

This area overlaps with the Northern Adriatic Ecologically or Biologically Significant Marine Area (CBD 2023).

This Important Shark and Ray Area is benthopelagic and ranges from surface waters (0 m) to a depth of 50 m based on the depths at which the Qualifying Species occur and the bathymetry of the area.

ISRA CRITERIA

CRITERION A - VULNERABILITY

Two Qualifying Species considered threatened with extinction according to the IUCN Red List of Threatened Species™ regularly occur in the area. These are the Endangered Common Smoothhound (Jabado et al. 2021) and the Vulnerable Spiny Dogfish (Finucci et al. 2020).

SUB-CRITERION C1 - REPRODUCTIVE AREAS

Northwest Adriatic is an important reproductive area for two shark species. Dogfishes (*Squalus* spp.) and smoothhounds (*Mustelus* spp.) have generally dominated shark bycatch in the northern Adriatic Sea (Barausse et al. 2014; Bonanomi et al. 2018). Between 2006 and 2015, a total of 12,585 hauls from pelagic trawl fisheries were recorded in 3,160 monitored fishing trips in the northern Adriatic. In these hauls, 2,169 Spiny Dogfish and 833 Common Smoothhounds were captured (Bonanomi et al. 2018).

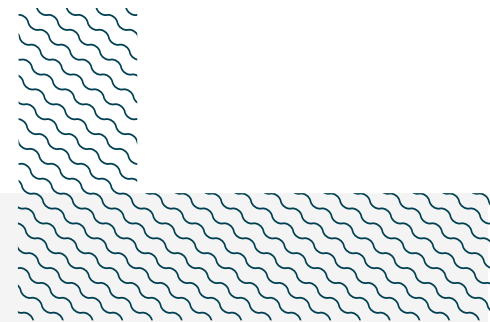
Between April and June across the study period (2006–2015), relatively small individuals (~90 cm total length [TL]) of Common Smoothhound were mostly caught at an average depth of 15 m (\pm 36 m SD) (Bonanomi et al. 2018). Reported size-at-birth for this species is 24–45 cm TL (Saïdi et al. 2008). Based on catches from a variety of fishing gear, pregnant females and juveniles of this species are found in the northern Adriatic (Bonanomi et al. 2018; Riginella et al. 2020).

Between July and September across the study period (2006–2015), small individuals (~70 cm TL) of Spiny Dogfish were incidentally captured at an average depth of 30 m (\pm 55 m SD). These were sometimes caught as aggregations of 5 to 146 individuals (Bonanomi et al. 2018). Reported size-at-birth for this species is 18–33 cm TL (Ebert et al. 2021).

Using data from these monitored fishing trips, this area was delineated by the spatial identification of aggregations of immature individuals using the following methods (Bonanomi et al. 2018). 'Nursery areas' were identified where large bycatch events of immature individuals were recorded (Bonanomi



et al. 2018; note that the use of the term ‘nursery areas’ in the study does not match other ecological uses of the term [e.g., Heupel et al. 2007]). For both Common Smoothhound and Spiny Dogfish, size-at-maturity was the threshold to identify immature individuals. Thus, only bycatch events for each haul with at least 50% immature individuals caught were selected. Following this, aggregations with >18 individual Common Smoothhound and >8 individual Spiny Dogfish were selected, since these thresholds represented the 95th quantile of the distribution of catches of immature individuals. For both species, the minimal area containing the selected events was computed and considered as a potential ‘nursery area’ (Bonanomi et al. 2018). Aggregations of immature individuals for both species in this area resulted in a greater mean catch-per-unit-effort (CPUE) compared with other areas of the northern Adriatic Sea.



Acknowledgments

Sara Bonanomi (Italian National Research Council IRBIM), Alessandro Lucchetti (Italian National Research Council IRBIM), Simone D’Acunto (CESTHA), Massimiliano Bottaro (Zoological Station Anton Dohrn), Mauro Sinopoli (Zoological Station Anton Dohrn), Emilio Sperone (University of Calabria), Maria Cristina Follesa (University of Cagliari), Letizia Marsili (University of Siena), Pierluigi Carbonara (COISPA), Peter M. Kyne (IUCN SSC Shark Specialist Group - ISRA Project), and Adriana Gonzalez-Pestana (IUCN SSC Shark Specialist Group - ISRA Project) contributed and consolidated information included in this factsheet. We thank all participants of the 2023 ISRA Region 3 - Mediterranean and Black Seas workshop for their contributions to this process.

This factsheet has undergone review by the ISRA Independent Review Panel prior to its publication.

This project was funded by the Shark Conservation Fund, a philanthropic collaborative pooling expertise and resources to meet the threats facing the world’s sharks and rays. The Shark Conservation Fund is a project of Rockefeller Philanthropy Advisors.

Suggested citation

IUCN SSC Shark Specialist Group. 2023. Northwest Adriatic ISRA Factsheet. Dubai: IUCN SSC Shark Specialist Group.

QUALIFYING SPECIES

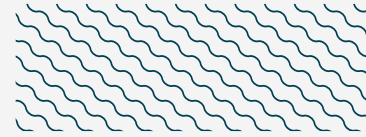
Scientific Name	Common Name	IUCN Red List Category	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met								
				A	B	C1	C2	C3	C4	C5	D1	D2
SHARKS												
<i>Mustelus mustelus</i>	Common Smoothhound	EN	5-800	X		X						
<i>Squalus acanthias</i>	Spiny Dogfish	VU	0-1,978	X		X						

SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
RAYS		
<i>Myliobatis aquila</i>	Common Eagle Ray	CR
<i>Pteroplatytrygon violacea</i>	Pelagic Stingray	LC

IUCN Red List of Threatened Species Categories are available by searching species names at www.iucnredlist.org. Abbreviations refer to: CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient.





REFERENCES

- Barausse A, Correale V, Curkovic A, Finotto L, Riginella E, Visentin E, Mazzoldi C. 2014.** The role of fisheries and the environment in driving the decline of elasmobranchs in the northern Adriatic Sea. *ICES Journal of Marine Science* 71(7): 1593–1603. <https://doi.org/10.1093/icesjms/fst222>
- Bonanomi S, Pulcinella J, Fortuna CM, Moro F, Sala A. 2018.** Elasmobranch bycatch in the Italian Adriatic pelagic trawl fishery. *PLoS ONE* 13(1): e0191647. <https://doi.org/10.1371/journal.pone.0191647>
- Casellato S, Masiero L, Sichirollo E, Soresi S. 2007.** Hidden secrets of the Northern Adriatic: “Tegnue”, peculiar reefs. *Central European Journal of Biology* 2(1): 122–136. <https://doi.org/10.2478/s11535-007-0004-3>
- Convention on Biological Diversity (CBD). 2023.** Northern Adriatic Ecologically or Biologically Significant Areas. Available at: <https://chm.cbd.int/database/record?documentID=204128> Accessed May 2023.
- Ebert DA, Dando M, Fowler S. 2021.** *Sharks of the world: a complete guide*. Princeton: Princeton University Press.
- Finucci B, Cheok J, Chiaramonte GE, Cotton CF, Dulvy NK, Kulka DW, Neat FC, Pacoureau N, Rigby CL, Tanaka S, et al. 2020.** *Squalus acanthias*. *The IUCN Red List of Threatened Species* 2020: e.T91209505A124551959. <https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T91209505A124551959.en>
- Fonda Umani S. 1996.** Pelagic production and biomass in the Adriatic Sea. *Scientia Marina* 60(Supl. 2): 65–77.
- Heupel MR, Carlson JK, Simpfendorfer CA. 2007.** Shark nursery areas: concepts, definitions, characterization and assumptions. *Marine Ecology Progress Series* 337: 287–297. <https://doi.org/10.3354/meps337287>
- Jabado RW, Chartrain E, Cliff G, Da Silva C, De Bruyne G, Derrick D, Dia M, Diop M, Doherty P, El Vally Y et al. 2021.** *Mustelus mustelus*. *The IUCN Red List of Threatened Species* 2021: e.T39358A124405881. <https://dx.doi.org/10.2305/IUCN.UK.2021-2.RLTS.T39358A124405881.en>
- Lipizer M, Partescano E, Rabitti A, Giorgetti A, Crise A. 2014.** Qualified temperature, salinity and dissolved oxygen climatologies in a changing Adriatic Sea. *Ocean Science* (10)5: 771–797. <https://doi.org/10.5194/os-10-771-2014>
- Marini M, Jones B, Campanelli A, Grilli F, Lee CM. 2008.** Seasonal variability and Po River plume influence on biochemical properties along western Adriatic coast. *Journal of Geophysical Research* 113: C05S90. <https://doi.org/10.1029/2007JC004370>
- Riginella E, Correale V, Marino IAM, Rasotto MB, Vrbatovic A, Zane L, Mazzoldi C. 2020.** Contrasting life-history traits of two sympatric smooth-hound species: implications for vulnerability. *Journal of Fish Biology* 96: 853–857. <https://doi.org/10.1111/jfb.14262>
- Saïdi B, Bradaï MN, Bouaïn A. 2008.** Reproductive biology of the smooth-hound shark *Mustelus mustelus* (L.) in the Gulf of Gabès (south-central Mediterranean Sea). *Journal of Fish Biology* 72: 1343–1354. <https://doi.org/10.1111/j.1095-8649.2008.01801.x>