

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

RIVER BOJANA/BUNA DELTA ISRA

Mediterranean and Black Seas Region

SUMMARY

River Bojana/Buna Delta is located in the southeast Adriatic Sea. It encompasses the area mostly influenced by the River Bojana/Buna, as well as nearby freshwater inflows. This river is the second largest tributary of the Adriatic Sea and creates a distinctive habitat rich in nutrients and fine sediments. Its lower reaches represent the border between Montenegro and Albania, among which the area is shared. The area overlaps with three existing marine protected areas in Montenegrin territorial waters and five Key Biodiversity Areas are recognised within the area, including sites covering lagoons and freshwater inflows. Within this area there are: **threatened species** (e.g., Common Thresher *Alopias vulpinus*); **range-restricted species** (Starry Skate *Raja asterias*); **reproductive areas** (e.g., Blue Shark *Prionace glauca*); and **undefined aggregations** (e.g., Blackspotted Smoothhound *Mustelus punctulatus*).

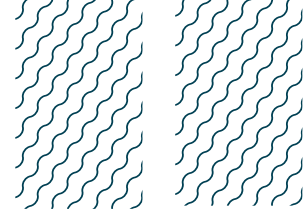
CRITERIA

Criterion A - Vulnerability; Criterion B - Range Restricted; Sub-criterion C1 - Reproductive Areas; Sub-criterion C5 - Undefined Aggregations

— —
MONTENEGRO
ALBANIA

— —
0-200 metres

— —
5,120 km²
 — —



DESCRIPTION OF HABITAT

River Bojana/Buna Delta extends from Cape of Rodon in Albania to the entrance of Boka Bay in Montenegro. The area is under the influence of many freshwater inflows, including River Ishmi, River Mati, River Drini, the main River Bojana/Buna, and a few coastal lagoons. The River Bojana/Buna itself is the outflow of the nearby Lake Skadar/Shkodra, which is under the joint jurisdiction of Montenegro and Albania. The river has a length of 41 km and represents the second largest tributary of the Adriatic Sea (Petković & Sekulić 2019; Milošević et al. 2022), after the River Po in Italy. It is also second in terms of sediment supply (Del Bianco et al. 2015). Its delta is located in the middle of the area's coastline. Before it enters the sea, the river splits into two branches, and creates an island (Ada Bojana Island). The southern branch creates the border between Montenegro and Albania, while the entire island falls within Montenegrin jurisdiction. The area does not include the estuary upstream of the meeting point of the river and the Adriatic Sea. The entire area is located directly opposite to the deepest part of the Adriatic Sea, the Southern Adriatic Pit, and is relatively close to the Strait of Otranto.

The area also includes the largest sandy beach of the eastern Adriatic (12 km long) which extends from the northern river branch northward. The beach is known for its unique sand dune vegetation and is recognised as a monument of nature (Stešević et al. 2020). The wider surrounding marine area is under the strong influence of the river, which supplies it with fine sediments and high nutrient concentrations (Marini et al. 2010; Campanelli et al. 2013; Del Bianco et al. 2015). An oceanic current disperses the river nutrients far northward through the waters of Montenegro (Marini et al. 2010). The Buna/Bojana River represents the southern counterpart of the River Po in the northern Adriatic, and it is easily distinguished in satellite images showing chlorophyll distribution in the Adriatic Sea (Marini et al. 2015).

Another important location is represented by the Kune-Vain lagoon complex, which is located on both sides of the estuary of the River Drini on the Adriatic coast. The area to the south comprises marshes and low-lying coastal lands that extend to the estuary of the River Mati. This complex spreads over 30 km², of which 11 km² are underwater, while the remainder are marshes, reeds, forests, shrubs, and cultivated lands (Miho et al. 2013).

This Important Shark and Ray Area is delineated from inshore and surface waters (0 m) to a depth of 200 m. The area is benthopelagic and includes both benthic habitats and the entire water column. The depth range was selected to encompass the entire area under strong river influence.

ISRA CRITERIA

CRITERION A - VULNERABILITY

Four Qualifying Species considered threatened with extinction according to the IUCN Red List of Threatened Species™ occur in the area. These are the Critically Endangered Blue Shark (Mediterranean Sea regional assessment; Sims et al. 2016), Endangered Common Smoothhound (Jabado et al. 2021a), and the Vulnerable Common Thresher (Rigby et al. 2022) and Blackspotted Smoothhound (Jabado et al. 2021b).



CRITERION B – RANGE RESTRICTED

This area holds the regular presence of the Starry Skate as a resident range-restricted species. This species has been observed in local catches during different surveys by the Institute of Marine Biology (from Kotor, Montenegro). This has included the national monitoring of commercial fisheries (launched in 2017 and undertaken on a quarterly basis) and other short-term surveys in which the species has been recorded in each survey year (I. Ćetković pers. obs. 2023). According to local fishers, the species is abundant in the area and present year-round. Starry Skate is distributed primarily in the Mediterranean Sea Large Marine Ecosystem (LME) and only very marginally in the Canary Current LME and Iberian Coastal LME.

SUB-CRITERION C₁ – REPRODUCTIVE AREAS

River Bojana/Buna Delta is an important reproductive area for two shark species. Repeated records of neonates or young-of-the-year (YOY) individuals have been documented for Common Thresher and Blue Shark, and pregnant female Blue Sharks have been recorded in the area. Some of this information originates from citizen science reports from both commercial and recreational fishers (I. Ćetković unpubl. data 2023).

Four young Common Threshers of ~150 cm total length (TL) have been recorded in the Montenegro side of the area (one in each 2016 and 2021 and two in 2020 and 2022 [both as pairs]; Ćetković et al. 2022a; I. Ćetković unpubl. data 2023). Additionally, three individuals of 122–170 cm TL were recorded from the Albanian part of the area during monitoring of shark catches between March 2016 and December 2018 (Bakiu & Soldo 2021). The lengths of sharks caught in the area overlaps with their known size-at-birth of 120–150 cm TL (Ebert & Dando 2021). This species has undergone severe declines in the Adriatic Sea (Soldo & Lipej 2022) and the repeated occurrence of YOY size individuals across several recent years is considered regionally significant.

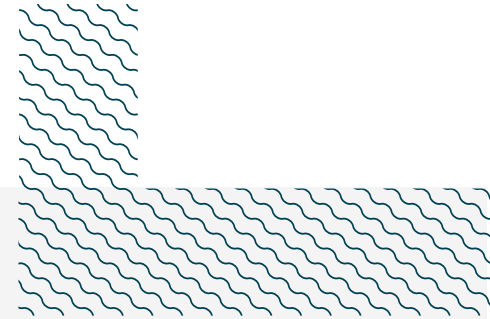
More than 20 neonate Blue Sharks of ~50 cm TL and YOY (<100 cm TL) have been recorded in the area in just over the last decade (neonates were recorded in 2010, 2017, 2020, 2021 and 2022) (Ćetković et al. 2019, 2022a; I. Ćetković unpubl. data 2023). Neonates were close in length to the known size-at-birth of the species (35–50 cm TL; Ebert & Dando 2021). Pregnant female Blue Sharks, with some exceeding 300 cm TL, have also been observed in local fishery catches during spring (Ćetković et al. 2019; I. Ćetković pers. obs. 2023). Blue Shark records are scattered across the entire proposed area, including away from the estuary itself. They are usually observed between April and July, with a peak in adult occurrence in May which is linked to reproductive activity.

SUB-CRITERION C₅ – UNDEFINED AGGREGATIONS

River Bojana/Buna Delta is an important area for the aggregation of two shark species.

The area surrounding the estuary is particularly rich with individuals of Common Smoothhound and Blackspotted Smoothhound, with occasional observations of aggregations of up to 100 sharks (Ćetković 2018; I. Ćetković pers. obs. 2023). Smoothhounds sustain the continued existence of a local shark-directed small-scale gillnet fishery on the Montenegrin side of the estuary (Ćetković 2018). Although local fishers provide information on yearly occurrence of pregnant females during late

winter and spring (including in 2020, 2021, 2022, and 2023; I. Ćetković unpubl. data 2023), whether sharks aggregate in the area for reproductive or other purposes is still unclear, as directed research has not been conducted on these species in the area.



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QUALIFYING SPECIES

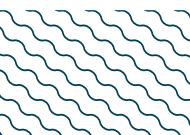
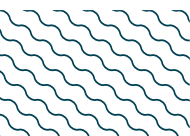
Scientific Name	Common Name	IUCN Red List Category	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met									
				A	B	C1	C2	C3	C4	C5	D1	D2	
SHARKS													
<i>Alopias vulpinus</i>	Common Thresher	VU	0-650	X		X							
<i>Mustelus mustelus</i>	Common Smoothhound	EN	5-800	X							X		
<i>Mustelus punctulatus</i>	Blackspotted Smoothhound	VU	0-300	X							X		
<i>Prionace glauca</i>	Blue Shark	CR*	0-1,000	X		X							
RAYS													
<i>Raja asterias</i>	Starry Skate	NT	0-700		X								

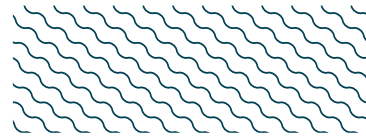
SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
SHARKS		
<i>Carcharhinus plumbeus</i>	Sandbar Shark	EN
<i>Cetorhinus maximus</i>	Basking Shark	EN
<i>Galeorhinus galeus</i>	Tope	CR
<i>Isurus oxyrinchus</i>	Shortfin Mako	EN
<i>Mustelus asterias</i>	Starry Smoothhound	VU*
<i>Scyliorhinus canicula</i>	Smallspotted Catshark	LC
<i>Squalus blainville</i>	Longnose Spurdog	DD
RAYS		
<i>Aetomylaeus bovinus</i>	Duckbill Eagle Ray	CR
<i>Bathytoshia lata</i>	Brown Stingray	VU
<i>Dasyatis pastinaca</i>	Common Stingray	VU
<i>Myliobatis aquila</i>	Common Eagle Ray	CR
<i>Pteroplatytrygon violacea</i>	Pelagic Stingray	LC
<i>Raja clavata</i>	Thornback Skate	NT
<i>Raja miraletus</i>	Brown Skate	LC
<i>Torpedo marmorata</i>	Marbled Torpedo Ray	VU
<i>Torpedo torpedo</i>	Ocellate Torpedo	VU

*Considered threatened in Mediterranean Sea regional assessment but NT globally.

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.



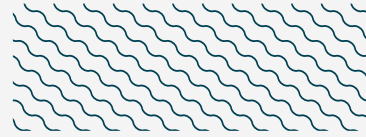


SUPPORTING INFORMATION

There are additional indications that River Bojana/Buna Delta may be an important reproductive area for Sandbar Shark. Six small individuals (2014–2022; Ćetković et al. 2022b), with some close in length to their known size-at-birth (56–75 cm TL; Ebert & Dando 2021) were recorded from the estuarine area. Their size ranged between 80–110 cm TL (Ćetković et al. 2022b).

River Bojana/Buna Delta may be an important feeding area for shark species that regularly occur in the area. The delta creates an area with eutrophic conditions in the southeast Adriatic Sea, by ensuring high nutrient concentrations, which causes high primary productivity indicated by high concentration of chlorophyll α (Marini et al. 2010; Campanelli et al. 2013). The river provides dissolved organic minerals, which enrich the surrounding area (Vukanić et al. 2016). Its influence is supported by other nearby freshwater inflows in Albania. This area is known for important food sources for fish, spawning grounds, nursery areas, and migration pathways on which different fish species depend (Beqiraj et al. 2011). The area is rich in prey species such as small pelagic fishes, schooling fishes (e.g., mullets), and small tunas.





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