

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

## PALMAHIM BRINE POOLS ISRA

### Mediterranean and Black Seas Region

#### SUMMARY

Palmahim Brine Pools is located in the southeastern Mediterranean Sea, 60 km off the coast of Israel. The area is within a marine protected area that covers a large-scale submarine rotational slide rooted in the Messinian evaporites. This area is characterised by a warm and saline brine pool system. Within this area there are: **threatened species** (Angular Roughshark *Oxynotus centrina*); **reproductive areas** (Blackmouth Catshark *Galeus melastomus*); and **feeding areas** (Angular Roughshark).

#### CRITERIA

**Criterion A - Vulnerability; Sub-criterion C1 - Reproductive Areas;**  
**Sub-criterion C2 - Feeding Areas**

ISRAEL

1,100-1,150 metres

0.09 km<sup>2</sup>





## DESCRIPTION OF HABITAT

Palmahim Brine Pools is located in the ultraoligotrophic southeast Mediterranean Sea, 60 km off the coast of Israel. Gas seepage is prominent at the toe of the Palmahim Disturbance, a large-scale submarine rotational slide rooted in the Messinian evaporites (Lawal et al. 2023). This brine pool system at >1,100 m depth was discovered in 2021. The site comprises several distinct habitats, including warm (~21°C), saline (salinity ~60 PSU), anoxic brines saturated with methane, sulfide, and ammonium at millimolar levels, brine-infused euxinic sediments that are covered with mats of sulfur-oxidising bacteria, reefs of chemosynthetic fauna (mainly *Lamellibrachia anaximandri* tubeworms, *Lucinoma kazani* clams, and *Idas* sp. mussels), and authigenic carbonates.

The area is within the newly declared Palmahim Slide marine protected area.

This Important Shark and Ray Area is benthic and is delineated from 1,100 to 1,150 m based on the bathymetry of the area.

## ISRA CRITERIA

### CRITERION A – VULNERABILITY

One Qualifying Species within the area is considered threatened with extinction according to the IUCN Red List of Threatened Species™. The Angular Roughshark is assessed as Endangered (Finucci et al. 2021).

### SUB-CRITERION C<sub>1</sub> – REPRODUCTIVE AREAS

Palmahim Brine Pools is an important reproductive area for one shark species.

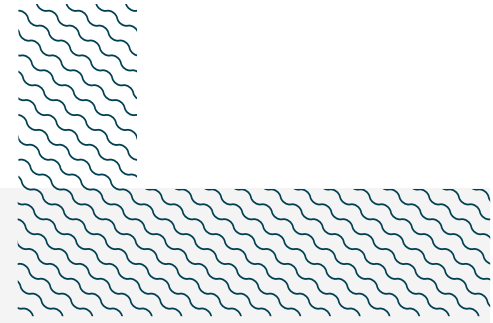
The area attracts thousands of Blackmouth Catsharks that breed and lay eggs, mainly among tubeworms or above fields of *Lucinoma kazani* clams, likely due to the elevated temperatures and ample food present in the area (Y. Makovsky pers. obs. 2023). Two Remotely Operated Vehicle (ROV) surveys were conducted in April and November 2021, and on both occasions the egg deposit field was located (Herut et al. 2022). In an area spanning >200 m<sup>2</sup>, the seabed is composed of egg cases that stack in layers. The top layer consisted of live egg cases containing yolk sacs and embryos of various stages, and below it there were many layers of old, empty egg cases, confirming the continuous and regular presence of this reproductive process in the area. These results suggest that Blackmouth Catsharks lay eggs year-round in this area.

### SUB-CRITERION C<sub>2</sub> – FEEDING AREAS

Palmahim Brine Pools is an important feeding area for one shark species.

During two ROV surveys in April and November 2021, Angular Roughsharks were observed feeding on Blackmouth Catshark eggs and on chemosynthetic clams in this area. Blackmouth Catshark eggs are concentrated in this small area, suggesting that the feeding area is similarly restricted to this site.





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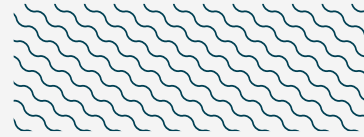
## **Suggested citation**

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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
<b>SHARKS</b>											
<i>Galeus melastomus</i>	Blackmouth Catshark	LC	55-2,000			X					
<i>Oxynotus centrina</i>	Angular Roughshark	EN	35-805	X			X				

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



## REFERENCES

**Finucci B, Chartrain E, De Bruyne G, Derrick D, Ducrocq M, Williams AB, VanderWright WJ. 2021.** *Oxynotus centrina*. *The IUCN Red List of Threatened Species* 2021: e.T63141A124462573. <https://dx.doi.org/10.2305/IUCN.UK.2021-2.RLTS.T63141A124462573.en>

**Herut B, Rubin-Blum M, Sisma-Ventura G, Jacobson Y, Bialik OM, Ozer T, Lawal MA, Giladi A, Kanari M, Antler G, et al. 2022.** Discovery and chemical composition of the eastmost deep-sea anoxic brine pools in the Eastern Mediterranean Sea. *Frontiers in Marine Science* 9: 1040681. <https://doi.org/10.3389/fmars.2022.1040681>

**Lawal AM, Bialik OM, Lazar M, Waldmann ND, Foubert A, Makovsky Y. 2023.** Modes of gas migration and seepage on the salt-rooted Palmahim disturbance, southeastern Mediterranean. *Marine and Petroleum Geology* 153: 106256. <https://doi.org/10.1016/j.marpetgeo.2023.106256>