FRA Proposal:

The Palmahim Disturbance Cold Water Coral Gardens and Cold Seeps

Standard Form for the Submission of Proposals for GFCM Fisheries Restricted Areas (FRAS) in the Mediterranean and the Black Sea

אוניברסיטת חיפה
University of Haifa
جامعة حيفا

The Society for the Protection of Nature in Israel
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החברה להגנת הטבע
הרפורמה להצלת הים התיכון

Name of the FRA
The Palmahim Disturbance Cold Water Coral Gardens and Cold Seeps

Submitted by:
The Society for the protection of Nature in Israel

www.mafish.org.il/english

University of Haifa, Israel

Date of submission:
February 2020

The data presented in this proposal is based, mainly, on the research work of Dr. Yizhaq Makovsky, and on the PhD thesis of Adam Weissman under the supervision of Prof' Dan Chernov.

Unless specified otherwise, all photos in this document where taken during research expeditions with the participation of researchers from the University of Haifa, including:

- 2010-2011 expedition on E/V Nautilus as part of NA019 - Exploration of the Israel Continental Margin, led by – Leon H. Charney School of Marine Sciences, University of Haifa; ;Institute for Exploration, University of Rhode Islands; The Helmsley Charitable Trust; Israel Oceanographic and Limonological Research Institute
- 2017 - Charney School of Marine Sciences expedition on the Bat –Galim research vessel using the Leopard ROV, led by Dr Yizhaq Makovsky
- 2016 - expedition on R/V Aegeo as part of SemSeeps project, funded by Eurofleets and led by Dr Yizhaq Makovsky and Dr. Andres Rüggeberg.

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Table Of Content

1

Executive Summary

Summary of the information contained in sections 2 to 8, including expected results

The Palmahim Disturbance is a unique site with fragile and vulnerable deep-sea ecosystems, such as coral gardens and cold seeps, based upon a distinct geological formation, as well as a spawning area for Atlantic Bluefin Tuna.

The Palmahim Disturbance is a salient submarine slide deforming the continental margin off southern Israel due to gravitational slumping above the Messinian evaporates. It is included in the area considered by Israel as its EEZ. The benthic habitats present at the Palmahim Disturbance fit the criteria for Essential Marine Habitats. They are important for the management of priority species, are considered vulnerable marine ecosystems (VME) by the FAO, are included on the OSPAR protected habitat list and are recognized as habitats in need of protection by the WWF.

The Palmahim Disturbance represents a rare occurrence of hard substrate in the deep water of the southeastern Mediterranean, which is generally soft bottomed with low species richness. Two distinct benthic ecosystems are present in the area, forming biodiversity hotspots in the deep Levant Sea:
On the margins of the Palmahim Disturbance, exposed carbonate rocks facilitate the succession of cold-water coral (CWC) communities, which inhabit rare and endangered species in need of immediate protection, such as black corals, octocorals, sea pens, deep-sea sharks and rays and a wide variety of invertebrates.

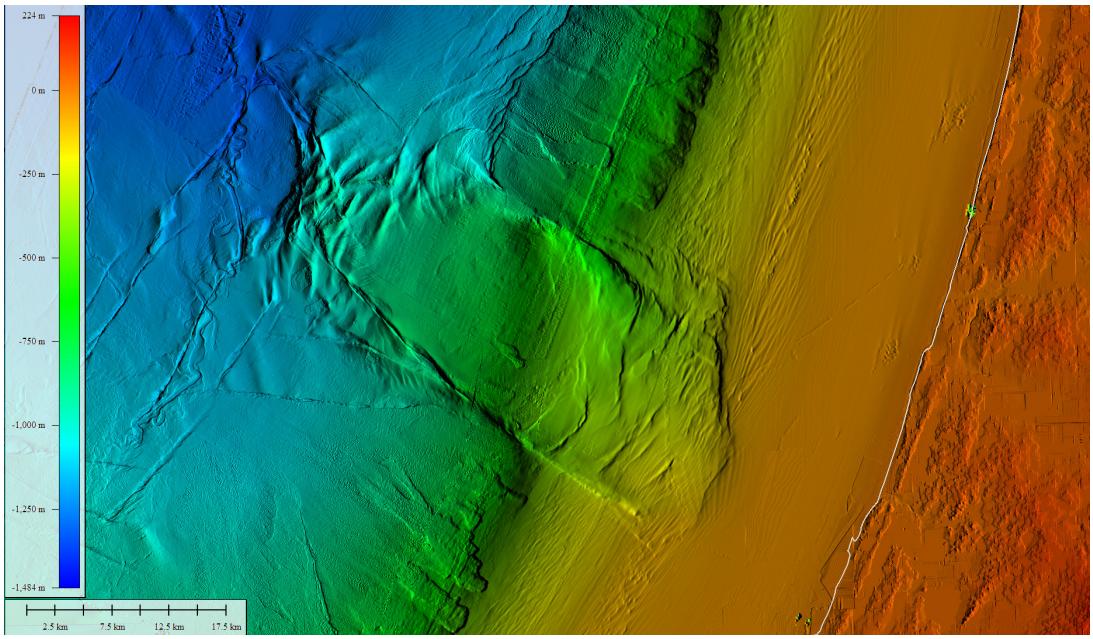
In the deeper, western zones of the site, cold seeps fuel fragile chemosynthetic communities sustaining symbiotic and non-symbiotic organisms such as tubeworms, clams, crustaceans, echinoderms and fish, which depend on the chemosynthetic primary production.

Although fishing activity in the area is low intensity, due to the sensitivity of the ecosystem, those activities take a heavy toll on nature. Recent scientific surveys at the locality have documented habitat destruction caused by bottom trawling: evident trawl marks and carbonate rubble demonstrate the damage caused to the benthic communities and the potential for large-scale habitat destruction of the entire site, if protective measures are not taken. Damage to CWC systems may be irreversible due to destruction of the substrate itself. Even if the substrate were to remain intact, the slow growth rates, combined with other anthropogenic stressors, may substantially inhibit the recovery of the benthic systems. Therefore, even a single event of trawling over the CWC gardens could destroy this rare community. The cold seep communities depend on the carbonate rock foundation for settlement as well. Thus, bottom trawling, which crushes the carbonate rocks, may pose a serious threat to these unique chemosynthetic communities.

Other fishing practices, such as long lines and nets, have also left their mark on the coral communities, and were found entangled in the corals at numerous locations, obstructing their food availability and at times splitting the colonies.

The pelagic zone is a spawning ground for the endangered Atlantic Bluefin Tuna (BFT). The area may support the reproduction of a genetically distinct population. BFT is fished by commercial and recreational Israeli fishermen in small numbers (estimated less than 20 tons a year) during the spawning season (May-July). Israel is not an ICCAT member and does not have a BFT catch quota, thus it should be considered IUU catch.

In light of the fragile and unique benthic ecosystems found at the Palmahim Disturbance and its importance for the endangered BFT, the evident damage and future risks to the VME and endangered species at the locality, we propose closing the Palmahim Disturbance to fishing, for the conservation of biodiversity in both the benthic and pelagic habitats. This is expected to ensure the survival of the benthic VMEs, and the safe reproduction of BFT in the FRA. Both outcomes will support the replenishment of fish stocks in the eastern Mediterranean, and boost research and education activities in the deep-sea.



general map of Palmahim disturbance.

Map created by Yizhaq Makovsky. The basis of this map is from EmodNet, and is based on Hall, J. K., Lippman, S., Gardosh, M., Tibor, G., Sade, A. R., Sade, H., … Nissim, I. (2015). A New Bathymetric Map for the Israeli EEZ: Preliminary Results. Ministry of National Infrastructures, Energy and Water Resources and the Survey of Israel.

2

Area Identification

2.1. GFCM GEOGRAPHICAL SUBAREA

Eastern Levant Sea ,GSA 27

www.fao.org/gfcm/data/map-geographical-subareas

2.2. NAME OF THE FRA

The Palmahim Disturbance Cold Water Coral Gardens and Cold Seeps

2.3. GEOGRAPHICAL LOCATION

2.3.1. General location

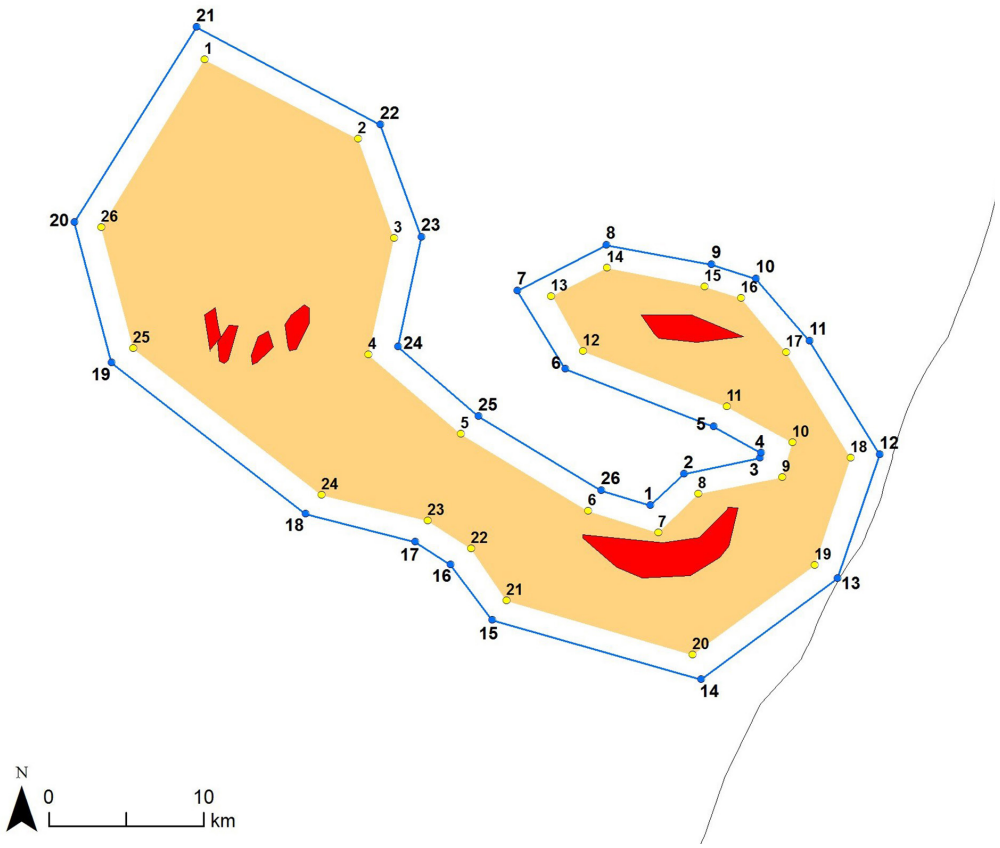
The area is located in the southeastern Levant Sea, west of the central Israeli shore.

2.3.2. Precise location of the proposed core area

Provide geographical coordinates (latitude and longitude in degrees, minutes and seconds) for the vertex of a polygonal area.

Long	Lat	POINT_Y	POINT_X	ID
34° 6' 45.419" E	32° 18' 56.133" N	32.315592	34.112616	1
34° 12' 8.331" E	32° 16' 9.540" N	32.269317	34.202314	2
34° 13' 23.281" E	32° 12' 40.940" N	32.211372	34.223134	3
34° 12' 29.779" E	32° 8' 36.657" N	32.143516	34.208272	4
34° 15' 43.861" E	32° 5' 49.622" N	32.097117	34.262184	5
34° 10' 51.665" E	32° 3' 41.493" N	32.061526	34.181018	24
34° 4' 16.087" E	32° 8' 49.151" N	32.146986	34.071135	25
34° 3' 8.493" E	32° 13' 3.793" N	32.21772	34.052359	26
34° 18' 52.883" E	32° 10' 39.121" N	32.177534	34.31469	13
34° 20' 50.252" E	32° 11' 38.112" N	32.19392	34.347292	14
34° 24' 15.275" E	32° 10' 58.969" N	32.183047	34.404243	15
34° 25' 32.569" E	32° 10' 34.791" N	32.176331	34.425714	16
34° 27' 6.703" E	32° 8' 41.040" N	32.144733	34.451862	17
34° 29' 21.877" E	32° 4' 59.069" N	32.083075	34.48941	18

34° 28' 6.798" E	32° 1' 14.389" N	32.020664	34.468555	19
34° 23' 49.690" E	31° 58' 5.745" N	31.968263	34.397136	20
34° 17' 19.285" E	32° 0' 0.005" N	32.000001	34.28869	21
34° 16' 5.638" E	32° 1' 48.492" N	32.030137	34.268233	22
34° 14' 34.240" E	32° 2' 47.920" N	32.046644	34.242844	23
34° 20' 11.008" E	32° 3' 7.944" N	32.052207	34.336391	6
34° 22' 38.553" E	32° 2' 22.432" N	32.039564	34.377376	7
34° 24' 1.772" E	32° 3' 43.935" N	32.062204	34.400492	8
34° 26' 57.992" E	32° 4' 18.866" N	32.071907	34.449442	9
34° 27' 19.693" E	32° 5' 32.443" N	32.092345	34.45547	10
34° 25' 1.646" E	32° 6' 47.834" N	32.113287	34.417124	11
34° 20' 0.000" E	32° 8' 43.439" N	32.1454	34.333333	12



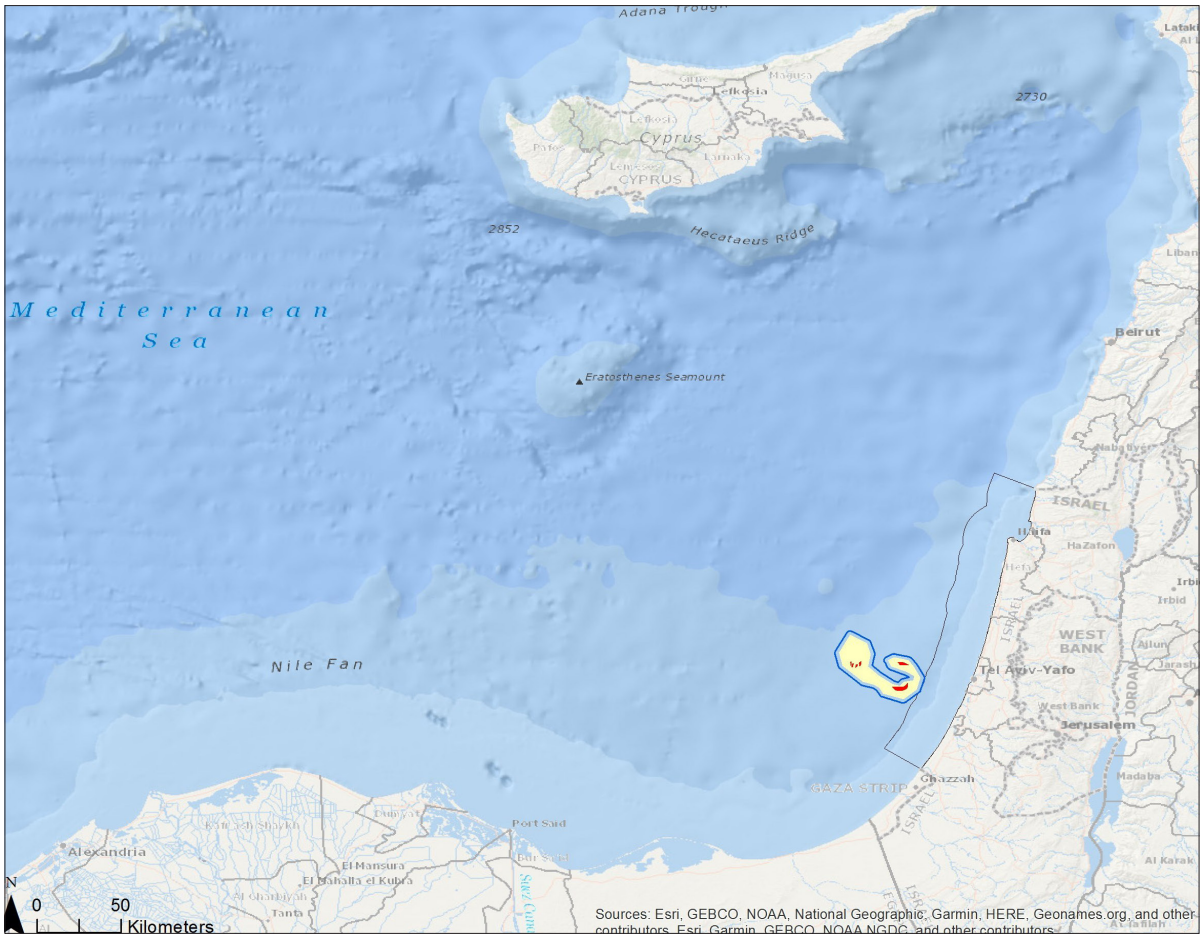
2.3.3. Buffer area (if applicable)

Provide geographical coordinates (latitude and longitude in degrees, minutes and seconds) for the vertex of a polygonal area.

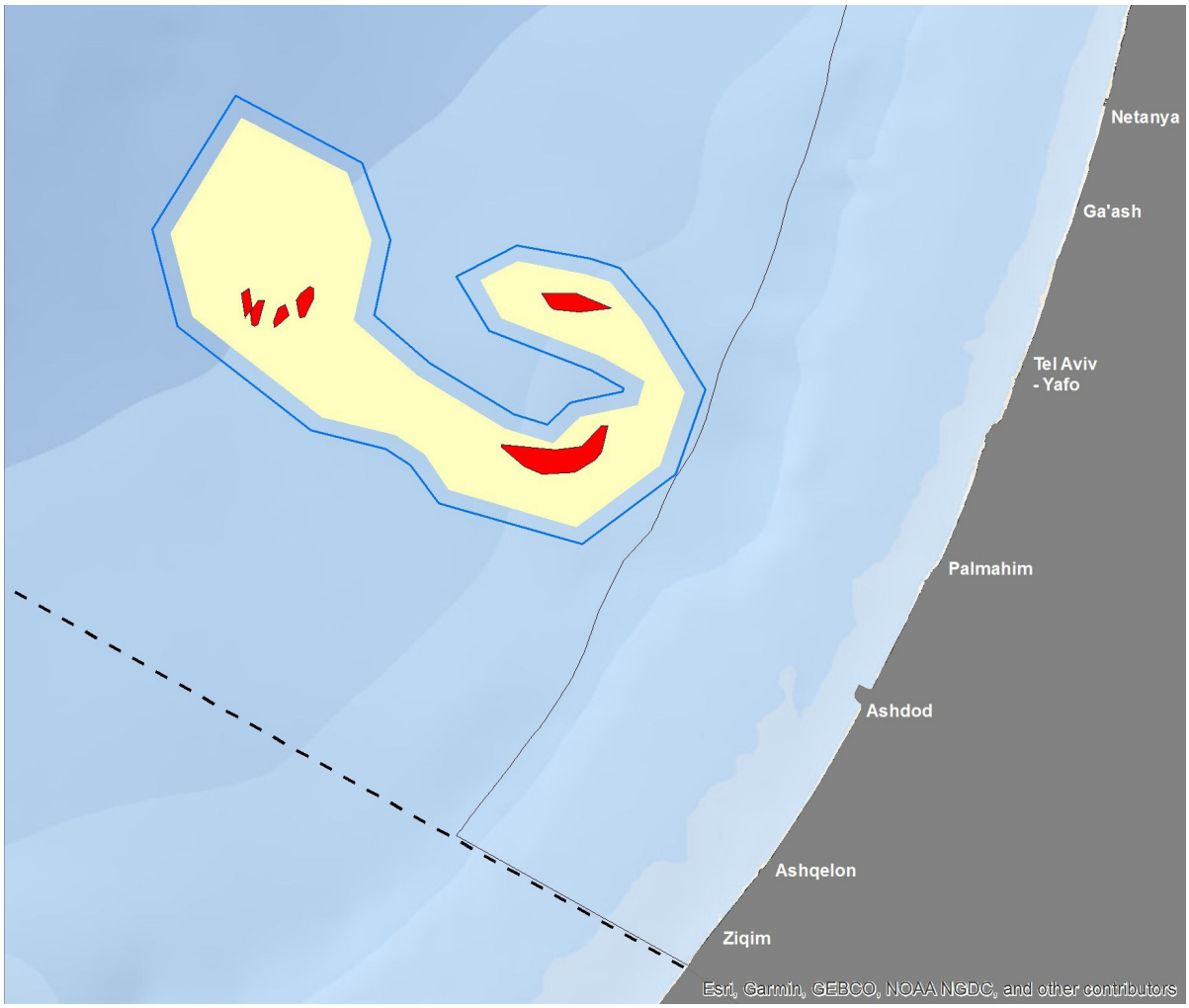
Longitude	Latitude	ID
34° 22' 21.142" E	32° 3' 19.612" N	1
34° 23' 32.609" E	32° 4' 25.836" N	2
34° 26' 11.012" E	32° 4' 59.568" N	3
34° 26' 14.192" E	32° 5' 10.355" N	4
34° 24' 34.294" E	32° 6' 4.902" N	5
34° 19' 22.841" E	32° 8' 6.388" N	6
34° 17' 42.089" E	32° 10' 51.265" N	7
34° 20' 48.877" E	32° 12' 26.805" N	8
34° 24' 30.270" E	32° 11' 45.976" N	9
34° 26' 3.051" E	32° 11' 16.025" N	10
34° 27' 56.292" E	32° 9' 5.378" N	11
34° 30' 23.410" E	32° 5' 6.769" N	12
34° 28' 54.039" E	32° 0' 46.962" N	13
34° 24' 7.681" E	31° 57' 14.913" N	14
34° 16' 48.933" E	31° 59' 18.731" N	15
34° 15' 21.867" E	32° 1' 15.678" N	16
34° 14' 8.201" E	32° 2' 3.574" N	17
34° 10' 17.880" E	32° 3' 2.189" N	18
34° 3' 30.428" E	32° 8' 19.763" N	19
34° 2' 12.688" E	32° 13' 14.845" N	20
34° 6' 28.096" E	32° 20' 3.843" N	21
34° 12' 54.100" E	32° 16' 38.873" N	22
34° 14' 20.465" E	32° 12' 43.939" N	23
34° 13' 31.548" E	32° 8' 52.792" N	24
34° 16' 21.061" E	32° 6' 26.876" N	25
34° 20' 37.808" E	32° 3' 51.483" N	26

2.3.4. Location map

Include geographical coordinates of the core and buffer areas, bathymetry and boundary of international waters. Add a global reference map of the Mediterranean with the location of the site.



The map of the site in the Levant Sea



Close up of the suggested FRA. The areas in **RED** are benthic VMEs observed by ROV: The two eastern polygons are CWC habitats, while the deeper, western, polygons are the Cold Seeps. The **YELLOW** polygon is an area unexplored by ROVs yet, although acoustic geophysical data indicated a high potential for hard substrate – indicating a high probability for additional benthic VMEs. The area between the yellow zone and the **BLUE** line is the suggested Buffer Zone (1.5 km). The **BLACK** line is the Israeli territorial water boundary.

2.3.5. Depth range

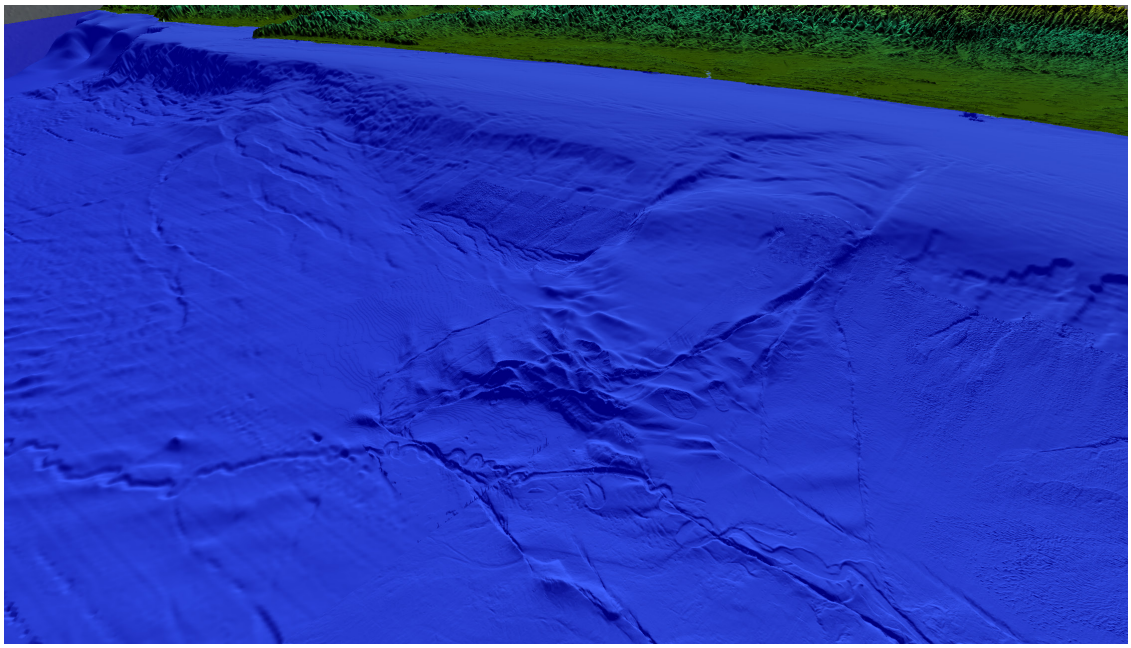
Core Zone: bottom depth 450-1200 mbsl, which includes:

- Pelagic zone – The entire water column.
- The cold-water corals grow at 450-850 mbsl.
- The cold seep communities are located at 1000-1200 mbsl.

2.4. SURFACE AREA

In ha and km2. Specify core and buffer area, if applicable.

- The proposed core area is 590 sq. km/50900 ha.
- The buffer zone is 255 sq. km/25500 ha.



3D simulation of the Palmahim disturbance, view from south west.

Map created by Yizhaq Makovsky. The basis of this map is from EmodNet, and is based on Hall, J. K., Lippman, S., Gardosh, M., Tibor, G., Sade, A. R., Sade, H., … Nissim, I. (2015). A New Bathymetric Map for the Israeli EEZ: Preliminary Results. Ministry of National Infrastructures, Energy and Water Resources and the Survey of Israel.

3

Site Description

3.1. MAIN PHYSICAL FEATURES

3.1.1. Geology/Geomorphology

Briefly describe geological aspects, sedimentation and erosion processes observable in the area and other geomorphologic features or geological risks. Indicate bibliographical sources.

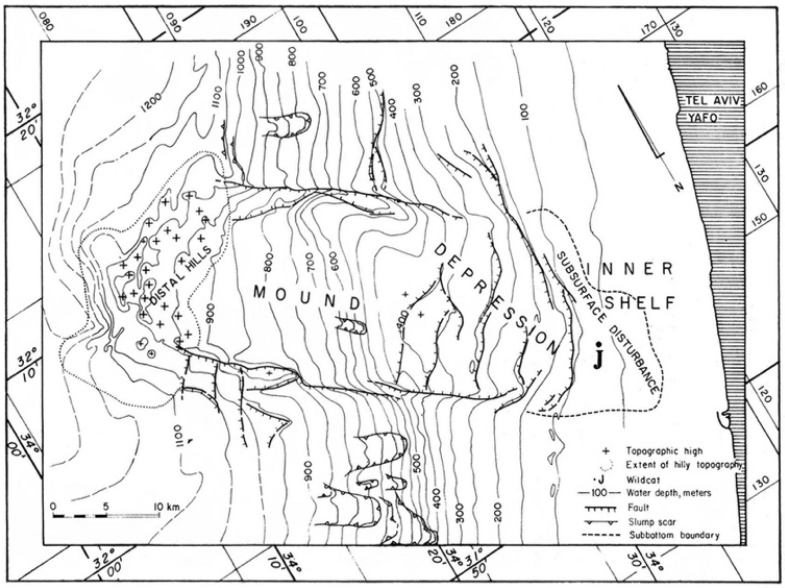
The Palmahim Disturbance is a large-scale 15x50 km rotational slide, stretching between water depths of ~100 m and ~1200 m on the continental slope offshore Israel (Almagor and Garfunkel, 1979). This continental slope, bounding the ultra-oligotrophic southeastern Mediterranean Sea (e.g. Krom et al. 2004), is composed predominantly of fine grain clayey clastic sediments supplied by the Nile river to the south (e.g. Almogi-Labin et al. 2009). The Disturbance has a general box shape, delimited on the northeast and southwest by a series of faults and a head scarp in the southeast at ~100 mbsl and a series of folds in the compressional zone at the base of the slide to the northwest at ~1100 mbsl (Garfunkel et al. 1979). However, extensive presence of authigenic carbonates, the product of the biogenic degradation of naturally seeping hydrocarbons, along the perimeters of the Palmahim Disturbance (Coleman et al. 2011; Makovsky et al. 2016; Rubin-Blum et al. 2014) **provide a unique concentration of hard substrates in the otherwise soft-bottomed deep southeastern Mediterranean basin**.

3.1.2. Other relevant physical or chemical features

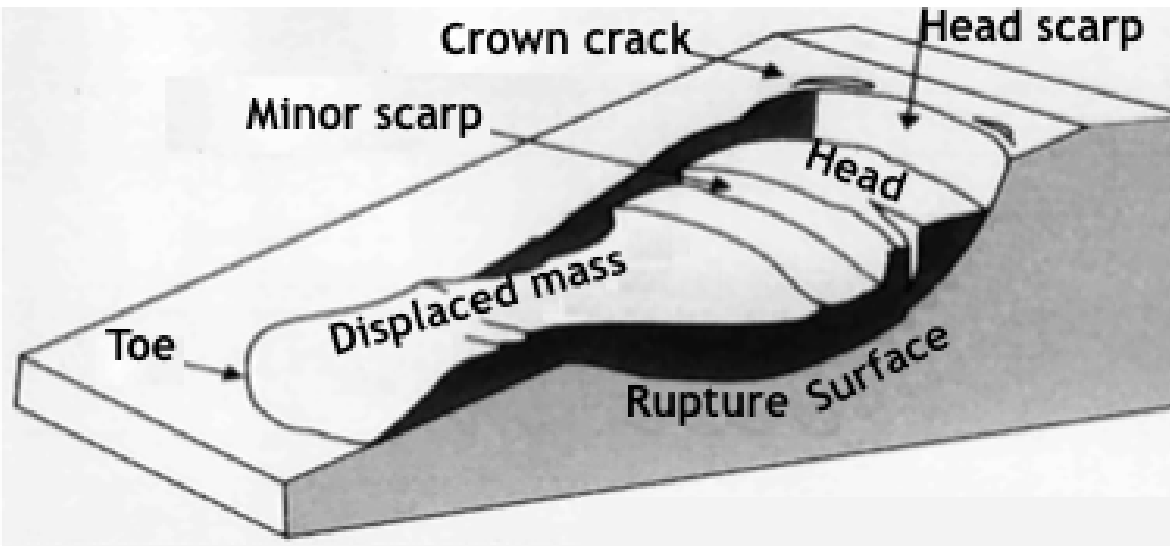
E.g. hydrodynamics, frontal areas, upwelling, etc.

The area surrounding the cold seeps (1000-1200 mbsl) appears to be highly bioturbated, indicating intense biological activity, uncommon at these depths in the surrounding area. The bioturbation is assumed to be fuelled by widespread subsurface chemosynthetic production. The only living macro-fauna found in the sediments was the ghost shrimp Calliax lobate, though large accumulations of dead chemosymbiotic bivalves were found aggregated on the sediments, indicating chemosynthetic trophic sourcing. Various deep-sea fishes have been documented roaming the area.

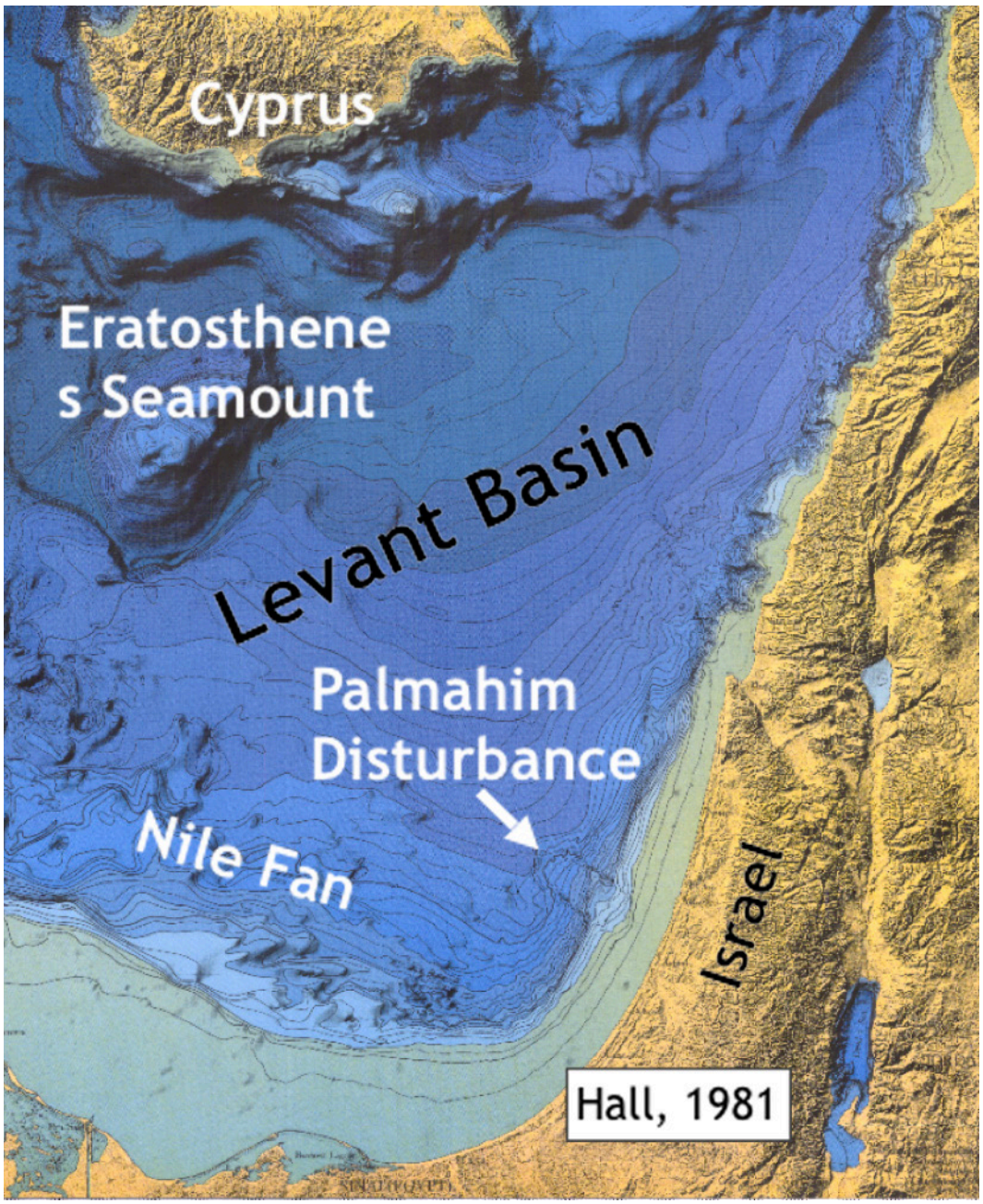
PALMAHIM DISTURBANCE – A MAJOR ANOMALY ON THE SOUTHEASTERN MARGIN OF THE LEVANT



Garfunkel et al., 1979



schematic description of submarine landslide features. Hampton et al.,1996


Cyprus
Eratosthene
s Seamount
Levant Basin
Palmahim
Disturbance
Nile Fan
Israel
Hall, 1981

Hall, 1981

3.2. BIOLOGICAL FEATURES

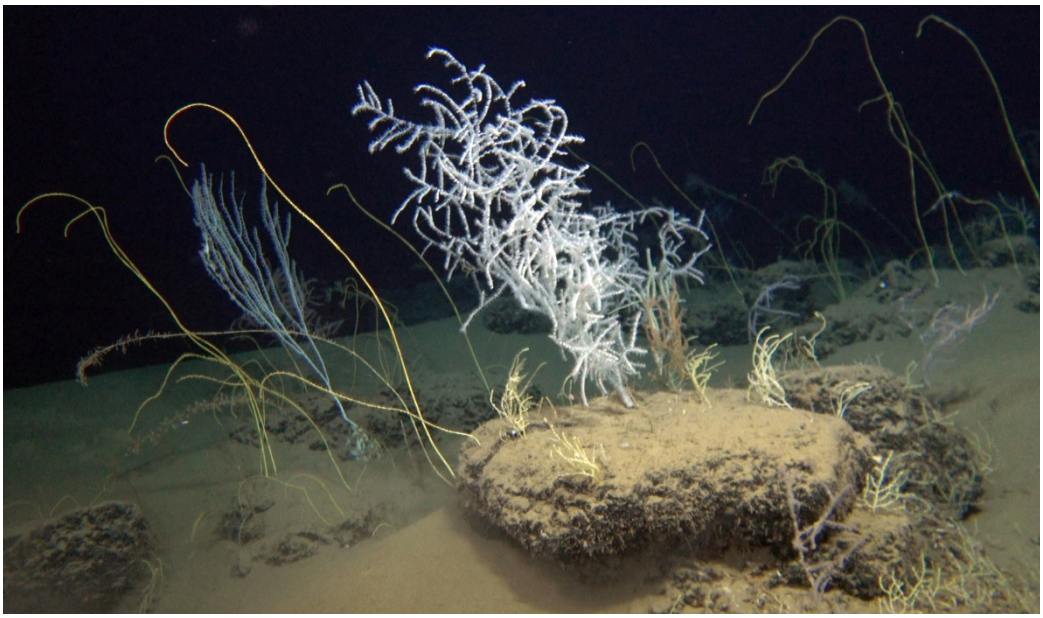
3.2.1. Habitats

Briefly describe the dominant marine habitats, including pelagic habitats, if applicable.

Recent exploration has uncovered unique deep-sea communities on the Israeli shelf at the Palmahim Disturbance (Coleman et al. 2012). Vast coral gardens are distributed along the margins of the Palmahim disturbance, CWC meadows grow in the compact sediments around the coral gardens and cold seep communities thrive in the deeper western zones of the site. These benthic habitats form important deep-sea ecosystems, which are extremely rare in the eastern Mediterranean.

Cold Water Coral Gardens

Diverse communities of endangered corals and associated deep-sea species, many of which are protected under several international agreements, were found to flourish at the site. This is the easternmost CWC community in the Mediterranean, and the only one found in the southeastern Levant Sea.



Diverse CWC community on the northern margins of the Palmahim Disturbance, including black corals, whip corals, bamboo corals and additional octocorals.

Octocoral Beds on Compact Mud

Numerous octocorals inhabit the surface of the compact mud in the area between the CWC gardens growing upon the rock facies. Both the critically endangered bamboo coral, *Isidella elongate*, and the sea pen Funiculina quadrangularis (VU) (Otero et al. 2017), are found in large numbers at the locality (Weissman et al. unpublished data) The occurrence of either of these species is a criterion for essential Marine Habitats (EMH) relevant for the management of priority species (GFCM 11th session, 2008).

The Critically Endangered *Isidella elongate* on compact mud sediments

Cold Seep Chemosynthetic Communities

In seeps, microbial consortia oxidizing methane and their end-product (e.g., sulphide) sustain abundant microbial populations exhibiting diverse metabolic pathways. Differences in seep intensity and temperatures create distinct habitats, dominated by unique microbial communities, sustaining symbiotic and non-symbiotic organisms such as tubeworms, clams, crustaceans, echinoderms and fish, which depend on the chemosynthetic primary production. Cold seeps are biodiversity hotspots in the deep sea, featuring unique species compositions with high variability between different seep systems. The high variability of seep conditions in the oceans, contributes to highly adapted faunal communities with a high potential for endemic species. Even though species richness is low in each individual site (Levin, 2005), their unique species composition contributes substantially to the beta diversity in the deep sea (Cordes et al. 2010).

Chemosynthetic communities, inhabited by thriving populations of vestimentiferan tubeworms *(Lamellibrachia anaximandri)*, chemosymbiotic bivalves and echinoderms feeding on the biofilm formed on the carbonate rocks in the seeps, were described around hydrocarbon seeps at the deep outskirts of the Palmahim Disturbance (Rubin-Blum et al. 2014[a-d]). Although no endemism was documented among the species found at the seeps to date, it should be noted that no extensive biological survey has been conducted yet on the seeps of Palmahim Disturbance, and much remains to be discovered.

A seep community at 1150 mbsl, exhibiting typical seep fauna living off chemosynthetic production – grazing urchins and crabs, and symbiotic *Lamellibrachia anaximandri* tubeworms.

Pelagic spawning area for Atlantic Bluefin Tuna

In the pelagic zone, the Palmahim disturbance is a spawning ground for the Bluefin Tuna (BFT) *(Thunnus thynnus)*. Druon et al. (2016) highlighted the Palmahim disturbance as a potential habitat for spawning in the southeastern Mediterranean during early summer (May-July). Genetic differences were documented between populations breeding in different areas in the Mediterranean (Riccioni et al, 2010), suggesting that the Palmahim disturbance area may support a distinct population of BFT.

Elmaliach (2018) reported the area as a spawning ground, but also reported high percentage of juvenile BFT in catches in Israel, highlighting the potential importance of the area as a nursery as well. She has also reported some demersal fish found in BFT stomachs caught in the area, implying potential importance of benthic habitats for BFT feeding.

3.2.2 List of species of regional importance

List the marine species protected under international agreements (specify which agreements) and/or included in the GFCM priority list. If applicable, indicate the IUCN category. Any other species may be listed if they are clearly considered of regional importance given their high representation in the area.

For each species indicate: 1) relative abundance (common [C], uncommon [U] or occasional [O]); 2) regional status (rare [r], endemic [e] and/or threatened [t]); and 3) local status as an important resident population (R), or important for breeding (B), feeding (F), wintering (W) or migratory passage (M).

Reference for cnidarian species in IUCN categories and international agreements may be found in Otero et al. 2017.

Species	1 - Relative abundance (C) (U))O)	2 - Regional status (r) (e) (t)	3 - Local status (R) (B) (F) (W) (M)	4- IUCN category	International Agreements
Leiopathes glaberrima/ Leiopathes sp.	C	R, E*, T *If the new species is valid, manuscript in review.	R, B	EN	CITES Annex II, Protocol SPA/BD Annex II, EU Regulation Trade wild fauna and flora Species (B), Bern Convention (III)
Antipathes dichotoma	C	R, E, T	R, B	NT	CITES Annex II, Protocol SPA/BD Annex II, Bern Convention (III)
Swiftia pallida	C	R, E	R	DD	
Viminella flagellum	C	R, E	R	NT	
Parantipathes larix	R	R, E, T	R	NT	CITES Annex II, Protocol SPA/BD Annex II
Isidella elongata	C	R, Nearly Endemic, T	R	CR	Protocol SPA/BD Annex II
Callogrogia verticilata	R	R	R	NT	Protocol SPA/BD Annex II
Funiculina Quadrangularis	C	R	R, B	VU	
Desmophyllum dianthus	R	R, E	R	EN	CITES Annex II, EU Regulation Trade wild fauna and flora species (B)
Chimera monstrosa	U			NT	
Oxynotus centrina	U	R		CR	SPA/BD Annex II
Dipturus batis	U	R		CR	SPA/BD Annex II
Thunnus thynnus	U	T	B, F	EN	SPA/BD Annex III

3.2.3 Occurrence of biological and ecological processes relevant to fish resources

E.g. essential fish habitats.

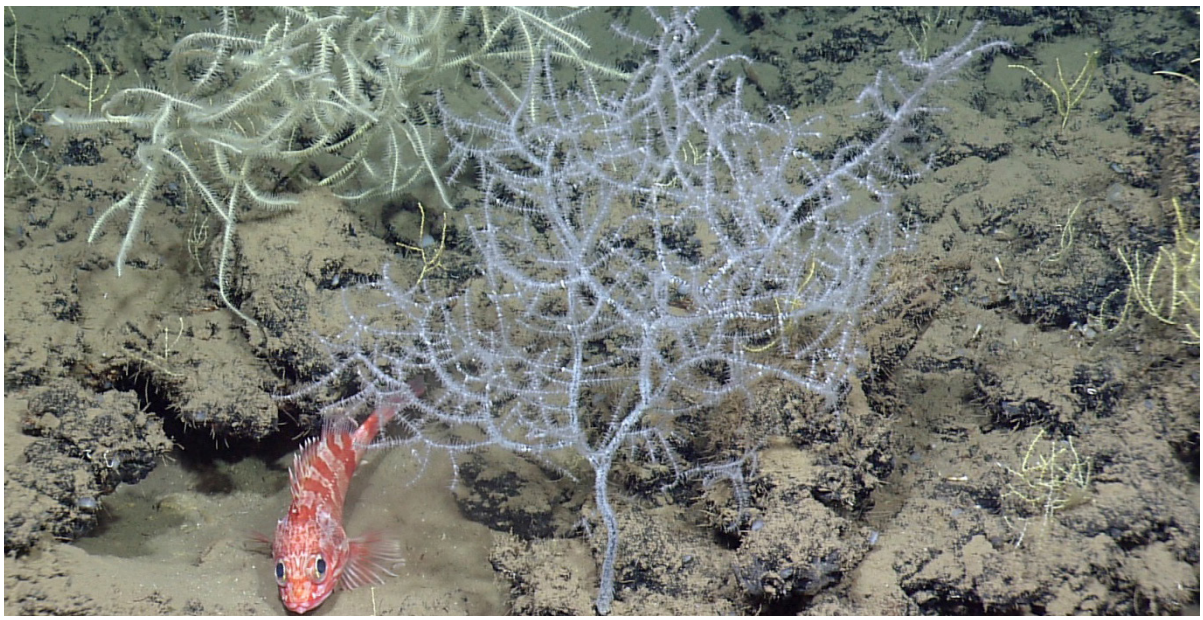
Deep-sea coral gardens as essential habitats

Deep-sea coral gardens are an important habitat, both as a nursery and a feeding ground for deep demersal fish species: The Coral gardens at the Palmahim Disturbance CWC gardens were found in association with abundant shrimp *(Plesionika spp)*, Blackmouth Catsharks, Atlantic Wreckfish and Blackbelly Rosefish. These same fish were found in high numbers in CWC sites in Italian waters as well (D'Onghia et al. 2012), highlighting the association between them and Mediterranean CWC grounds.

Catsharks were documented using CWC as a nursery in the Gulf of Mexico (Etnoyer, 2007), and as a spawning ground in Scottish waters (Henry et al. 2013). A large population of Blackmouth Catshark lives among the corals at the Palmahim Disturbance, although there is no direct evidence for spawning at the locality, yet.

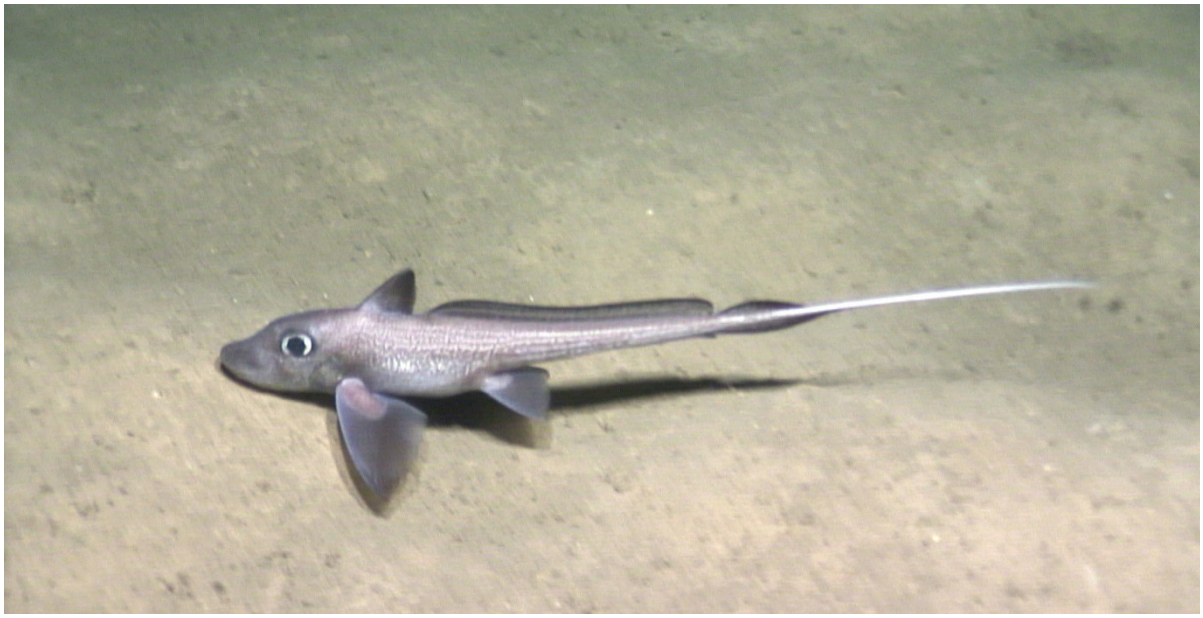
Cold-water coral habitats provide an important habitat for the Blackbelly Rosefish *(Helicolenus dactylopterus)*. In the Santa Maria di Lucia (SML) coral banks in the northern Ionian, the biomass and individual size of this species was found to be higher when compared to surrounding waters, thus demonstrating a spillover effect. Furthermore, an abundance of young individuals was found among the corals in the SML coral banks, suggesting the coral grounds act as a spawning ground and nursery for this species (D'Onghia et al. 2010).

Deep-sea coral gardens have been found to be a suitable habitat for Atlantic Wreckfish *(Polyprion americanus)*, and it is abundant in deep-sea coral habitats in the Mediterranean and the Atlantic (Ross et al. 2004, D'Onghia et al. 2012). Large specimens of this fish, over 1 m long, have settled among the corals in Palmahim Disturbance, evidence of long-lived individuals finding refuge at the site.

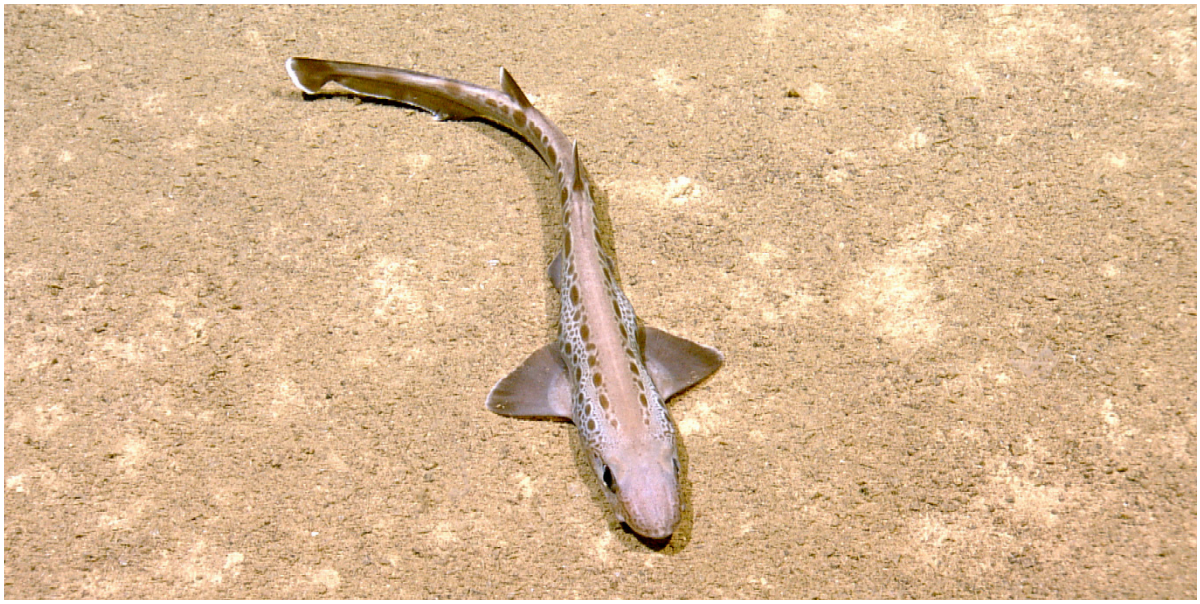


A Blackbelly Rosefish *(Helicolenus dactylopterus)* residing among Antipatharians.

The Critically Endangered Common Skate *(Dipturus batis)* found at 600 mbsl in the vicinity of the coral gardens.



The elusive *Chimera monstrosa* in the deeper regions of the Palmahim Disturbance; several encounters have been documented at varying depths.

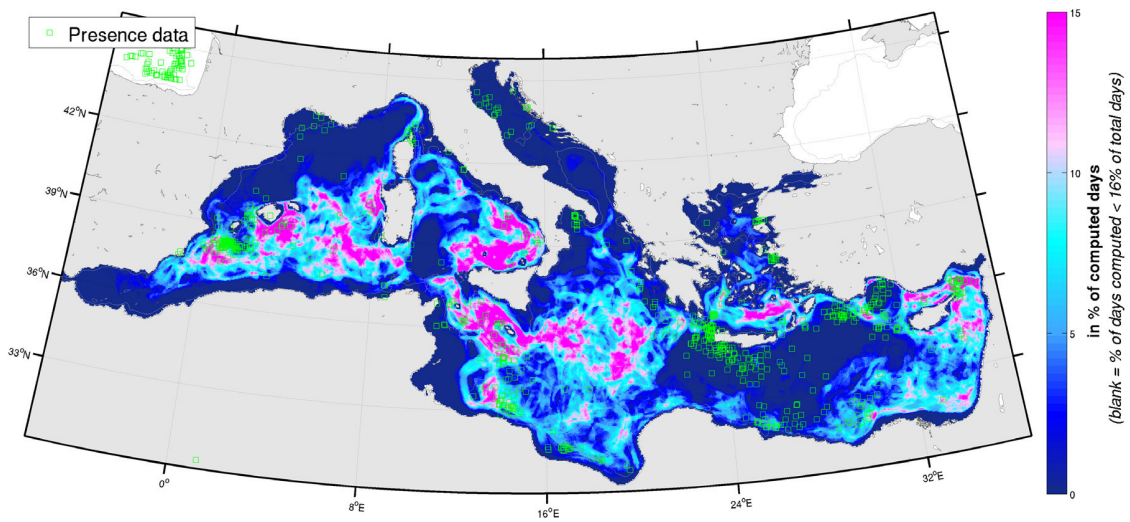


Blackmouth catsharks *(Galeus melastomus)* were commonly sighted roaming in the vicinity of the Palmahim Disturbance.

Pelagic spawning area for Atlantic Bluefin Tuna

In the pelagic zone, the Palmahim disturbance is a spawning ground for the Bluefin Tuna (BFT) *(Thunnus thynnus)*. Druon et al. (2016) highlighted the Palmahim disturbance as a potential habitat for spawning in the southeastern Mediterranean during early summer (May-July). Genetic differences were documented between populations breeding in different areas in the Mediterranean (Riccioni et al, 2010), suggesting that the Palmahim disturbance area may support a distinct population of BFT.

Elmaliach (2018) reported the area as a spawning area, but also reported high percentage of juvenile BFT in catches in Israel, highlighting a potential importance of the area as a nursery as well. She has also reported some demersal fish found in BFT stomachs caught in the area, implying potential importance of benthic habitats for BFT feeding.



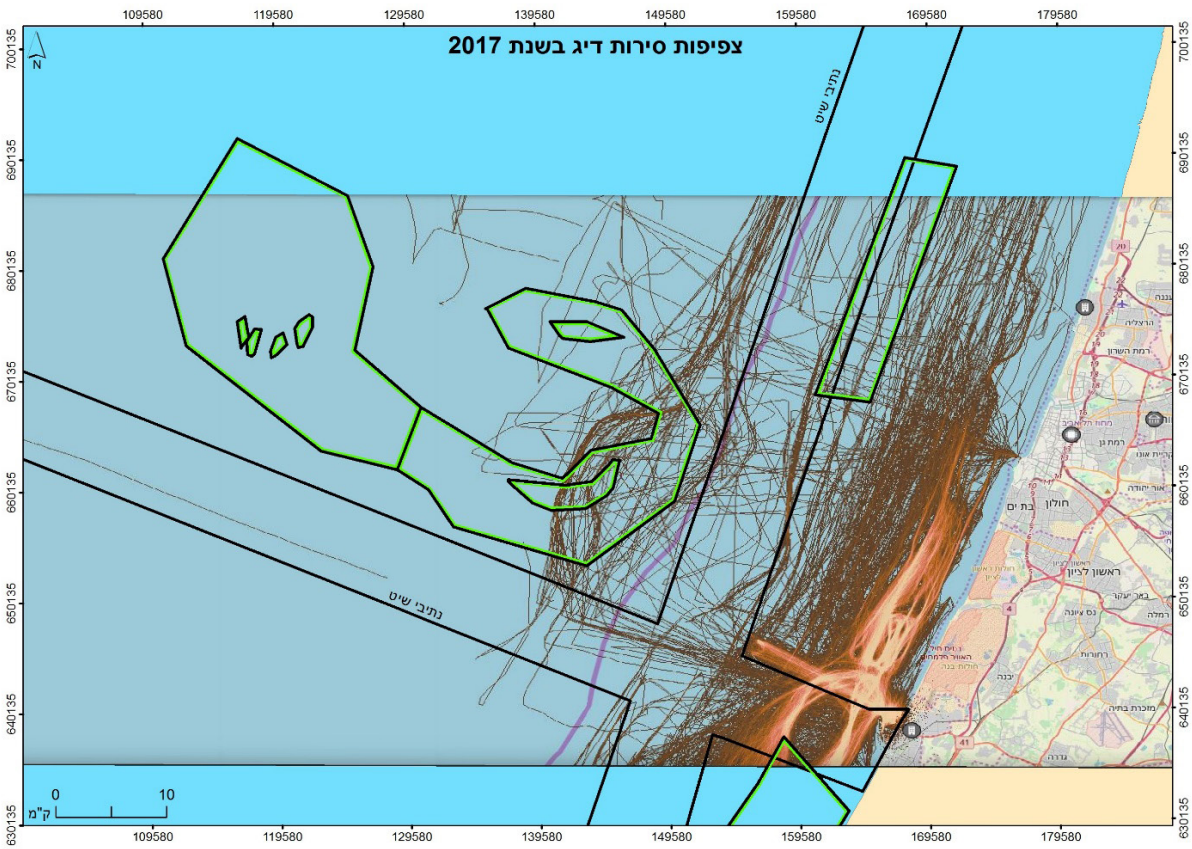
Spawning sites of Atlantic Bluefin Tuna. From Druon et al, 2016.

3.3 USE OF NATURAL RESOURCES

3.3.1 Current human use and development of fisheries

The Palmahim Disturbance area is a fishing ground for few (less than 5) commercial longline vessels, fishing seasonally for Bluefin Tuna during the spawning season (May-July). Bluefin Tuna fishery is not regulated in Israel. Israel is not a member in ICCAT, and does not hold a quota, nor are landings reported to ICAAT, and thus it should be considered IUU catch. Lost longline fishing gear might also harm benthic habitats. Israeli Bottom trawlers do not fish in the area regularly, due to its long distance from the shore, and the low economic value of the catch. Occasionally, a bottom trawler may fish in the eastern outskirts of the area, during the summer recruitment moratorium, attempting to avoid the territorial waters restrictions. This is not bottom trawl fishery; nevertheless, an occasional one-time trawling event might destroy the fragile habitats in the area.

- Number of vessels by fishery operating in the area:
  Less than five commercial longline vessels (Elmaliach 2018), sporadic trawl activity (2-3 trawls, a few times a year).
- Total annual catches by species for each fishery in the area:
  Less than 20 tons for longline fishing, less than 10 tons for bottom trawling
- Percentage of total catches fished in the area in relation to the total value of catches fished in the area:
  Trawl and longline catches in the area are less than 1% of the total catch of the Israeli fishing fleet.
- Percentage of the value of catches in the area in relation to the total value.
  As described above, it is negligible.
- Bycatch rates of vulnerable species in the area:
  No quantitative data is available, but Edelist at el (2013) reported bycatch of sensitive pelagic sharks during longline fishing, and Elmaliach (2018) reported bycatch of swordfish *(Xiphias gladius)*, bigeye thresher sharks *(Alopias superciliosus)*, shortfin mako shark *(Isurus oxyrinchus)* a pelagic stingray *(Pteroplatytrygon violacea)* and a sunfish *(Mola mola)*.
- Number of fishers involved in the fisheries operating in the area:
  Less than 10 longline fishermen, operating less than two months each year. Trawl is negligible.
- Name(s) of base port(s) :
  Ashdod and Jaffa.



Map showing the annual activity of fishing vessels in 2017 according to marinetraffic.com

a) Provide the number of users depending on these resources, seasonality, assessment of the social and economic importance of their use and of the perceived impact on the conservation of the area, using a score of 0-1-2-3 (0: null, 1: low, 2: medium, 3: high).

ACTIVITY AND CATEGORY	ASSESS THE IMPORTANCE OF		ESTIMATED NUMBER OF USERS	SEASONALITY
Fishing	**SOCIO-ECONOMIC IMPACTS**	**CONSERVATION IMPACTS**		
Artisanal	0	0	0 (deep water, not accessible by artisanal vessels)	0
Industrial: bottom trawling	0 Only occasional vessels rarely fish on the eastern outskirts of the area, but the potential of a single fishing event is destructive.	1 FRA is expected to replenish demersal fish populations, creating a spill- over effect that may benefit bottom trawlers fishing to the east, in shallow waters.	0	Summer – a few Israeli bottom trawlers travel outside territorial waters only to avoid the summer recruitment moratorium.
Long line	**1** **Less than 5 commercial vessels fish for BFT in the area, with no quota.**	**3** **FRA is expected to boost BFT population in the area, through the protection of the spawning and nursery of the specific population in the site.**	**1** **Less than 5 commercial vessels fish for BFT in the area, with no quota.**	**May-June, during the BFT spawning season.**
Other				
Aquaculture	0	0	0	---

3.3.2 Current human use and development other than fisheries

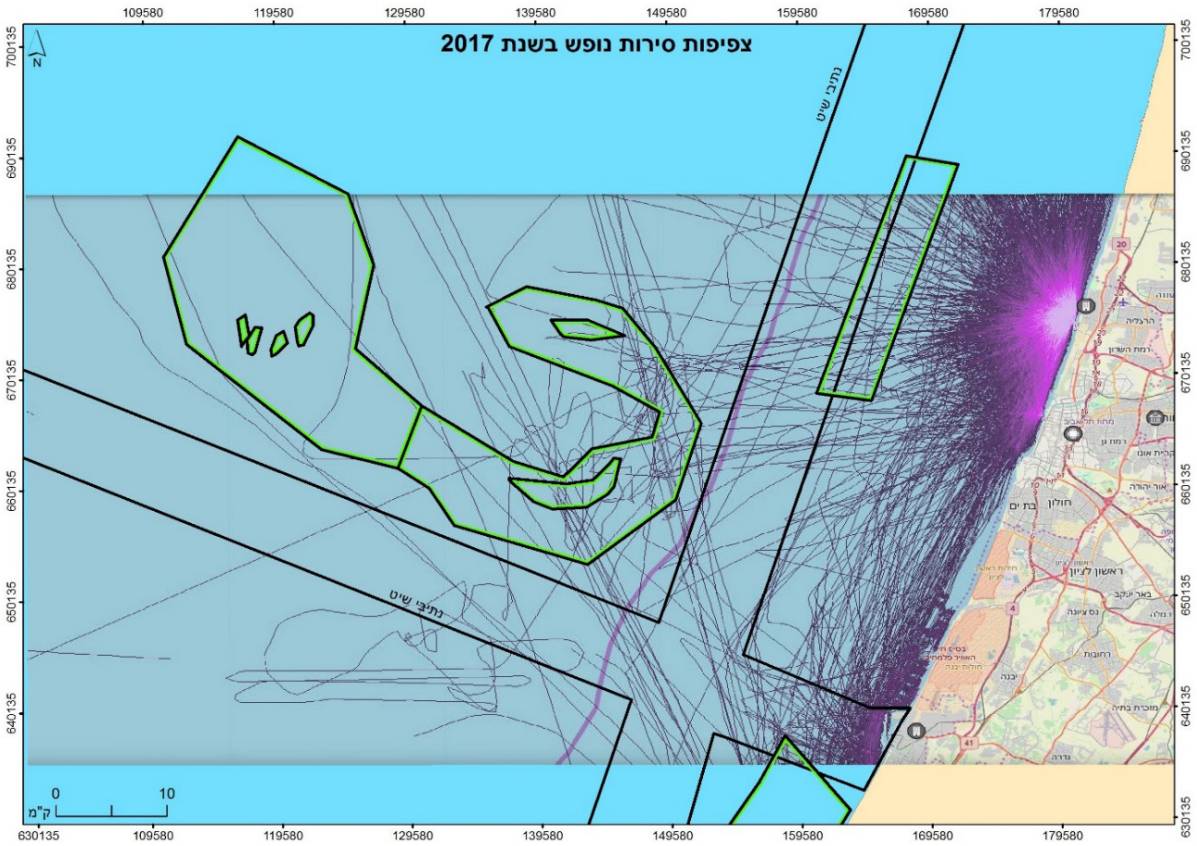
a) Briefly describe how the area is currently used by other economic sectors. To the best of our knowledge, no use is currently being made of the resources at the site.

The area is included in "Block D" that was recently allocated by the Israeli ministry of Energy for gas exploration. This potential use is not dependent on the living resources in the area, thus is not expected to be impacted by the FRA.

b) Provide the number of users depending on these resources, seasonality, assessment of the social and economic importance of their use and of the perceived impact on the conservation of the area, using a score of 0-1-2-3 (0: null, 1: low, 2: medium, 3: high).

ACTIVITY AND CATEGORY	ASSESS THE IMPORTANCE OF		ESTIMATED NUMBER OF USERS	SEASONALITY
Other activities	**SOCIO-ECONOMIC IMPACTS**	**CONSERVATION IMPACTS**		
Tourism	0		1	
Transport	0		1	
Mining	0		0	

The area is a minor transportation route, some vessels cross it (attached is a map from 2017 showing traffic volume of non-fishing vessels, according to marintraffic.com). The FRA will not limit transportation so is not expected to have any socio-economic impacts on these sectors.



Map showing the traffic volume of vessels from 2017, according to marintraffic.com.

4

Regional Importance Of The Site

This section aims at stressing the importance of the site for conservation at a regional scale.

4.1. PRESENCE OF ECOSYSTEMS/HABITATS OF PARTICULAR IMPORTANCE FOR THE MEDITERRANEAN

The Palmahim disturbance is home to several unique deep-sea biodiversity hotspots. Both the CWC gardens and the cold seep communities are recognized as important and vulnerable habitats by the international community (OSPAR 2008; FAO 2009; CBD, 2007; WWF/IUCN, 2004). These habitats are biodiversity hotspots in need of protection, inhabited by many organisms which are protected under international treaties (CITES Annex II, Barcelona convention – Protocol SPA/BD Annex II, EU Regulation Trade wild fauna and flora Species (B), Bern Convention (III).

In the Levant Sea context, the Palmahim disturbance is the only location apart from the Eratosthenes Seamount that is known to harbour cold-water coral gardens, with thriving communities living on the hard surface provided by the carbonate rocks, essentially a deep-sea hotspot in the otherwise vast spaces of soft sediment in the eastern Mediterranean.
Recently, the Nile Delta Fan was declared an FRA in order to protect its chemosynthetic communities. Although both the Nile Delta system and the Palmahim Disturbance system are in the same geo-region, the Palmahim gas system fuelling the community is separate from the Nile Delta gas reservoirs, thus we expect that the microbial and faunal communities may differ between the sites. Since cold seeps are a highly diverse habitat, with high beta diversity between sites (Cordes et al. 2010), it would be valuable to protect the cold seep systems in order to conserve the unique biodiversity at the Palmahim Disturbance seeps.

4.2. PRESENCE OF HABITATS THAT ARE CRITICAL TO ENDANGERED, THREATENED OR ENDEMIC SPECIES

Indicate the habitat types and the species linked to them and provide information about their status (IUCN classification, etc.).

Conservation Protocols and species red list category references can be found in the following links:

CITES Annex II -

www.cites.org/eng/app/appendices.php

Protocol SPA/BD Annex II -

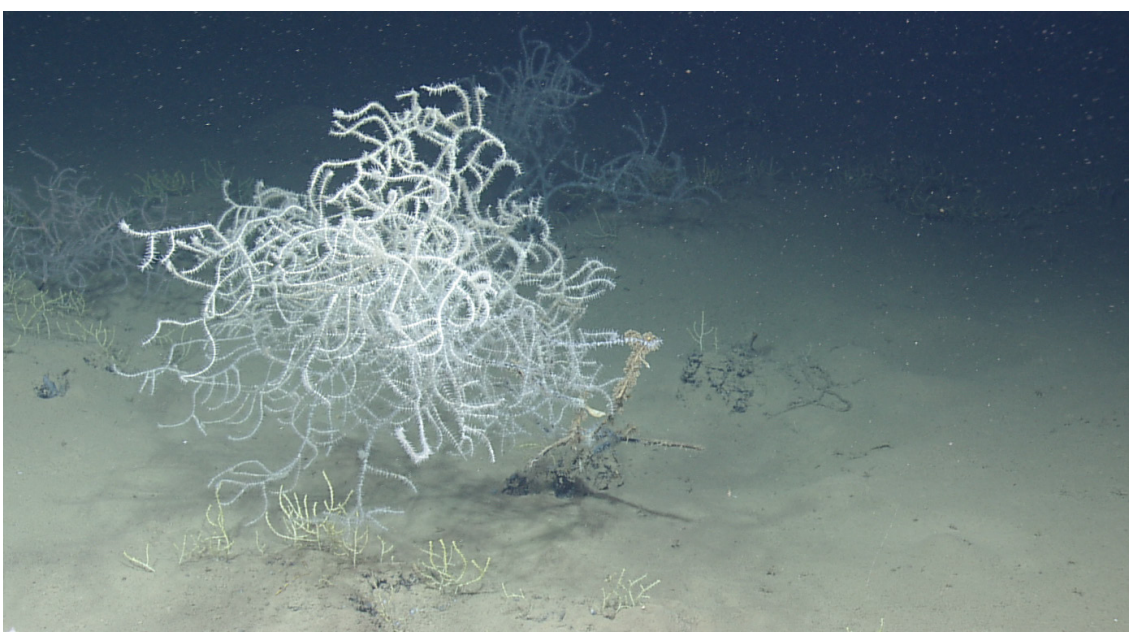
www.rac-spa.org/sites/default/files/annex/annex_2_en_2013.pdf

IUCN Red list of Mediterranean Corals –
www.iucn.org/sites/dev/files/import/downloads/anzothoa_fact_sheet_final_baja.pdf
Italian IUCN website
www.iucn.it/

Cold Water Coral Gardens

The cold-water coral gardens are home to several deep-sea corals growing on the carbonate crusts found on the outskirts of the Palmahim Disturbance, most of which are considered endangered and/or protected, including the following species:

Leiopathes sp./Leiopathes glaberrima – A potential new species of black coral that differs from the well-known *Leiopathes glaberrima* (Weissman, A. et al. manuscript in review), was discovered at the site. If it is indeed a new species, it is most likely endemic to the site. Over 1000 colonies have been viewed in the ROV surveys to date, with some of the colonies 1.5 meters tall, corresponding to an age estimate of over 1500 years (Etnoyer et al. 2018) indicative of long term occupation of the site. All antipatharians (black corals) are in the CITES annex II. *Leiopathes glaberrima* is classified as **Endangered** in the IUCN red list.
Antipathes dichotoma – Another species of black coral with hundreds of colonies found



A suspected new species of black coral, *Leiopathes sp.* found at the coral gardens.

at the site. Classified as **Near Threatened** in the IUCN red list, and included in the CITES Annex II.

Parantipathes larix – A rare black coral; several colonies were sighted at the location. Classified as **Nearly Threated** in the IUCN red list and protected under CITES Annex II and Protocol SPA/BD Annex II of the Barcelona convention.

***Parantipathes larix* colony between small *Leiopathes* colonies living on the carbonate crusts.**

Swiftia pallida – A small octocoral growing near the carbonate crusts; thousands of colonies were sighted at the coral gardens. Classified as **Data Deficient** in the IUCN red list.

Viminella flagellum – The yellow whip coral; hundreds of colonies were sighted upon the ridges on the outskirts of the Palmahim Disturbance. It is the only population documented to date of this species in the eastern Mediterranean. Classified as **Nearly Threated** in the IUCN red list.

Callogrogia verticilata – A large white branching octocoral; several colonies were sighted growing on the carbonate rocks. This species is included in the Protocol SPA/BD Annex II and is classified as **Nearly Threated** in the IUCN red list.

Desmophyllum dianthus – A solitary stony coral; living polyps were documented at the site. It is classified as **Endangered** in the IUCN red list and is protected under CITES Annex II and the EU Regulation Trade wild fauna and flora species (B).

Cold-water coral meadows growing on sediments

Long stretches of compact mud extending between the carbonate rocks, are inhabited by large populations of two species, which are both included in the IUCN red list:

Isidella elongate – A species of bamboo coral; hundreds of colonies were found living on compact mud between the carbonate rocks, forming large meadows. It is protected under the Protocol SPA/BD Annex II and classified as **Critically Endangered** in the IUCN red list.

Funiculina quadrangularis – The tall sea pen; hundreds of colonies were sighted on the soft sediments in all areas of the Palmahim Disturbance at depths between 434-827 meters. Polyps photographed in the lab have indicated advanced reproductive stages in the colonies with several eggs found in the polyps, highlighting the importance of protecting a reproductive population of a rare species. It is classified as **Vulnerable** in the Mediterranean IUCN red list (Otero et al, 2017), and classified as **Critically Endangered** in other parts of the Mediterranean (IUCN Italy).

Additional species found at the Palmahim Disturbance

Chimera monstrosa – The rabbitfish has been documented several times near the bottom, at depths between 800-1100 meters; it is classified as **Near Threated** in the IUCN red list.

Oxynotus centrina – The Angular Rough Shark has been documented near the coral gardens at a depth of 700 meters, it is classified as **Critically Endangered** in the IUCN red list.

***Dipturus batis* –** The Common Skate, has been documented near the coral gardens at a depth of 660 meters; it is classified a **Critically Endangered** in the IUCN red list.

***Thunnus thynnus* –** The pelagic zone is an essential habitat for Atlantic Bluefin Tuna, classified as **Endangered** in the IUCN red list, and listed on annex 3 in SPA/BD Protocol of the Barcelona convention.

4.3. OTHER RELEVANT FEATURES

4.3.1 Educational interest

E.g. particular value of the site for environmental education or awareness activities.

The Palmahim Disturbance is the flagship site of deep-sea conservation awareness in Israel, as well as an important educational tool. Recently a booklet was published (www.mafish.org.il/wp-content/uploads/2018/10/yam-amok-v7-single-pages-heavy-2.pdf) on the ecology of the site by The Society for the Protection of Nature in Israel (SPNI) and Haifa University.
A short video was also produced in order to make the marvels of the Palmahim Disturbance accessible to the general public (www.youtube.com/watch?v=4eeNgKgXK6g&t=2s)

4.3.2 Scientific interest

Particular value of the site for research.

The Palmahim Disturbance is the focus of broad multidisciplinary research. Comprehensive work has been done by scientists from around the world in various scientific fields, with manuscripts published in their respective fields, investigating biological, geological and oceanographic features of this unique area.

List of publications:

Almagor, G. & Garfunkel, Z. (1979) Submarine slumping in continental margin of Israel and northern Sinai.
American Association of Petroleum Geologists Bulletin, 63(3), 324-340.

Antler, G., Turchyn, A. V., Herut, B., & Sivan, O. (2015). A unique isotopic fingerprint of sulfate-driven anaerobic oxidation of methane. *Geology,* 43(7), 619-622.

Coleman, D. F., Austin Jr, J. A., Ben Avraham, Z., & Ballard, R. D. (2011). Exploring the continental margin of Israel: "Telepresence" at work. Eos, *Transactions American Geophysical Union,* 92(10), 81-82.

Eruteya, O., Waldmann, N., Reshef, M., & Ben-Avraham, Z. (2017, April). Subsurface Fluid Escape at the Palmahim Disturbance in the Levant Basin, SE Mediterranean Sea. In *EGU General Assembly Conference Abstracts* (Vol. 19, p. 18736).

Eruteya, O. E., Reshef, M., Ben-Avraham, Z., & Waldmann, N. (2018). Gas escape along the Palmahim disturbance in the Levant Basin, offshore Israel. *Marine and Petroleum Geology,* 92, 868-879.

Makovsky, Y., Rüggeberg, A., Bialik, O., Foubert, A., Almogi-Labin, A., Alter, Y., Bampas, V., Basso, D., Feenstra, E., Fentimen, R., Friedheim, O., Hall, E., Hazan, O., Herut, B., Kallergis, E, Arageorgis, A., Antonios, Kolountzakis, Manousakis, L., Nikolaidis, M., Fotios, Pantazoglou, Eyal Rahav, Panagiotis Renieris, N.S., Sisma-Ventura, G., Stasnios, V., Weissman, A., Participants, E.S. (2016). R/V AEGAEO Cruise EUROFLEETS2 SEMSEEP 20.09. – 01.10.2016, Piraeus (Greece) – Piraeus (Greece).

Rubin-Blum, M., Antler, G., Tsadok, R., Shemesh, E., Austin Jr, J. A., Coleman, D. F., ... & Tchernov, D. (2014a). First evidence for the presence of iron oxidizing Zetaproteobacteria at the Levantine continental margins. *PLoS One,* 9(3), e91456.

Rubin-Blum, M., Tsadok, R., Shemesh, E., Goodman-Tchernov, B. N., Austin, J. A., Coleman, D. F., ... & Tchernov, D. (2014b). Distribution of the Lamellibrachia spp. (Siboglinidae, Annelida) and their trophosome endosymbiont phylotypes in the Mediterranean Sea. *Marine biology,* 161(6), 1229-1239.

Rubin-Blum, M., Antler, G., Turchyn, A. V., Tsadok, R., Goodman-Tchernov, B. N., Shemesh, E., ... & Tchernov, D. (2014c). Hydrocarbon-related microbial processes in the deep sediments of the Eastern Mediterranean Levantine Basin. *FEMS microbiology ecology,* 87(3), 780-796.

Rubin-Blum, M., Shemesh, E., Goodman-Tchernov, B., Coleman, D. F., Ben-Avraham, Z., & Tchernov, D. (2014d). Cold seep biogenic carbonate crust in the Levantine basin is inhabited by burrowing Phascolosoma aff. turnerae, a sipunculan worm hosting a distinctive microbiota. *Deep Sea Research Part I: Oceanographic Research Papers,* 90, 17-26.

Waldmann, N., Austin Jr, J., Ben-Avraham, Z., Ballard, R., Coleman, D., Hall, J., ... & Sade, R. Evidence for sediment slumping in relation to possible past active seepage in the Eastern Mediterranean.

Unpublished Manuscripts/In Review:

Beccari, V., Basso, D., Spezzaferri, S., Rüggeberg, A. and Makovsky, Y. (2019) Preliminary video-spatial analysis of cold seeps bivalve beds along the continental slope of Israel (Palmahim Disturbance).

Weissman, A., Bialik, M. O., Makovsky, Y., Tchernov, D. (2019) Description of a new species of Leiopathes (Antipatharia: Leiopathidae) from the Palmahim Disturbance in the Levantine Sea (Mediterranean).

5

Impacts And Activities Affecting The Area

5.1. IMPACTS AND ACTIVITIES WITHIN THE SITE

5.1.1 Exploitation of natural resources

Assess if current exploitation rates of natural resources within the site (e.g. fishing, sand and mineral exploitation) are deemed unsustainable in quality or quantity, and possibly quantify these threats (e.g. percentage of the site area under threat, or any known increase in extraction rates).

The Palmahim Disturbance area is part of the EEZ claimed by Israel. No proper legislation has been established yet for this area, and fishing regulation is not yet valid in the EEZ, though a framework law is being discussed in the Israeli Knesset (parliament) for several years.

Israeli bottom trawlers do not fish in the area on a regular basis, due to its long distance from the shore, and the low economic value of the catch. Occasionally, a bottom trawler may fish in the eastern outskirts of the area, during the summer time recruitment moratorium in effect in Israeli territorial waters. This is not bottom trawl fishery; nevertheless, an occasional one-time trawling event might destroy the fragile habitats in the area.
The Palmahim Disturbance area is a fishing ground for few (less than 5) commercial long line vessels, fishing seasonally for Bluefin Tuna during the spawning season (May-July). Bluefin Tuna fishery is not regulated in Israel. Israel is not a member in ICCAT, and does not hold a quota, nor are landings reported to ICAAT, and thus it should be considered IUU catch. Lost longline fishing gear might also harm benthic habitats.

5.1.2 Threats to habitats and species

Indicate any serious threat to habitats (e.g. modification, disturbance, pollution) or to species (e.g. disturbance, poaching, introduction of alien species, etc.) in the area.

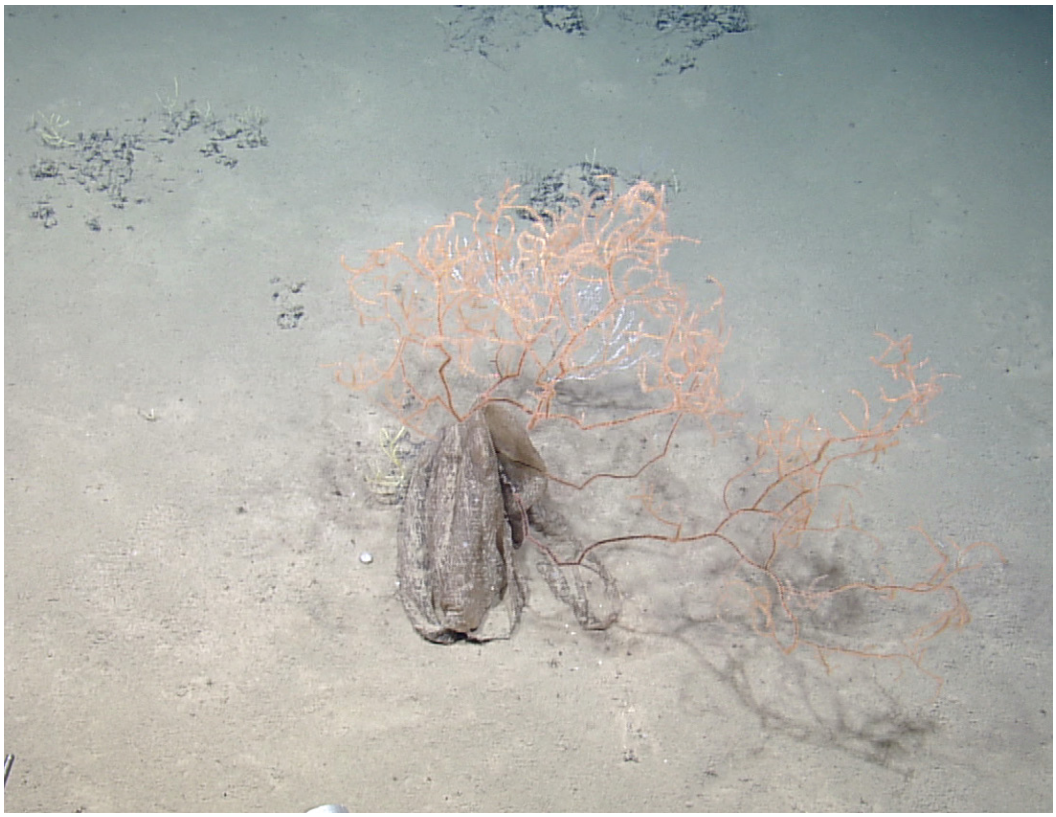
Bottom trawling is the most serious threat to cold seep and deep-sea coral communities (Althaus et al, 2009). Trawling activity may result in total destruction of these habitats. Trawl marks on the soft sediments, as well as crushed carbonate rocks, that form the foundation of the deep-sea communities, have already been documented at the site, indicating sporadic trawling activity at the location. Trawling activity near the coral gardens is also a threat, due to sediment suspension that harms suspension feeders such as corals (Hall-Spencer et al, 2002).

Longline fishing also endangers corals, which are often caught as bycatch by bottom longline fishing (Sampaio et al. 2012). Corals may be physically damaged by long-line fishing gear, as has been observed at the Palmahim Disturbance coral gardens, where many of the corals were documented entangled in fishing gear. **Longline fishing is the major threat to breeding and juvenile Atlantic Bluefin Tuna in the area. This fishing practice was also found to contain a high by-catch of protected species** (Caminas et al, 2009; Ferretti et al, 2008), and was shown to catch sharks and rays in Israel as well (Elmaliach, 2018).

Corals entangled in fishing gear, 500 mbsl.

Plastic debris: trash was documented both near the coral gardens, as well as in the deeper portion of the site where large amounts of trash have accumulated on the seabed and around the seep sites.

In the last decades, **oil and gas exploration** and production have been expanding in the southeastern Levant Sea. Exploration and production of oil and gas could have a severe effect on coral habitats. Physical damage due to placement of structure and gear (rigs, cables pipes), chemical pollution originating from activities such as drilling fluids, rock cuttings or discharges from the wells (Freiwald et al. 2004, Cordes et al, 2016). The area is included in "Block D" that was recently allocated by the Israeli Ministry of Energy for gas exploration. The SPNI is negotiating with the Ministry of Energy to ensure the sustainability of offshore operations in this sensitive area.



A plastic bag entangled in a *Leiopathes sp.* colony at 650 mbsl.

5.2. IMPACTS AND ACTIVITIES AROUND THE SITE

5.2.1 Pollution

Sources and description of pollution.

No nearby pollution source is known.
Despite the distance from shore, when surveyed with ROVs, a large proportion of the deep-sea corals were found entangled in plastic bags, plastic sheets, and fishing gear. Plastic litter was found in the seep sites as far down as 1100 mbsl. The nearby shipping route to the south of the proposed FRA might be a potential source of pollution and debris.

5.2.2 Other external, natural and/or anthropogenic threats

Briefly describe any other external threat to the ecological, biological, aesthetic or cultural values of the area (such as unregulated exploitation of natural resources, serious threats to habitats or species, pollution issues, etc.) that are likely to affect the area.

The area is included in "Block D" that was recently allocated by the Israeli ministry of Energy for gas exploration. The SPNI is negotiating with the Ministry of Energy, to ensure the sustainability of offshore operations in this sensitive area.

Climate change is a dominant threat in the eastern Mediterranean (Turley et al, 2007, Fox et al, 2016), and is anticipated to challenge deep-water habitats in the Palmahim Disturbance. Securing the area from local pressures is expected to improve its resilience to global pressures.

5.2.3 Sustainable development measures

Indicate if the area is covered by a management plan or is bordering with another zone subject to a management plan.

The Palmahim Disturbance area is part of the EEZ claimed by Israel. No proper legislation has been established yet for this area; therefore, neither fishing regulations nor MPA legislation is valid in the EEZ at this time, though a framework law is being discussed in the Israeli Knesset (parliament) for several years.
Therefore, there are no sustainable development measures implemented in the area at this time, and there is no legal framework at the national level to enforce such measures.

6

Expected Development And Trends[1]

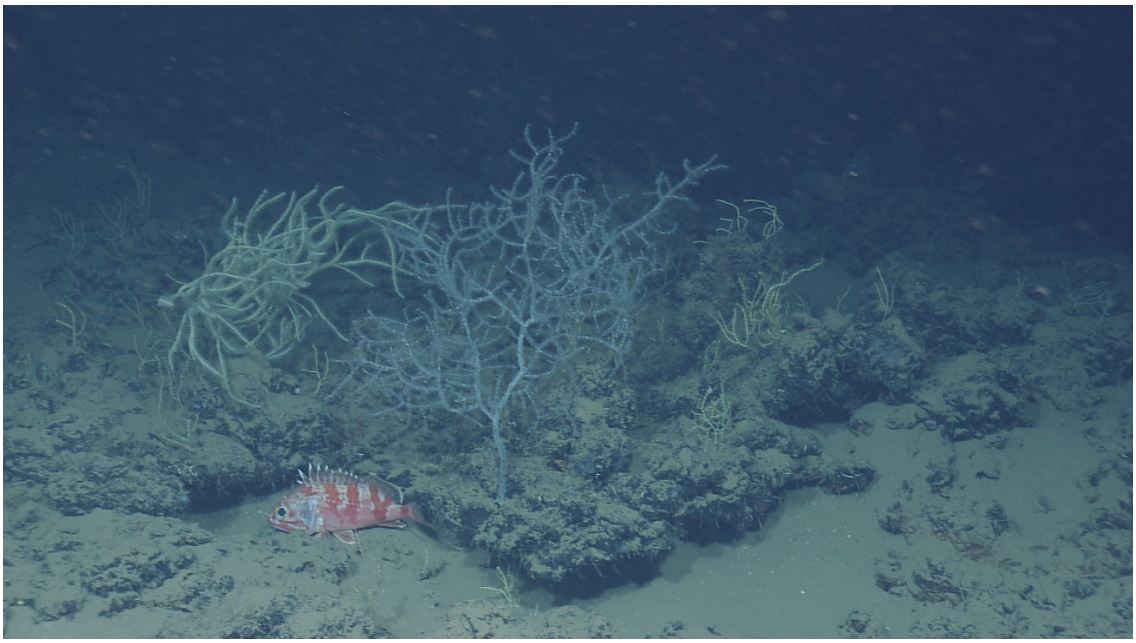
These aspects are not always easy to assess.
Therefore, filling out this section is not compulsory.

[1] Expected development and trends mean the development which is most likely to occur in the absence of any deliberate intervention to protect and manage the site.

6.1. EXPECTED DEVELOPMENT AND TRENDS RELATED TO THE THREATS TO AND PRESSURES UPON THE AREA

Briefly describe the development of economic and other activities in the area.

The Strategic Environmental Survey by the Israeli Ministry of Energy has recognized the CWC and the cold seep sites at the Palmahim disturbance as an extremely sensitive area.
No commercial development has been implemented in the area to date, but the area is included in "Block D" that was recently allocated by the Israeli ministry of Energy for gas exploration. The SPNI is negotiating with the Ministry of Energy to ensure the sustainability of offshore operations in this sensitive area.



***Helicolenus dactylopterus*, also known by its popular name Blackbelly rosefish, rests beneath a black coral at a depth of 750 meters in the coral gardens of the Palmahim disturbance. This is a demersal fish, about 25 cm long.**

7

Management And Protection Regime

7.1. LEGAL STATUS

If applicable.

The Palmahim Disturbance area is part of the EEZ claimed by Israel. No proper legislation has been established yet for this area; therefore, neither fishing regulations nor MPA legislation is valid in the EEZ at this time, though a framework law is being discussed in the Israeli Knesset (parliament) for several years.
Therefore, there is no legal framework at the national level to exert protective measures at this point. However, two planning processes have identified the sensitivity of the Palmahim Disturbance:
1) The Strategic Environmental Survey by the Israeli Ministry of Energy has recognized the CWC and the cold seep sites as an extremely sensitive area.
2) The Palmahim disturbance was designated a marine protected area under the Israeli marine spatial plan (2019). However, until proper legislation regarding the legal status of Israeli EEZ will be established, it remains untenable. The polygon of the proposed FRA matches the suggested designation of a MPA in the Israeli marine spatial plan.

7.1.1 Historical background related to management in the area

7.1.2 Regulatory measures currently governing management on the site

Indicate if the area, or part of it, has been designated under an international conservation category and, if the case, when.

The parts below 1000 m at the site are considered a "no bottom trawling zone" by the GFCM.

7.1.3 Objectives

Indicate the objectives of the area (by order of importance) as stated in its legal declaration.

7.2. LEGAL BACKGROUND

Indicate if the area, or part of it, is subject to any legal claim, or to any pending legal case in this connection within the framework of an international body.

The Palmahim Disturbance area is part of the EEZ claimed by Israel. No proper legislation has been established yet for this area; therefore, neither fishing regulations nor MPA legislation is valid in the EEZ at this time, though a framework law is being discussed in the Israeli Knesset (parliament) for several years.
Therefore, there is no legal framework at the national level to exert protective measures at this point. However, two planning processes have identified the sensitivity of the Palmahim Disturbance:

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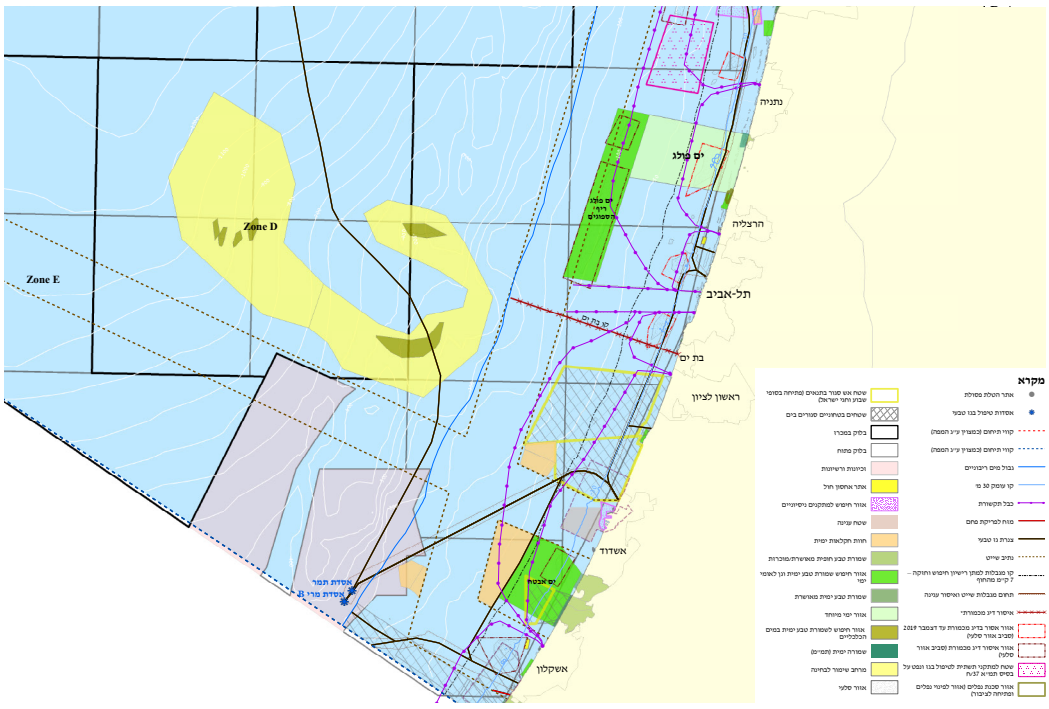
2) The Palmahim disturbance was designated a marine protected area under the Israeli Marine Spatial Plan (2019). However, until proper legislation regarding the legal status of Israeli EEZ will be established, it remains untenable. The polygon of the proposed FRA matches the suggested designation of a MPA in the Israeli marine spatial plan.

7.3. LEGAL PROVISIONS FOR MANAGEMENT

7.3.1 Zoning in the area

Briefly indicate if the legal texts protecting the area provide for different zones to allocate different management objectives in the area (e.g. core and scientific zones, fishing zones, etc.) and, if applicable, indicate the surface area of such zones. Provide a map in annex.

The Palmahim disturbance was designated a marine protected area under the Israeli Marine Spatial Plan (2019). However, until proper legislation regarding the legal status of Israeli EEZ will be established it remains untenable. This initial planning designated a core area proposed as a marine reserve, and a "Potential Reserve Area" in which a detailed survey should be conducted to identify sensitive habitats for conservation.



The Palmahim disturbance MPA in the Israeli Marine Spatial Plan, 2019. known VME's are marked as brown polygons, and are designated as proposed nature reserve. potential area for sensitive VME's is marked in yellow, and is designated as "potential nature reserve".

7.3.2. Legal competence

Legal competence and responsibility with regard to administration and implementation measures.

Not relevant

7.3.3 Other legal provisions

Describe any other relevant legal provisions, such as those requiring a management plan or any other significant measure concerning the protection and management of the area.

Not relevant

8

Objectives Of The FRA And Proposed Management Measures

8.1. OBJECTIVES OF THE FRA

Indicate the rationale that justifies the designation of a FRA.

The objective of the FRA is to safeguard the cold-water corals and cold seeps VMEs in the Palmahim Disturbance from physical damage, and to protect the deep-sea fauna from fishing, as well to protect the Atlantic Bluefin Tuna spawning area from pelagic fishing. The FRA would serve as a biodiversity benthic hotspot and a BFT spawning area with a spillover effect, in order to support the rehabilitation efforts of this over-exploited species, and to prohibit IUU fishing.

Benthic VMEs

Internationally, deep-sea coral gardens and chemosynthetic based seep communities are recognized as needing protection. The United Nations Environment Program (UNEP – The Coordinating Unit for the Mediterranean Action Plan, Secretariat to the Barcelona Convention and its Protocols) has recognized coral aggregations and chemosynthetic based communities as special ecological features in need of protection (CBD, 2007). The FAO considers coral aggregations as sensitive habitats, forming vulnerable marine habitats, and recommends fishing closures where such habitats are known or are likely to be found (FAO, 2009).
Many of the species occurring at the Palmahim Disturbance, like other Mediterranean deep-sea coral grounds, are included in the CITES annex II protocols, and/or are included in the IUCN red list, highlighting the importance of protecting these species and their habitat.

Fishing pressures are already present in this site: Many of the corals viewed on the ROV surveys at the locality were entangled in fishing gear, and evidence of trawling. Trawl marks were documented on the sediments, as well as crushed carbonate rocks with an extremely depleted coral cover in the area.

Prevention is better than cure:

Bottom trawling: Destruction to deep-sea corals by bottom trawling has been documented worldwide, and the presence of coral rubble has increased in the last decades (OSPAR, 2008; IUCN and WWF, 2004). Cold water corals and octocoral beds are extremely slow growing, and damage by trawling will take decades to recover, if they recover at all (Huvenne et al. 2016).

Bottom trawling in deep-sea coral grounds may be compared to clearcutting a forest, though the recovery rates of the former ecosystems is much slower. Rehabilitation of the sites following trawling impacts, may be irreversible, thus efficient protection prior to trawling is immensely important. On seamounts off Tasmania, trawling has reduced the matrix forming coral (***Solenosmilia variabilis***) by two orders of magnitude, the community richness has decreased three fold and a large diversion was noticed in the megabenthos assemblage structures when compared with non-trawled seamounts in the same locality (Althaus et al., 2009).
The effectiveness of establishing protection prior to fishing destruction was demonstrated in the Darwin Mounds in the NE Atlantic. The mounds were discovered in 1998, and were closed to all bottom fishing in 2003. A survey in 2011 to evaluate the effectiveness of the fishing closure, showed that the amount of corals in the western area of the mounds that had not been previously fished, was found to be similar to the initial amount, as expected in a functioning MPA. On the other hand, the eastern part, that was heavily fished prior to the closure, showed no signs of recovery or recolonization by corals – 10 years after the MPA came into effect (Huvenne et al., 2016).
Not much research has been done to assess the effects of bottom trawling on chemosynthetic communities. Baco et al. (2010) described heavy impact due to trawling, which destroyed the foundations of the habitat in seamounts off New Zealand. If contacted by bottom trawling gear, the carbonate foundation, which form the base for chemosynthetic communities at seep sites, is crushed to rubble.

Long-line fishing: Longline fishing gear is highly destructive to deep-sea corals and may physically damage the corrals *in situ*, if it gets entangled in them; moreover, deep -sea corals are not uncommonly landed as bycatch (Aguilia & Marín., 2013; Sampaio et al. 2012). thus, the proposed fishing enclosure will prevent ghost fishing and unintentional damage to the VME's at the site.

Atlantic Bluefin Tuna spawning site

The proposed FRA is expected to protect an essential marine habitat of the Bluefin Tuna, preserving an area that is proposed as an important breeding ground for the eastern Mediterranean population, and is expected to support its recovery, as well as to eliminate IUU fishing of this apex predator.

We expect the FRA to boost scientific research and activity in this unique area, and to support new discoveries in pharmacology, engineering and medicine and even in the growing submersible eco-tourism industry, in the future.

8.2. PROPOSED PROTECTION MEASURES FOR THE FRA

8.2.1 Management measures

Suggest management measures to be implemented in the FRA.

We propose a total fishing closure in the area, particularly bottom trawl fishing and longline fishing. Both of these practices have had devastating effects on these unique benthic communities in other regions of the Mediterranean.
Longline and other fishing practices that target Atlantic Bluefin Tuna are a threat to this endangered species during its spawning season, and to juvenile fish during their recruitment; they should therefore be forbidden.

8.2.2 Monitoring, control and surveillance measures

Suggest measures to effectively enforce the FRA.

Due to the distance of the FRA from the Israeli coast, it is suggested to use VMS as a key monitoring tool. The SPNI is promoting a bill to make VMS a mandatory measure for fishing vessels in Israel, in compliance with resolutions 33/2009/7 and GFCM/38/2014/1.
The SPNI has filed a complaint to GFCM about Israel's failure to comply with these resolutions.

The Israeli Nature and Parks Authority has been operating a marine unit since 2018. It is now in the process of purchasing a long-distance vessel, which can help enforcement steps in the FRA.

8.2.3 Socio-economic impact(s) of the FRA

Indicate the potential socio-economic impact(s) of the proposed measures.

The Palmahim Disturbance is not a fishing ground for artisanal fishermen. Bottom trawlers only occasionally fish on the eastern outskirts of the area, and less than 5 longline vessels use the area during the BFT spawning season, as IUU fishing.
Thus, a fishing closure is not expected to have negative socio-economic impacts. On the other hand, the FRA would support the recovery of eastern ABFT population, and would boost demersal fish populations, creating a spillover effect for the benefit of nearby regions.

8.2.4 Economic assessment of ecosystems services

The research regarding ecosystem services provided by deep-sea habitats is in its infancy and there is not much supporting data regarding the services provided by the sites located in the Palmahim Disturbance. Therefore, the information we present refers to ecosystem services provided by similar habitats. The conservation of both the coral gardens and the seep communities have important economic implications (Jobstvogt et al., 2014; Foley et al., 2010), in the fields of science, medicine, pharmaceuticals, general ecosystem health, fisheries, and in the developing field of deep-sea ecotourism via submersibles.

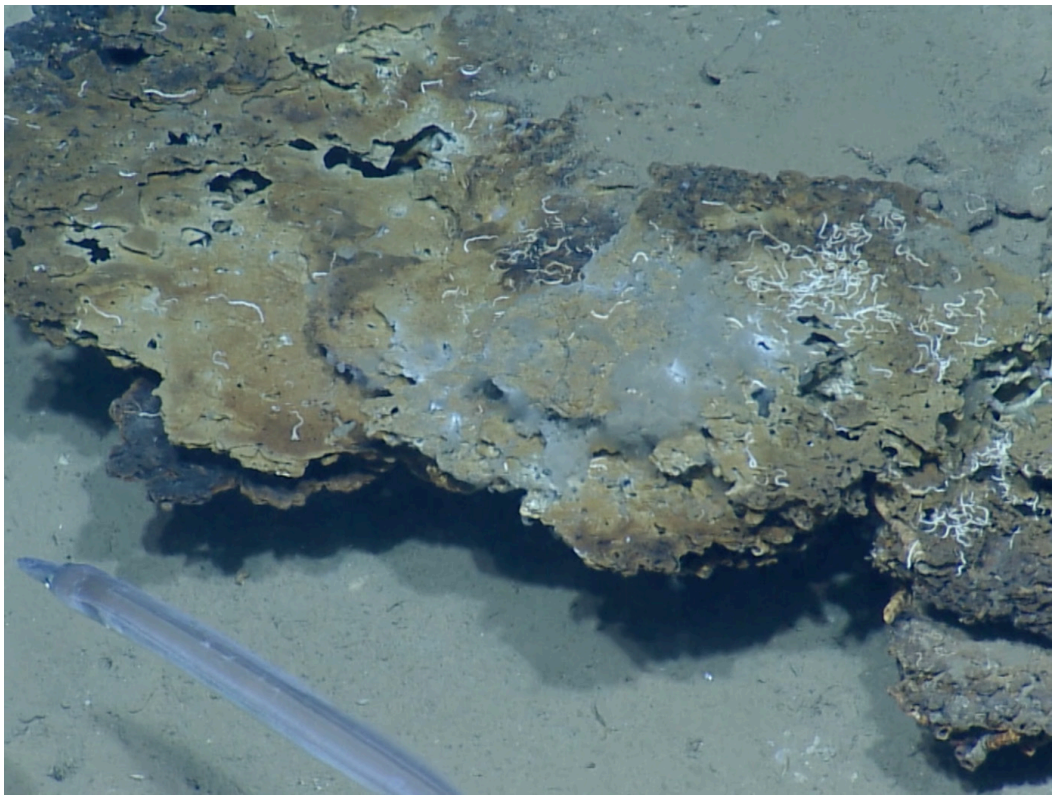
Cold water corals

Deep-sea coral gardens act as a habitat for many species, including commercially valuable fish species. The complexity of habitat and food availability support nursery grounds for an array of taxa, including fish, shrimps and other invertebrates. New discoveries from CWC are utilized in medical, pharmacological, engineering and food research. There is a huge potential for discovering new pharmacological compounds, and already black coral extracts have been found to have a positive effect on acute lung inflammation caused by cigarette smoke (Bai et al. 2011), and the skeleton of ***Isidella*** corals is used for bone grafting. Synthetic analogues of the coral skeleton have been developed based on the structure of the ***Isidella*** skeleton (Ehrlich, 2019), reducing the future harvest of these endangered corals. The long-lived deep-sea corals, act as climate archives and a proxy for climate change, by using stable isotope data found in their skeleton to detect trends in ocean chemistry (Williams et al., 2006,2007 ; Robinson et al., 2014).

Cold Seeps

Many open questions remain regarding the functioning, distribution and diversity of cold seep environments, consequently the assessment of ecosystem function remains limited. Yet, chemosynthetic environments are some of the most diverse chemical and physical ecosystems on earth, with a high potential for discovering new eukaryotes and prokaryotes (Takai & Nakamura, 2011). The tolerance to a wide range of temperatures, pH, and pressure make Archaea found in such environments attractive to industrial sectors (UNU-IAS, 2005). Chemosynthetic communities offer an amazing opportunity to search for new

metabolic pathways and compounds, inhabiting a unique and diverse genomic bank. The Seep fauna constitutes a unique pool of potential for the supply of new biomaterials, pharmaceuticals and genetic resources that have already been the basis for a number of patents (Gjerde, 2006; Arrieta et al., 2010).



Cold gas (Methane) seeps, and the carbonate rocks formed near them, carbonate rocks formed near them, 1156 meters deep, in the Palmahim disturbance.

9 Relevant Contacts

Stakeholders (if applicable), name(s), position(s) and contact address(es) of the person(s) who compiled the form and/or can provide further information.

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IUCN Red list of Mediterranean Corals –
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