

# GUIDELINES AND PROTOCOLS FOR THE SUSTAINABLE EXPLOITATION AND MANAGEMENT OF MARINE AREAS

Final Version of May 2023

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# 1. Premise

In the context of the WP5 of the ARGOS project (Interreg 2014-2020) KDM Sub Service was in charge by the Friuli Venezia Giulia Region, project ARGOS LP, to carry out the following activities:

- Supply, assembly and installation of 6 TECNOREEF pyramidal modules with characteristics and dimensions compliant with the existing ones, located within the perimeter of the SP001 of the ADRIBLU area located in the coastal waters of the Municipality of Lignano Sabbiadoro;
- Underwater biological investigations and experimental fishing to define the effectiveness in terms of fish restocking;
- Definition and implementation of guidelines and a protocol for the sustainable management of the fish resources in the marine area, in collaboration with local small-scale fishing operators.

The ADRIBLU area is located in front of Lignano Sabbiadoro city, near the end of the wastewater discharge pipeline, at a depth between 15 and 16 metres. Figure 1 shows the position of the study area.

## Timing

The activities started at the beginning of the summer 2022 with coordination and planning meetings. Field activities starting in August with the assembly of the pyramid modules; the installation was carried out 13 September 2022

The first underwater biological monitoring was conducted on 27 and 28 October 2022; scientific fishing due to bad weather conditions and unavailability of professional fishermen have been postponed until 16 January 2023 (first campaign).

The second biological monitoring was carried out at the end of April 2023 in order to be able to evaluate the colonisation conditions of the new Fish Aggregation Devices (TecnoReef pyramids) more than 6 months after the installation.

This final report summarises the activities carried out and the results obtained, providing the first indications for a sustainable management of fish resources in this marine area.

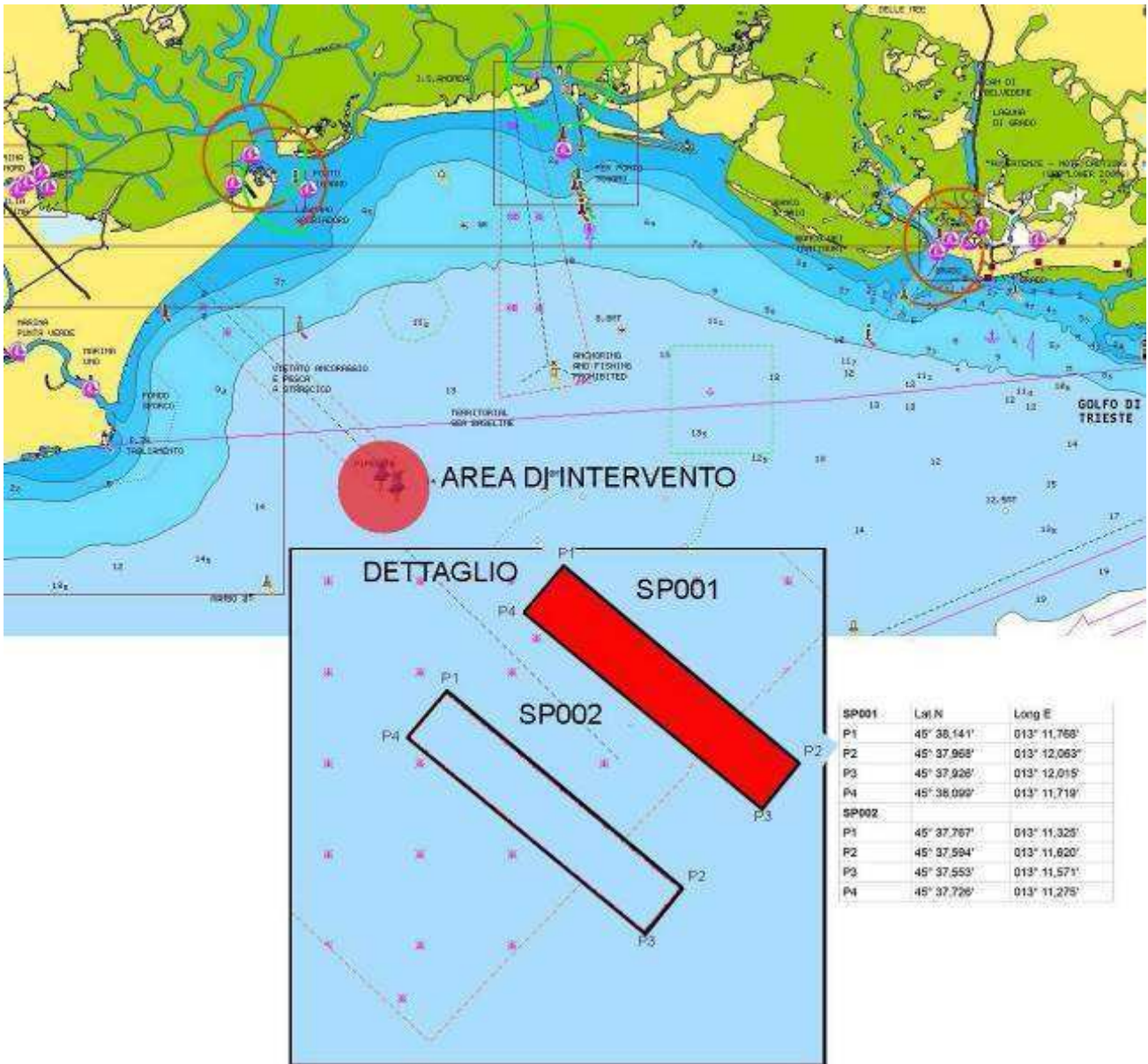


Figure 1: location of the study area.

## 2. Biological Survey

The fish populations, as planned, were investigated with a visual census carried out by underwater biologists and through scientific fishing.

For each of the 2 activities, 2 campaigns were conducted according to the timing indicated above.

## 3. Visual Census

It was operated through visual inspection integrated with video and photos, both for the census of the fish fauna and for an assessment of the levels of coverage of the restored artificial barriers.

The dives were carried out in the complex of submerged structures located at the southern and northern extremes of the SP001 area (Figure 2).

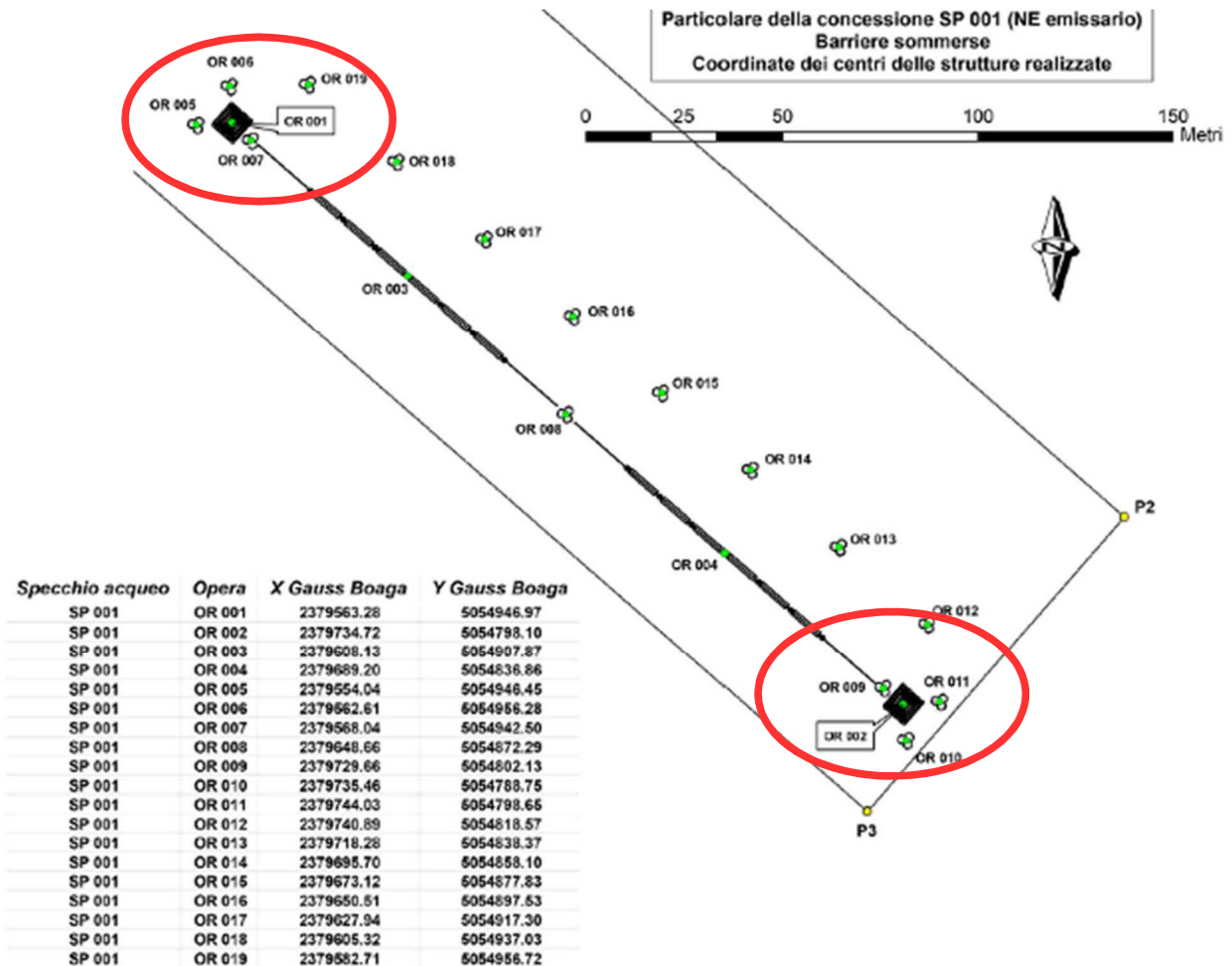


Figure 2: the diving areas in red

Visual census has long been an important and effective method for investigating fish fauna (Harmelin-Vivienet al., 1985). It is an activity performed in immersion by specialised personnel. Specifically, the operations were carried out by a pair of divers, biologists with knowledge of the fish fauna, equipped with self-contained air breathing apparatus (ARA). The technique adopted was that of horizontal transects. Visual census was performed by following a 100m long line at 2 different sites with 2 successive dives.

The line was placed between the restored barriers taking care to include at least 3 artificial structures in each path - not necessarily straight - (TecnoReef pyramids, mooring blocks of buoys and Ped pipes); at the structures observations were conducted from a fixed point for a duration of 2 minutes in each position.

The fish species present in an area about 4 m wide (2 m right and 2 m left of the guide wire, visibility permitting), for a height from the bottom of approximately 1.5-2 m, were surveyed. For each survey, due to the reduced visibility of the water (less than 2/2.5 m), greater attention was paid to necto-benthic species on the outward journey, while more attention was paid to strictly benthic species on the return journey.

Poor visibility hampered the observations preventing the census of fish species more sensitive to the noise produced by the breathing apparatus. For fish schools it was not easy to quantify the number of individuals; they have therefore been indicated with abundances greater than 5, 10 and 20 units. Visibility was certainly a limit during the second survey with visibility near the bottom reduced to 1.5/2 m.

In the October underwater surveys, 18 taxa were counted and more than 200 individuals were observed. Table 1 shows the list of species or groups surveyed in each area.

The species observed are mainly necto benthic. *Sciaena umbra* and *Umbrina cirrosa* was only detected near or inside the concrete structures.

Pelagic species, as mackerel (*Scomber scomber*), were observed only in the first campaign, as well as benthic species such as conger eel and lobster. The absence of *Serranus scriba* was observed in the second campaign, replaced by *Serranus hepatus*.

In the spring survey, 15 taxa were recorded, observing 77 individuals in addition to 2 schools of young *Trachurus trachurus* each quantifiable in a few hundred individuals.

As can be seen in the charts showing Abundance, specific richness and diversity index, the spring survey counted fewer taxa than in the autumn period and in both surveys the southern area had higher values of abundance and specific richness while at the level of diversity the 2 areas do not differ significantly (graph 3) in each survey but only between the 2 seasons.



Area Nord	Specie	28/10/2022		
		Area Nord 1	Area Nord 2	Area Nord TOT
Chromis chromis (Linnaeus, 1758)	Castagnola	2	3	5
Diplodus annularis (Linnaeus, 1758)	Sparaglione	8	12	20
Diplodus sargus (Linneo, 1758)	sarago maggiore	6		6
Gobius bucchichi Steindachner, 1870	ghiozzo buccichi	2		2
Homarus gammarus (Linnaeus, 1758)	Astice		1	1
Labridae indet	tordo indet	3	2	5
Sciaena umbra Linnaeus, 1758	Corvina	5	3	8
<i>Scomber scombrus Linnaeus, 1758</i>	Sgombro		2	2
Scorpaena sp.	Scorfano		2	2
Serranus scriba (Linnaeus, 1758)	Sciarano	1		1
Sparidae indet.	Sarago	5	8	13
Trachurus trachurus (Linnaeus, 1758)	Sugarello	15	10	25
Umbrina cirrosa (Linnaeus, 1758)	Ombrina	1	2	3

**Table 1:** taxa observed during the first visual census in the Northern SP001 area.

Area Sud	Specie	28/10/2022		
		Area Sud 1	Area Sud 2	Area Sud TOT
<i>Boops boops (Linnaeus, 1758)</i>	Boga		3	3
Chromis chromis (Linnaeus, 1758)	Castagnola	15	5	20
Conger conger (Linnaeus, 1758)	Grongo	1		1
Dicentrarchus labrax (Linnaeus, 1758)	Branzino		3	3
Diplodus annularis (Linnaeus, 1758)	Sparaglione	1		1
Diplodus sargus (Linneo, 1758)	sarago maggiore	4		4
Gobius bucchichi Steindachner, 1870	gobius buccichi	1	2	3
Homarus gammarus (Linnaeus, 1758)	Astice	1		1
Labridae indet	tordo indet	5	3	8
Parablennius rouxi (Cocco, 1833)	Bavosa bianca	1	3	4
Sciaena umbra Linnaeus, 175	Corvina	1	2	3
Serranus hepatus (Linnaeus, 1758)	Sacchetto	3	1	4
Serranus scriba (Linnaeus, 1758)	Sciarano	3	3	6
Sparidae indet.	Sarago	1	3	4
Trachurus trachurus (Linnaeus, 1758)	Sugarello	15	25	40
Umbrina cirrosa (Linnaeus, 1758)	Ombrina		1	1

**Table 2:** taxa observed during the first visual census in the Southern SP001 area.

		21/04/2023		
Area Nord	Specie	Area Nord 1	Area Nord 2	Area Nord TOT
Parablennius rouxi (Cocco, 1833)	Bavosa bianca		1	1
Diplodus annularis (Linnaeus, 1758)	Sparaglione		1	1
Gobius bucchichi Steindachner, 1870	ghiozzo buccichi	1	3	4
Gobius geniporus Valenciennes, 1837	ghiozzo geniporo	2	3	5
Symphodus roissali (Risso, 1810)	tordo verde	1		1
Symphodus cinereus (Bonnaterre, 1788)	tordo grigio		1	1
Parablennius gattorugine (Linnaeus, 1758)	ghiozzo gattoruggine	1		1
Serranus hepatus (Linnaeus, 1758)	Sacchetto	5	8	13
Trachurus trachurus (Linnaeus, 1758)	Sugarello	banco juv		banco

**Table 3:** taxa observed during the second visual census in the Northern SP001 area.

		21/04/2023		
Area Sud	Specie	Area Sud 1	Area Sud 2	Area Sud TOT
Diplodus annularis (Linnaeus, 1758)	Sparaglione	3	2	5
Diplodus sargus (Linneo, 1758)	sarago maggiore	4	1	5
Diplodus vulgaris (Geoffroy Saint-Hilaire, 1817)	sarago fasciato		1	1
Gobius bucchichi Steindachner, 1870	ghiozzo buccichi	3	1	4
Awaous commersoni (Schneider, 1801)	ghiozzo nero	1		1
Symphodus cinereus (Bonnaterre, 1788)	tordo grigio	2	2	4
Symphodus roissali (Risso, 1810)	tordo verde	1		1
Parablennius rouxi (Cocco, 1833)	Bavosa bianca		1	1
Sciaena umbra Linnaeus, 175	Corvina	11	12	23
Scorpaena notata Rafinesque, 1810	Scorfanotto	1		1
Serranus hepatus (Linnaeus, 1758)	Sacchetto	2	1	3
Trachurus trachurus (Linnaeus, 1758)	Sugarello		banco	banco
Sepia officinalis Linnaeus, 1758	Seppia		1	1

**Table 4:** taxa observed during the second visual census in the Southern SP001 area.

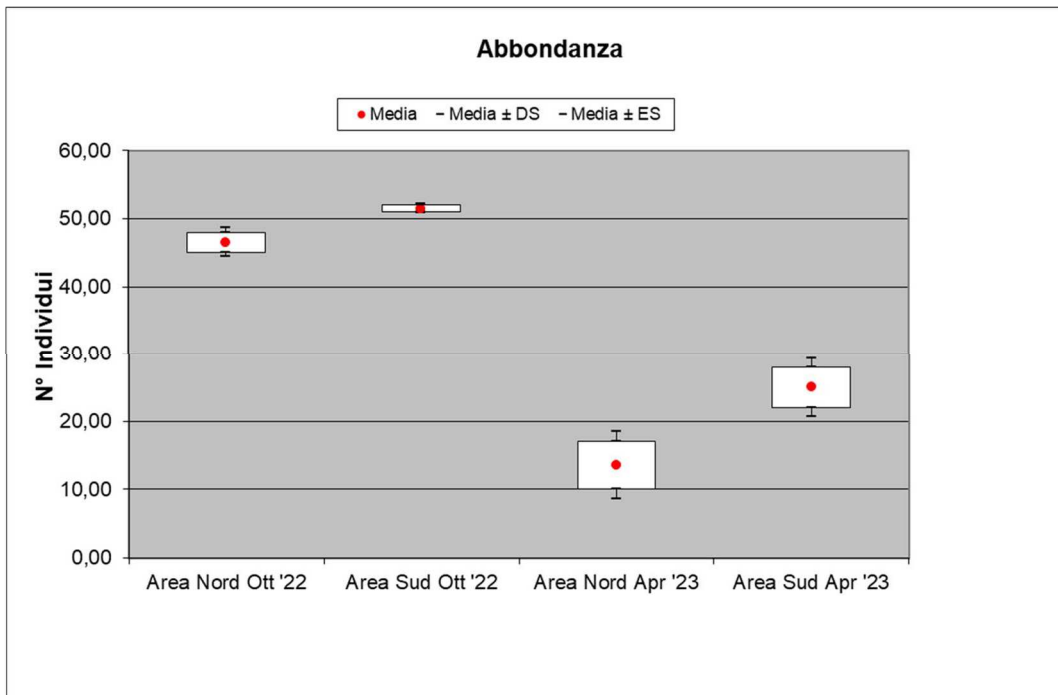


Chart 1: Box-plot of abundance values (individuals) observed during underwater surveys

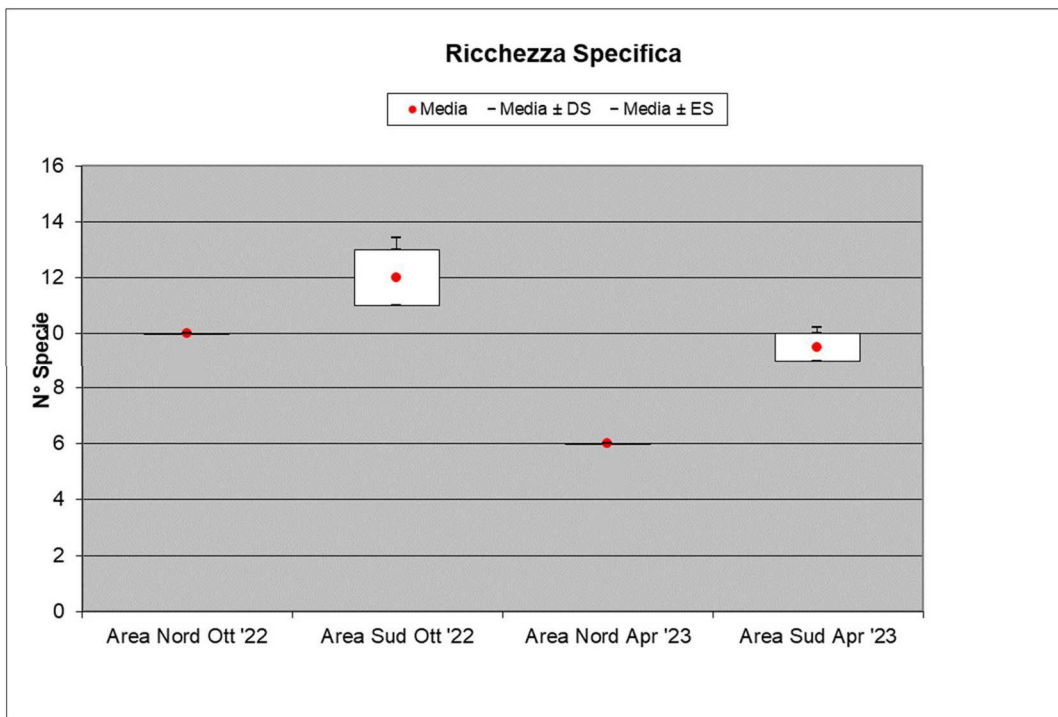


Chart 2: Box-plot of species diversity values (n. taxa) observed during underwater surveys

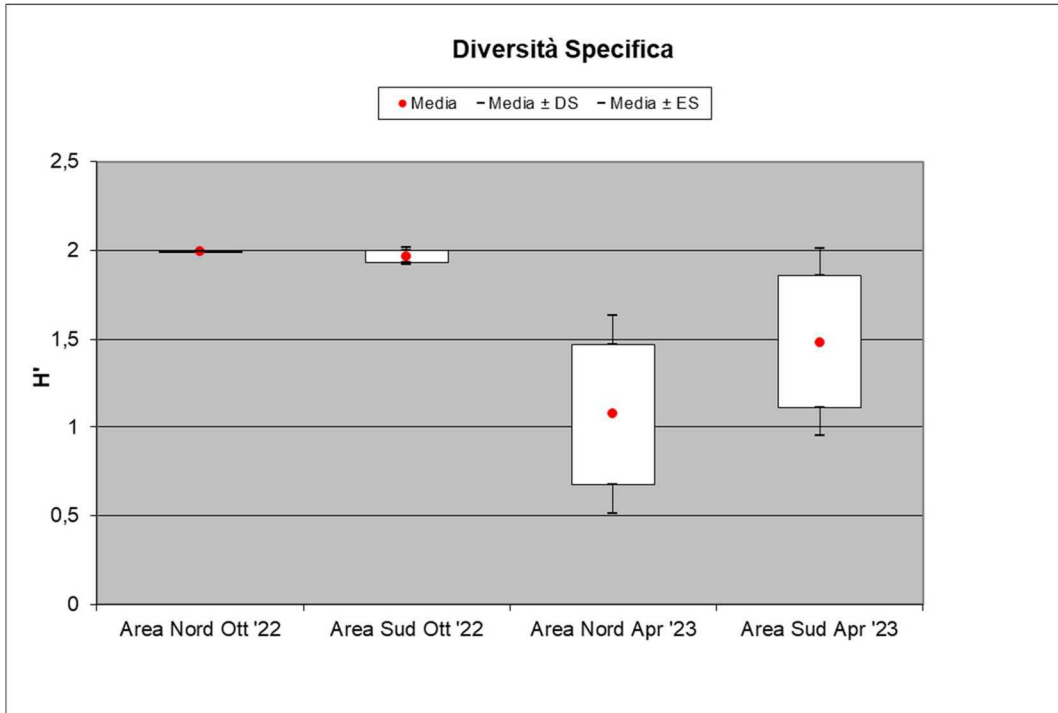


Chart 3: Box-plot of diversity values (Shannon Wiener index) observed during underwater surveys



Photo 1: approaching the net to haul it off.



Photo 2: cleaning the nets at the end of the first campaign.

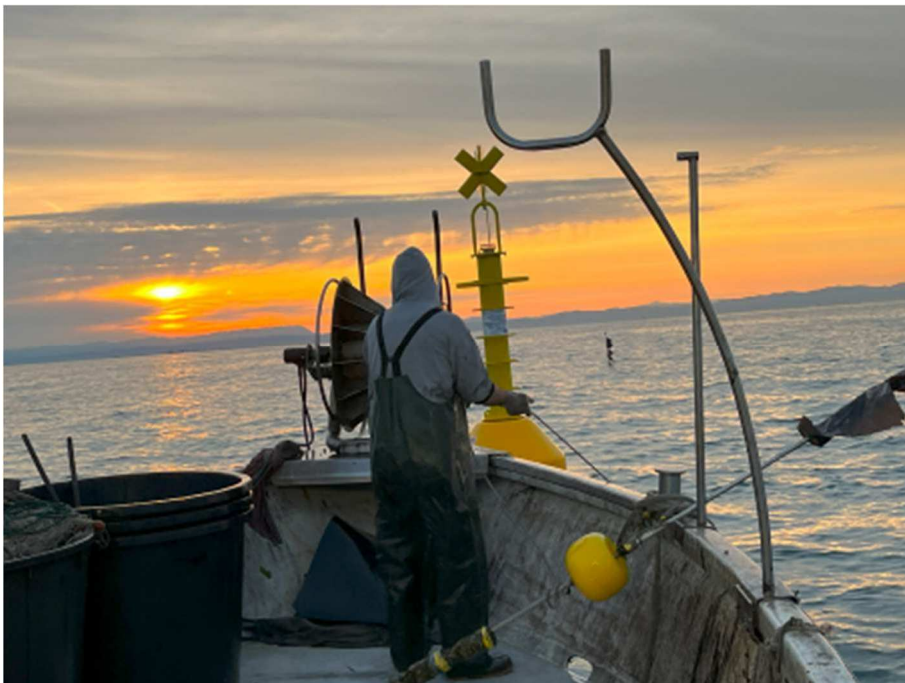


Photo 3: fishing net recovery during the second campaign.

The following steps were carried out in the laboratory:

- Taxonomic determination. The captured organisms have been recognized and classified. The most recent texts on the fish fauna of the Italian seas and the FAO catalogs were used for the classification. For the nomenclature, the check-list of the Italian Fauna adopted by the Ministry of the Environment was used.
- Determination of the biometric parameters of the captured organisms. The length of the individuals was measured in cm from the apex of the snout to the caudal fork or to the tip of the caudal fin if this does not have an evident fork. The measured values were reported in worksheets and then in tables.
- Determination of fresh weight of captured organisms. Weight was measured using a digital scale (accuracy 1 g). The measured values were reported in worksheets and then in tables.

The results of the first fishing campaign can be summarised as follows:

Area Out: only 1 species, non-commercial, immediately released: *Hypocampus guttulatus*.

Area IN: 6 species: 5 fish and 1 mollusc specie.

Specie/Taxa	n.pz
<i>Trachurus trachurus</i>	13
<i>Pagellus erythrinus</i>	2
<i>Umbrina cirrosa</i>	4
<i>Diplodus annularis</i>	34
<i>Spicara maena</i>	7
<i>Sepia officinalis</i>	2

**Table 5:** species caught during the first fishing campaign.

The results of the second fishing campaign can be summarised as follows:

Area Out: 2 species: 1 fish and 1 crustacean.

Area IN: 3 species: 2 fish and 1 mollusc specie.

Area	SP001	Area	Bianco
Specie/Taxa	n.pz	Specie/Taxa	n.pz
<i>Pagellus erythrinus</i>	1	<i>Solea solea</i>	1
<i>Spicara maena</i>	2	<i>Squilla mantis</i>	1
<i>Sepia officinalis</i>	2		

**Table 6:** list of species caught in area SP001 and in the external blank, during the second fishing campaign.

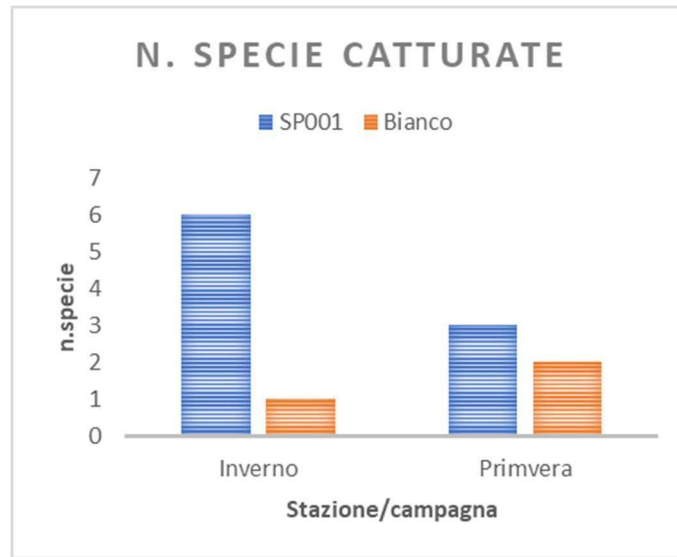


Chart 4: number of fish species caught in the 2 control sites during the winter and spring fishing campaigns.

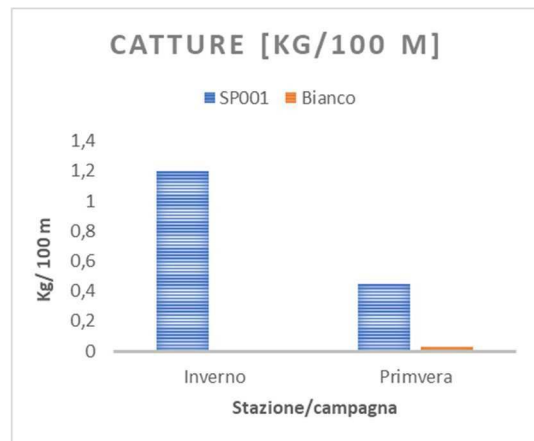
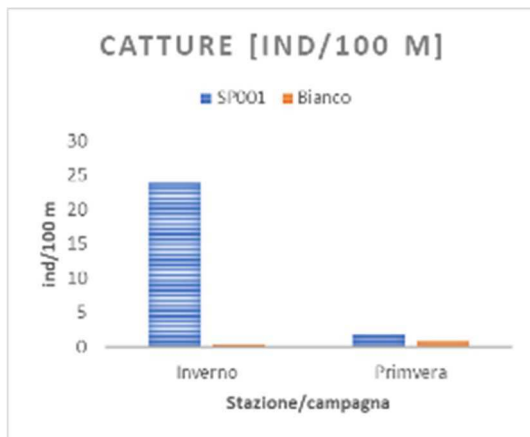


Chart 5: captures expressed as n. ind/100 m and kg/100 m conducted in the two control sites during the winter and spring fishing campaigns.



## 5. Supply, assembly and installation of tecnoreef modules

The Project Tender Specifications require the “Supply, assembly and installation of 6 TECNOREEF pyramids with characteristics and dimensions compliant with the existing ones, located within the perimeter of the area SP001 (Annex B Bis). Each of the 6 pyramids, coded with the codes OR005, OR006, OR008, OR009, OR012 and OR015 must be positioned in correspondence and in any case within about 1 meter of distance from each of the 6 collapsed pyramids, of known position”.

The existing pyramids within the perimeter of the SP001 area are made by assembling 12 octagonal plates in "seafriendly" concrete with stainless steel reinforcement according to the scheme illustrated in Figure 3.

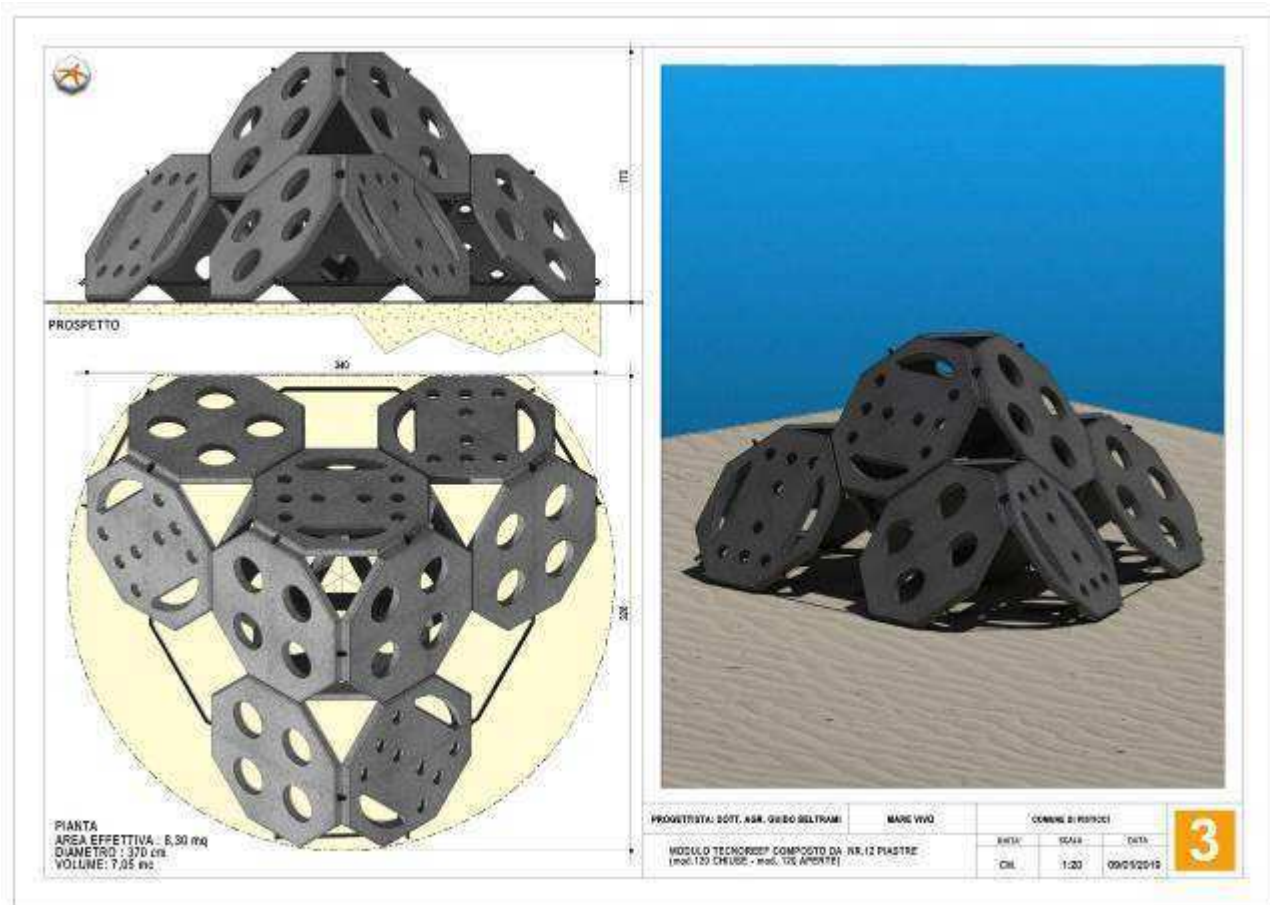


Figure 3: pyramidal module with 12 TecnoReef plates.

We then proceeded to supply a total of 72 plates and their assembling by creating the 6 required structures on the ground (Photo 4 and Photo 5)



Photo 4: assembly of pyramid modules



Photo 5: pyramid modules.

Before proceeding with the installation of the 6 new modules on the seabed of the SP001 area, the effective position and GPS coordinates of the existing pyramids was verified.

The verification was carried out by means of a Side Scan Sonar survey and through targeted dives on the identified targets.

Annex B bis and Figure 4 show the positions of the structures set up in the previous INTERREG projects: 2 "tube" structures (OR001 and OR002) and 15 TecnoReef pyramidal structures (from OR005 to OR019).

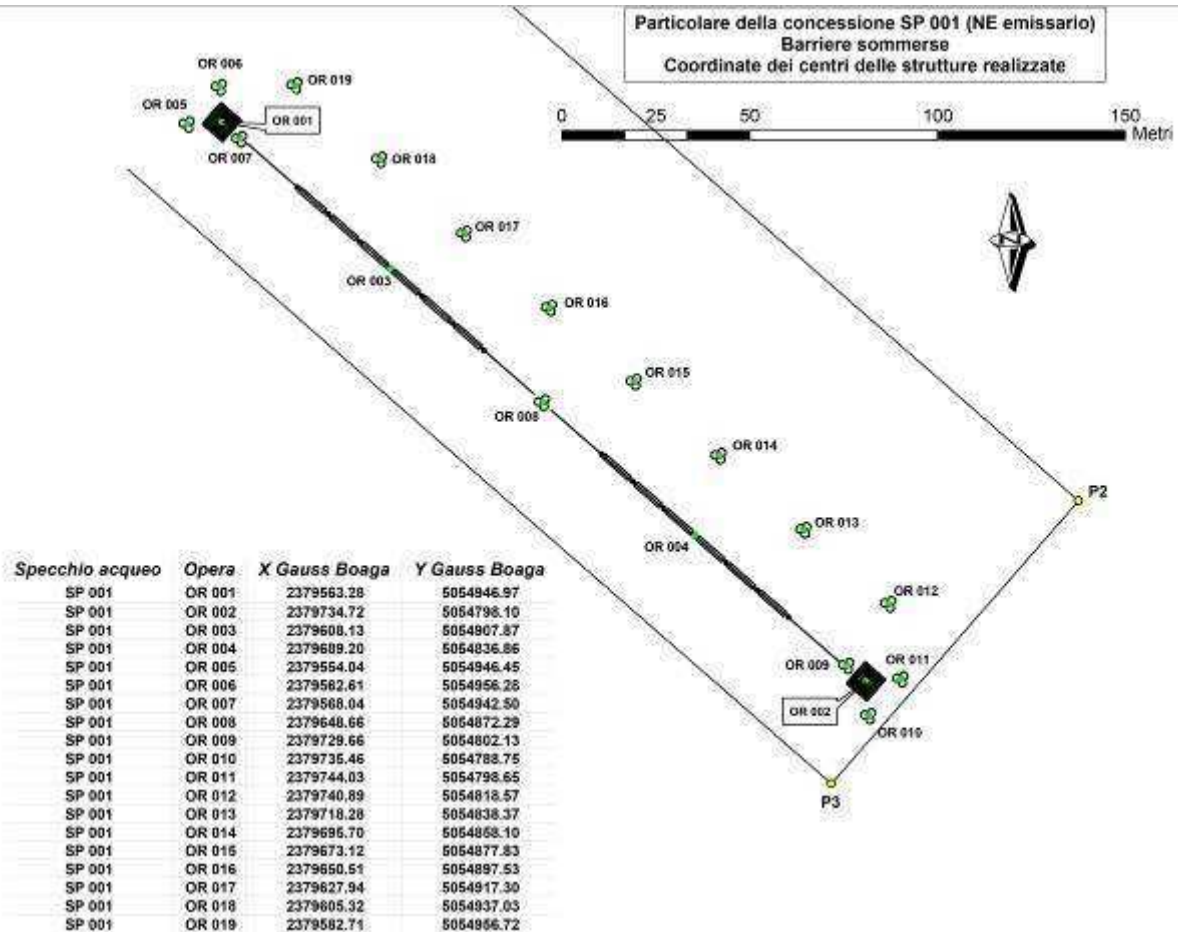


Figure 4: extract from Annex B bis indicating the location of the existing structures.

The Gauss Boaga Fuso Est coordinates shown in attachment Ba bis, as shown in the figure above, were converted into geographic coordinates ETRF89 (WGS84) by means of the ConveRgo software developed by CISIS – Interregional Center for IT, geographic and statistical systems.

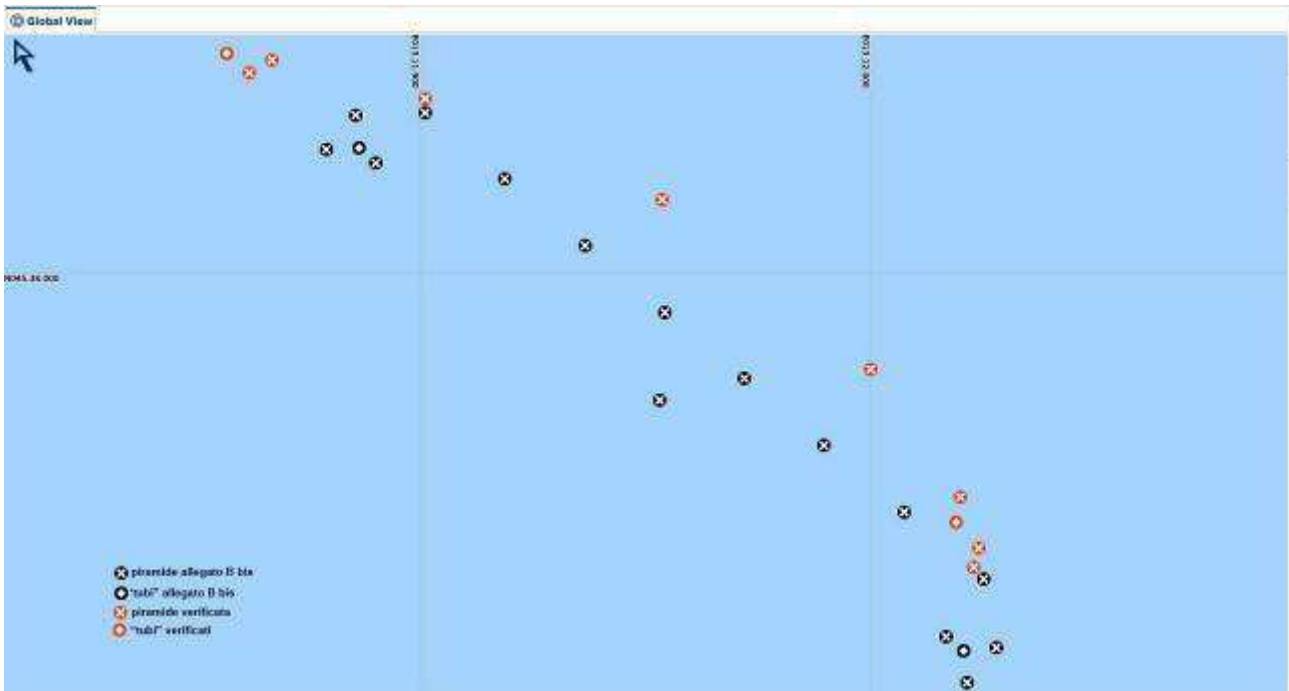
Table 7 shows the results of this conversion.

Side scan sonar surveys and diving conducted for this project identified only 8 of the original 17 structures. Figure 5 shows (in red) the positions identified and verified during the present project with respect to the positions of the 17 structures (in black) obtained from Annex B bis.

Table 8 shows the coordinates of the 8 structures identified and verified during immersion. The assembly and installation operations were carried out between August and September 2022 and the first surveys on the covering of the structures were carried out at the end of October in conjunction with the underwater surveys of the fish fauna.

ID	Gauss Boaga Fuso Est		WGS84	
	X	Y	Lat N	Long E
OR001	2379563,28	5054946,97	45° 38,019'	013° 11,886'
OR002	2379734,72	5054798,10	45° 37,941'	013° 12,021'
OR005	2379554,04	5054946,45	45° 38,019'	013° 11,879'
OR006	2379562,61	5054956,28	45° 38,024'	013° 11,886'
OR007	2379568,04	5054942,50	45° 38,017'	013° 11,890'
OR008	2379648,66	5054872,29	45° 37,980'	013° 11,953'
OR009	2379729,66	5054802,13	45° 37,943'	013° 12,017'
OR010	2379735,46	5054788,75	45° 37,936'	013° 12,021'
OR011	2379744,03	5054798,65	45° 37,941'	013° 12,028'
OR012	2379740,89	5054818,57	45° 37,952'	013° 12,025'
OR013	2379718,28	5054838,37	45° 37,963'	013° 12,007'
OR014	2379695,70	5054858,10	45° 37,973'	013° 11,990'
OR015	2379673,12	5054877,83	45° 37,983'	013° 11,972'
OR016	2379650,51	5054897,53	45° 37,994'	013° 11,954'
OR017	2379627,94	5054917,30	45° 38,004'	013° 11,937'
OR018	2379605,32	5054937,03	45° 38,015'	013° 11,919'
OR019	2379582,71	5054956,72	45° 38,025'	013° 11,901'

**Table 7:** conversion of the GB FE plane coordinates shown in attachment B bis into WGS84 geographic coordinates.



**Figure 5:** positions of the structures identified (in red) compared to the positions obtained from attachment B bis (in black).

As can be seen from the figure above, in the vicinity of the "tube" structure OR001 only 2 pyramids have been identified, both damaged, both located SE to the OR001. The pyramids OR008 and OR002 has not been identified despite intense searches. The pyramids OR012 and OR015 have not been identified with certainty. Three pyramids in good condition have been identified near the OR002 "tube" structure.

ID	Gauss Boaga Fuso Est		WGS84	
	X	Y	Lat N	Long E
OR001	2379525.86	5054974.94	45° 38,034'	013° 11,857'
OR002	2379733.28	5054835.01	45° 37,961'	013° 12,019'
OR005?	2379532.20	5054969.24	45° 38,031'	013° 11,862'
OR006?	2379538.75	5054972.76	45° 38,033'	013° 11,867'
OR009?	2379738.14	5054822.00	45° 37,954'	013° 12,023'
OR010?	2379739.59	5054827.53	45° 37,957'	013° 12,024'
OR011?	2379734.70	5054842.42	45° 37,965'	013° 12,020'
OR012?	2379709.56	5054879.67	45° 37,985'	013° 12,000'
OR015?	2379650.64	5054929.90	45° 38,011"	013° 11,954'
OR018?	2379582.70	5054960.66	45° 38,027'	013° 11,901'

**Table 8:** coordinates of the 8 structures identified and verified during the dives.

The installation was carried out with a pontoon equipped with a hoist (Photos 6, 7 and 8).



Photo 6



Photo 7



Photo 8

The exact location for the positioning of the pyramids was guided by the following criteria:

- OR005 and OR006: although in the immediate vicinity of the "tube" structure OR001 2 pyramids were identified, both damaged, it was decided not to place the new structures adjacent to them. In fact, it is believed that the existing pyramids were damaged by the mooring chain of the signalling buoy attached to the block placed a few meters away. In order to prevent the 2 new structures from being damaged, it was deemed appropriate to place them at N of OR001, outside the range of action of the chain;
- OR008: not having been able to find the existing pyramid, it was decided to place the new structure in the position envisaged by the original project, i.e. at the centre of the segment joining OR001 and OR002;
- OR009: the new pyramid was placed adjacent to the most damaged one of the three found near OR002;
- OR0012 and OR0015: the new pyramids were placed adjacent to two of the three existing structures found distant from OR001 and OR002.



Figure 6 shows (in green) the positions of the 6 new pyramids with respect to the positions (in red) of the existing structures identified.

Table 9 shows the coordinates of the structures laid in the context of this project.



Figure 6: positions of the new pyramids (in green) compared to the positions of the identified existing structures (in red).

ID	Gauss Boaga Fuso Est		WGS84	
	X	Y	Lat N	Long E
OR005 2022	2379519.52	5054984.31	45° 38,039'	013° 11,852'
OR006 2022	2379528.68	5054986.00	45° 38,040'	013° 11,859'
OR008 2022	5054902.31	2379626.86	45° 37,996'	013° 11,936'
OR009 2022	5054821.80	2379737.43	45° 37,954'	013° 12,022'
OR012 2022	5054879.21	2379710.33	45° 37,985'	013° 12,001'
OR015 2022	5054929.33	2379651.40	45° 38,011"	013° 11,954'

Table 9: coordinates of the 6 new TecnoReef pyramids.

As a corollary to this discussion, it should be noted that, as already mentioned, the mooring block of the signalling buoy was originally placed near the "tube" structure OR001 and two pyramids, presumably OR005 and OR007. The continuous motion of the chain, connected to the signaling buoy on the surface, caused damage to the three structures. To avoid this, it is recommended to install a jumper buoy.

### Colonisation

About a month after the installation, the structures showed an initial veil of bacteria and the first presence of hydrozoa and spirorbid polychaetes. Subsequent dives have revealed a slight improvement in colonisation with an increase in colonised surfaces (practically 100%) by pioneer species such as spirorbid polychaetes and sabellids with the presence of some small Clamidae molluscs and flat oysters (*Ostrea edulis*). The covering of the new pyramids is proceeding and only after the summer season could we observe the presence of organisms such as porifera and tunicates which will allow us to reach the state of the older pyramids (Photo 11).



**Photo 9:** first colonization of the pyramids at the end of October 2022.



Photo 10: colonisation of the new pyramids in April 2023.

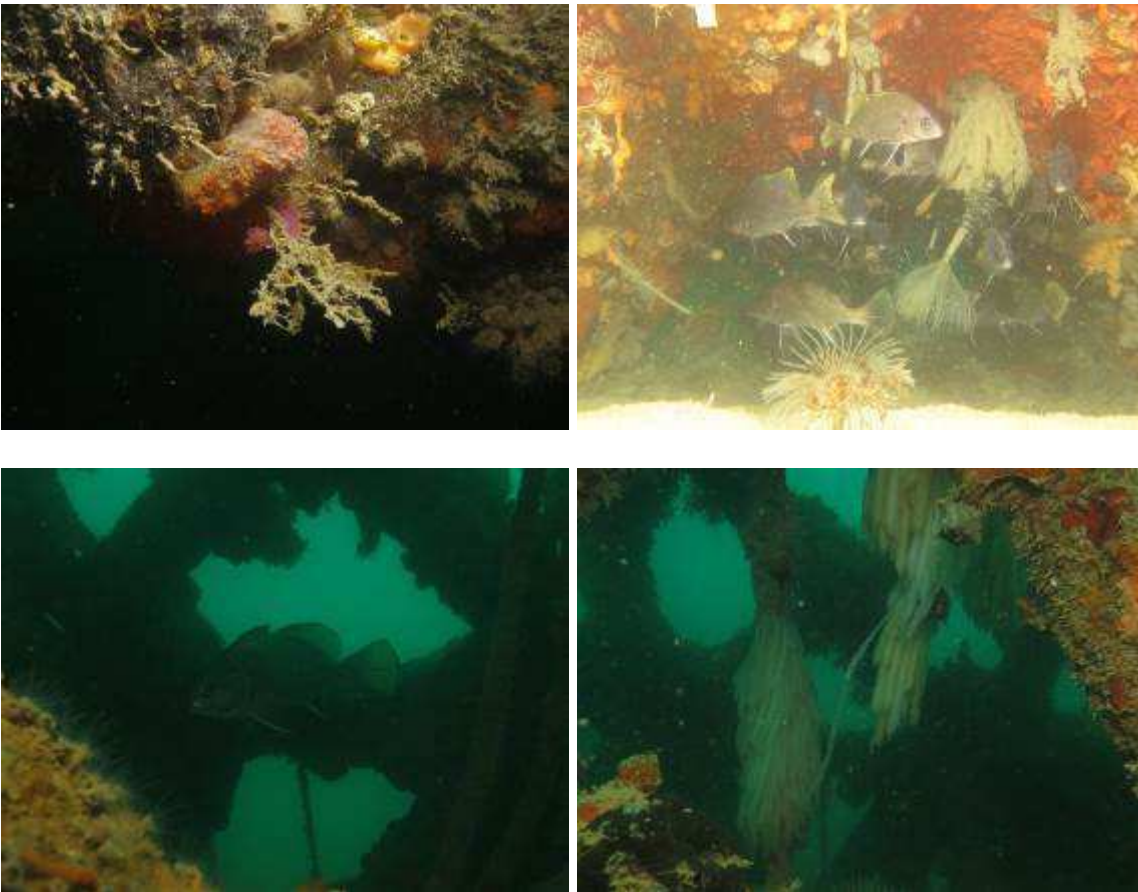


Photo 11: colonisation of the old pyramids in April 2023.

## 6. Guidelines and protocol for the management of the marine area

The Lignano sewage pipeline and the nearby ADRIBLU areas SP001 and SP002, which have long been equipped with different types of artificial barriers, are known to both sport and professional fishermen, due to the effect of concentration of fish species within these structures.

From the interviews with the representatives of the local fishing cooperative, it emerges that in recent years there has been a clear decline in the presence of fish in the area, while maintaining the presence of juvenile shoals of various species, especially in the spring-summer period.

A possible role of a site with these characteristics could evidently be important due to the presence of nutrients capable of stimulating the food chain. In the spring and summer periods there is a great abundance of small pelagic species (juvenile blue fish) which also attract important predators (i.e. dolphinfish and tuna) that cannot be target species.

The overall area have a limited extension (the long sides of the area are approximately 300 m) and is now managed as a no-take zone, given its possible role as a source of target species for nearby areas. However, the management of this little area has to be considered in the framework of a wider strategy aimed at the management of the western Friuli Venezia Giulia coastal marine area by the local fishermen Cooperative (COGEPA). Area that is nowadays involved in an important project dealing with the setting of artificial barriers dedicated to fish restocking, near the coastline between the mouth of the Tagliamento river and the study area. It is therefore necessary to envisage the overall management of the entire fishing area, aiming at greater fruition and rotation fishing opportunities. The regulation for future management will be prepared during meetings with professional operators to propose to the regional institutions in charge and to the competent Ministry for Fisheries a management plan for a wider area that includes all the areas with artificial structures and the related seabed.

In an optic of a possible management of the ADRIBLU area by the local fishery cooperative it is recommended to strongly regulate possible fishing pressure, focusing on selective fishing techniques (e.g. 36 mm mesh or larger), targeting large animals. It will be necessary an evaluation of the catches and monitoring of the populations of the area over time, with a continuous dialogue with the operators of artisanal fishing. In addition to maintaining constant attention to the reproductive periods of the different species.

This activity could be done in advance by planning the fishing periods and the type of gear to be used; not only tools such as bottom nets, but also pots dedicated to crustaceans or cephalopods. For example, lobster fishing could be concentrated/allowed only for a limited period, between the end of winter and the beginning of spring, always with dedicated and very selective tools.

Therefore, the following topics must be foreseen:

- catch restrictions (size);
- gear restrictions (mesh size);
- restriction on the number of weekly and annual fishing days;
- restrictions on the fishing period.

An initial operational hypothesis can be elaborated by considering the size of the area and the fishing effort that can be applied to it without risking the loss of equipment on the barriers and without heavily affecting the fish population. The possible exploitation of the area could allow 2 gillnets 300 m long on each side for a maximum of 1,200 m of net. This by lowering the nets between the Fixed and FAD structures perpendicular to the coast. This fishing effort by a small fishing vessel every 15 days (twice a month).

Fishing can be done with gillnets (trammel nets only for cuttlefish in season) with a suggested mesh size of at least 30 mm. The target are the larger individuals, who are of greater interest in the market while maintaining the presence of juveniles in the area.

An internal regulation among professional operators may consider not fishing or rather releasing individuals close to reproduction (females and males with eggs) or species that result in catches of little interest such as selachians.

All these provisional guidelines have been discussed with the local fishing cooperative, defining the role of the ADRIBLU area as a no-take zone.

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## 8. Attachments

### WINTER CAMPAIGN

<b>Stazione</b>	<b>SP001</b>		Data	16/01/2023		
<b>Campagna I</b>					Latitudine (N)	Longitudine (E)
Inizio cala	ora	16:34	Coordinate	Inizio cala	45° 38,0423'	13° 11,8885'
Fine Cala		16:38		Giro cala	45° 37,949'	13° 12,0481'
Lunghezza cala	m	600		Fine Cala	45° 37,9997'	13° 11,9209'
Inizio raccolta	ora	18:05		totale tempo	01:31	
Rete Tipo		trimaglio				
Lunghezza cala	m	600				
maglia	(lato mm)	36				
altezza rete	cm	160				
<b>Campagna I</b>	<b>16-gen-23</b>					
<b>Super classe/Phylum</b>	<b>Classe</b>	<b>Famiglia</b>	<b>Specie/Taxa</b>	<b>n.pz</b>	<b>Peso [g]</b>	
Pisces	Osteichthyes	Carangidae	<i>Trachurus trachurus</i>	13	849	
		Sparidae	<i>Pagellus erythrinus</i>	2	353	
		Sciaenidae	<i>Umbrina cirrosa</i>	4	290	
			<i>Diplodus annularis</i>	34	4477	
		Centracanthidae	<i>Spicara maena</i>	7	513	
Mollusca	Cephalopoda	Sepiidae	<i>Sepia officinalis</i>	2	726	
Totale	specie	6		62	7208	
	Individui	62				
Resa	n.ind/100 m	23,8				
	Kg/100 m	1,20				

Stazione	Bianco		Data	16/01/2023		
<b>Campagna I</b>						
Inizio cala	ora	16:20	Coordinate	Inizio cala	Latitudine (N)	Longitudine (E)
Fine Cala		16:24			45° 38,1504	13° 12,1447'
Lunghezza cala	m	600		Fine Cala	45° 38,2914'	13° 12,5885'
Inizio raccolta	ora	17:45		totale tempo	01:25	
Rete Tipo		trimaglio				
Lunghezza cala	m	600				
maglia	(lato mm)	36				
altezza rete	cm	160				
<b>Campagna I</b>						
<b>16-gen-23</b>						
<b>Super classe/Phylum</b>	<b>Classe</b>	<b>Famiglia</b>	<b>Specie/Taxa</b>	<b>n.pz</b>	<b>Peso [g]</b>	
Pisces	Osteichthyes	Syngnathidae	<i>Hippocampus guttula</i>	1	15	
Totale	specie	1		1	15	
	Individui	1				
Resa	n.ind/100 m	0,4				
	Kg/100 m	0,003				



<b>Bianco</b>				
<b>Campagna I</b>	16/01/2023			
<b>Specie</b>	<b>dimensioni</b>	<b>[cm]</b>	<b>Peso [g]</b>	
<i>Hippocampus guttulatus</i>	L tot.	nd	15	liberato

<b>SP001</b>				
<b>Campagna I</b>	16/01/2023			
<b>Specie</b>	<b>dimensioni</b>	<b>[cm]</b>	<b>Peso [g]</b>	
<i>Trachurus trachurus</i>	L tot.	19,5	57	
		19	52	
		23,5	97	
		21	73	
		18,5	53	
		20	55	
		19,5	59	
		21	72	
		21	71	
		23	99	
		17,5	42	
		20	60	
		19,5	59	
<i>Pagellus erythrinus</i>	L tot.	23,5	176	
		24	177	
<i>Spicara moena</i>	L tot.	18,5	66	
		20	80	
		20,5	80	
		18,5	70	
		18,5	69	
		9	75	
		18	73	
<i>Diplodus annularis</i>	L tot.	20	130	
		20,5	142	
		19	122	
		21	163	
		21	145	
		19	124	
		19,5	143	
		21	157	
		19,5	135	
		21	136	
		19	108	
		21	169	
		19	134	
		18,5	122	
		19	119	
		19,5	132	
		21	124	
		19,5	132	
		19,5	134	
		20,5	150	
		19	127	
		21	149	
		19	112	
		20	142	
		19	105	
		21	148	
		19	106	
		19,5	125	
		23	184	
		20	153	
		14,5	28	
		19	123	
		20,5	141	
		19	115	
<i>Sepia officinalis</i>	L tot.	11	226	
		15	500	
<i>Umbra cirrosa</i>	L tot.	27	290	liberata
<b>Totale Peso [g]</b>			<b>7208</b>	

## SPRING CAMPAIGN

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Stazione	SP001		Data	28/04/2023		
<b>Campagna II</b>					Latitudine (N)	Longitudine (E)
Inizio cala	ora	04:25	Coordinate	Inizio cala	45° 38,0307'	13° 11,8879'
Fine Cala		04:27		Giro cala	45° 38,9462	13° 12,0497'
Lunghezza cala	m	600		Fine Cala	45° 38,0251'	13° 11,8618'
Inizio raccolta	ora	06:15		totale tempo	01:50	
Rete Tipo		trimaglio				
Lunghezza cala	m	600				
maglia	(lato mm)	36			c cv	
altezza rete	cm	160				
<b>Campagna II</b>	<b>28-apr-23</b>					
<b>Super classe</b>	<b>Classe</b>	<b>Famiglia</b>	<b>Specie/Taxa</b>	<b>n.pz</b>	<b>Peso [g]</b>	
Pisces	Osteichthyes	Sparidae	<i>Pagellus erythrinus</i>	1	291	
		Centracanthidae	<i>Spicara maena</i>	2	133	
Mollusca	Cephalopoda	Sepiidae	<i>Sepia officinalis</i>	2	746	
Totale	specie	3		5	1170	
	Individui	5				
Resa	n.ind/100 m	1,9				
	Kg/100 m	0,45				

Stazione	Bianco		Data	28/04/2023		
<b>Campagna II</b>					Latitudine (N)	Longitudine (E)
Inizio cala	ora	16:20	Coordinate	Inizio cala	45° 38,1504	13° 12,1447'
Fine Cala		16:24				
Lunghezza cala	m	600		Fine Cala	45° 38,2914'	13° 12,5885'
Inizio raccolta	ora	17:45		totale tempo	01:25	
Rete Tipo		trimaglio				
Lunghezza cala	m	600				
maglia	(lato mm)	36				
altezza rete	cm	160				
<b>Campagna II</b>	<b>28-apr-23</b>					
<b>Super classe</b>	<b>Classe</b>	<b>Famiglia</b>	<b>Specie/Taxa</b>	<b>n.pz</b>	<b>Peso [g]</b>	
Pisces	Osteichthyes	Soleidae	<i>Solea solea</i>	1	99	
Multicrustacea	Malacostraca	Squillidae	<i>Squilla mantis</i>	1	68	
Totale	specie	2		2	167	
	Individui	2				
Resa	n.ind/100 m	0,8				
	Kg/100 m	0,03				

<b>SP001</b>			
Campagna II	28/04/2023		
Specie	dimensioni	[cm]	Peso [g]
<i>Spicara maena</i>	L tot.	17,5	60
		19,5	73
<i>Pagellus erythrinus</i>	L tot.	27,5	291
<i>Sepia officinalis</i>	L tot.	15	397
		15,5	349
Totale Peso [g]			1170

<b>Bianco</b>			
Campagna II	28/04/2023		
Specie	dimensioni	[cm]	Peso [g]
<i>Solea solea</i>	L tot.	23,5	99
<i>Squilla mantis</i>	L tot.	16	68
Totale Peso [g]			167

PICTURES



April 2023



April 2023



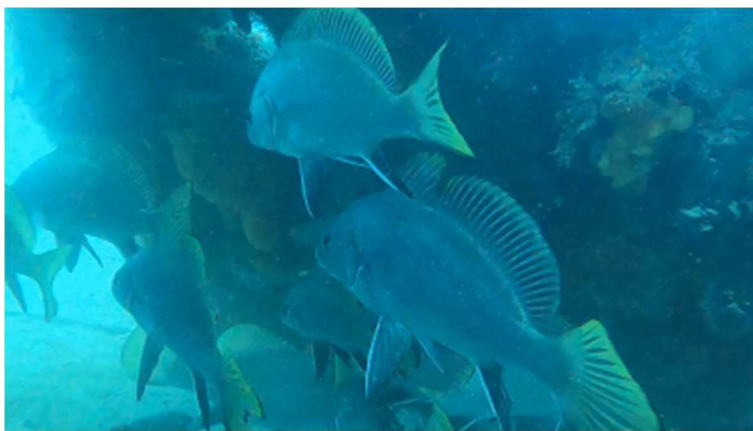
April 2023



April 2023



April 2023



April 2023



April 2023, squid eggs



October 2022

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October 2022



April 2023



April 2023



April 2023