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Abstract

This document describes the activities planned in activity 3.3 (Monitoring Campaigns) regarding the 2021 monitoring campaigns carried out between February and May at the three project sites (the additional ones will be carried out in September/October 2021) and includes baseline survey methodologies and all data collected, a comparison with preliminary survey data (WP 3.1) and an update on seagrass transplantations status and progress (WP 4.2).

The analysis of the data collected during the monitoring campaigns carried out in 2021 (between February and June) showed, at the Panzano Bay, some differences between the parameter values (2019 and 2021), probably due to the slightly different sampling periods. At the Kornati NP and RNP Coastal Dunes sites, changes in the mean values of the main parameters were found.

Regarding the update on the status and progress of the seagrass transplantations (planned in WP 4 activity 2), monitoring highlighted that, at the Panzano Bay, approximately 50% of the plugs transplanted in September 2020 and almost all the plugs transplanted in April 2021 were still in place. At the Kornati NP site, the total number of shoots and the leaf length showed a slight decrease (partly due to the high sedimentation trend). At the RNP Coastal Dunes site, shoot density and height of the longest leaf, showed good leaf conditions, but physical loss of shoots was due to multiple causes, that cannot be identified with certainty (i.e., fishing, anchoring, wave erosion).

1. Introduction

1.1. Aim and objectives

SASPAS (Safe Anchoring and Seagrass Protection in the Adriatic Sea) is an INTERREG project that aims to provide a proposal to develop and share actions and advanced policies for the conservation and sustainable use of the territory.

The common challenge of Project SASPAS is to preserve and get a better status of conservation of biodiversity of the Adriatic Sea ecosystem in order to decrease its vulnerability.

The overall objective is to improve the conservation and restoration of seagrasses by installing safe anchoring systems, performing pilot transplants, carrying out monitoring activities and establishing an integrated management system for seagrasses in the Adriatic area. The change will result in an increase in the level of conservation of habitat types and species in the Natura 2000 sites involved in the Project areas. To achieve the envisaged change the project will adopt a scientific-applicative approach, following the DPSIR (Driving force – Pressure – State – Impact - Response) causal framework, analyzing the interactions between society and the environment - the cause-effect relationships between interacting components of complex social, economic, and environmental systems. By doing so, it is possible to measure the effectiveness of responses put in place.

Since marine seagrasses and especially *Posidonia oceanica* beds (1120*) are widespread along the coastal areas of Interreg Programme and their conservation status is similar in the two Member States, significant results can only be achieved by establishing a good cross-border cooperation between the Italian and Croatian key partners. The cross-border approach ensures coordinated and cooperative actions in planning and performing the protection and restoration activities, as well as in the development of the envisaged Marine Seagrass Safeguard Integrated Management Program (i.e., the proposed guidelines for the management and proper behavior in protected areas). The innovative aspect, which goes beyond the existing common practices, consists in the joint protection and restoration of biodiversity at transboundary level through the development of specifically- tailored innovative solutions, harmonized for the Adriatic area and applicable to other similar realities facing with the same biodiversity protection and restoration issues.

The project activities have been carried out within the three project study sites (Figure 1):

- Monfalcone (Bay of Panzano),
- Kornati National Park – (Nacionalni Park Kornati),
- Regional Natural Park of Coastal Dunes from Torre Canne to Torre San Leonardo.

This proposal is well suited to the Adriatic, in particular to the Apulia (Regional Natural Park of Coastal Dunes from Torre Canne to Torre San Leonardo) and Kornati National Park, characterized by widespread coverage of *P. oceanica*. In both sites, in the summer, there is a significant flow of pleasure boats, and the development of the industry tourism cannot fail to reckon with the need to preserve the quality of the

territory, understood as a whole between land, coast and sea. In Monfalcone (Bay of Panzano), there is an important coverage of marine seagrasses (i.e., *Cymodocea nodosa*) too.



Figure 1. Location of the three project sites.

Both *P. oceanica* and *C. nodosa* play a crucial role in the consolidation of coastal sediments, slowing erosive phenomena, thanks to their rhizomial apparatus with which they anchor to the bottom; with the leaf they promote the capture of suspended sediments, helping to limit turbidity, not to mention a number of benefits for marine and lagoon organisms.

The main project outputs related to the planned activities are:

- monitoring system with 3 data collections/monitoring campaigns (1 in 2020 and 2 in 2021),
- placement of environmentally friendly anchoring systems (anchorage and simple signaling buoys),
- pilot seagrass transplants,
- Integrated Management System for seagrasses in the Adriatic area, made by a GIS Digital Information Platform (DIP) and a Marine Seagrass Safeguard Integrated Management Program (MSSIMP).

Protected areas managers, local, regional, and national public bodies, environmental associations, and NGOs, as well as the public will mainly benefit from the project activities.

1.2. Structure of Work Package 3

The objective of the Work Package 3 - *Integrate real-time monitoring system of marine seagrasses (phanerogamae) - in the involved Natura 2000 sites* – is to monitor and gather data on marine seagrasses in the three project sites, in order to improve the protection and to restore the biodiversity in the cross-border area.

The WP3 package consists of three activities:

- activity 3.1 - Preliminary Environmental Survey,
- activity 3.2 - Driver and Pressure Identification and Assessment,
- activity 3.3 - Monitoring campaigns.

The preliminary survey (activity 3.1) aimed to characterize the biodiversity of the project sites and gathering up-to-date information on the distribution and quality of seagrasses and their associated biota. The information collected, provided a starting point for the analysis of existing drivers and pressures, following the DPSIR (Drivers-Pressure-State-Impact-Response) procedures (activity 3.2). Monitoring campaigns were carried out to control the plants phenological life cycle and the spatial dynamics of marine seagrasses as a response to the concrete actions (activity 3.3). Moreover, they will help to identify the potential impacts that the project could have on seagrass meadows and other valuable habitats and species.

The analyses included all monitoring data, especially those concerning the retreat or surface increase dynamics that will be related to the behavior of biodiversity at eco-friendly buoys.

Thus, the goal is to characterize and quantify, in time and space, the measured impacts and assess trends in biodiversity, as far as possible over the Project time frame. The results are critical to activate or strengthen different types of protection policies, to act with additional conservation measures or to manage recreational boat areas differently.

This document describes the activities planned in activity 3.3 (Monitoring Campaigns) regarding the 2021 monitoring campaigns carried out between February and May at the three project sites (the additional ones will be carried out in September/October 2021).

All the activities were conducted adopting up-to-date safety protocols, to reduce risks during underwater operations. Expert marine and transitional water biologists, according to standard operating procedures for the macrophytobenthos, performed laboratory analyses of collected samples.

Specifically, this Monitoring Campaign Report includes baseline survey methodologies and all data collected, a comparison with preliminary survey data (WP 3.1) and an update on seagrass transplantations status and progress (WP 4.2).

2. The three project areas and the Natura 2000 sites.

2.1. Monfalcone (Bay of Panzano)

The Bay of Panzano is a small bay of the Adriatic Sea (Friuli-Venezia Giulia), located in the northern part of the Gulf of Trieste, limited to the south-west by the Punta Sdobba, at the mouth of the Isonzo River. Inside the Panzano Bay are located two Natura 2000 sites: a Special Areas of Conservation (SAC) “Cavana di Monfalcone”, a Special Area of Conservation (SAC) and a Special Protection Area (SPA) “Foce dell’Isonzo - Isola della Cona” (Mouth of the Isonzo River and Cona Island) (Figure 2).

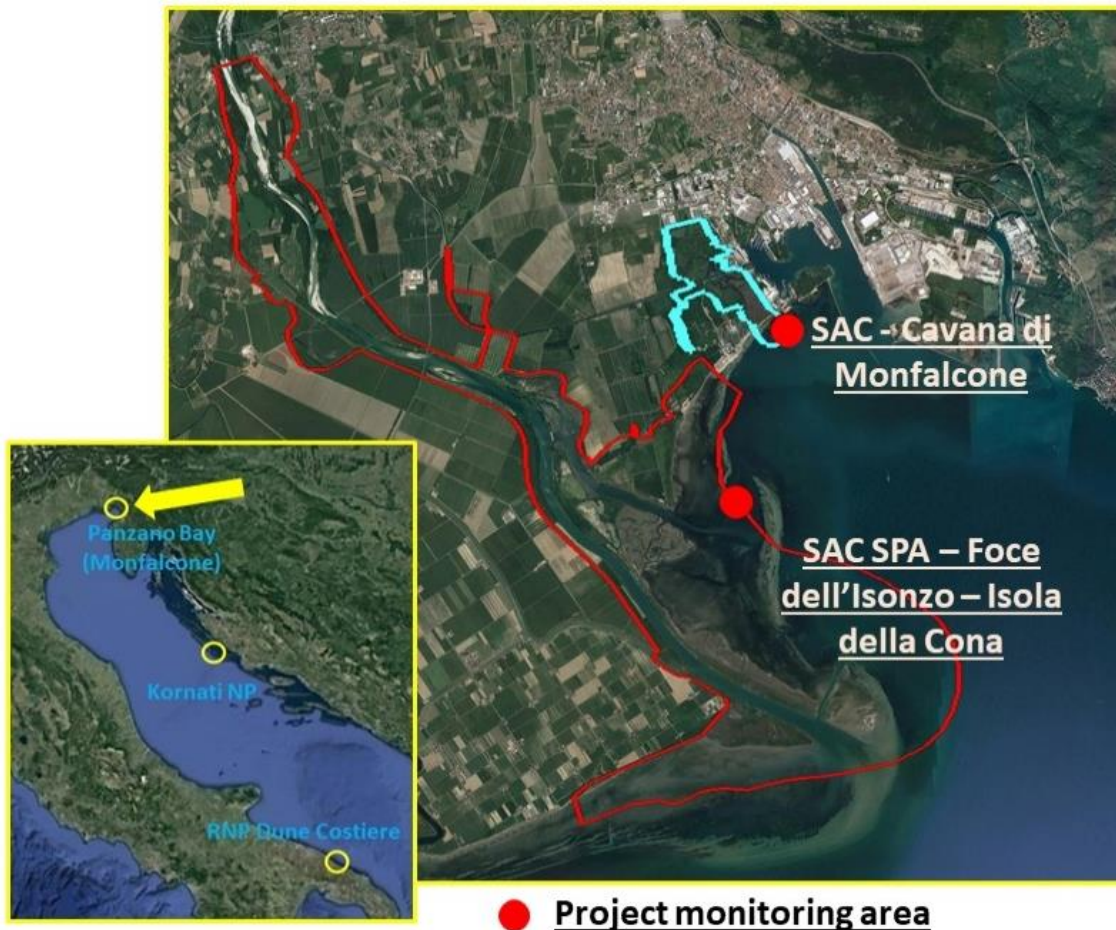


Figure 2. Location of the study areas in the Panzano Bay, positioned in two Natura 2000 sites.

Natura 2000 site: SAC IT3330007 - Cavana di Monfalcone

The “Cavana di Monfalcone” SAC extends over a surface of 133 ha, of which 12% is marine, in the transition area between the flat land and the Adriatic Sea. It is important because it includes a set of ecological systems characterized by rare habitats in a good status of conservation. A complex system of spring canals is still present, not modified by land reclamation. It is a site that includes the spring ecological system closest to the coastline and therefore in direct contact with salt and marine waters. Aquatic surfaces with different trophic status, water speed, depth and salinity preserve a rich and well-diversified aquatic vegetation.

Habitat 1110 (“Sandbanks which are slightly covered by sea water all the time”) is present in the marine zone of the site. It consists mainly of sandy sediments (larger grain-size sediments, including boulders and cobbles, or smaller grain-size sediments including mud may also be present). These habitats are permanently submerged and predominantly surrounded by deeper water. Above the sand-bank the water depth rarely exceeds 20 m. In these sub-littoral sandbanks, seagrass meadows can be present: *Zostera marina* (in brackish-salt waters), *Cymodocea nodosa* (in salt waters) and *Zostera noltei* in shallower salty waters.

The other Habitat identified is the 1140 (“Mudflats and sandflats not covered by sea water at low tide”) and is characterized by sands and mud emerging during the low tides, partially covered by *Zostera noltei* and partly coated by green, blue, brown macroalgae, and diatoms.

Natura 2000 site: SAC SPA IT3330005 - Foce dell'Isonzo - Isola della Cona

The “Foce dell'Isonzo – Isola della Cona” SAC SPA covers an area of 2.668 ha, 40% of which is marine. It is situated in the eastern part of the Friuli Venezia Giulia region along the last stretch of the Isonzo River and coincides in large part with the “Foce dell'Isonzo Regional Nature Reserve”.

The marine part of the site covers about 1.100 ha of shallow waters with relevant extensions of seagrass meadows; in the marine part of the site the Habitat 1110 (“Sandbanks which are slightly covered by sea water all the time”) and the Habitat 1140 (“Mudflats and sandflats not covered by sea water at low tide”) are present.

2.2. Regional Natural Park of Coastal Dunes from Torre Canne to Torre San Leonardo

The “Regional Nature Park Dune Costiere from Torre Canne to Torre San Leonardo” extends for 1.100 ha, along 8 km of coastline, and includes the inland agricultural areas occupied by centuries-old olive groves and ancient “masserie” (typical Apulian farms) (Figure 3). The perimeter follows the long course of the “lame” (55 km of erosion), which characterizes the Park's territorial morphology. They are linear clefts of the land perpendicular to the coastline, with flat bottom and slightly sloping sides originated by the erosive action of surface waters.

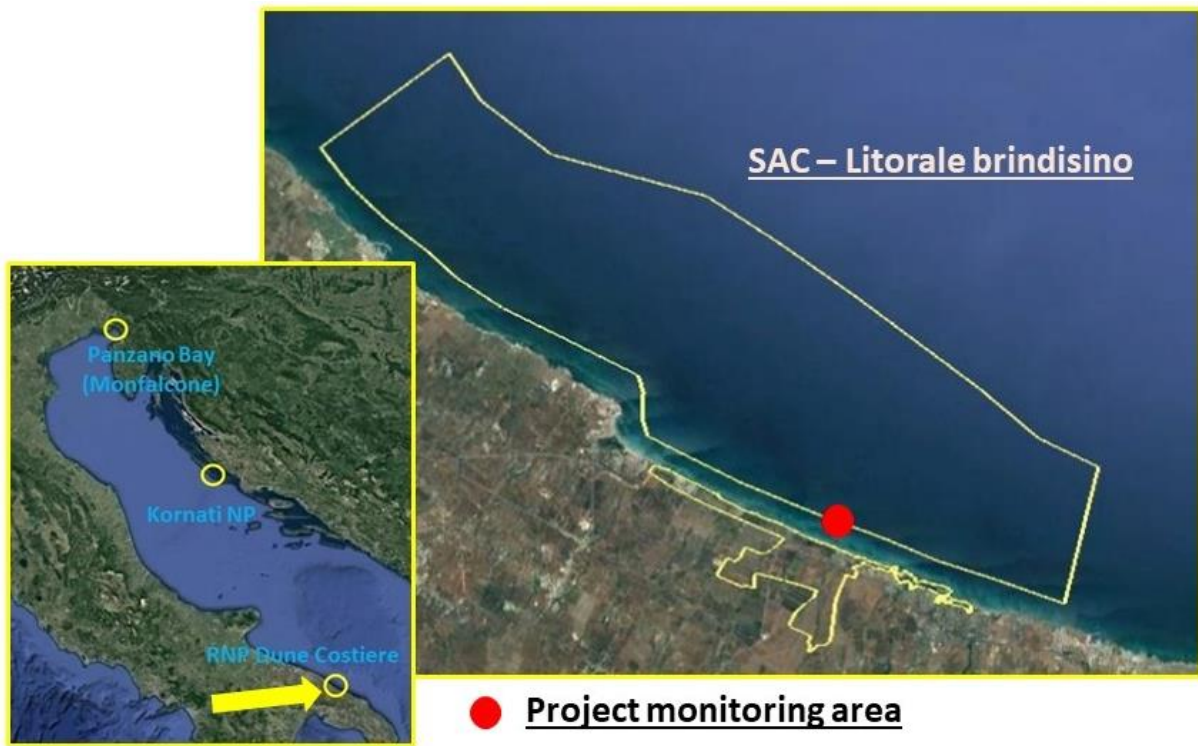


Figure 3. Location of the study area in the RNP Dune Costiere, positioned in a Natura 2000 site.

In the protected area, many habitats are present. Each habitat is a result of the geological, morphological, and climatic features of the site that determines the presence of plant and animal species. Some of them are considered priority habitats, such as that colonized by *Posidonia oceanica*. Starting at a depth of 10-12 m, *P. oceanica* meadows are present on sandy bottoms.

The park includes the Special Areas of Conservation (SAC) “Litorale brindisino”.

Natura 2000 site: SAC IT9140002 - Litorale brindisino

The SAC “Litorale brindisino” covers an area of 7,256 ha, 95% of which is marine. The priority habitat 1120* (*P. oceanica*) covers 50% of the total area. It is also characterized by the presence of coastal wetlands, where rare or endangered species of migratory birds stop or reproduce.

2.3. Kornati NP

Kornati National Park is designated as Site of Community Importance SCI HR4000001 - Nacionalni park Kornati (Figure 4). The park¹ was established in 1980 and its management began in 1982. It currently includes 89 islands and reefs, a total area of 217 km², of which almost 80% is marine territory (land 50 km² / sea 167 km²) and a total coastline of 238 km. Karst features dominate its geomorphology. It is estimated that at least 2,500 to 3,000 families of benthic and pelagic fauna live in the Kornati archipelago such as 353 species of macroalgae, 3 species of underwater flower plants as well as about 850 animal species – 61 species of corals, 177 species of mollusks, 127 species of polychaetes, 61 species of decapod crabs, 64 species of echinoderms and 185 species of fishes. Meadows of *P. oceanica* are also present in the Park, up to a depth of 25-30 meters. The presence of alien species is included among the anthropogenic threats. *P. oceanica* is particularly threatened by some macroalgal species: *Caulerpa cylindracea*² (that has been observed in the last years and is spreading in the entire Park) and the turf-forming red algae *Womersleyella setacea* and *Acrothamnion preissii* (two species that grow over *Posidonia* rhizomes).

Public Institution, under the competence of the Ministry of Economy and Sustainable Development, manages the Kornati National Park. The land part of the park is entirely privately owned (around 620 owners).

Four no-take zones are present where scientific research is only allowed. Sailing is allowed in the entire Kornati National Park except in the areas of strict protection. Anchoring and overnight stay are allowed only in 19 locations (bays and coves). Autonomous diving is allowed only in organized groups, with a license for autonomous diving in the Kornati NP obtained in advance.

Since 2013, traditional fishing in Kornati National Park is forbidden and only recreational fishing is allowed.

¹ The data cited in the following paragraphs are reported in the articles: Casier (2011); Mihelcic and Ramov (2018); Ivković, (2015).

² *Caulerpa cylindracea* Sonder [previously known as *Caulerpa racemosa* var. *cylindracea* (Sonder) Verlaque, Huisman et Boudouresque]

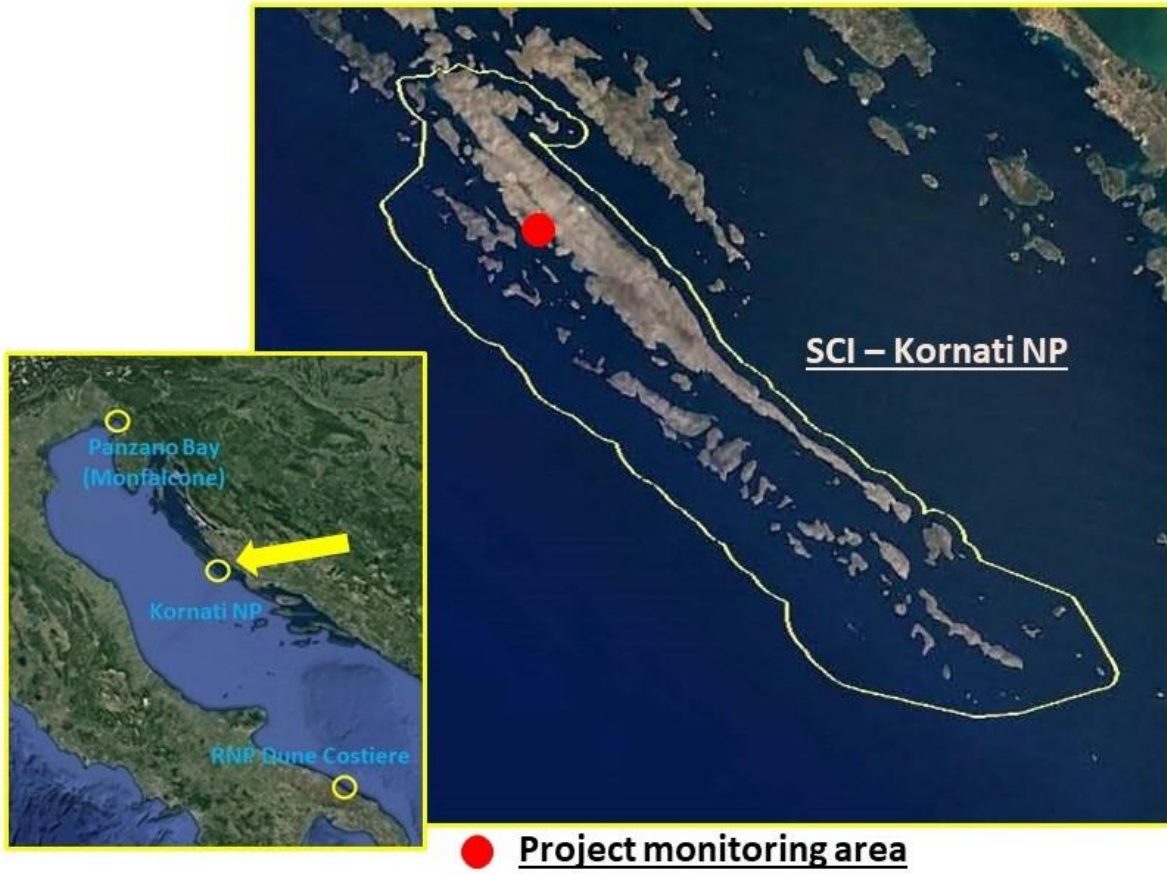


Figure 4. Location of the study area in the Natura 2000 site Kornati NP.

3. SASPAS MONITORING PROTOCOL

The SASPAS Monitoring Protocol aims to identify the best procedure to perform both field surveys and laboratory analyses in order to define a shared methodology to assess the status of seagrass meadows in Natura 2000 sites.

The protocol identifies useful indicators to monitor the status and possible changes of seagrass meadows and to assess the effects on the ecosystem of the concrete actions implemented in WP4: the pilot seagrass transplants (activity 4.2) and the placement of environmentally friendly anchoring systems (anchorage and simple signaling buoys) (activity 4.1). The monitoring protocol allows for the acquisition of necessary and univocal information related to the three project sites (Chapter 2).

The SASPAS Monitoring Protocol is a chapter in the “WP 3 Activity 1 - PRELIMINARY SURVEY REPORT” and specifies the methodologies for carrying out the activities as planned in activity 3.1 (Preliminary Environmental Survey) and activity 3.3 (Monitoring campaigns) and includes:

- a brief description of the seagrass species likely to be found at the three project sites - knowledge of these species is useful for selecting appropriate indicators because, although similar, the species have differences that may affect the applicability of the indicators;
- the best procedure to carry out field surveys and laboratory analyses;
- the description of indicators measured during the field and laboratory activities, in order to assess the status of seagrass meadows, in different stations to be appropriately placed nearby the areas where concrete actions were carried out.

In this document, the description of indicators measured during the field and laboratory activities is only reported.

3.1. Monitoring activities

The SASPAS Monitoring Protocol was applied to the field activities planned in activity 3.1 (Preliminary survey) and, more extensively, in activity 3.3 (Monitoring campaigns).

In activity 3.1, the protocol was applied to broader areas to update knowledge of the status of biodiversity at the project sites (e.g., species, bathymetry, seagrass presence/absence, meadow extension and coverage) and to identify specific areas where concrete actions were implemented (as planned in activity 4.1 and activity 4.2) to protect the habitat of *P. oceanica* and/or other marine seagrasses. Information on operational limits, general criticalities, prohibitions, local ordinances, etc. was also gathered.

The same methodologies of sampling and sample laboratory analyses, used during the preliminary survey activities (activity 3.1), were adopted during the 2020 and 2021 monitoring campaigns (activity 3.3), to check the success of the protection measure activities (activity 4.2 - pilot seagrass transplants).

In addition to the use of specific indicators, described in detail below, the monitoring protocol includes underwater photo and video surveys to document field activities.

During the boat-supported field activities, direct observations were carried out through scuba diving, video-photographic records, and seagrass sampling. All these activities were carried out by Scientific Scuba Operators, and if necessary, in the case of special operations, also considering possible requests from local Maritime Authorities.

All activities were implemented in accordance with national laws, regulations, and permissions. Diving permits to carry out the monitoring activities were obtained from the Ministry of Environmental and Nature Protection. For monitoring at sites within protected areas, permission from the management board of MPA or Park is required.

All the activities were conducted by adopting updated safety protocols, to reduce risks during diving operations. A safety plan was set up for all field activities to profile and manage surface and underwater operations according to criteria to maintain a high safety standard (such as the use of a stand-by operator, underwater communicators, floating indicators, etc.).

Because of their wide national and European distribution and similar morphological structure (leaves, roots, rhizomes), the monitoring protocols for *Zostera marina*, *Zostera noltei* and *Cymodocea nodosa* appear to be relatively similar.

Monitoring sites were examined at approximately the same time of year, each year: late spring-summer for *C. nodosa* and *Zostera* spp. and late summer-early autumn for *P. oceanica*.

Sampling planned in activity 3.3 (and in activity 3.1), according to the monitoring protocol, was performed on selected stations. In each study site, three Zones were selected where three monitoring stations were placed at different depths, for a total of nine stations (Figure 5).

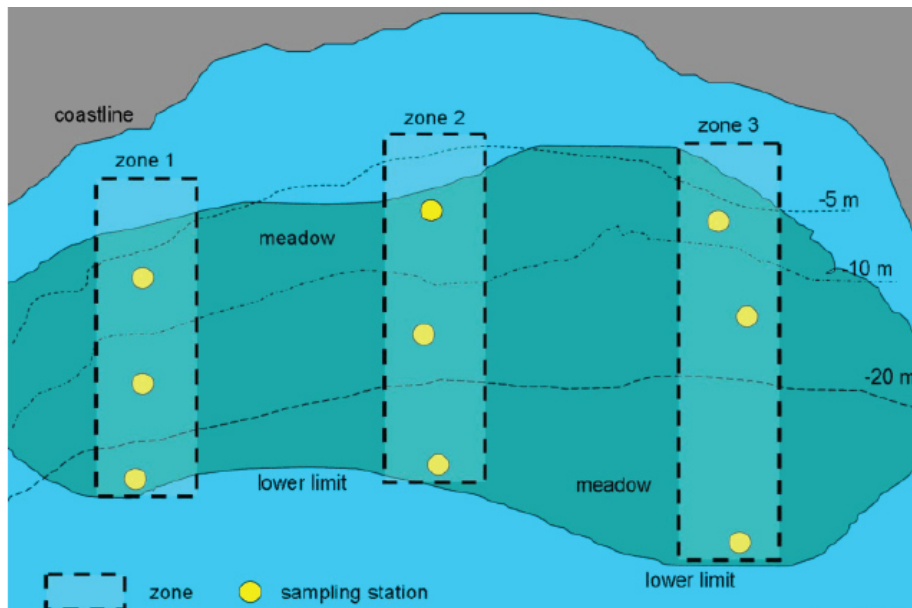


Figure 5. Example of distribution of sampling stations in the three zones and at three different bathymetric ranges (UNEP/MAP - RAC/SPA, 2014).

3.2. Sampling methodology scheme and indicators

The proposed sampling methodology and indicators are shown in Figure 6. The scheme, taken from the ISPRA monitoring protocol for *P. oceanica* (ISPRA, 2012) for the WFD monitoring, was simplified to be adapted to the objectives and timing of the SASPAS project. The indications reported in the UNEP/MAP - RAC/SPA (2014) monitoring protocol for *P. oceanica* were also considered to achieve the integration of the two protocols.

Considering that:

- the activities scheduled by the SASPAS project (39 months) allowed only two vegetative monitoring seasons,
- some status indicators have an ecological significance only if collected for several years,
- the structure and phenology of *P. oceanica*, partially differ from those of the other seagrasses,
- species require different transplanting and monitoring periods,
- seagrass meadows are characterized by great interannual variation,

only status indicators were selected for the monitoring protocol that could meaningful and useful answers over the timeframe of the project.

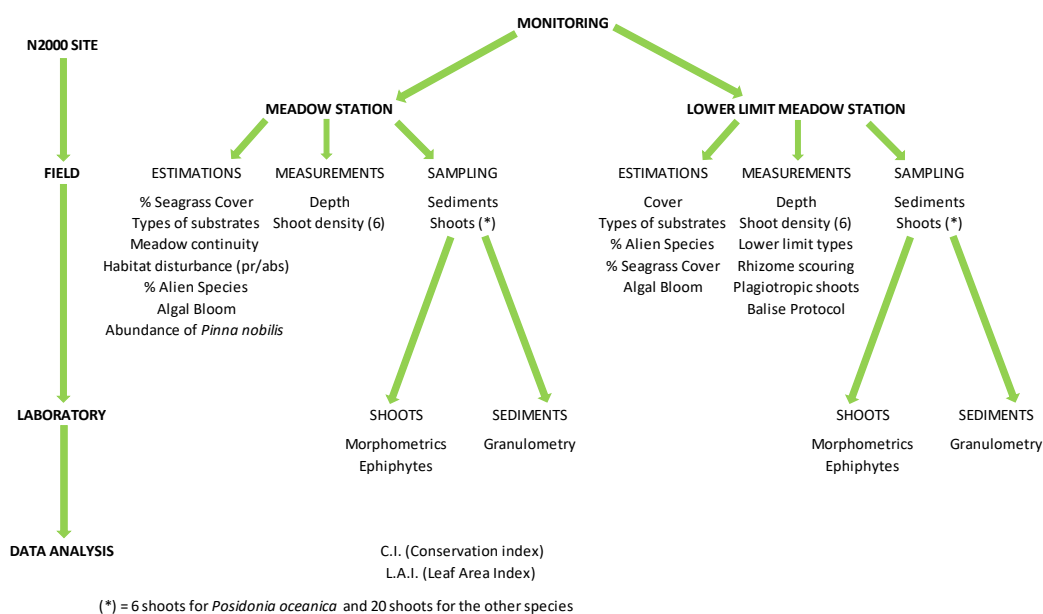


Figure 6. Sampling methodology scheme (ISPRA, 2012, modified).

The following table (Table 1) shows the indicators selected for the protocol.

Table 1. List of indicators selected for the monitoring protocol.

Indicators	Seagrass Meadows		
	<i>Posidonia oceanica</i>	<i>Zostera</i> spp.	<i>Cymodocea nodosa</i>
Meadow Cover (%)	x	x	x
Continuous/discontinuous meadow	x	x	x
Dead matte (%)	x		
Depth limit (m)	x		
Substrate type	x	x	x
Shoot density (shoots/m ²)	x	x	x
Shoot morphometric measurement	x	x	x
Balilage protocol	x		
Blooms and filamentous algae	x	x	x
Epiphytes (phyto-zoobenthos)	x	x	x
<i>Pinna nobilis</i> Abundance	x	x	x
Alien species (e.g. <i>Caulerpa</i> spp.)	x	x	x
Presence/absence of habitat disturbance	x	x	x

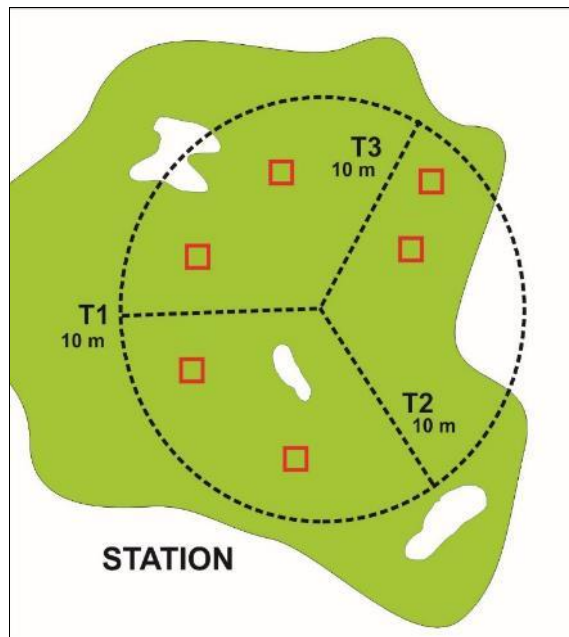


Figure 7. Sampling methodology scheme (Gerakaris *et al.*, 2017, modified).

Figure 7 is an example of a possible sampling design to test the spatial variability within each sampling site in different circular zones (Gerakaris *et al.*, 2017, modified). At each station, shoot density was measured in random quadrats and meadow cover was estimated along 10 m linear transects (T1, T2 and T3). The green polygon is a portion of a hypothetical meadow.

3.2.1. General data

Several types of data were collected at each station. General information was recorded at the meadow scale and the following data were recorded at each site: monitoring date; site name/code; coordinator and of the operator's name; exposure.

3.2.2. Percentage Cover and meadow continuity

Seagrass cover and its continuity/discontinuity describe the seafloor fraction covered by seagrasses on a 0-100% scale and provides a measure of seagrass abundance. As cover is depth-dependent, any measure of cover was related to water depth. Both density and length of shoot affect the estimation of the seagrass cover (e.g., short shoots may have the same cover as meadows of sparser but longer shoots). Seagrass cover may reflect the patchiness of seagrass stands or seagrass cover of within patches, or both.

Percent seagrass cover is usually visually estimated by a diver as the fraction of the bottom covered by seagrasses. Cover can be estimated directly as percentage or according to a cover scale. For *P. oceanica*

the cover of the dead matte was also evaluated.

SASPAS protocol: all percent cover values were assessed using the Line Intercept Transect (LIT) technique (Bianchi *et al.*, 2004) (Figure 8). Three transects, each of 10 m length, were monitored at each station (transects extend radially from a fixed central point). Key elements (Lx) cover measurements, along the transects (live seagrass; unvegetated muddy/sandy patches; unvegetated rocky patches; dead matte), were considered for each transect, at the nine stations.

Along the transects, all the key element changes were noted and recorded. Thus, the seagrass presence was referred as a percentage of transect length. As an approximation, this linear pattern was also reported to m² and averaged.

The per cent cover (R%) along a 10 m transect was calculated from the following formula:

$$R\% = \sum(Lx/10 * 100)$$

where Lx is the length of the cover, 10 is the length of the transect (Figure 9).

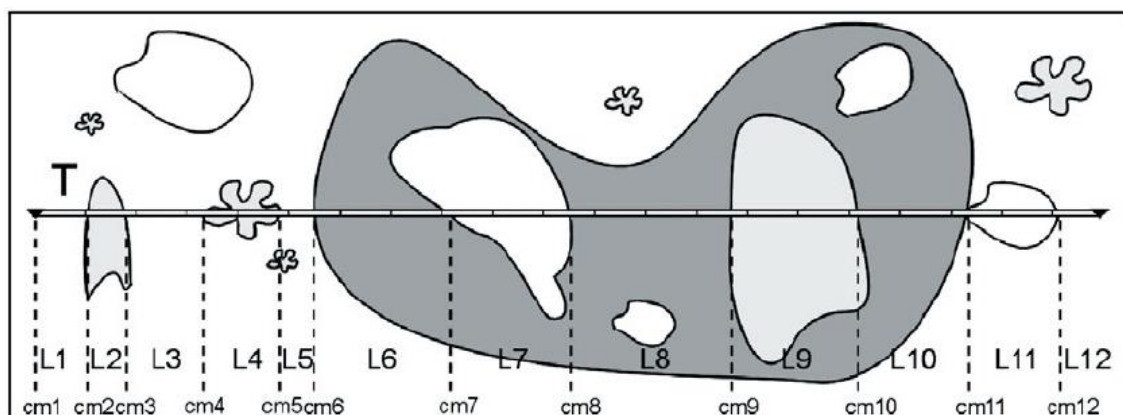


Figure 8. Line Intercept Transect (LIT) technique (Bianchi *et al.*, 2004).

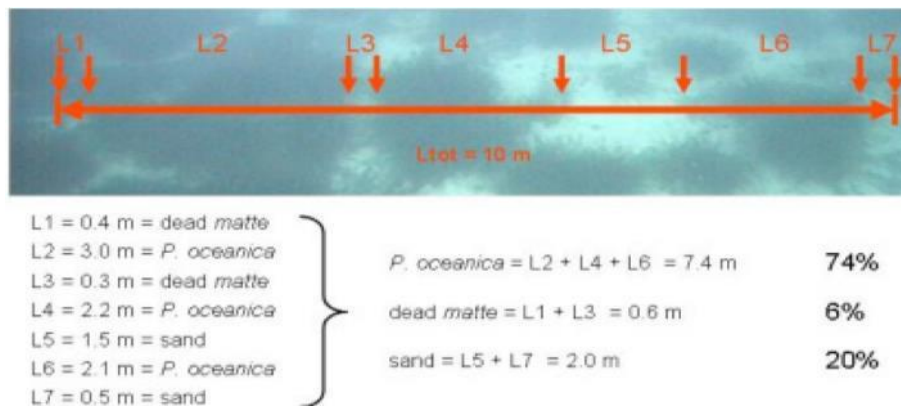


Figure 9. Example of LIT technique for the assessment of percentage cover (UNEP/MAP - RAC/SPA, 2014).

3.2.3. Shoot density

Shoot density is the number of seagrass shoots/m² and thus provides a measure of seagrass abundance along depth gradients. The decline in density with depth suggests that shoot density responds faster than other indicators (e.g., biomass and cover) to environmental changes and may be an early indicator of change or negative trends that are occurring in the habitat type (Borum *et al.*, 2004).

SASPAS protocol: shoot density was measured non-destructively by counting the number of shoots within sampling unit (six replicated quadrats) launched randomly at least one meter apart at each sampling station. As shoot density is depth-dependent, any measure of shoot density was related to water depth.

When shoot density is high (i.e. ≥ 2500 shoots/m²) counting of dense stands is only feasible using small sub-areas. Duarte and Kirkman (2001) suggested different frames size depending on the expected shoot density: 0.5 m x 0.5 m for less than 300 shoots/m², 0.25 m x 0.25 m for 300-3000 shoots/m² and 0.1 m x 0.1 m for more than 3000 shoots/m².

For *P. oceanica*, the number of shoots per m² is one of the most widely used descriptors to assess ecosystem health (Pergent-Martini *et al.*, 2005; UNEP/MAP-RAC/SPA, 2011) because it provides information on the viability and dynamic of meadows. This indicator also reveals changes due to human influence when measured on a multi-year time scale. Since the meadow density is strongly affected by the depth, Pergent *et al.* (1995) identified four classes, which are a function of the theoretical mean densities for each depth. They reflect the ecological conditions of the meadow (Buia *et al.*, 2004). Recently this classification was updated for the interpretation of monitoring data (UNEP/MAP-RAC/SPA, 2011) (Table 2).

Along the lower limit of *P. oceanica* meadows, rhizome scouring (laying bare of the rhizomes) and plagiotropic shoots (plagiotropic to orthotropic rhizome ratio) were also considered.

Table 2. Meaning of shoot density (shoots/m²) for *P. oceanica* (UNEP/MAP-RAC/SPA, 2011 modified).

Depth (m)	High	Good	Moderate	Poor	Bad
1	> 1133	1133 to 930	930 to 727	727 to 524	< 524
2	> 1067	1067 to 863	863 to 659	659 to 456	< 456
3	> 1005	1005 to 808	808 to 612	612 to 415	< 415
4	> 947	947 to 757	757 to 567	567 to 377	< 377
5	> 892	892 to 709	709 to 526	526 to 343	< 343
6	> 841	841 to 665	665 to 489	489 to 312	< 312
7	> 792	792 to 623	623 to 454	454 to 284	< 284
8	> 746	746 to 584	584 to 421	421 to 259	< 259
9	> 703	703 to 547	547 to 391	391 to 235	< 235
10	> 662	662 to 513	513 to 364	364 to 214	< 214
11	> 624	624 to 481	481 to 338	338 to 195	< 195
12	> 588	588 to 451	451 to 314	314 to 177	< 177
13	> 554	554 to 423	423 to 292	292 to 161	< 161
14	> 522	522 to 397	397 to 272	272 to 147	< 147
15	> 492	492 to 372	372 to 253	253 to 134	< 134
16	> 463	463 to 349	349 to 236	236 to 122	< 122
17	> 436	436 to 328	328 to 219	219 to 111	< 111
18	> 411	411 to 308	308 to 204	204 to 101	< 101
19	> 387	387 to 289	289 to 190	190 to 92	< 92
20	> 365	365 to 271	271 to 177	177 to 83	< 83
21	> 344	344 to 255	255 to 165	165 to 76	< 76
22	> 324	324 to 239	239 to 154	154 to 69	< 69
23	> 305	305 to 224	224 to 144	144 to 63	< 63
24	> 288	288 to 211	211 to 134	134 to 57	< 57
25	> 271	271 to 198	198 to 125	125 to 52	< 52
26	> 255	255 to 186	186 to 117	117 to 47	< 47
27	> 240	240 to 175	175 to 109	109 to 43	< 43
28	> 227	227 to 164	164 to 102	102 to 39	< 39
29	> 213	213 to 154	154 to 95	95 to 36	< 36
30	> 201	201 to 145	145 to 89	89 to 32	< 32
31	> 189	189 to 136	136 to 83	83 to 30	< 30
32	> 179	179 to 128	128 to 77	77 to 27	< 27
33	> 168	168 to 120	120 to 72	72 to 24	< 24
34	> 158	158 to 113	113 to 68	68 to 22	< 22
35	> 149	149 to 106	106 to 63	< 63	
36	> 141	141 to 100	100 to 59	< 59	
37	> 133	133 to 94	94 to 55	< 55	
38	> 125	125 to 88	88 to 52	< 52	
39	> 118	118 to 83	83 to 48	< 48	
40	> 111	111 to 78	78 to 45	< 45	

3.2.4. Shoot morphometric measurement

The study of the phenological characteristics of marine seagrasses allows to describe the vitality of plants through the analysis of vegetation turnover and cyclic phases that characterize the species and the meadow.

SASPAS protocol - The following parameters were measured in the laboratory: shoot length (cm/shoot), shoot width (cm/shoot), average number of leaves (leaves/shoot), leaf necrosis (% leaves/shoot) of randomly collected shoots at each station (for *P. oceanica* only orthotropic shoots were sampled). At each station, 6 shoots of *P. oceanica* and 20 shoots of the other species (which were also used for epiphyte analyses) were collected.

The limited number of *P. oceanica* shoots (6) collected compared to those provided by other monitoring protocols (6-18) (ISPRA, 2012) is justified by the fact that the monitoring operations aimed to preserve the meadows as much as possible, considering how they are damaged by trawling or anchoring.

3.2.5. Leaf Area Index (LAI) and Conservation Index (CI)

To assess the conservation status of the *P. oceanica* meadows, the monitoring protocol foresees the application of two indices, the Leaf Area Index (LAI) and the Conservation Index (CI):

Leaf Area Index (LAI):

The photosynthetically active surface (m²/m²) was determined by multiplying the mean surface of one-shoot leaves (only one face) by meadow shoot density.

Conservation Index (CI): (only applicable to *P. oceanica*)

$$CI = P/(P+D)$$

where: P= % of alive *P. oceanica*; D= % of dead matte.

Based on the values of CI, meadows were classified according to the criterion proposed by Montefalcone (2009) following the WFD requirements:

Bad	Poor	Moderate	Good	High
CI<0.3	0.3≤CI<0.5	0.5≤CI<0.7	0.7≤CI<0.9	CI≥0.9

3.2.6. Algal blooms and filamentous algae

Macroalgal blooms can vary greatly over time both because they grow fast and because they are regulated by wind exposure and can be decimated after a storm. The presence and quantity of filamentous algae (especially the genera *Ulva* and *Cladophora*) were used as an indicator of nutrient richness in coastal waters.

SASPAS protocol: the presence/absence of macroalgal blooms was measured by visual estimations from boat using the aqua scope.

3.2.7. Abundance of epiphytes

Epiphytes (phyto- and zoo-) can be a prominent component of seagrass ecosystems when nutrient concentrations are high. Both composition and abundance are important. Samples with associated epiphytic assemblages were collected in immersion and stored frozen or in a preservation liquid until laboratory analysis.

SASPAS protocol: for each station 6 shoots of *P. oceanica* and 20 shoots of the other species (that were also used for morphometric measurements) were collected.

Each shoot collected was carefully examined under a stereomicroscope to determine the organisms present. They were classified into three morpho-functional categories: *encrusting* (encrusting or prostrate algae), *turf* (algae less than 10 mm long) and *erect* (algae greater than 10 mm) (Airoldi and Cinelli, 1997; Irving and Connell, 2002a, 2002b). Zoobenthos organisms were only reported when their presence was significant. Then, cover, i.e., the percentage of area occupied by organisms on the leaf surface, was calculated and divided among the three morpho-functional categories.

3.2.8. Associated communities

The abundance of bivalve *Pinna nobilis* (listed in the Annex IV of HD) is considered an indicator of meadow health (Borum *et al.*, 2004; Díaz-Almela e Duarte, 2008). The presence of *P. nobilis* can be affected by physical impacts on the meadows (e.g., boat anchoring).

SASPAS protocol: *Pinna nobilis* density was measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long (see “Belt Transect” technique in Bianchi *et al.*, 2004; Figure 10) and evaluating their status (dead or alive).

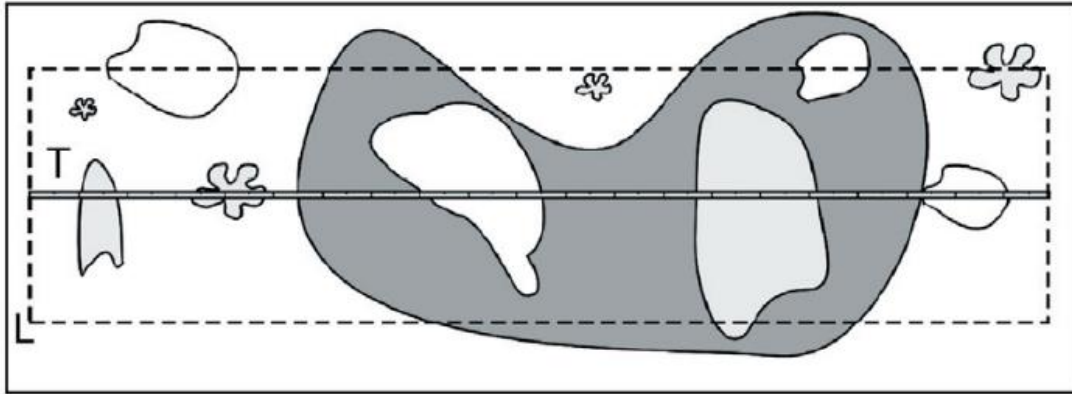


Figure 10. "Belt Transect" technique (Bianchi et al., 2004).

3.2.9. Lower limit of meadows and balise placement (only for *P. oceanica*)

The lower depth of the meadow extension is more fragile than the upper one and can be considered as an indicator of the dynamics of the entire meadows. In addition, its bathymetric identification was performed by the technique called "balisage" which allow to verify its evolution in the temporal scales envisaged by the project. It consists in the installation of marking points (balises), dead bodies were placed on the bottom at the edge of the meadow and the possible retreat or increase of the contour was monitored.

SASPAS protocol: considering the schedule of the project, the protocol adopted by the Réseau de Surveillance Posidonies (Charbonnel et al., 2000) was applied in a simplified form with the laying of three balises and a photographic survey.

During the Preliminary Survey (WP 3.1), divers tried to find three sections of the lower limit (characterized by degraded/risk of meadows conditions) placing three balises (1 balise at each section). Only one section was identified and all three balises were placed along it. Divers took photos: no. 3 frontal pictures (central, lateral right side and lateral left side) from 0.5 m off the seafloor, using a picket installed 1.5 m from the balise, downward to the *P. oceanica* meadow.

Because of the characteristics of the two study areas (NP Kornati and Litorale Brindisino), in the stations located in an area characterized by the presence of discontinuous meadows, the balises were placed on the bottom by the edge of patches of *Posidonia* characterized by degraded/risk conditions. The selected limit did not correspond to the actual lower limit of the meadow (as represented in the example in the Figure 11), as only possible anchor-risk contours were considered, to monitor their retreat dynamics.

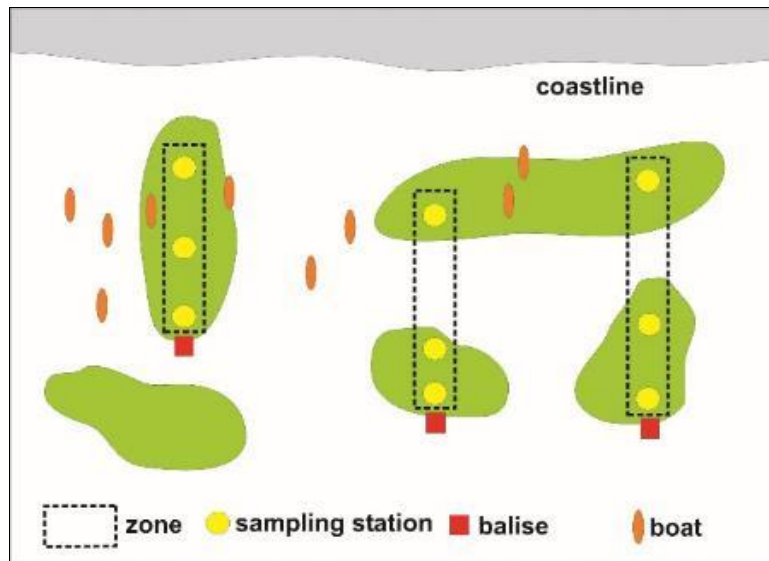


Figure 11. Example of balise placement in a discontinuous meadow.

The typology of lower limits is based on the description of Pergent *et al.* (1995) integrated by Montefalcone (2009) and UNEP/MAP-RAC/SPA (2009):

- progressive limit: with plagiotropic (horizontal) rhizomes beyond the limit oriented toward the bottom, the absence of matte, regularly decreasing cover (indicates colonization of the meadow in the depth);
- sharp limit: the meadow stops abruptly with the presence of vertical rhizomes but in the absence of matte; it is characterized by high (>25 %) or low (<25 %) cover (these limits usually indicate a state of equilibrium, but low percent cover may indicate environmental deterioration and an early imbalance);
- erosive limit: the meadow stops abruptly with the presence of a pronounced step of matte and cover > 50 %;
- sparse limit: density is less than 100 shoots per m² and cover less than 15 % (in general it reflects degraded conditions);
- regressive limit: the presence of dead matte beyond the limit, within the dead matte a few isolated shoots or residual patches of *P. oceanica* alive may persist, with or without step of matte, isolated or connected to the meadow (it testifies a decline of the meadow).

Recent classifications of the status of the meadow in function of lower limit depth, typology and % cover are reported in Table 3, Table 4 and Table 5 (UNEP/MAP-RAC/SPA, 2009, 2011).

Table 3. Status of the meadow in function of the lower limit depth (UNEP/MAP-RAC/SPA, 2011, modified).

	High	Good	Moderate	Poor	Bad
Depth (m)	> 34.2	34.2 to 30.4	30.4 to 26.6	26.6 to 22.8	< 22.8

Table 4. Status of the meadow in function of the lower limit tipology (UNEP/MAP-RAC/SPA, 2011, modified).

	High	Good	Moderate	Poor	Bad
Lower limit	progressive	sharp (cover > 25 %)	sharp (cover < 25 %)	sparse	regressive

Table 5. Status of the meadow in function of the lower limit cover (UNEP/MAP-RAC/SPA, 2011, modified).

	High	Good	Moderate	Poor	Bad
% cover at lower limit	> 35 %	35 % to 25 %	25 % to 15 %	15 % to 5 %	< 5 %

3.2.10. Type of substrate

The type of substrate, by means of visual observation, was also evaluated. Sediment samples were collected for laboratory grain-size analyses.

3.2.11. Alien species

The presence of *alien species* is included among anthropogenic threats. *P. oceanica* is particularly threatened by some algal species: three species of the genus *Caulerpa* (*C. taxifolia*, *C. prolifera* and *C. cylindracea*) and the turf-forming red alga *Womersleyella setacea*. For this reason, their reporting and coverage estimation are required by the WFD protocols applied in the Mediterranean Sea.

SASPAS protocol: the abundance of *alien species* was evaluated as cover using the same methods described for seagrass cover (along three transects at each station).

3.2.12. Presence/absence of habitat disturbance

Evidence of mechanical pressures (e.g., mooring systems, concrete blocks, piers, chains, ropes, and trash) and signs of impacts (e.g., detached shoots, detached plates of matte, damages due to trawling or anchoring) was identified through visual observation.

4. MONITORING RESULTS

The results of the 2021 monitoring campaigns carried out between February and May at the three project sites are reported in the following paragraphs (the additional ones will be carried out in autumn 2021). In the project sites, at each station, general information, such as monitoring date, site name/code, coordinator and operators' names, exposure, and coordinates were recorded in the field sheets (see annexes). Also, laboratory data were reported in special sheets that are collected in the annexes.

The coordinates of the monitoring stations at the three study sites are reported in Table 6:

Table 6. Coordinates of the monitoring stations in the three study sites.

Monfalcone (Bay of Panzano)			Kornati NP (NEW)			RNP Dune Costiere		
	Latitude (N)	Longitude (E)		Latitude (N)	Longitude (E)		Latitude (N)	Longitude (E)
Z1 A	45 46' 45,81"	13 32' 12,51"	Z1 A	43 82' 46,91"	15 27' 50,53"	Z1 A	40 48' 59,81"	17 31' 25,11"
Z1 B	45 46' 45,47"	13 32' 19,19"	Z1 B	43 82' 48,69"	15 27' 53,43"	Z1 B	40 48' 59,83"	17 31' 24,42"
Z1 C	45 46' 37,97"	13 32' 27,58"	Z1 C	43 82' 52,37"	15 27' 55,52"	Z1 C	40 48' 59,81"	17 31' 23,78"
Z2 A	45 45' 34,13"	13 31' 36,79"	Z2 A	43 82' 45,74"	15 27' 53,12"	Z2 A	40 49' 00,32"	17 31' 25,01"
Z2 B	45 45' 28,69"	13 31' 54,79"	Z2 B	43 82' 48,56"	15 27' 55,03"	Z2 B	40 49' 00,39"	17 31' 24,38"
Z2 C	45 45' 23,05"	13 32' 32,63"	Z2 C	43 82' 50,92"	15 27' 58,33"	Z2 C	40 49' 00,43"	17 31' 23,51"
Z3 A	45 45' 06,27"	13 31' 54,88"	Z3 A	43 80' 90,83"	15 25' 52,50"	Z3 A	40 49' 00,91"	17 31' 24,93"
Z3 B	45 45' 09,33"	13 32' 06,01"	Z3 B	43 80' 89,44"	15 25' 50,55"	Z3 B	40 49' 00,87"	17 31' 24,10"
Z3 C	45 45' 11,00"	13 32' 35,82"	Z3 C	43 80' 88,89"	15 25' 48,61"	Z3 C	40 49' 00,92"	17 31' 23,17"
			<i>Balise</i>	43 49' 31,10"	15 16' 32,59"	<i>Balise</i>	40 49' 00,08"	17 31' 23,99"

4.1. Monfalcone (Bay of Panzano)

4.1.1. Monitoring area

At Monfalcone, the first monitoring campaign planned in 2021 took place in April in the two Natura 2000 sites in the Panzano Bay: SAC - *Cavana di Monfalcone* and SPA-SAC - *Foce dell'Isonzo - Isola della Cona* (Figure 13).

In the area located in the northern part of the Panzano bay, in the site "Cavana di Monfalcone", Zone 1 (Z1) was located on a *Cymodocea nodosa* meadow, where anchoring pressures occur, due to the presence of medium-sized boats (sailboats). Within this Zone, three monitoring stations were positioned at different depths (Stations Z1-A, Z1-B and Z1-C) (Figure 12).

The Zone 2 (Z2) and Zone 3 (Z3) were placed in the "Foce dell'Isonzo – Isola della Cona". These Zones are characterized by shallow depth and are located on *Cymodocea nodosa* meadows mixed with other species (i.e., *Zostera noltei* in Z2 and *Zostera marina* in Z3). In these areas anchoring pressures occur, due to the presence of small-size boats. As at Zone 1, three monitoring stations were located, within each Zone, at different depths, for a total of six stations (Z2-A, Z2-B, Z2-C, Z3-A, Z3-B and Z3-C) (Figure 12).



Figure 12. Sampling scheme applied to Zone 1 in the in the site "Cavana di Monfalcone" and to Zones 2 and 3 in the in the site "Face dell'Isonzo, Isola della Cona".

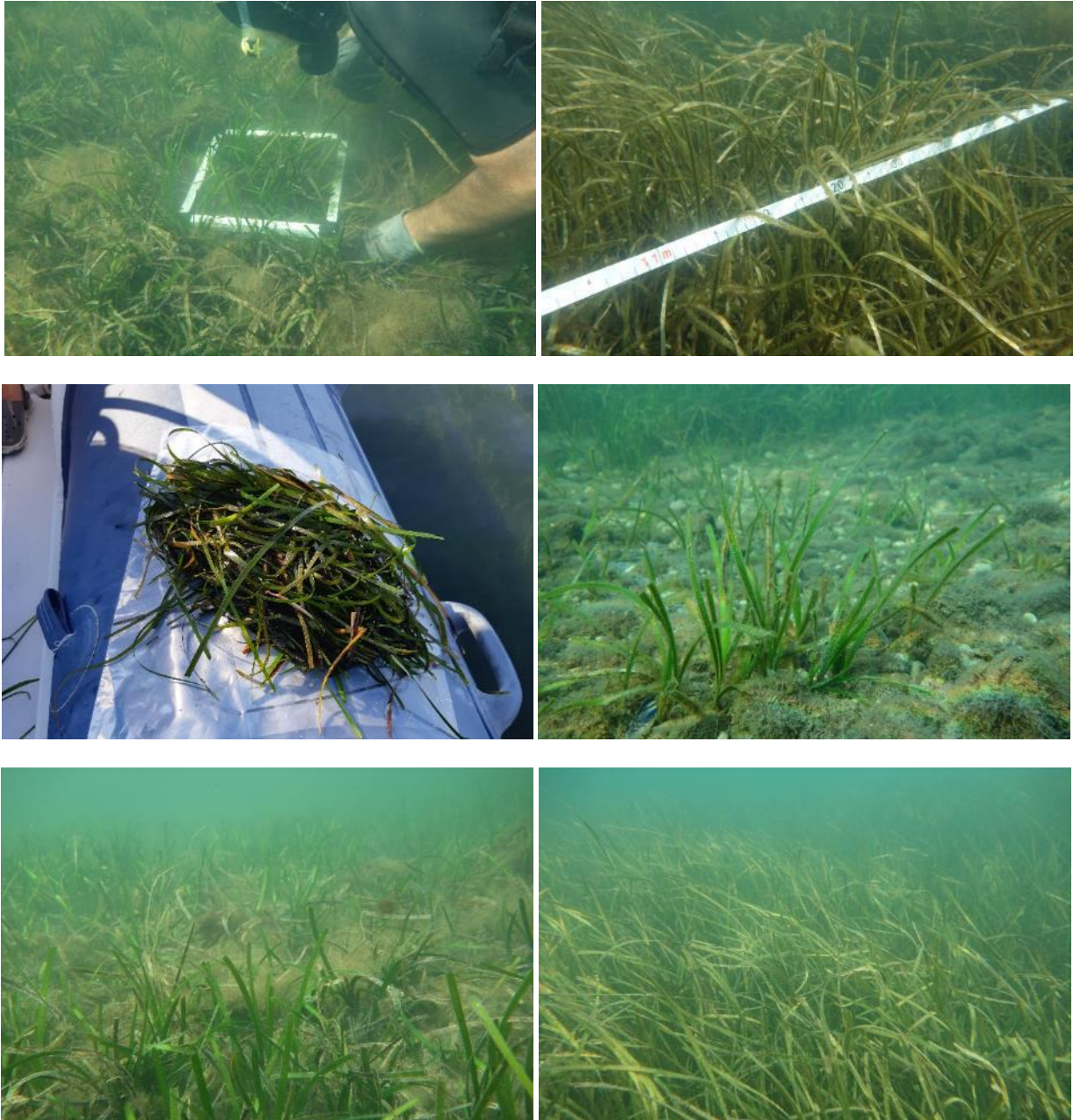


Figure 13. April 2021. Panzano Bay: first monitoring campaign 2021.

4.1.2. Distribution of seagrass meadows

In the Bay of Panzano, *Cymodocea nodosa* is the most abundant seagrass species, which sometimes forms mixed meadows together with *Zostera marina* and / or *Zostera noltei*. Concerning the sampling areas, as previously mentioned, Zone 2 and Zone 3 were located on *Cymodocea nodosa* meadows, with reduced presence of other species (*Zostera noltei* in Z2 and *Zostera marina* in Z3) (Figure 14).

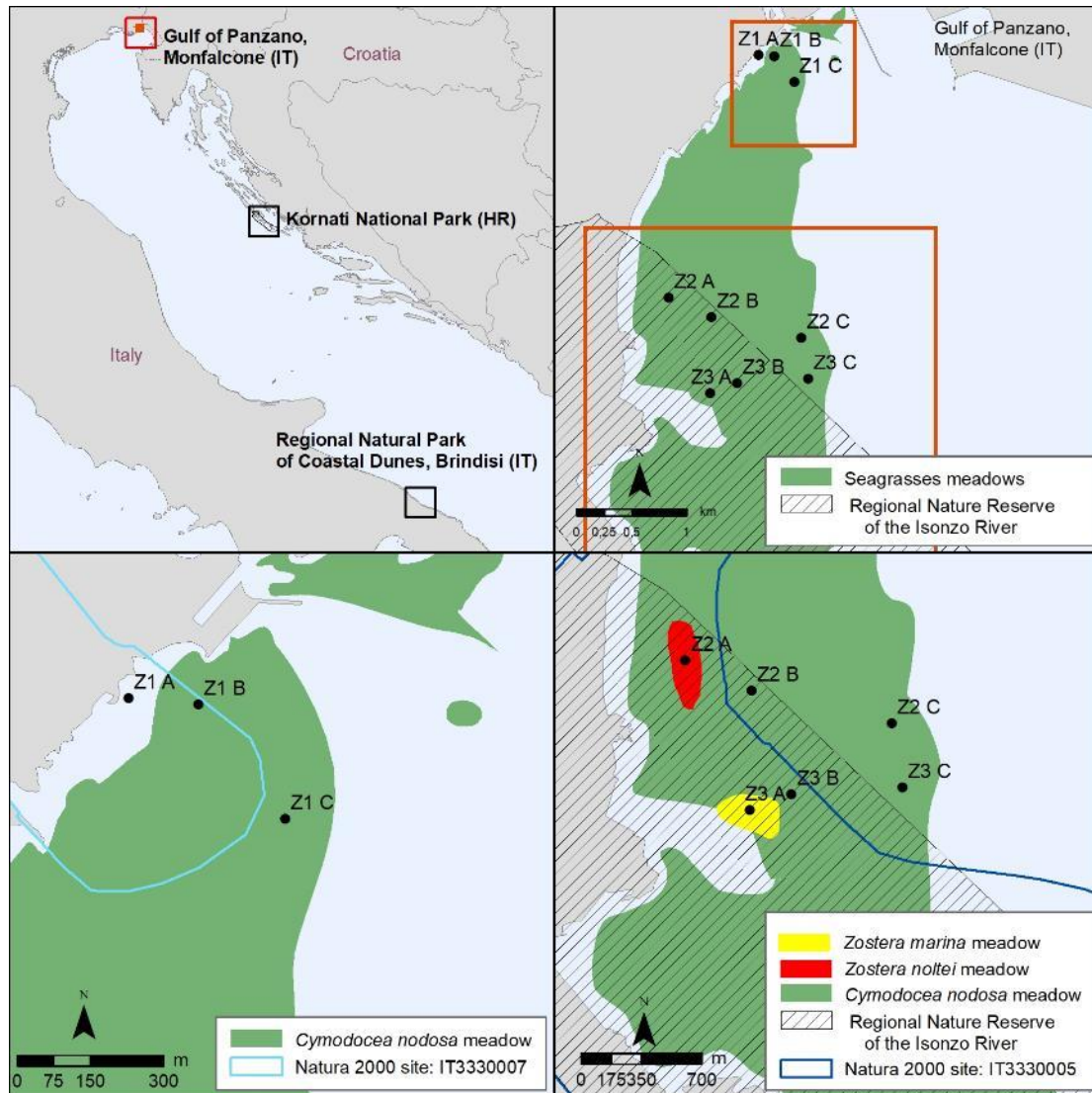


Figure 14. Seagrass distribution and monitoring stations in the Panzano Bay.

At the time of measurements, a high continuity of meadows was observed in the monitoring stations and no particular signs of disturbance were recorded.

Other sites, coincident with the shallower areas were little or no colonized.

4.1.3. Percentage Cover and meadow continuity

In Zone 1 (stations Z1-A, Z1-B and Z1-C), the average cover of *Cymodocea nodosa* varied between 0% and 100%. In fact, in some areas (Station Z1-C) seagrasses were absent (bare seabed). In Zone 2 (stations Z2-A, Z2-B and Z2-C), as mentioned before, *Cymodocea nodosa* meadows were mixed with *Zostera noltei* and (as the graphs shows) the average cover of both species was close to 100% or slightly less than 100% (some discontinuity of the meadow). In Zone 3 (stations Z3-A, Z3-B and Z3-C), coverage of both species (*C. nodosa* and *Zostera marina*) was close to 100%. Even considering the variability due to the presence of different species characterized by different seasonal cycles, data analysis suggests the existence of limited differences of percent cover along stations and Zones. A comparison with the data from 2019 campaign (preliminary survey - WP 3 activity 1) showed an increase of *Z. noltei* coverage at station Z2-A. However, no statistically significant differences ($p < 0.05$) were found between the two coverage values (2019 and 2021). The results are summarized in Figure 15.

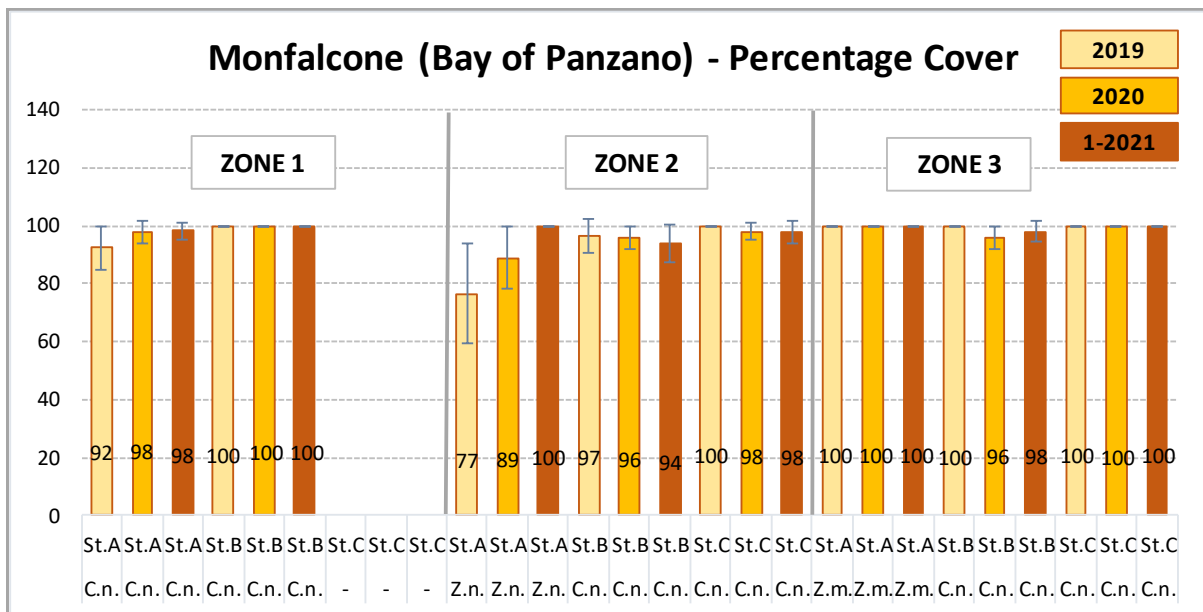


Figure 15. The average values of seagrass percentage cover as measured at the sampling stations.

4.1.4. Shoot density

In Zone 1 (stations Z1-A, Z1-B and Z1-C), the average shoot density of *Cymodocea nodosa* varied between 628 and 730 shoots/m² (at Z1-C station seagrasses were absent). In Zone 2 (stations Z2-A, Z2-B and Z2-C), the mean value of shoot density ranged between 637 and 707 shoots/m² for *Cymodocea nodosa* and was about 1915 shoots/m² for *Zostera noltei*. In the third Zone (stations Z3-A, Z3-B and Z3-C), the average shoot density of *Cymodocea nodosa* ranged from 578 to 789 shoots/m². It was about 306 shoots/m² for *Zostera marina*. As for the percent cover, the data analysis suggests the presence of limited differences along stations and Zones for shoot density. The differences were related to the species (*C. nodosa* e *Zostera* spp.) and characterized by different seasonal cycles (growth rate and spread, reproductive season, etc.).

A comparison with data from the 2019 campaign (preliminary survey - WP 3 activity 1) highlights a decrease of *Zostera noltei* shoot density in the station Z2-A. However, statistically significant differences ($p < 0.05$) between the two coverage values (2019 and 2021) were only found in Z1-B for *C. nodosa* (characterized by an increase between 2019 and 2021). The results are summarized in Figure 16.

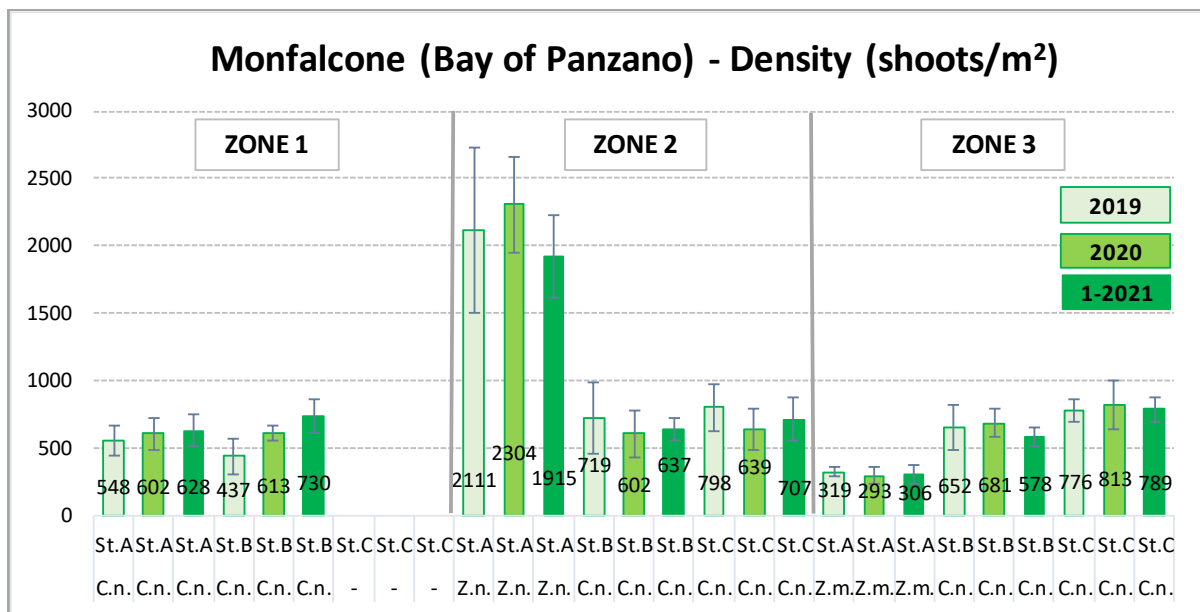


Figure 16. The average values of seagrass shoot density as measured at the sampling stations.

4.1.5. Shoot morphometric measurement

In Zone 1 (stations Z1-A, Z1-B and Z1-C), the mean shoot length of *Cymodocea nodosa* ranged from 11 to 14.5 cm (at Z1-C station the seagrasses were absent). In Zone 2 (stations Z2-A, Z2-B and Z2-C), the mean shoot length was in the range 8.9 - 22.5 cm for *Cymodocea nodosa* whereas *Zostera noltei* showed an average value of 10.8 cm. In Zone 3 (stations Z3-A, Z3-B and Z3-C), the mean shoot length of *Cymodocea nodosa* ranged from 11.7 to 13.1 cm. *Zostera marina* showed an average value of 58.1 cm. Analysis of the data suggests that limited differences along stations and Zones characterize *C. nodosa* shoot length. They are mainly due to different water depths. Light attenuates with increasing depth and seagrasses prolong leaves and thin shoots density to capture more light to convert into photosynthetic production. Compared to the average shoot length of *C. nodosa*, the shorter length of *Z. noltei* and the longer length of *Z. marina* are expected due to their different phenological cycles.

A comparison with data from the 2019 campaign (preliminary survey - WP 3 activity 1) showed differences in the three species shoot length (decreases and/or increases). Statistically significant differences ($p < 0.05$) between the two shoot length values (2019 and 2021) were found in all stations. The results are summarized in Figure 17.

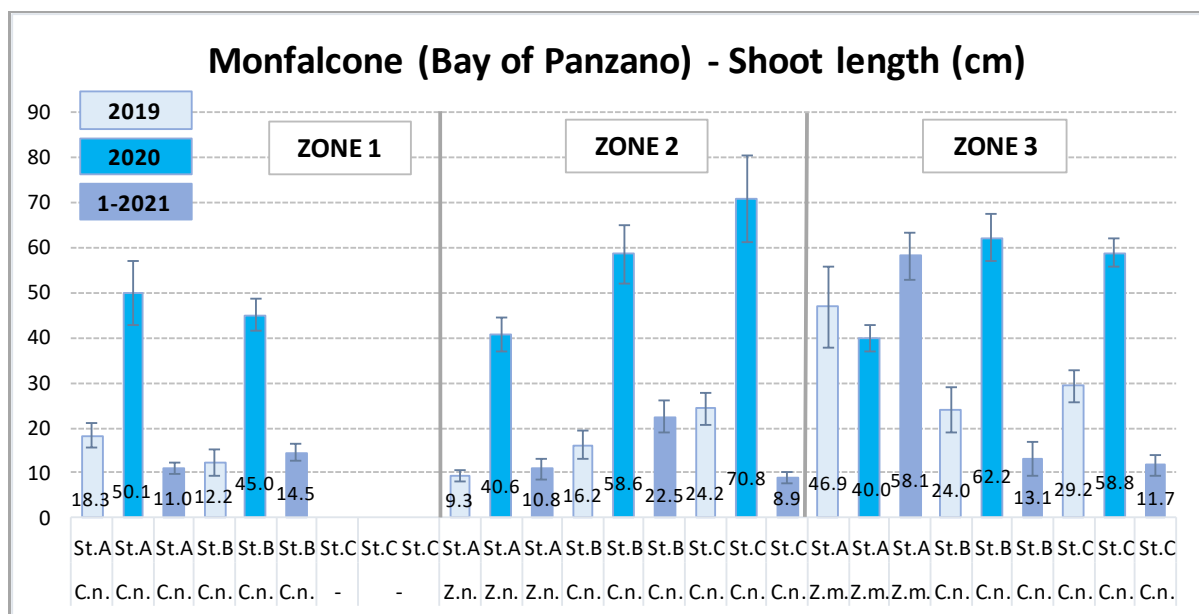


Figure 17. The average values of seagrass shoot length as measured at the sampling stations.

The other parameters are summarized in Table 7 (average values and standard deviations).

Table 7. Shoot width (cm/shoot), n. of leaves/shoot and leaf necrosis (% leaves/shoot) (average values and standard deviations).

Zone 1		Z1-A (C.n.)	Z1-B (C.n.)	Z1-C
Shoot width (cm/shoot)	2021	0.21±0.02	0.22±0.02	-
	2020	0.36±0.01	0.35±0.02	-
	2019	0.17±0.02	0.18±0.03	-
N. of leaves/shoot	2021	1.7±0.4	2.2±0.5	-
	2020	2.7±0.5	2.8±0.6	-
	2019	3.1±0.5	3.0±0.7	-
Leaf necrosis (% leaves/shoot)	2021	1.5±0.5	2.0±0.5	-
	2020	0.6±0.2	0.6±0.2	-
	2019	0.1±0.2	0.4±0.8	-
Zone 2		Z2-A (Z.n.)	Z2-B (C.n.)	Z2-C (C.n.)
Shoot width (cm/shoot)	2021	0.11±0.01	0.27±0.02	0.17±0.02
	2020	0.11±0.01	0.34±0.01	0.38±0.02
	2019	0.10±0	0.18±0.02	0.28±0.02
N. of leaves/shoot	2021	3.8±0.5	1.7±0.7	1.8±0.5
	2020	2.8±0.4	2.7±0.5	2.5±0.5
	2019	2.8±0.4	2.7±0.6	2.7±0.6
Leaf necrosis (% leaves/shoot)	2021	0.1±0.2	3.4±1.0	1.2±0.5
	2020	0.2±0.2	0.7±0.5	1.1±0.5
	2019	0.2±0.2	0.3±0.5	1.4±0.9
Zone 3		Z3-A (Z.m.)	Z3-B (C.n.)	Z3-C (C.n.)
Shoot width (cm/shoot)	2021	0.45±0.02	0.25±0.02	0.21±0.02
	2020	0.49±0.01	0.33±0.02	0.39±0.02
	2019	0.44±0.05	0.19±0.03	0.25±0.04
N. of leaves/shoot	2021	4.7±0.7	1.8±0.4	1.9±0.4
	2020	4.8±0.7	2.8±0.4	3.0±0.7
	2019	4.8±0.7	2.8±0.5	2.8±0.5
Leaf necrosis (% leaves/shoot)	2021	1.1±0.4	0.8±0.5	0.6±0.3
	2020	1.5±0.5	0.7±0.3	0.5±0.3
	2019	1.1±0.5	0.8±0.3	1.4±0.9

The comparison with the 2019 campaign data (preliminary survey - WP 3 activity 1) shows no particular anomalies in the three parameters' values.

4.1.6. Leaf Area Index (LAI)

The index values are reported in Table 8 (average values):

Table 8. Leaf Area Index (LAI) averages values (the values in brackets refer to 2019 Preliminary survey campaign and 2020 monitoring campaign).

Zone 1	Z1-A (C.n.)	Z1-B (C.n.)	Z1-C
LAI (station average value)	0.09 (0.28-1.66)	0.20 (0.14-1.59)	-
LAI (Zone average value)	0.15 (0.21-1.62)		-
Zone 2	Z2-A (Z.n.)	Z2-B (C.n.)	Z2-C (C.n.)
LAI (station average value)	0.41 (0.34-1.37)	0.29 (0.25-2.07)	0.07 (0.69-2.62)
LAI (Zone average value)	-	0.18 (0.47-2.35)	
Zone 3	Z3-A (Z.m.)	Z3-B (C.n.)	Z3-C (C.n.)
LAI (station average value)	1.89 (1.81-1.35)	0.15 (0.44-2.31)	0.14 (0.86-3.37)
LAI (Zone average value)	-	0.15 (0.65-2.84)	

Comparison with data from the 2019 campaign (preliminary survey - WP 3 activity 1) showed decreases and increases in LAI values due to differences in density and shoot length of *C. nodosa* and *Z. noltei*.

4.1.7. Algal blooms and filamentous algae

A general visual assessment by boat using aqua scope in the monitoring areas showed the absence of (filamentous) macroalgal blooms.

4.1.8. Abundance of epiphytes

The average cover of the three categories was calculated (i.e., the percentage of surface area occupied by the organisms on the leaf surface) and reported in Table 9.

Table 9. Average cover of the three categories (Encrusting layer, Erect layer and Turf layer).

	Z1-A (C.n.)	Z1-B (C.n.)	Z1-C	Z2-A (Z.n.)	Z2-B (C.n.)	Z2-C (C.n.)	Z3-A (Z.m.)	Z3-B (C.n.)	Z3-C (C.n.)
Encrusting layer	20%	15%	/	15%	15%	15%	15%	20%	15%
Erect layer	<5%	<5%	/	<5%	<5%	<5%	<5%	<5%	<5%
Turf layer	10%	10%	/	5%	10%	5%	<5%	10%	10%

The dominance of the *encrusting layer* (mainly represented by red calcareous algae) is reported in the literature as a positive condition of the quality status of seagrass meadows. In fact, in disturbed environments (e.g., in the presence of increased nutrient concentrations or water turbidity), there would be a reduction in the abundance of encrusting taxa and a simultaneous increase in the presence of filamentous algae (Ballesteros, 1987; Martínez-Crego *et al.*, 2010).

4.1.9. Associated communities

In the study area (within the corridors and in their proximity), no live or dead individuals of *Pinna nobilis* were found.

4.1.10. Type of substrate

Considering the close relationship between seagrasses and substrate, to identify the type of substrate, in addition to visual observation in field, sediment samples were collected for laboratory granulometric analyses. The results are reported in Table 10:

Table 10. Results of the grain-size analyses.

	Pebbles %	Gravel %	fine sand %	silt %	clay %	Grain size classification
	$\phi > 64$ mm	$2 < \phi < 64$ mm	$0.063 < \phi < 2$ mm	$0.0039 < \phi < 0.063$ mm	$\phi < 0.0039$ mm	
Z1	0.00	0.00	86.11	11.73	2.16	Fine silty sand
Z2	0.00	0.00	80.93	15.09	3.98	Fine silty sand
Z3	0.00	0.00	78.38	18.38	3.24	Fine silty sand

4.1.11. Alien species

No alien algal species were found in the study area during the monitoring activities.

4.1.12. Presence/absence of habitat disturbance

Concerning human disturbance and evidence of mechanical pressures, no anthropogenic pressures were observed in or near the monitoring Zones.

4.1.13. Monitoring of seagrass transplantation

At Monfalcone (Figure 18), the area for pilot seagrass transplantations (planned in WP 4 activity 2) was identified in the SPA/SAC Foce dell'Isonzo – Isola della Cona (near Zone 2 and Zone 3). This area is characterized by shallow waters (about 1.2 meters above mean sea level), and by the presence of *Cymodocea nodosa* meadows, partly mixed with other species (*Zostera noltei* and *Zostera marina*). Anchoring pressures occur in this area, due to the presence of small boats. The meadows of the donor site were selected in a nearby area (Figure 18). The donor meadow was continuous with no visible signs of disturbance.

In September 2020, *Cymodocea nodosa* shoots were transplanted using two different techniques (Figure 19). The first one, which was prevalent, involved the collection and planting of sods (vegetated units where the plant with leaves, roots and rhizomes are taken with the native sediment surrounding it). The second one involved the collection of shoots (bare root planting units - cuttings) and subsequent replanting, using anchor staples.

In April 2021, an additional *Cymodocea nodosa* pilot transplantation was performed at Panzano Bay, in an area nearby the first transplantation by using the same two techniques. The donor site was selected in an adjacent area. Donor meadow was continuous, with no visible signs of disturbance.

Two square transplant areas (10 X 10 m) were selected, where the manual transplant of vegetated plugs and bare root planting cuttings was carried out.

The results of the monitoring campaigns carried out in September 2021 (as planned in WP 3 activity 3.3) are reported below.

First pilot transplantation (September 2020): sods showed a good development in 50% of cases, as the remaining 50% got eroded (Figure 20 and Figure 21). Regarding the other technique, few transplanted cuttings were found. These losses showed that the cuttings technique was not the most suitable for the area (exposed to the Autumn storms and that occurred shortly after the transplant).

Additional pilot transplantation (April 2021): sods showed a rapid leaf/rhizome development and a rapid and wide colonization of the seabed (Figure 22 and Figure 23) reaching about 100% of success. Regarding the transplanted shoots, by staples, about 70% survived the transplantation and this was due to: a) the

vegetative period (spring), favorable to the development of plants and b) the refinement in the transplantation technique.

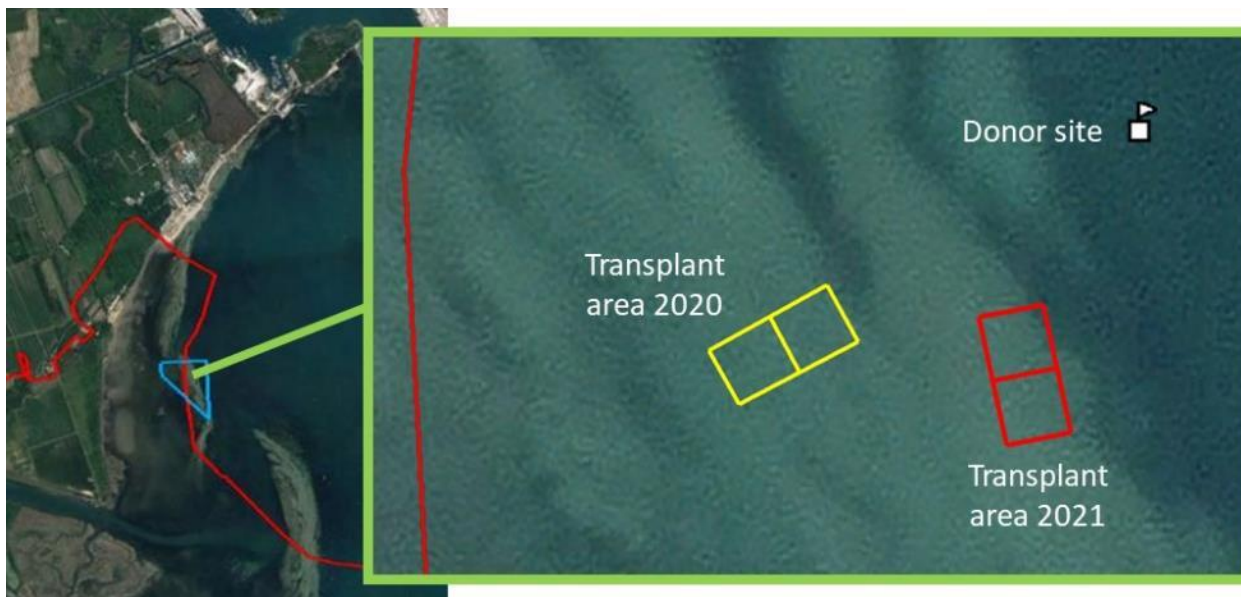


Figure 18. Seagrass transplantation: host and donor sites in Panzano Bay (Monfalcone)



Figure 19. *Cymodocea nodosa* transplanting techniques: collection and planting of plugs (on the left) and collection of shoots and subsequent re-planting by staples (on the right).



Figure 20. September 2021: sods of C. nodosa transplanted in September 2020 that got eroded.



Figure 21. September 2021: sods of C. nodosa transplanted in September 2020 that showed a good development.



Figure 22. September 2021: sods of C. nodosa transplanted in April 2021 that showed a good development.



Figure 23. September 2021: sods of C. nodosa transplanted in April 2021 that showed a rapid and wide colonization of the seabed.

4.2. KORNATI NP

4.2.1. Monitoring area

At the Kornati NP site, the first monitoring campaign planned in 2021 was carried out in May (Figure 26). In this case, two types of sites were considered, located on *P. oceanica* meadows. The first one is the “Anchoring site” a little bay where anchoring pressures occur and the second one is the “Diving site”, a less confined site where diving boats anchor for authorized diving activities.

In the “Anchoring site” (in Kravljačica Bay), two Zones were selected (Zone 1 and Zone 2) on the *P. oceanica* meadows, each one hosting three monitoring stations, placed at different depths (St. A, B and C) for a total of six stations. In addition, three marking points (balises) were placed (Figure 24).

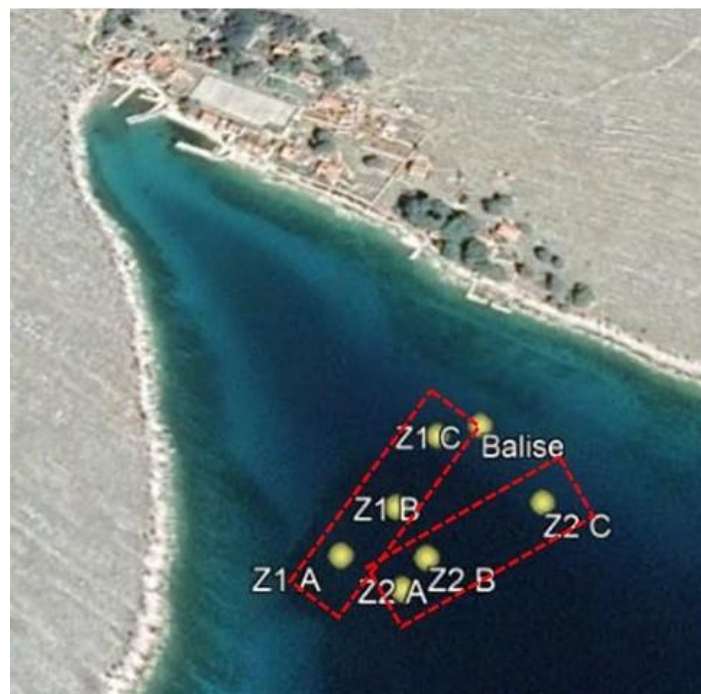


Figure 24. Sampling scheme applied to the Zone 1 and Zone 2 in the in the “Anchoring site” in Kravljačica Bay.

At the “Diving site”, located between the Borovnik island and Balun, dive boats anchor for authorized diving activities. Along Zone 3, three monitoring stations (St. A, B and C) were placed (Figure 25).



Figure 25. Sampling scheme applied to the Zone 3 in the in the “Diving site” positioned between Borovnik island and Balun island.

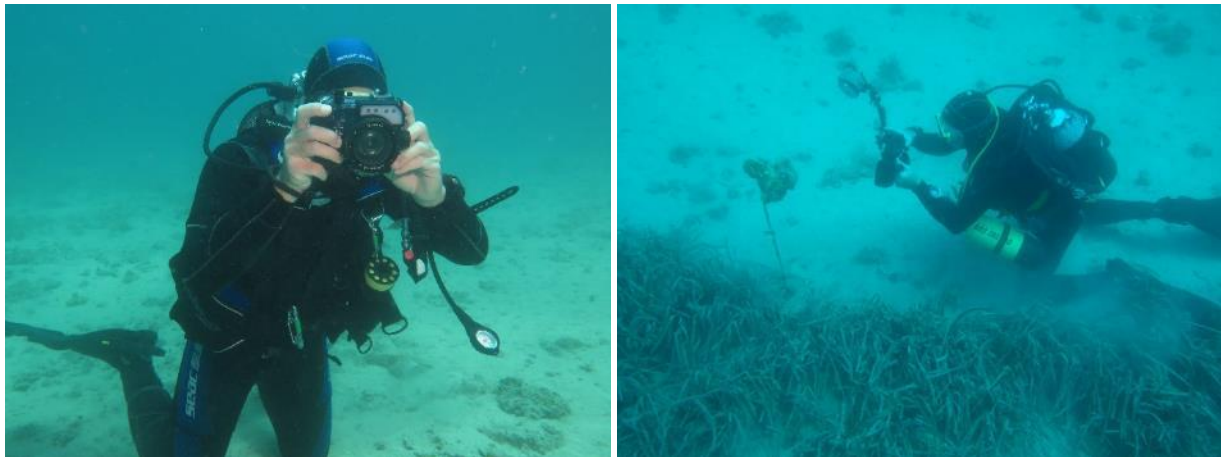


Figure 26. May 2021, Kornati NP: first monitoring campaign 2021.

4.2.2. Distribution of seagrass meadows

In an overall view, *P. oceanica* meadows are widespread in the park, down to depths of 25-30 meters and with an irregular distribution that mainly follows the bathymetric pattern of the archipelago (Figure 27).

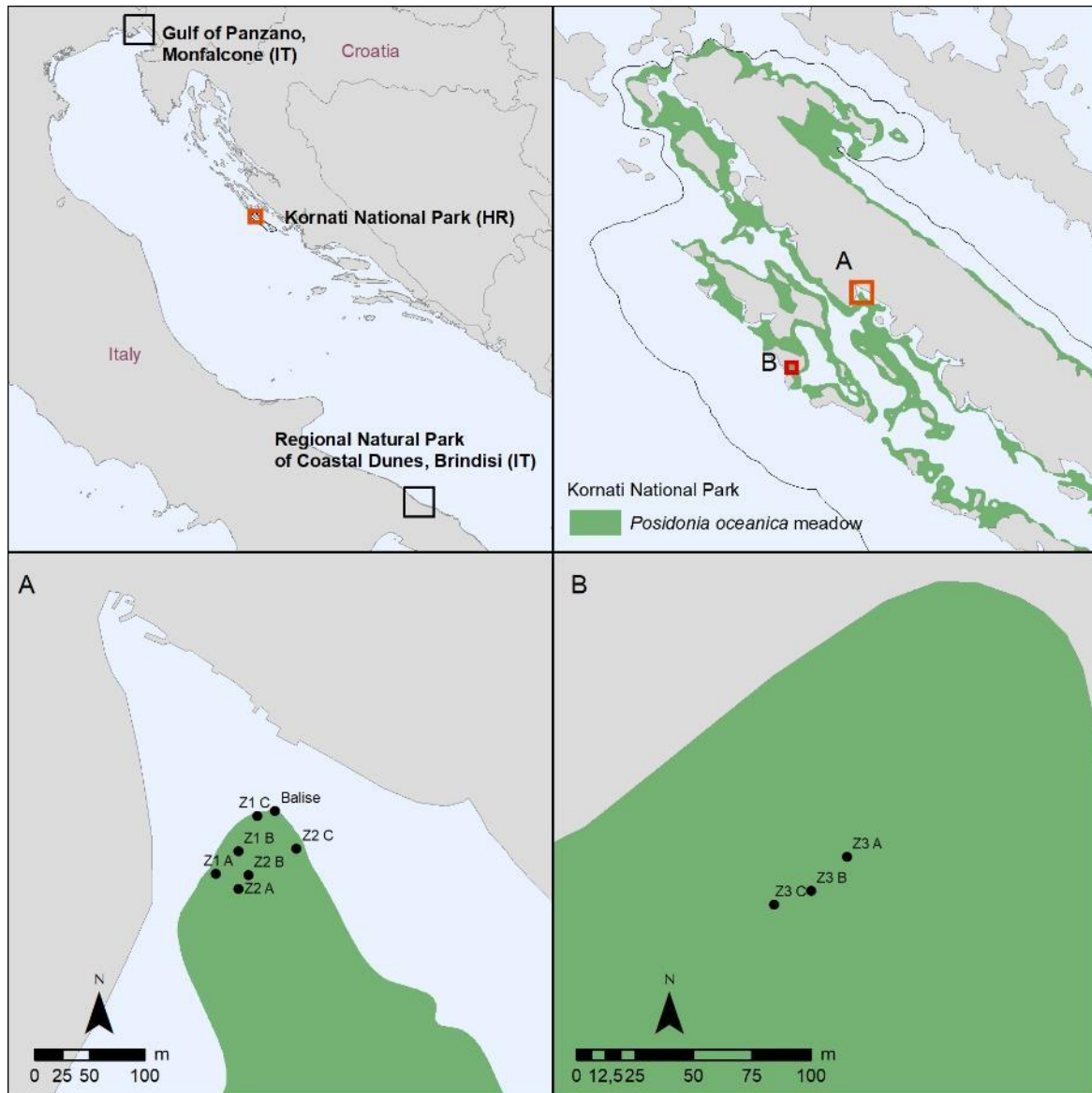


Figure 27. Seagrass distribution and monitoring stations in the Kornati NP.

The existing distribution map was produced on the basis of the first available information and through orthophoto observations and bathymetric maps. This map represents a potential distribution range, as there is a need for more detailed seagrass distribution maps based on actual data collected in the field.

At the “Anchoring site” (Zone 1 and Zone 2) signs of disturbance on the meadows were reported and, in some areas, the cover was fragmented and patchy and damage to seagrasses appeared to be caused by anchor dragging and scraping of anchor chains along the seabed. The “Anchoring site”, due to its morphology, bathymetric trend and wind exposure, behaves as a sedimentation basin. At present, it is reasonable to assume that the numerous anchorages of pleasure boats in the summer period were also responsible for sediment re-suspension.

In the “Diving site” (Zone 3) the meadow was continuous, with no visible signs of disturbance and low sedimentation; only a few points were devoid of meadows, but this is believed to be due to natural distribution dynamics and not to the impact of human activities.

4.2.3. Percentage Cover and meadow continuity

In the “Anchoring site”, where two zones (Zone 1 with stations Z1-A, Z1-B, Z1-C and Zone 2 with stations Z2-A, Z2-B and Z2-C) were located, the mean *P. oceanica* coverage ranged between 31% and 56%, showing strong discontinuity of the meadow, with a very patchy distribution, attributable to different pressures, as below suggested.

In the “Diving site” (where Zone 3, with stations Z3-A, Z3-B and Z3-C was located), the mean coverage of *P. oceanica* ranged between 61% and 72%. The distribution resulted homogeneous, with sandy lenses to interrupt meadows and a few signs interpreted as anchorage disturbances.

The data analysis suggests the existence of differences in the cover percentage of *P. oceanica* along stations in the “Anchoring site” and in the “Diving site”. In particular, the stations placed in the “Diving site” were characterized by coverage values higher than the ones in the “Anchoring site”. This is an expected result because, as mentioned before, in the “Anchoring site” *P. oceanica* meadows suffered from mechanical damage caused by boat anchoring and correlated disturbances (physical impacts, sediment burial, over-sedimentation on the canopy, light attenuation...) resulting in a very irregular residual distribution.

A comparison with the data from 2019 monitoring campaign (preliminary survey - WP 3 activity 1) highlights a general increase in the “Anchoring site” (with the only exception of station Z2-B). However, statistically significant differences ($p < 0.05$) between the two coverage values (2019 and 2020) were only recorded in one out of the six stations (Z1-B station). In the “Diving site”, a coverage decrease was recorded in the three stations. The presence of sandy lenses that cause variations in the overall values of coverage in this site was probably responsible for these differences. However, these differences are not statistically significant ($p < 0.05$). The results are summarized in Figure 28.

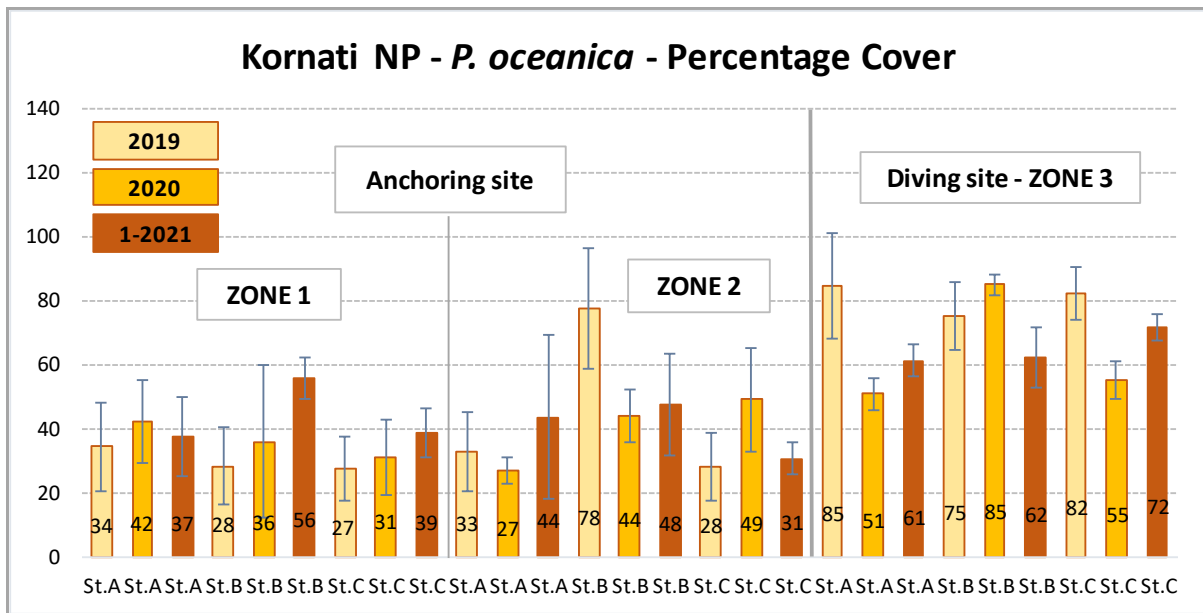


Figure 28. The average values of *P. oceanica* per cent cover as measured at the sampling stations.

4.2.4. Shoot density

At the “Anchoring site” (Zone 1 and Zone 2), the mean density of *P. oceanica* shoots ranged between 85 and 184 shoots/m². In the “Diving site” (Zone 3), the average shoot density of *P. oceanica* ranged between 183 and 279 shoots/m². As for the percentage cover, the existence of marked differences along stations at the “Anchoring site” for shoot density of *P. oceanica* were mainly related to the presence of anchoring pressure. This impact was not the result of an instantaneous disturbance, but a signal of suffocation and degradation of the leaf canopy caused by continuous mooring at anchor in the bays and by the presence of numerous pleasure boats throughout the long summer season (arrival and departure, sewage discharge, bathing activities, restaurants on the shore, etc.).

In particular, physical damage to seagrasses seems caused by dragging anchors and scraping anchor chains along the seabed. A comparison with the data of the 2019 monitoring campaign (preliminary survey - WP 3 activity 1) showed, as for the percentage cover, contradictory signs of decrease and increase of density for the different stations of the anchoring site, which correspond to such an irregular disturbance to the meadow. However, statistically significant differences ($p < 0.05$) between the two density values (2019 and 2021) were only found in two out of the six stations (Z1-C and Z2-A stations).

In the “Diving site”, the data analysis highlights a decrease of shoot density in stations Z3-B and Z3-C. However, no statistically significant differences ($p < 0.05$) between the density values (2019 and 2021) were found. The results are summarized in Figure 29.

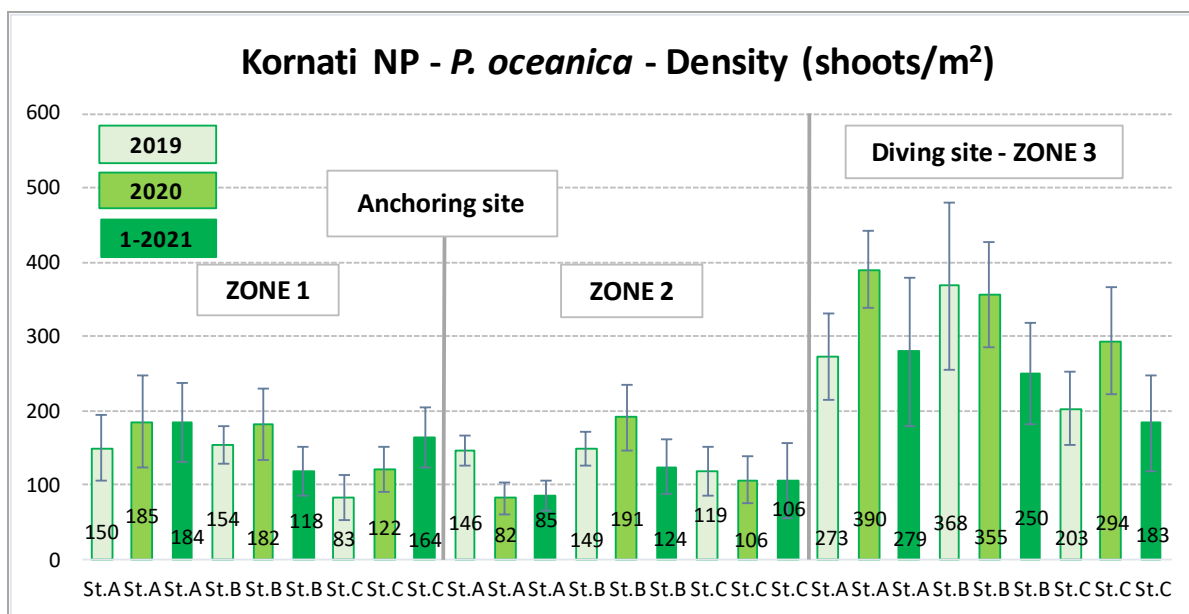


Figure 29. The average values of *P. oceanica* shoot density as measured at the sampling stations.

In Table 11, the values of shoot density and depth are related to the five classes for the final ecological classification (*sensu* WFD) (UNEP/MAP-RAC/SPA, 2011) (see par. 3.2.3).

Table 11. Shoot density and depth values in relation to the five classes for the final ecological classification (*sensu* WFD) (UNEP/MAP-RAC/SPA, 2011).

Zones	Z1	Z2	Z3
Density (shoots/m²) (average value)	155	105	238
Depth (m) (average value)	13	15	9
Ecological classification (<i>sensu</i> WFD)	BAD	BAD	POOR

Comparison with data from the 2019 monitoring campaign (preliminary survey - WP 3 activity 1) showed no changes in the ecological conditions of the meadow (still BAD in the “Anchoring site” and POOR in the “Diving site”).

4.2.5. Shoot morphometric measurement

At the “Anchoring site”, in Zone 1 (stations Z1-A, Z1-B and Z1-C), the average length of *P. oceanica* shoots ranged between 29.1 to 40.3 cm; in Zone 2 (stations Z2-A, Z2-B and Z2-C) between 31.9 and 40.8 cm. In the “Diving site”, in Zone 3 (stations Z3-A, Z3-B and Z3-C), the average length of *P. oceanica* shoots ranged between 32.0 and 46.7 cm.

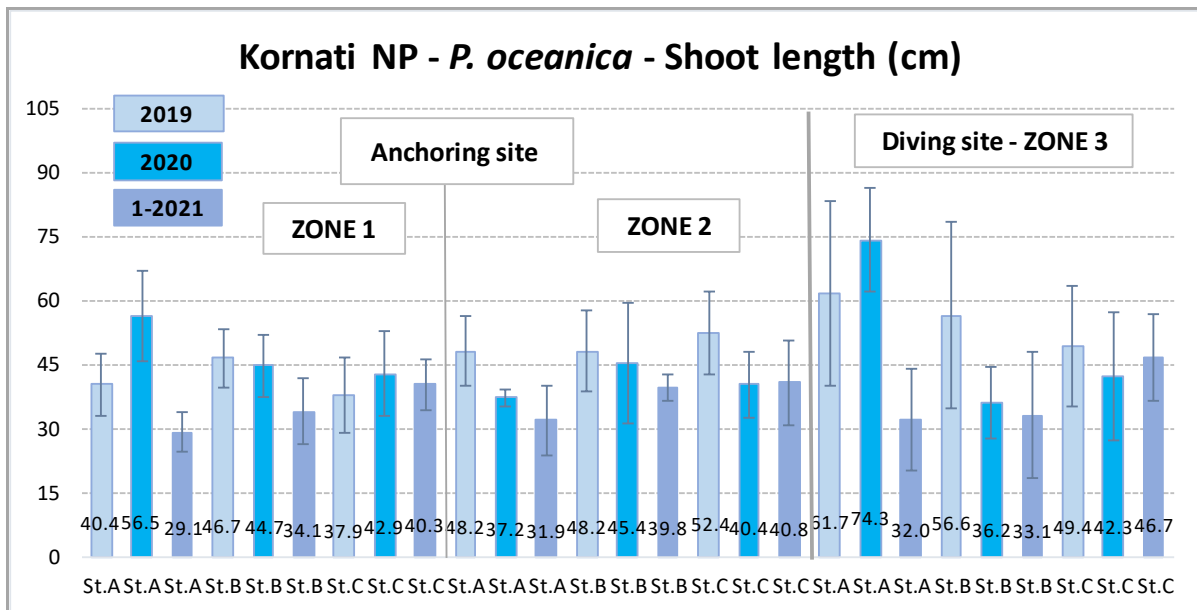


Figure 30. The average values of *P. oceanica* shoot length as measured at the sampling stations.

Unlike the previous parameters, as far as shoot length is concerned, the existence of differences along the stations in the “Anchoing site” and in the “Diving site” was less evident. However, even in this case, they seemed to be related, at least in part, to the presence or reduced presence of anchoring pressure.

A comparison with data from the 2019 monitoring campaign (preliminary survey - WP 3 activity 1) showed, in the “Anchoing site”, a general reduction in the length of the shoots and only a slight increase at the station Z1-C (statistically significant differences ($p < 0,05$) in Z1-A, Z1-B and Z2-A stations).

At the “Diving site”, a decrease in the shoot length was recorded at the three stations. However, statistically significant differences ($p < 0,05$) between the two density values (2019 and 2021) were only found in one out of three stations (Z3-A).

The other parameters are summarized in Table 12 (average values and standard deviations).

Comparison with data from the 2019 monitoring campaign (preliminary survey - WP 3 activity 1) showed a general decrease in leaf necrosis of *Posidonia* leaves at both the Anchoing site (Zone 1 and 2) and the Diving site (Zone 3).

Table 12. Shoot width (cm/shoot), n. of leaves/shoot and leaf necrosis (% leaves/shoot) (average values and standard deviations).

Zone 1		Z1-A	Z1-B	Z1-C
Shoot width (cm/shoot)	2021	0.79±0.03	0.83±0.06	0.96±0.01
	2020	0.93±0.04	0.91±0.06	0.93±0.08
	2019	1.06±0.51	0.84±0.03	0.79±0.01
N. of leaves/shoot	2021	5.3±1.0	6.2±2.3	7.0±1.9
	2020	4.5±0.5	6.0±2.4	5.0±1.4
	2019	6.2±2.4	6.2±1.6	5.8±0.8
Leaf necrosis (% leaves/shoot)	2021	0.3±0.4	0	1.7±4.1
	2020	1.4±0.6	1.2±0.8	0.2±0.4
	2019	15.9±7.7	12.4±6.6	3.2±2.6
Zone 2		Z2-A	Z2-B	Z2-C
Shoot width (cm/shoot)	2021	0.82±0.05	0.86±0.03	0.96±0.03
	2020	0.82±0.02	0.92±0.09	0.91±0.05
	2019	0.79±0.05	0.81±0.03	0.89±0.01
N. of leaves/shoot	2021	4.5±0.5	5.8±1.7	6.5±2.1
	2020	5.2±0.8	5.7±1.0	5.7±2.2
	2019	6.8±1.8	6.7±1.2	6.7±3.7
Leaf necrosis (% leaves/shoot)	2021	0.9±0.6	1.3±1.0	0.2±0.6
	2020	5.8±6.0	1.9±1.9	10.1±10.9
	2019	17.7±9.9	9.1±5.4	9.3±3.7
Zone 3		Z3-A	Z3-B	Z3-C
Shoot width (cm/shoot)	2021	0.74±0.05	0.73±0.05	0.95±0.01
	2020	0.81±0.04	0.76±0.04	0.71±0.02
	2019	0.69±0.03	0.70±0.03	0.70±0.03
N. of leaves/shoot	2021	5.3±0.8	8.0±4.0	7.0±2.4
	2020	5.7±1.0	4.8±0.8	6.0±0
	2019	6.8±2.0	5.3±0.5	6.0±1.3
Leaf necrosis (% leaves/shoot)	2021	1.5±1.5	0.6±0.9	17.9±7
	2020	8.5±8.5	5.5±5.1	3.9±2.1
	2019	22.2±10.0	30.7±6.4	36.3±10.6

4.2.6. Leaf Area Index (LAI) and Conservation Index (CI)

To assess the conservation status of *P. oceanica* meadows, two indices were applied: the Leaf Area Index (LAI) and the Conservation Index (CI).

Leaf Area Index (LAI)

The values of the indices are shown in Table 13 (average values):

Table 13. Average Leaf Area Index (LAI) (the values in brackets refer to 2019 Preliminary survey campaign and 2020 monitoring campaign).

Zone 1	Z1-A	Z1-B	Z1-C
LAI (station average value)	1.37 (2.31-3.06)	1.29 (2.09-2.57)	2.35 (0.90-1.69)
LAI (Zone average value)	1.67 (1.77-2.44)		
Zone 2	Z2-A	Z2-B	Z2-C
LAI (station average value)	0.73 (1.92-0.78)	1.54 (2.07-2.91)	1.71 (2.23-2.23)
LAI (Zone average value)	1.33 (2.07-1.66)		
Zone 3	Z3-A	Z3-B	Z3-C
LAI (station average value)	2.39 (4.77-6.25)	2.75 (4.13-3.04)	3.45 (2.69-2.72)
LAI (Zone average value)	2.86 (3.87-4.00)		

Comparison with data from the 2019 campaign (preliminary survey - WP 3 activity 1) showed a decrease in the average LAI values in Zone 1, Zone 2 and Zone 3.

Conservation Index (CI)

The CI values ranged from 0 (maximum alteration or minimum conservation status, only presence of dead matte) to 1 (high conservation status) (Table 14).

Table 14. Conservation Index (CI) average values.

Zone 1	Z1-A	Z1-B	Z1-C
<i>CI (station average value)</i>	0.37	0.56	0.39
<i>CI (Zone average value)</i>	0.44 (poor conservation status)		
Zone 2	Z2-A	Z2-B	Z2-C
<i>CI (station average value)</i>	0.44	0.48	0.31
<i>CI (Zone average value)</i>	0.41 (poor conservation status)		
Zone 3	Z3-A	Z3-B	Z3-C
<i>CI (station average value)</i>	0.61	0.60	0.72
<i>CI (Zone average value)</i>	0.64 (moderate conservation status)		

In the “Diving site”, the decrease recorded (compared to 2019) in the percentage of cover in Zone 3 (especially at station Z3-A) caused the meadow conservation status to change from GOOD to MODERATE.

4.2.7. Algal blooms and filamentous algae

A general visual assessment by boat using aqua scope in the monitoring areas showed the absence of (filamentous) macroalgal blooms.

4.2.8. Abundance of epiphytes

The average cover of the three categories was calculated and reported in Table 15:

Table 15. Average cover of the three macroalgal categories (*Encrusting layer, Erect layer and Turf layer*).

	Z1-A	Z1-B	Z1-C	Z2-A	Z2-B	Z2-C	Z3-A	Z3-B	Z3-C
<i>Encrusting layer</i>	35%	30%	35%	25%	30%	35%	35%	30%	35%
<i>Erect layer</i>	5%	5%	5%	5%	5%	5%	10%	10%	10%
<i>Turf layer</i>	10%	10%	10%	15%	10%	10%	15%	15%	15%

As for the other study sites, the dominance of the *encrusting layer* (represented mainly by red calcareous algae) can be considered a positive condition of the quality status of seagrass meadows.

4.2.9. Associated communities

In the study area (within the corridors and in their proximity), no live or dead individuals of *Pinna nobilis* were found.

4.2.10. Lower limit of meadows and balise placement

In June 2019, as planned by the WP 3.1 activities, three marking points (balises - dead bodies) were placed in the “Anchor site” on the seabed at the meadow edge of the station (at 14 meters depth), along stretches of the lower limit characterized by degraded/risk conditions. In this case, only one section of the limit was selected, and divers took photographs (central and lateral) of the area where the balises were placed for future comparison, to highlight possible retreat or increase in the limit of the meadows.

The selected limit did not correspond to the actual lower limit of the meadow as only the potential contours endangered by anchoring were considered. The depth of the upper limit (13.2 m) was measured at station Z1-C.

In May 2021, some photos of the balises were taken (Figure 31, Figure 32 and Figure 33). The analysis of these photos showed a stable condition of the meadows, as no signs of retreat of *Posidonia* were visible.

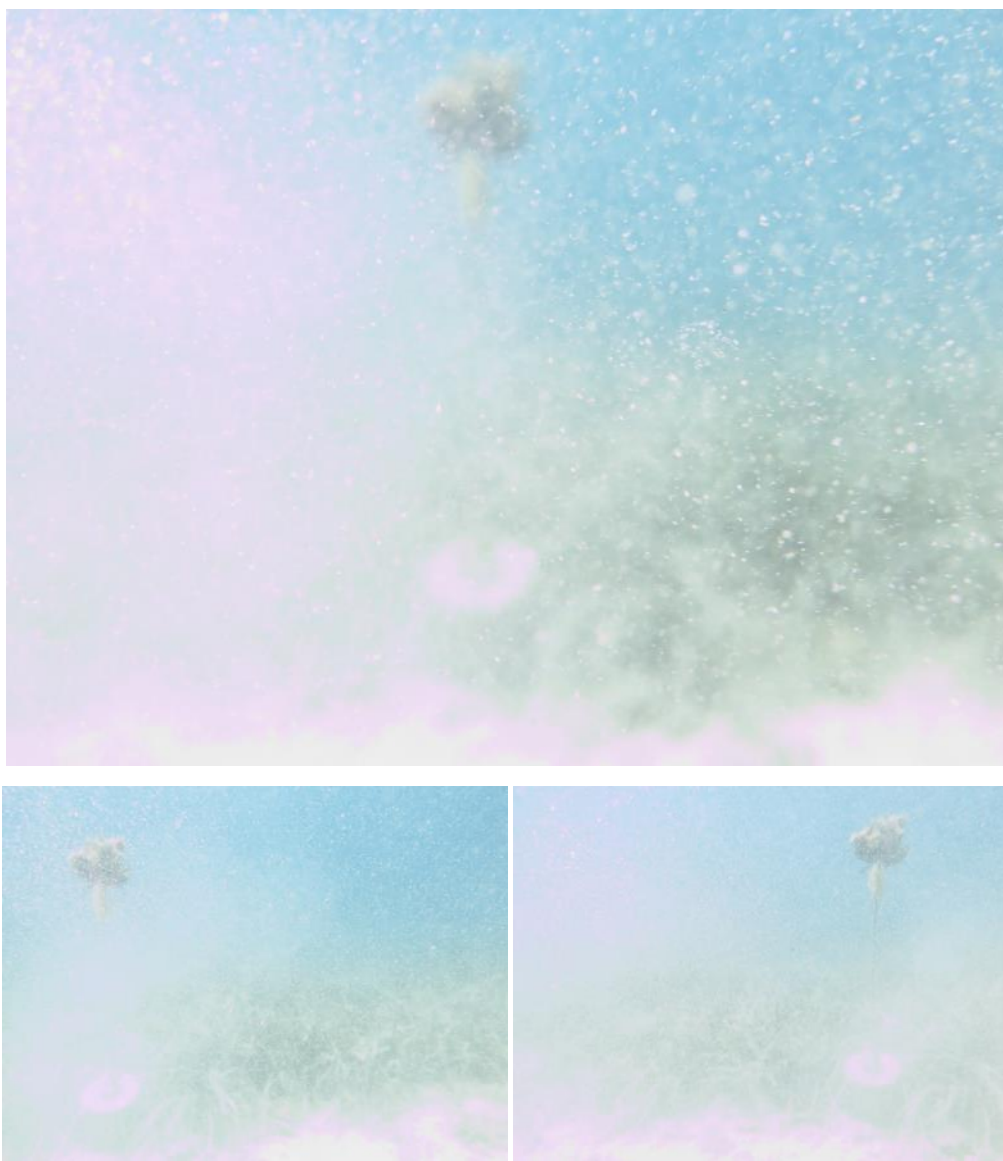


Figure 31. Balise (n. 2) placed by the edge of the meadow on the left of the central balise.

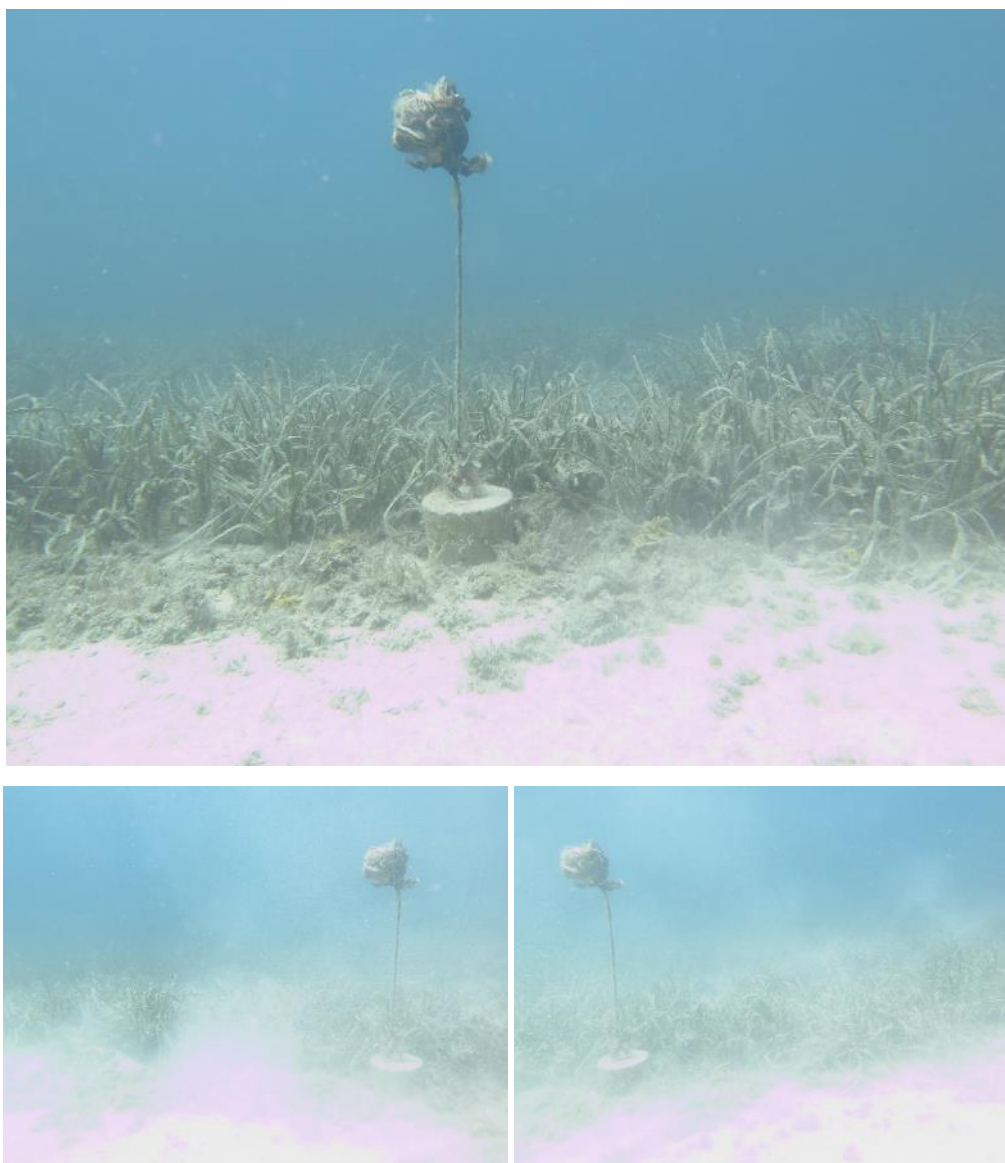


Figure 32. Balise (n. 1) placed by the edge of the meadow between the other two balises.



Figure 33. Balise (n. 3) placed by the edge of the meadow on the right of the central balise.

4.2.11. Type of substrate

Granulometric analyses are reported in Table 16:

Table 16. Results of the grain-size analyses.

	Pebbles %	Gravel %	fine sand %	silt %	clay %	Grain size classification
	$\phi > 64$ mm	$2 < \phi < 64$ mm	$0.063 < \phi < 2$ mm	$0.0039 < \phi < 0.063$ mm	$\phi < 0.0039$ mm	
Z1	0.00	0.00	17.54	69.12	13.34	Clayey sandy silt
Z2	0.00	0.00	11.05	70.44	18.51	Clayey sandy silt
Z3	0.00	0.00	28.41	62.04	9.55	Slightly clayey fine sand silt

4.2.12. Alien species

Although the invasive marine alga *Caulerpa cylindracea* was observed in the last years, spreading throughout the Park, no alien algae were detected during the monitoring activities at the “Anchoring site” and at the “Diving site”.

4.2.13. Presence/absence of habitat disturbance

At the “Anchoring site” (Zone 1 and Zone 2) signs of disturbance and some litter on the seabed were reported (bottles and cans plastic containers). At the “Diving site” (Zone 3) the meadow was continuous with low sedimentation and no visible signs of disturbance; only a few points were devoid of meadow, possibly due to anchoring (anchor and chains).

4.2.14. Monitoring of seagrass transplantation

In October 2019, at the Kornati NP site, two closed pilot seagrass transplantation plots were realized at Kravljačica bay, so called the “Anchoring site” (near Zone 1 and Zone 2), as planned in WP 4 activity 2 (Figure 34), following the method of Scannavino *et al.* (2014). These plots were characterized by the absence of seagrasses or by very spotty covers and by the evidence of frequent presence of anchored boats. The meadow of the donor site was selected in the “Diving site”.



Figure 34. Seagrass transplantation: transplant site in "Anchoring site" and photo-mosaic of the transplanting areas.

The cuttings collected in the donor meadow were fixed to the arms of a biodegradable support and 12 patches composed each of 6 supports were placed in the area to be reforested (Figure 35).

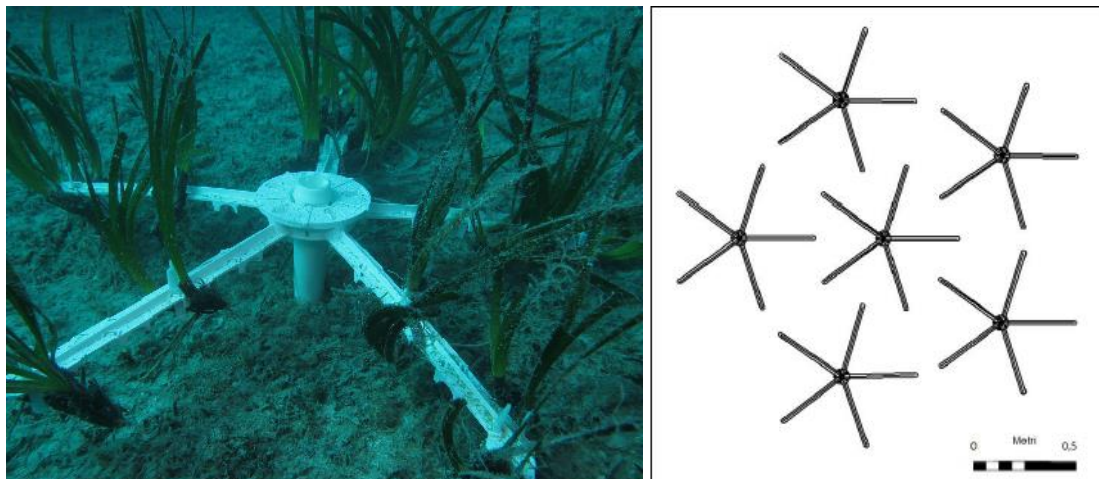


Figure 35. Examples of support with cuttings and of a "transplant patch".

Monitoring was carried out in October 2019, identifying, and labelling a total of 6 supports randomly distributed along the transplant patches. Shoot density, height of the longest leaf and increase length of the rhizome were measured.

The results of the monitoring campaigns carried out in June 2020 and May-June 2021 (as planned in WP 3 activity 3, Figure 37) are reported below (Figure 36); it is important to underline that, since October 2019, the transplanted area in Kravljačica Bay was frequently monitored and all transplants were in good conditions. In May 2021, *Caulerpa cylindracea* was observed in the transplant area.

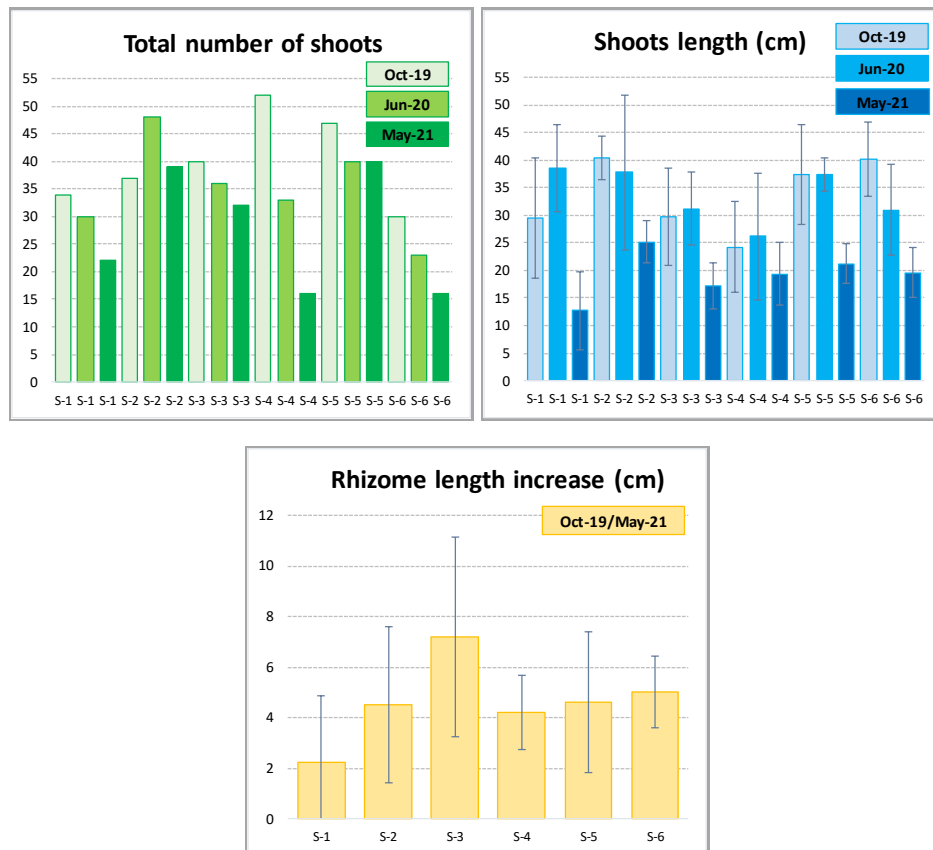


Figure 36. Total number of shoots, average values of shoot length and rhizome length increase of the 6 monitored support (S-1, S-2, S-3, S-4, S-5 and S-6) in October 2019, in June 2020 and in May 2021.

The total number of shoots and the leaf length showed a slow decrease respectively in 5 out of the 6 stations and in all the six measured supports. The decrease was partly due to the high sedimentation trend still going. The rhizomes length showed an increase in all the supports (Figure 36).



Figure 37. May 2021: seagrass transplantation monitoring activities in the Anchoring site.



Figure 38. October 2021: Transplantation area in Levrnaka Bay and donor site.

The second (additional) pilot transplantation area was carried out in October 2021 in Levrnaka Bay, located in the homonymous island, two miles from Kravljacića.



Figure 39. October 2021. Seagrass transplantation: preparation of the transplanted cuttings and their supports.



Figure 40. October 2021. Transplanted cuttings and supports on the seabed.

4.3. Regional Natural Park of Coastal Dunes from Torre Canne to Torre San Leonardo

4.3.1. Monitoring area

In the Regional Natural Park of Coastal Dunes site, the first monitoring campaign planned in 2021 was carried out in February in the Natura 2000 site “Litorale brindisino” (Figure 41).

The study area is located at about 500 meters from the coast and the zones are arranged almost parallel to the coastline. Location Z1 is the closest Zone, while Z3 is the most distant.

The three Zones were located in *P. oceanica* meadow, where anchoring pressures occur due to the presence of medium-sized boats. Within each Zone, three monitoring stations were placed at different depths (Stations Z1-A, Z1-B and Z2-C; Z2-A, Z2-B and Z3-C; Z3-A, Z3-B and Z1-C).



Figure 41. Sampling scheme applied to the monitoring Zones (1-2-3) in the Regional Natural Park of Coastal Dunes.

4.3.2. Distribution of seagrass meadows

The presence of *P. oceanica*, along the coast of the park, was detected a few hundred meters offshore, at a depth of about 7 meters, where the upper limit showed an irregular pattern (Figure 42).

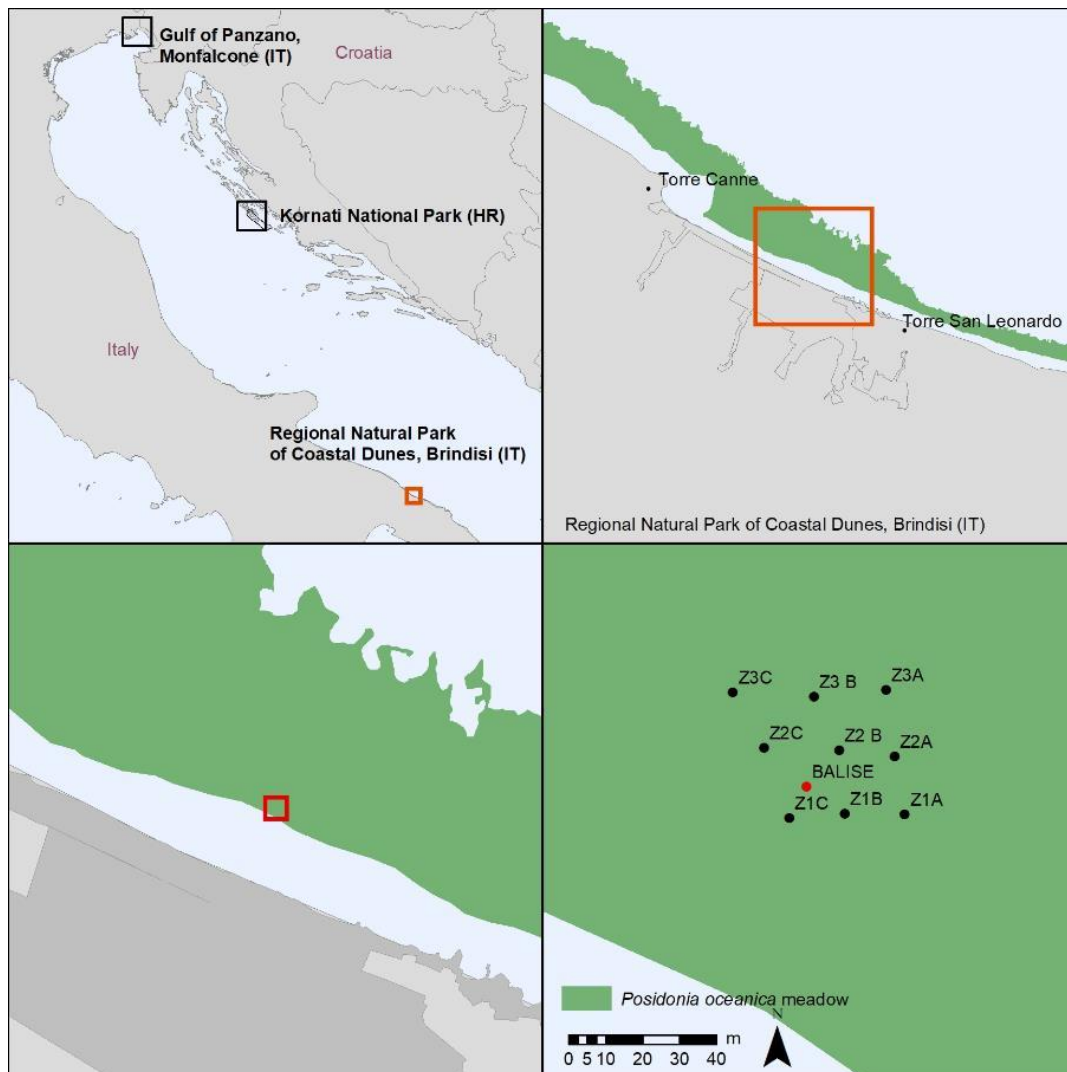


Figure 42. Seagrass distribution and monitoring stations in the Regional Natural Park of Coastal Dunes.

The lower limit is much further offshore, at a depth that has not been investigated. The site identified for the measurements and to carry out the pilot transplantations is approximately opposite to Rosa Marina. The meadow coverage was approximately 70-75%, on matte, with the presence of numerous areas of inter-matte sandy deposits. Several areas of matte were observed where seagrass was certainly retreated, for reasons not directly related to anthropogenic pressures.

4.3.3. Percentage Cover and meadow continuity

The average coverage of *P. oceanica* ranged between 49% and 93% in Zone 1 (stations Z1-A, Z1-B and Z1-C), and between 20% and 80% in Zone 2 (stations Z2-A, Z2-B and Z2-C). In these Zones, the meadows were continuous. On the contrary, in Zone 3, with the exception of station Z3-A, the average coverage of *P. oceanica* was lower than in Zone 1 and 2 (14% - 7% - in stations Z3-B and Z3-C and 36% in Z3-A), highlighting a discontinuity of the meadow. The results are summarized in Figure 43.

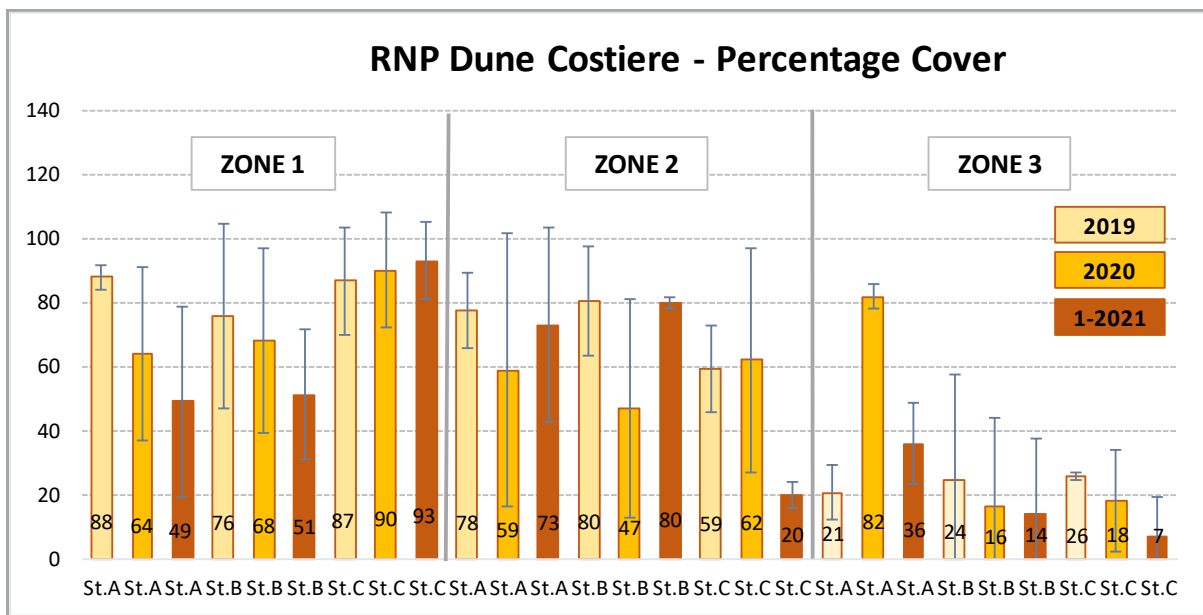


Figure 43. The average values of *P. oceanica* per cent cover as measured at the sampling stations.

As highlighted during the previous campaign (preliminary survey WP 3.1), the data analysis suggests the existence of differences along the stations between Zones 1 and 2 and Zone 3. In particular, the stations placed in Zone 1 and Zone 2 are characterized by a higher cover percentage than those in Zone 3, with the exception of station Z3-A. The comparison with data from the 2019 campaign (preliminary survey - WP 3 activity 1) also showed a slight decrease in the average coverage at the monitoring stations with the exception of Z1-C, Z3-A, where a slight increase was recorded, and Z2-B, where there was no variation. However, these differences were partly due to the different sampling seasons (September in 2019 and February in 2021). The results are summarized in Figure 43 and confirm an irregular coverage pattern (in time and space) that was observed during the diving campaigns, highlighting erosion dynamics that do not respond to a determined trend.

4.3.4. Shoot density

In Zone 1 (stations Z1-A, Z1-B and Z1-C), the average density of *P. oceanica* shoots ranged between 275 and 322 shoots/m², in Zone 2 (stations Z2-A, Z2-B and Z2-C) the range was 277-302 shoots/m² and quite similar in Zone 3 (261-279 shoots/m²). As already recorded in 2019, data analysis suggests the existence

of limited differences along stations and Zones for shoot density. Comparison with data from the 2019 campaign (preliminary survey - WP 3 activity 1) also showed an overall decrease in the mean shoot density at the monitoring stations with the exception of Z2-B and Z2-C, where very slight increases were detected. As for the per cent cover, these decreases were largely due to the different sampling seasons (September in 2019 and February in 2021). The results are summarized in Figure 44.

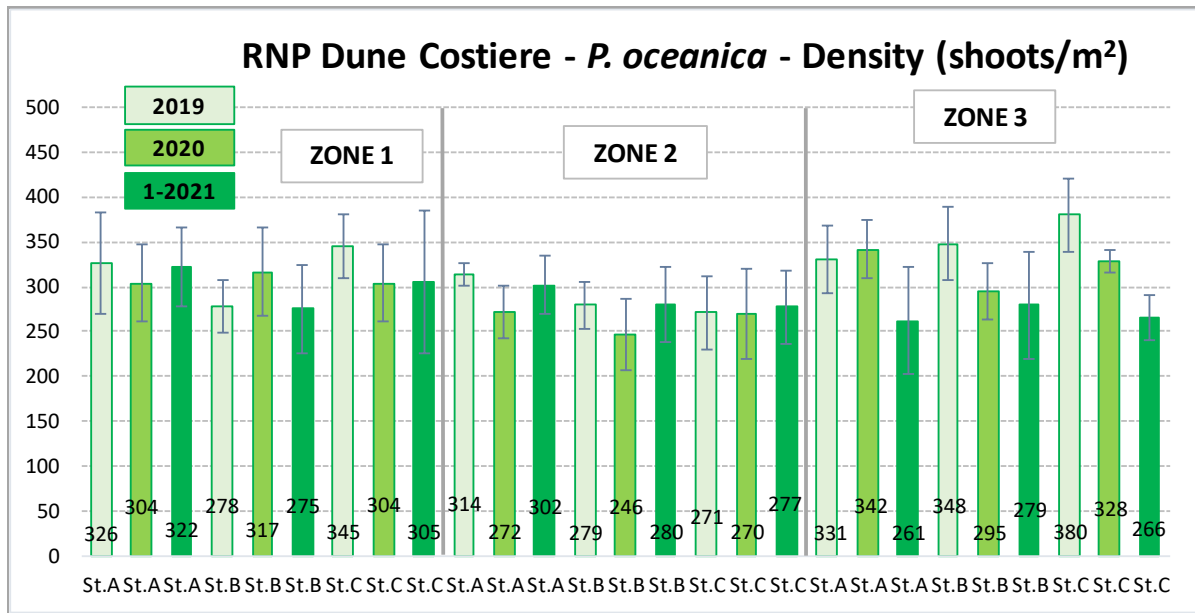


Figure 44. The average values of *P. oceanica* shoot density as measured at the sampling stations.

In Table 17, shoot density and depth values are related to the five classes of ecological status (*sensu* WFD) (UNEP/MAP-RAC/SPA, 2011) (see par. 3.6.3 and par. 4.2.4).

Table 17. Shoot density and depth values in relation to the five classes for the final ecological classification (*sensu* WFD) (UNEP/MAP-RAC/SPA, 2011).

Zones	Z1	Z2	Z3
Density (shoots/m²) (average value)	301	286	269
Depth (m) (average value)	7	7	8
Ecological classification (<i>sensu</i> WFD)	POOR	POOR	POOR

Comparison with data from the 2019 campaign (preliminary survey - WP 3 activity 1) showed no changes in the ecological conditions of the meadow (still POOR in the three zones).

4.3.5. Shoot morphometric measurement

The mean shoot length of *P. oceanica* ranged between 37.1 and 39.5 cm in Zone 1 (stations Z1-A, Z1-B and Z1-C); 33.1 and 40.2 cm in Zone 2 (stations Z2-A, Z2-B and Z2-C) and 46.5 and 55.7 cm in Zone 3 (stations Z3-A, Z3-B and Z3-C).

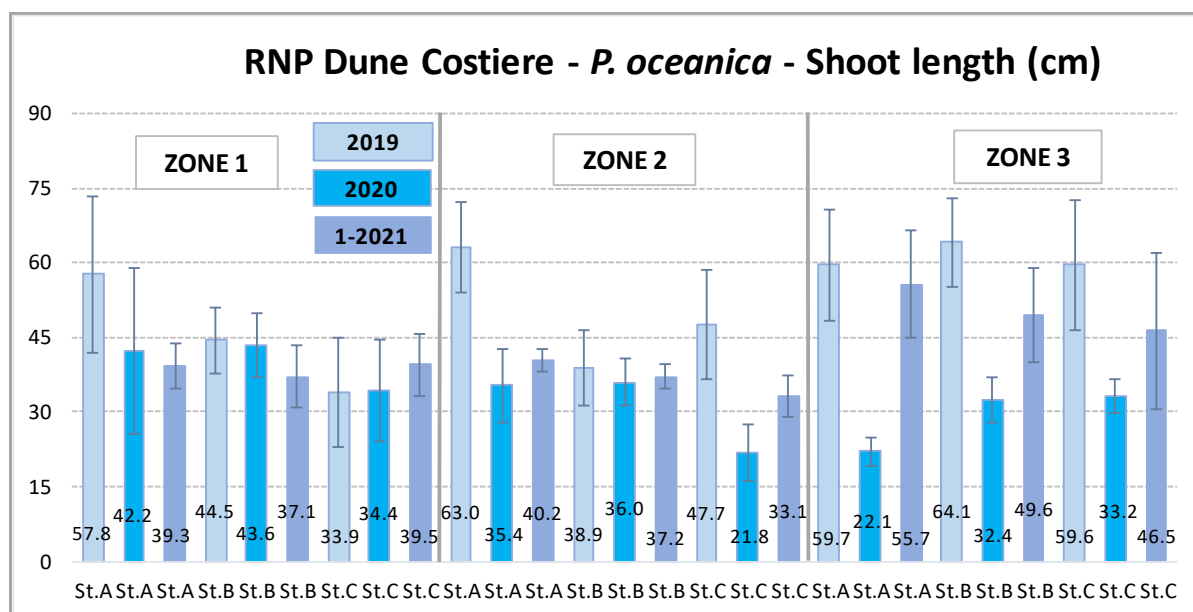


Figure 45. The average values of *P. oceanica* shoot length as measured at the sampling stations.

Comparison with data from the 2019 campaign (preliminary survey - WP 3 activity 1) showed an overall decrease in the average shoot length at the monitoring stations, with the only exception of station Z1-C. The results are summarized in Figure 45.

Other derivate parameters are summarized in Table 18 (average values and standard deviations):

Table 18. Shoot width (cm/shoot), n. of leaves/shoot and leaf necrosis (% leaves/shoot) (verage values and standard deviations).

Zone 1		Z1-A	Z1-B	Z1-C
Shoot width (cm/shoot)	2021	0.82±0.04	0.85±0.05	0.83±0.02
	2020	0.81±0.06	0.83±0.05	0.76±0.03
	2019	0.81±0.03	0.84±0.02	0.81±0.03
N. of leaves/shoot	2021	6.0±0.6	4.2±0.8	4.8±0.8
	2020	5.5±1.0	6.7±0.8	5.8±0.8
	2019	6.0±1.7	5.5±1.0	5.7±1.4
Leaf necrosis (% leaves/shoot)	2021	0.4±0.8	0	0.1±0.1

	2020	1.8±1.3	1.9±0.8	0.6±1.4
	2019	4.1±3.9	9.8±4.9	8.5±4.0
Zone 2		Z2-A	Z2-B	Z2-C
Shoot width (cm/shoot)	2021	0.85±0.04	0.81±0.04	0.80±0.10
	2020	0.87±0.04	0.82±0.03	0.79±0.02
	2019	0.80±0.03	0.83±0.04	0.84±0.04
N. of leaves/shoot	2021	5.0±0.6	4.5±0.5	5.0±0.9
	2020	6.0±0.6	6.0±0	4.8±0.8
	2019	5.5±1.2	5.3±0.5	5.2±1.3
Leaf necrosis (% leaves/shoot)	2021	0.5±0.7	0.1±0.2	1.7±2.0
	2020	0.8±0.8	1.0±0.8	0.6±0.7
	2019	5.9±5.1	7.7±4.3	11.2±6.6
Zone 3		Z3-A	Z3-B	Z3-C
Shoot width (cm/shoot)	2021	0.86±0.03	0.90±0	0.89±0.02
	2020	0.74±0.01	0.73±0.02	0.69±0.03
	2019	0.81±0.03	0.84±0.02	0.85±0.01
N. of leaves/shoot	2021	5.0±0.6	4.8±1.5	4.3±0.5
	2020	7.0±0.9	5.2±0.8	7.5±1.6
	2019	5.8±1.2	4.8±0.4	5.5±1.8
Leaf necrosis (% leaves/shoot)	2021	0.3±0.8	0	0
	2020	0.6±0.5	0	0.1±0.3
	2019	7.8±7.2	7.1±4.9	18.4±6.9

Comparison with data from the 2019 campaign (preliminary survey - WP 3 activity 1) showed an overall general decrease of leaf necrosis in *Posidonia*.

4.3.6. Leaf Area Index (LAI) and Conservation Index (CI)

To assess the conservation status of *Posidonia* meadows, two indices were applied: the Leaf Area Index (LAI) and the Conservation Index (CI).

Leaf Area Index (LAI)

LAI values are reported in Table 19 (average values and standard deviations):

Table 19. Average Leaf Area Index (LAI). The values in brackets refer to 2019 preliminary survey campaign and 2020 monitoring campaign).

Zone 1	Z1-A	Z1-B	Z1-C
LAI (station average value)	3.83 (2.90-4.06)	2.41 (3.62-2.96)	3.05 (2.33-2.71)
LAI (Zone average value)	3.10 (2.95-3.24)		
Zone 2	Z2-A	Z2-B	Z2-C
LAI (station average value)	3.31 (1.95-3.81)	2.59 (1.76-2.72)	2.53 (1.06-3.19)
LAI (Zone average value)	2.81 (1.59-3.24)		
Zone 3	Z3-A	Z3-B	Z3-C
LAI (station average value)	3.75 (2.04-4.92)	4.09 (1.64-4.41)	3.02 (2.60-5.59)
LAI (Zone average value)	3.62 (2.09-4.98)		

Comparison with data from the 2019 campaign (preliminary survey - WP 3 activity 1) showed an overall stability of the LAI mean values in the three Zones.

Conservation Index (CI)

The CI values are reported in Table 20 (average values and standard deviations):

Table 20. Conservation Index (CI) average values.

Zone 1	Z1-A	Z1-B	Z1-C
CI (station average value)	1.00	0.92	0.92
CI (Zone average value)	0.95 (high conservation status)		
Zone 2	Z2-A	Z2-B	Z2-C
CI (station average value)	0.80	0.89	0.71
CI (Zone average value)	0.80 (good conservation status)		
Zone 2	Z2-A	Z2-B	Z2-C
CI (station average value)	1.00	1.00	1.00
CI (Zone average value)	1.00 (high conservation status)		

Comparison with data from the 2019 campaign (preliminary survey - WP 3 activity 1) showed no changes in the conservation status of the meadow (still HIGH in Zone 1 and Zone 3 and GOOD in Zone 2).

4.3.7. Algal blooms and filamentous algae

The visual assessment by boat using an aqua scope in the monitoring areas showed the absence of (filamentous) macroalgal blooms.

4.3.8. Abundance of epiphytes

The average coverage of the three categories was calculated and reported in in Table 21:

Table 21. Average cover of the three macroalgal categories (*Encrusting layer*, *Erect layer* and *Turf layer*).

	Z1-A	Z1-B	Z1-C	Z2-A	Z2-B	Z2-C	Z3-A	Z3-B	Z3-C
<i>Encrusting layer</i>	35%	30%	30%	30%	30%	25%	25%	30%	30%
<i>Erect layer</i>	5%	5%	10%	5%	5%	5%	10%	10%	5%
<i>Turf layer</i>	10%	10%	5%	5%	5%	5%	5%	5%	10%

As for the other study sites, the dominance of the *encrusting layer* (represented mainly by red calcareous algae) can be considered a positive condition of the quality status of seagrass meadows.

4.3.9. Associated communities

No live or dead individuals of *Pinna nobilis* were found in the study area (within the corridors and in their proximity).

4.3.10. Lower limit of meadows and balise placement

In September 2019, three marking points (balises - dead bodies) were placed between Zone 1 and Zone 2 on the seabed by the edge of the meadow (positioned at a depth of 7,5 meters), along sections of the lower meadow limit characterized by degraded/risk conditions (erosion and retreat of the meadow).

As in the Kornati NP site, only one section of the limit was selected where the balises were placed for future comparison to highlight possible retreat or increase of the meadow limit that was characterized by erosion and retreat. It did not correspond to the proper lower limit of the meadow (as only possible endangered contours were considered).

In October 2020, the balise located at the edge of the meadow to the left of the central balise was not found during the monitoring activities. During the second monitoring campaign, carried out in February 2021, the “missing” balise was found some meters away from its original position completely covered by sand and repositioned.

The displacement of the balise and the traces of mobility of the sandy lenses suggest a certain energy at the sea-bottom during weather events of considerable magnitude.

In February 2021, during the first monitoring campaign, some photos of the balises were taken (Figure 46, Figure 47 and Figure 48). The analysis of these photos shows a stable condition, as no signs of retreat where observed.

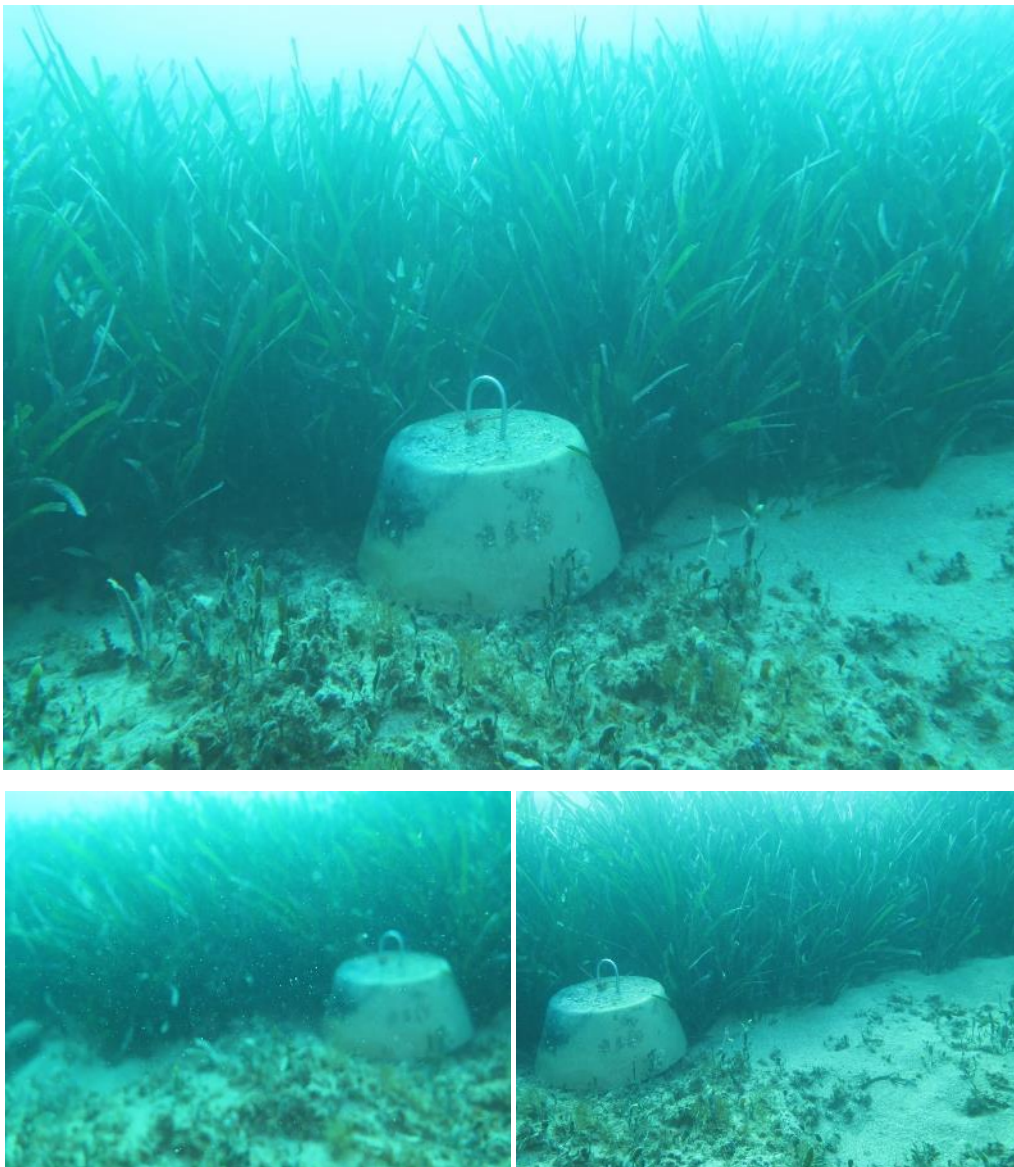


Figure 46. Balise (n. 2) placed by the edge of the meadow on the left of the central balise.

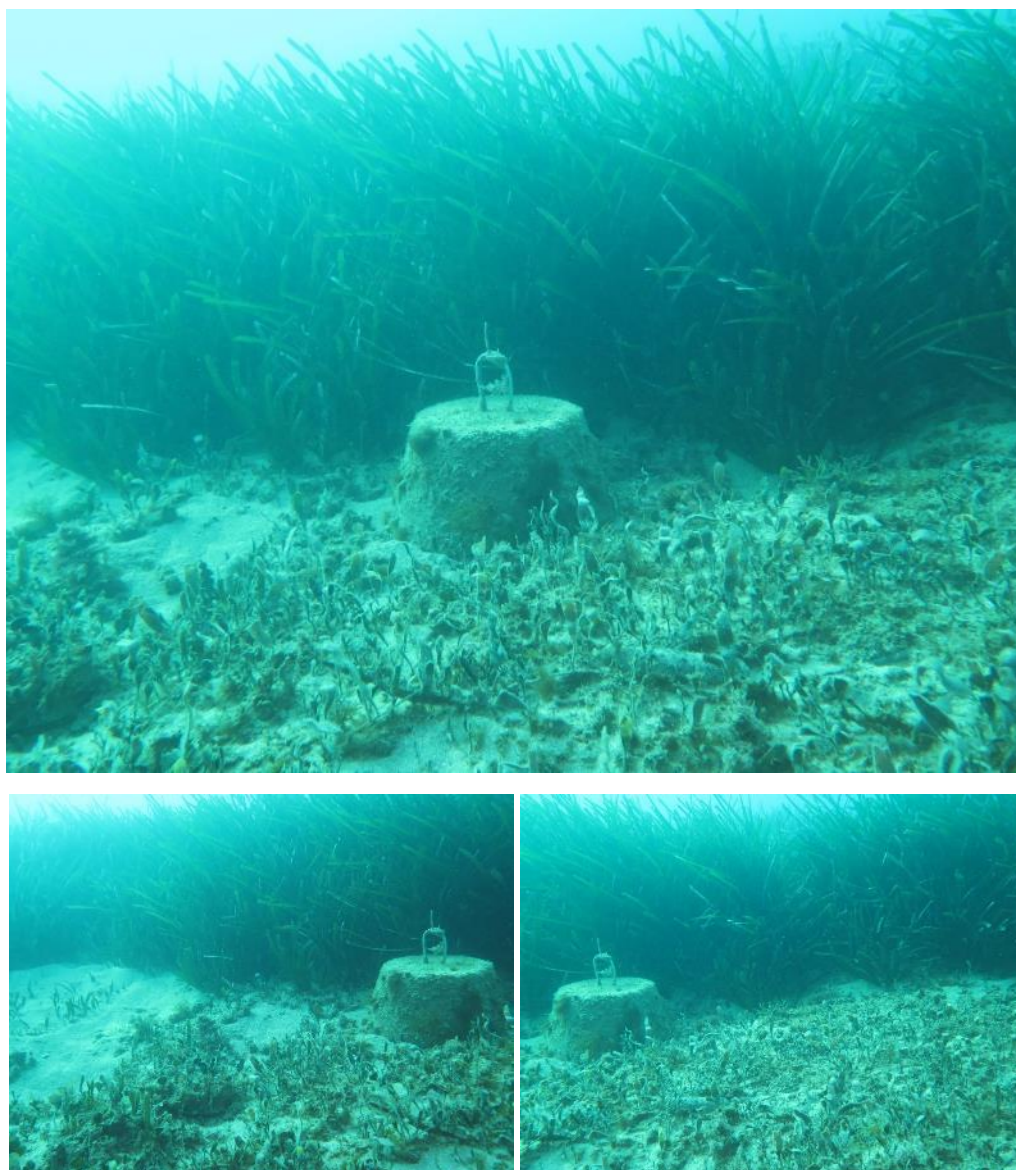


Figure 47. Balise (n. 1) placed by the edge of the meadow between the other two balises.

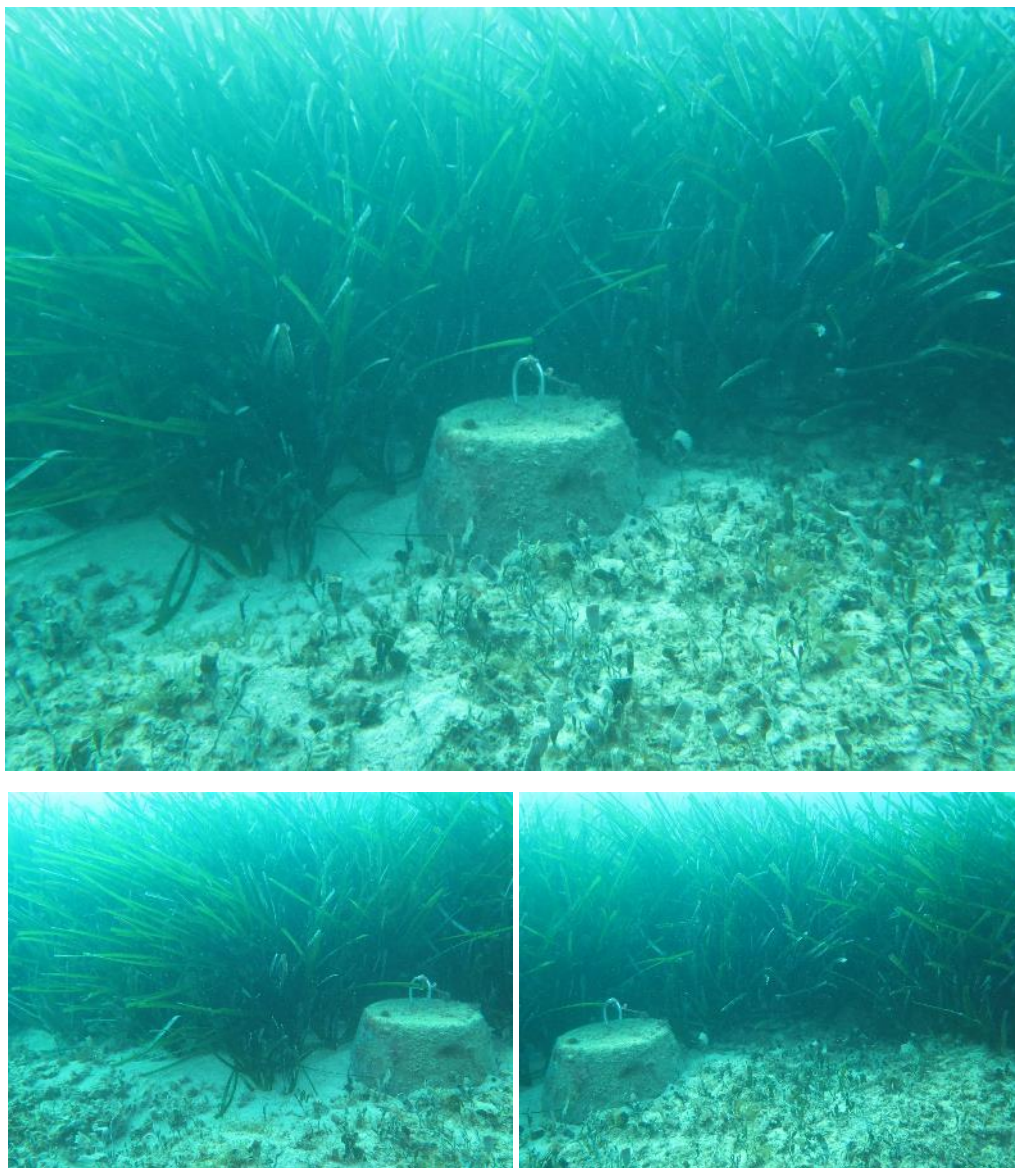


Figure 48. Balise (n. 3) placed by the edge of the meadow on the right of the central balise.

4.3.11. Type of substrate

Granulometric analyses are reported in Table 22:

Table 22. Results of the grain-size analyses.

	Pebbles %	Gravel %	fine sand %	silt %	clay %	Grain size classification
	$\phi > 64$ mm	$2 < \phi < 64$ mm	$0.063 < \phi < 2$ mm	$0.0039 < \phi < 0.063$ mm	$\phi < 0.0039$ mm	
Z1	0.00	0.00	99.46	0.5	0.04	Medium-fine sand
Z2	0.00	0.00	96.89	2.99	0.12	Medium-fine sand
Z3	0.00	0.00	97.88	1.93	0.19	Medium-fine sand

4.3.12. Alien species

No alien species were found in the study area during the monitoring activities. However, it is important to emphasize the abundant presence of *Caulerpa prolifera*, an indigenous green alga, congeneric with the alien *Caulerpa taxifolia* and *Caulerpa racemosa* which are invading some areas of the Mediterranean Sea. In fact, regressed meadows are prone to invasion by one or more of the potential substitutes of *P. oceanica* such as *C. racemosa*, or other common Mediterranean seagrasses such as *Cymodocea nodosa*.

4.3.13. Presence/absence of habitat disturbance

Concerning human disturbance and evidence of mechanical pressures, none were observed in or near the monitoring Zones.

4.3.14. Seagrass transplantation

In the RNP Coastal Dunes site, the area to perform the pilot seagrass transplantation (planned in WP 4 activity 2) was identified near Zone 1. This area is characterized by the absence of seagrasses (bare seabed) or low meadows coverage values and the frequent presence of anchored boats (Figure 49).

The transplantation, originally planned in October 2020, was postponed (due to difficulties in obtaining permits from the competent authorities to RNP administrative constraints, and to the COVID-19 emergency) and carried out at the end of February 2021.

The transplantation area was located near to the SIC Area "Litorale Brindisino", in a discontinuous meadow with the upper limit at a depth of 8 m, characterized by the presence of patches of *Posidonia oceanica*, dead mat and sandy sediments (Figure 49). The distribution of the dead mat is fragmented and is partially localized on sub-superficial rocky states.



Figure 49. Seagrass transplantation: transplant site and photo-mosaic of the transplanting areas.

The transplantation was carried out in two contiguous quadrats, in relation to the area's bathymetry, each of which represented approximately an area of about 100 m², for a total transplant area of about 200 m².

The cuttings collected in the donor meadow were fixed to the arms of a biodegradable support and 14 patches were arranged in the area. On the whole a total of 84 anchoring modules and about 2,500 rhizome patches composed each of 6 supports were placed in the area to be reforested. The used technique was that reported by Scannavino *et al.* (2014).

The first monitoring campaign was carried out in May 2021, identifying, and labelling a total of 6 supports randomly distributed along the transplant patches. Shoot density and height of the longest leaf³ (Figure 50), showing good leaf conditions, but physical loss of shoots due to multiple causes that cannot be identified with certainty (i.e., fishing, anchoring, wave erosion) (Figure 51).

³ Length increase of the rhizome were measured during the second 2021 campaign (planned in October/November).

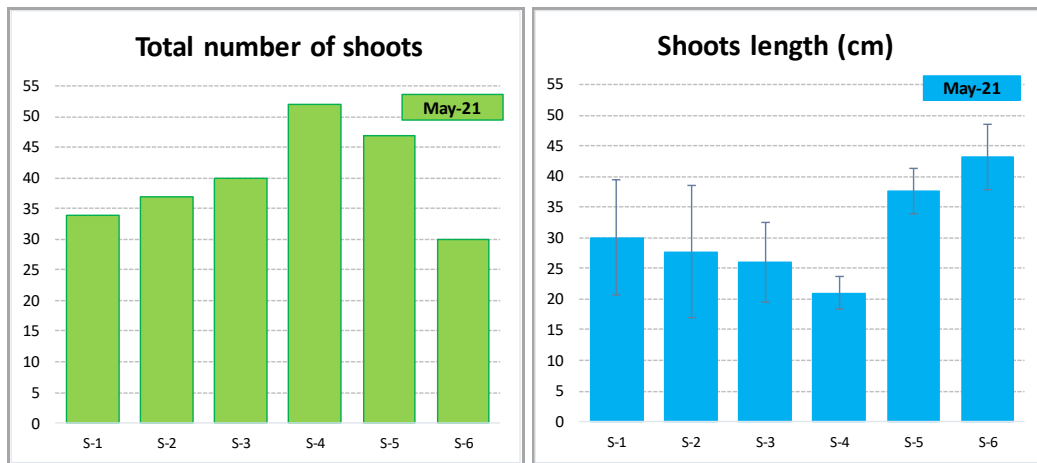


Figure 50. Total number of shoots and average shoot length of the 6 monitored supports (S-1, S-2, S-3, S-4, S-5 and S-6) monitored in May 2021.



Figure 51. May 2021: seagrass transplantation monitoring activities in the RNP Coastal Dunes site.

5. CONCLUSIONS

The comparison of the data collected during the monitoring campaigns carried out in 2021 (between February and June) with those collected during the preliminary survey (preliminary survey - WP 3 activity 1 - 2019) shows that:

- at the Panzano Bay, no anomalies were found. A comparison with data from the 2019 monitoring campaign (preliminary survey - WP 3 activity 1) highlights some differences between the parameter values (2019 and 2021), probably due to the slightly different sampling periods (end of May in 2019 and mid-April in 2021);
- at the Kornati NP, changes in the mean values of the main parameters were found. However, data analysis showed no changes in the ecological conditions of the meadow (still BAD in the “Anchoring site” and POOR in the “Diving site”). Furthermore, the analysis of balises showed stable or moderately improved meadows condition, as signs of retreat were not recorded and some denser patches of *Posidonia* were observed;
- at the RNP Coastal Dunes, changes in the mean values of the main analyzed parameters were found. However, comparison with data from the 2019 campaign showed no change in the ecological status of the meadow (still POOR in the *three* zones) and in the conservation status of the meadow (still HIGH in Zone 1 and Zone 3 and GOOD in Zone 2). The analysis of the balises showed a stable condition, as there were no signs of retreat.

Regarding the update on the status and progress of the seagrass transplantations (planned in WP 4 activity 2), it is important to underline that:

- at the Panzano Bay in April 2021, a monitoring of the restored sites was carried out highlighting that approximatively 50% of the plugs transplanted in September 2020 and almost all the plugs transplanted in April 2021 were still in place;
- at the Kornati NP site, the total number of shoots and the leaf length showed a slight decrease respectively in 5 out of the 6 stations and in all the six measured supports. It was partly due to the high sedimentation trend still going, which results as a contour condition;
- at the RNP Coastal Dunes site, the transplant, originally planned in October 2020, was postponed, and carried out in February 2021. Shoot density and height of the longest leaf, showed good leaf conditions, but physical loss of shoots was due to multiple causes, that cannot be identified with certainty (i.e., fishing, anchoring, wave erosion).

6. ACKNOWLEDGEMENTS

In the Monfalcone site, the monitoring campaign was carried thanks to the concrete support, in time, by the Civil Protection Service and the Hannibal Marina of Monfalcone. Coordination of activities was also carried out by LP.

In the Regional Natural Park Coastal Dunes, the monitoring campaign was carried out with the collaboration of the “Lega Navale”, a section of Ostuni. Coordination of activities was carried out by the RNP partner.

Help and cooperation was received from the competent Offices of the Maritime Authority (“Capitaneria di Porto” of Monfalcone and “Delegazione di Spiaggia” of Ostuni).

In the Kornati NP, the survey was carried out by the competent partners (PP1 SELC, PP4 SUNCE, PP5 Park Kornati), with the expert support of the Najada Diving of Murter.

In addition to the partners directly involved in the field activities, a special thanks go to the professors A. Falace and A. Sfriso, respectively of UNITS (PP2 CONISMA) and DAIS-UNIVE (PP7 CORILA) partners, for the comments and suggestions necessary for the completion of the document.

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8. ANNEXES

- Field Data Sheets.
- Laboratory Data Sheets.

Field Data Sheets

Bay of Panzano (Monfalcone)

WP 3.3 - Monitoring campaigns

Page: 1/2 /

Date: 15-04-2021 Zone and sampling station: Z1-A (MONFALCONE)

Depth: 1,9 m

Coordinates: 45°46'45,81" - 13°32'12,51"

Coordinator: A. RISMONDO

Operators: A. RISMONDO - M. CONSENTINO

Habitat characterization and disturbance (potential pressures in the area and signs of impact): CYMODOCEA MEADOW

Seagrass: CYMODOCEA NOBOSA

Other Seagrasses: _____

Meadow continuity: yes / no

Type of substrate: SANDY

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: _____

Algal blooms and filamentous algae: _____

Presence of *Pinna nobilis*: yes / no

Shoot density

Size of sampling units: 30 x 30 cm

Replicate	No of shoots	Depth (m)	Notes
1	43	1,90	
2	67	1,90	
3	58	1,90	
4	49	1,90	
5	70	1,80	
6	52	1,90	

Collection of shoots for laboratory analyses: yes / no

Collection of sediment for laboratory analyses: yes / no

Zone and sampling station: **Z1-A (MONFALCONE)**

Page: **2/2**

% Coverage

Size of sampling units: transect 10 m

Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
CN	1000		CN	1000		CN	470	
						SA	520	
						CN	1000	

C = categories

P = P. oceanica
 Cn = C. nodosa
 Zm = Z. marina
 Zn = Z. noltei

D = Dead matte
 M = Mud
 Sa = Sand
 St = Stones/Pebbles
 R = Rock

O = other species

Notes:

i = intercept (cm)

Presence and density of *Pinna nobilis* *

Replicate	No of alive individuals	No of dead individuals
1	<u> </u>	<u> </u>
2	<u> </u>	<u> </u>
3	<u> </u>	<u> </u>

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

WP 3.3 - Monitoring campaigns

Page: 1/2

Date: 15-04-2021 Zone and sampling station: Z1-B (MONFALCONE)

Depth: 2,2 m

Coordinates: 45°46'45,47" - 13°32'19,19"

Coordinator: A. RISMONDO

Operators: A. RISMONDO - M. CONSENTINO

Habitat characterization and disturbance (potential pressures in the area and signs of impact): CYMODOCEA MEADOW

Seagrass: CYMODOCEA NODOSA

Other Seagrasses: /

Meadow continuity: yes / no

Type of substrate: SANDY

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: /

Algal blooms and filamentous algae: /

Presence of *Pinna nobilis*: yes / ~~no~~

Shoot density

Size of sampling units: 30 x 30 cm

Replicate	No of shoots	Depth (m)	Notes
1	74	2,2	/
2	49	2,1	/
3	72	2,2	/
4	53	2,2	/
5	70	2,2	/
6	76	2,1	/

Collection of shoots for laboratory analyses: ~~yes~~ / no

Collection of sediment for laboratory analyses: ~~yes~~ / no

Zone and sampling station: **Z1 - B (MONFALCONE)**

Page: **2/2**

% Coverage **Size of sampling units: transect 10 m**

Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
CN	1000		CN	1000		CN	1000	

C = categories

- P = *P. oceanica*
- Cn = *C. nodosa*
- Zm = *Z. marina*
- Zn = *Z. noltei*

- D = Dead *matte*
- M = Mud
- Sa = Sand
- St = Stones/Pebbles
- R = Rock

O = other species

i = intercept (cm)

Notes: _____

Presence and density of *Pinna nobilis* *

Replicate	No of alive individuals	No of dead individuals
1	/	/
2	/	/
3	/	/

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

WP 3.3 - Monitoring campaigns

Page: 1./2

Date: 15-04-2021 Zone and sampling station: Z1-C (MONFALCONE)

Depth: 4,3 m

Coordinates: 45° 46' 37,97" - 13° 32' 27,58"

Coordinator: A. RISMONDO

Operators: A. RISMONDO - M. CONSENTINO

Habitat characterization and disturbance (potential pressures in the area and signs of impact): /

Seagrass: /

Other Seagrasses: /

Meadow continuity: yes / no

Type of substrate: SANDY SILT

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: /

Algal blooms and filamentous algae: /

Presence of *Pinna nobilis*: yes / ~~no~~

Shoot density

Size of sampling units: 30 x 30 cm

Replicate	No of shoots	Depth (m)	Notes
1	/	/	/
2	/	/	/
3	/	/	/
4	/	/	/
5	/	/	/
6	/	/	/

Collection of shoots for laboratory analyses: yes / ~~no~~

Collection of sediment for laboratory analyses: ~~yes~~ / no

Zone and sampling station: **Z1-C (MON FALCONE)**

Page: **2/2**

% Coverage Size of sampling units: transect 10 m

Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
SA	1000		SA	1000		SA	1000	

C = categories

P = P. oceanica
Cn = C. nodosa
Zm = Z. marina
Zn = Z. noltei

D = Dead matte
M = Mud
Sa = Sand
St = Stones/Pebbles
R = Rock

O = other species

i = intercept (cm)

Notes: _____

Presence and density of *Pinna nobilis* *

Replicate	No of alive individuals	No of dead individuals
1	✓	✓
2	✓	✓
3	✓	✓

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

WP 3.3 - Monitoring campaigns

Page: 1/2

Date: 14-04-2021 Zone and sampling station: Z2-A (MONFALCONE)

Depth: 0,75 m

Coordinates: 45° 45' 34,13" - 13° 31' 36,79"

Coordinator: A. RISMONDO

Operators: A. RISMONDO - S. CIRIACO

Habitat characterization and disturbance (potential pressures in the area and signs of impact): ZOSTERA NOLTEI MEADOW

Seagrass: ZOSTERA NOLTEI

Other Seagrasses: /

Meadow continuity: yes / no

Type of substrate: SANDY SILT

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: /

Algal blooms and filamentous algae: /

Presence of *Pinna nobilis*: yes / no

Shoot density

Size of sampling units: 30 x 30 cm

Replicate	No of shoots	Depth (m)	Notes
1	167	0,75	/
2	133	0,75	/
3	154	0,70	/
4	175	0,75	/
5	198	0,75	/
6	207	0,70	/

Collection of shoots for laboratory analyses: yes / no

Collection of sediment for laboratory analyses: yes / no

Zone and sampling station: Z2 - A (MONFALCONE)

Page: 2/2

% Coverage **Size of sampling units: transect 10 m**

Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
ZN	1000	-	ZN	1000	-	ZN	1000	-

C = categories
 P = P. oceanica D = Dead *matte*
 Cn = C. nodosa M = Mud
 Zm = Z. marina Sa = Sand
 Zn = Z. noltei St = Stones/Pebbles
 R = Rock

O = other species **i = intercept (cm)**
Notes: _____

Presence and density of *Pinna nobilis* *

Replicate	No of alive individuals	No of dead individuals
1		
2		
3		

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

WP 3.3 - Monitoring campaigns

Page: 1,2 / 1,2

Date: 14-04-2021 Zone and sampling station: Z2-B (MONFALCONE)

Depth: 1,20 m

Coordinates: 45°45'28,69" - 13°31'54,79"

Coordinator: A. RISMONDO

Operators: A. RISMONDO - S. CIRIACO

Habitat characterization and disturbance (potential pressures in the area and signs of impact): CYMODOCEA MEADOW

Seagrass: CYMODOCEA NODOSA

Other Seagrasses: /

Meadow continuity: yes / no

Type of substrate: SANDY SILT

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: /

Algal blooms and filamentous algae: /

Presence of *Pinna nobilis*: yes / no

Shoot density

Size of sampling units: 30 x 30 cm

Replicate	No of shoots	Depth (m)	Notes
1	52	1,20	/
2	47	1,20	/
3	58	1,10	/
4	63	1,10	/
5	55	1,20	/
6	69	1,20	/

Collection of shoots for laboratory analyses: yes / no

Collection of sediment for laboratory analyses: yes / no

Zone and sampling station: **ZZ-B (MONFALCONE)**

Page: **2/2**

% Coverage **Size of sampling units: transect 10 m**

Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
CN	570		CN	1000	/	CN	790	
SA	630					SA	840	
CN	780					CN	1000	
SA	850							
CN	1000							

C = categories

P = *P. oceanica*
 Cn = *C. nodosa*
 Zm = *Z. marina*
 Zn = *Z. noltei*

D = Dead *matte*
 M = Mud
 Sa = Sand
 St = Stones/Pebbles
 R = Rock

O = other species

i = intercept (cm)

Notes: _____

Presence and density of *Pinna nobilis* *

Replicate	No of alive individuals	No of dead individuals
1	/	/
2	/	/
3	/	/

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

WP 3.3 - Monitoring campaigns

Page: 1/2

Date: 15-04-2021 Zone and sampling station: Z2-C (MONFALCONE)

Depth: 2,5 m

Coordinates: 45° 45' 23,05" - 13° 32' 32,63"

Coordinator: A. RISMONDO

Operators: A. RISMONDO - M. CONSENTINO

Habitat characterization and disturbance (potential pressures in the area and signs of impact): CYMODOCEA MEADOW

Seagrass: CYMODOCEA NOBOSA

Other Seagrasses: /

Meadow continuity: yes / no

Type of substrate: SANDY

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: /

Algal blooms and filamentous algae: /

Presence of *Pinna nobilis*: yes / no

Shoot density

Size of sampling units: 30 x 30 cm

Replicate	No of shoots	Depth (m)	Notes
1	66	2,5	/
2	49	2,6	/
3	71	2,5	/
4	43	2,5	/
5	77	2,6	/
6	76	2,5	/

Collection of shoots for laboratory analyses: yes / no

Collection of sediment for laboratory analyses: yes / no

Zone and sampling station: ZZ-C (MONFALCONE)

Page: 2/2

% Coverage Size of sampling units: transect 10 m

Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
CN	1000		CN	840		CN	1000	
			SA	910				
			CN	1000				

C = categories

- P = P. oceanica
- Cn = C. nodosa
- Zm = Z. marina
- Zn = Z. noltei

- D = Dead matte
- M = Mud
- Sa = Sand
- St = Stones/Pebbles
- R = Rock

O = other species

i = intercept (cm)

Notes: _____

Presence and density of Pinna nobilis *

Replicate	No of alive individuals	No of dead individuals
1	✓	✓
2	✓	✓
3	✓	✓

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

WP 3.3 - Monitoring campaigns

Page: 1/2

Date: 14-04-2024 Zone and sampling station: Z3-A (MONFALCONE)
 Depth: 2,20 m
 Coordinates: 45° 45' 06,27" - 13° 31' 54,88"
 Coordinator: A. RISMONDO
 Operators: A. RISMONDO - M. CONSENTINO

Habitat characterization and disturbance (potential pressures in the area and signs of impact): ZOSTERA MARINA MEADOW

Seagrass: ZOSTERA MARINA
 Other Seagrasses:
 Meadow continuity: yes / no
 Type of substrate: SANDY SILT

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species:
 Algal blooms and filamentous algae:

Presence of *Pinna nobilis*: yes / no

Shoot density

Size of sampling units: 30 x 30 cm

Replicate	No of shoots	Depth (m)	Notes
1	33	2,20	✓
2	23	2,20	✓
3	34	2,10	✓
4	30	2,20	✓
5	27	2,20	✓
6	18	2,10	✓

Collection of shoots for laboratory analyses: yes / no

Collection of sediment for laboratory analyses: yes / no

Zone and sampling station: Z3-A (MONFALCONE)

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% Coverage

Size of sampling units: transect 10 m

Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
Zm	1000		Zm	1000		Zm	1000	

C = categories

P = P. oceanica
 Cn = C. nodosa
 Zm = Z. marina
 Zn = Z. noltei

D = Dead *matte*
 M = Mud
 Sa = Sand
 St = Stones/Pebbles
 R = Rock

O = other species

i = intercept (cm)

Notes: _____

Presence and density of *Pinna nobilis* *

Replicate	No of alive individuals	No of dead individuals
1	—	—
2	—	—
3	—	—

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

WP 3.3 - Monitoring campaigns

Page: 1/2

Date: 14-04-2021 Zone and sampling station: Z3-B (MONFALCONE)

Depth: 1,80 m

Coordinates: 45° 45' 09,33" - 13° 32' 06,01"

Coordinator: A. RISMONDO

Operators: A. RISMONDO - S. CIRIACO

Habitat characterization and disturbance (potential pressures in the area and signs of impact): CYMODOCEA MEADOW

Seagrass: CYMODOCEA NODOSA

Other Seagrasses: /

Meadow continuity: yes / no

Type of substrate: SANDY SILT

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: /

Algal blooms and filamentous algae: /

Presence of *Pinna nobilis*: yes / no

Shoot density

Size of sampling units: 30 x 30 cm

Replicate	No of shoots	Depth (m)	Notes
1	43	1,80	/
2	54	1,80	/
3	49	1,80	/
4	61	1,70	/
5	57	1,80	/
6	48	1,80	/

Collection of shoots for laboratory analyses: yes / no

Collection of sediment for laboratory analyses: yes / no

Zone and sampling station: **Z3-B (MONFALCONE)**

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% Coverage Size of sampling units: transect 10 m







Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
CN	780		CN	1000		CN	1000	
SA	850							
CN	1000							

C = categories
 P = *P. oceanica*
 Cn = *C. nodosa*
 Zm = *Z. marina*
 Zn = *Z. noltei*

 D = Dead *matte*
 M = Mud
 Sa = Sand
 St = Stones/Pebbles
 R = Rock

O = other species
i = intercept (cm)
Notes: _____

Presence and density of *Pinna nobilis* *

Replicate	No of alive individuals	No of dead individuals
1		
2		
3		

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

WP 3.3 - Monitoring campaigns

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Date: 15-04-2021 Zone and sampling station: Z3-C (MONFALCONE)

Depth: 2,8 m

Coordinates: 45° 45' 11,00" - 13° 32' 35,82"

Coordinator: A. RISMONDO

Operators: A. RISMONDO - M. CONSENTINO

Habitat characterization and disturbance (potential pressures in the area and signs of impact): CYMODOCEA MEADOW

Seagrass: CYMODOCEA NODOSA

Other Seagrasses:

Meadow continuity: yes / no

Type of substrate: SANDY

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species:

Algal blooms and filamentous algae:

Presence of *Pinna nobilis*: yes / no

Shoot density

Size of sampling units: 30 x 30 cm

Replicate	No of shoots	Depth (m)	Notes
1	60	2,8	/
2	79	2,9	/
3	65	2,8	/
4	73	2,9	/
5	68	2,9	/
6	81	2,8	/

Collection of shoots for laboratory analyses: yes / no

Collection of sediment for laboratory analyses: yes / no

Zone and sampling station: **Z3-C (MONFALCONE)**

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% Coverage **Size of sampling units: transect 10 m**

Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
CN	1000		CN	1000		CN	1000	

C = categories
P = P. oceanica
Cn = C. nodosa
Zm = Z. marina
Zn = Z. noltei

D = Dead matte
M = Mud
Sa = Sand
St = Stones/Pebbles
R = Rock

O = other species

i = intercept (cm)

Notes: _____

Presence and density of *Pinna nobilis* *

Replicate	No of alive individuals	No of dead individuals
1	<u> / </u>	<u> / </u>
2	<u> / </u>	<u> / </u>
3	<u> / </u>	<u> / </u>

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

Field Data Sheets

Kornati NP

WP 3.3 - Monitoring Campaigns

Page: 1/2

Date: 25.5.2021. Zone and sampling station: Kravljačica bay, Z1A

Depth: 9,5 m

Coordinates: NEW: 43,824691 15,275053

Coordinator: Zrinka Jakl

Operators: Agata Kovačev, Matea Martinović

Habitat characterization and disturbance (potential pressures in the area and signs of impact):

A lot of mud and dead matte. Bad visibility.

A lot of bottles, cans plastic containers.

Posidonia meadow is not compact and doesn't have continuity

Seagrass: *Posidonia oceanica*

Other Seagrasses: No

Meadow continuity: Yes

Type of substrate: Sand, mud, meadow

For *Posidonia oceanica*: Upper limit depth ...?... / Lower limit depth:?.....

Presence of alien species: No

Algal blooms and filamentous algae: No

Presence of *Pinna nobilis*: No

Shoot density

Size of sampling units: 40 x 40 cm

Replicate	No of shoots	Depth (m)	Notes
1	29	9,9	
2	18	9,7	
3	34	8,9	
4	41	8,8	
5	33	9,1	
6	22	9,8	

Collection of shoots for laboratory analyses: Yes

Collection of sediment for laboratory analyses: Yes

Zone and sampling station: **Kravljačica bay, Z1A**

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% Coverage Size of sampling units: transect 10 m

Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
D	20		D	60		D	20	
P	30		P	120		P	40	
D	110		D	160		D	70	
P	150		P	170		P	200	
D	200		D	230		D	270	
P	230		P	270		P	410	
D	240		D	310		D	530	
P	250		P	330		P	540	
D	290		D	390		D	560	
P	310		P	400		P	590	
D	350		D	420		D	660	
P	430		P	430		P	710	
D	460		D	580		D	750	
P	480		P	610		P	760	
D	530		D	660		D	790	
P	560		P	670		P	810	
D	580		D	690		D	830	
P	620		P	710		P	850	
D	690		D	950		D	870	
P	720		P	920		P	890	
D	750		D	990		D	930	
P	800		P	1000		P	980	
D	930					D	1000	
P	940							
D	1000							

C = categories

P = *P. oceanica*
 Cn = *C. nodosa*
 Zm = *Z. marina*
 Zn = *Z. noltei*

D = Dead *matte*
 M = Mud
 Sa = Sand
 St = Stones/Pebbles
 R = Rock

O = other species

i = intercept (cm)

Notes: _____

Presence and density of *Pinna nobilis**

Replicate	No of alive individuals	No of dead individuals
1	No alive individuals _____	No dead individuals _____
2	_____	_____
3	_____	_____

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

WP 3.3 - Monitoring Campaigns

Page: 1/2

Date: 25.5.2021. **Zone and sampling station:** Kravljačica bay, Z1B

Depth: 14 m

Coordinates: OLD: 43,824869 15,275343

Coordinator: Zrinka Jakl

Operators: Zrinka Jakl, Matea Špika

Habitat characterization and disturbance (potential pressures in the area and signs of impact):

A lot of mud and dead matte. Bad visibility.

A lot of bottles, cans plastic containers.

Posidonia meadow is not compact and doesn't have continuity

Seagrass: *Posidonia oceanica*

Other Seagrasses: No

Meadow continuity: yes / no Yes

Type of substrate: Mud, sand, meadow

For *Posidonia oceanica* : Upper limit depth / Lower limit depth:

Presence of alien species: No

Algal blooms and filamentous algae: No

Presence of *Pinna nobilis* : No

Shoot density

Size of sampling units: 40 x 40 cm

Replicate	No of shoots	Depth (m)	Notes
1	17	14,1	
2	12	14,6	
3	18	15,1	
4	18	15,1	
5	28	14,6	
6	20	13,9	

Collection of shoots for laboratory analyses: Yes

Collection of sediment for laboratory analyses: Yes

Zone and sampling station: **Z1B**

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% Coverage **Size of sampling units: transect 10 m**

Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
P	50		P	40		D	50	
D	150		D	70		P	120	
P	220		P	110		D	160	
D	270		D	140		P	240	
P	320		P	280		D	270	
D	350		D	360		P	400	
P	380		P	430		D	420	
D	420		D	480		P	520	
P	450		P	540		D	600	
D	530		D	570		P	720	
P	610		P	600		D	790	
D	640		D	640		P	850	
P	690		P	660		D	890	
D	770		D	690		P	950	
P	820		P	780		D	1000	
D	850		D	740				
P	930		P	790				
D	1000		D	910				
			P	940				
			D	1000				

C = categories

P = *P. oceanica*
 Cn = *C. nodosa*
 Zm = *Z. marina*
 Zn = *Z. noltei*

D = Dead *matte*
 M = Mud
 Sa = Sand
 St = Stones/Pebbles
 R = Rock

O = other species

i = intercept (cm)

Notes: _____

Presence and density of *Pinna nobilis* *

Replicate	No of alive individuals	No of dead individuals
1	No of alive individuals _____	No dead individuals _____
2	_____	_____
3	_____	_____

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

WP 3.3 - Monitoring Campaigns

Page: 1/2

Date: 25.5.2021. **Zone and sampling station:** Kravljačica bay, Z1C
Depth: 13,9 m
Coordinates: OLD: 43,825250 15,275528 NEW: 43,825237 15,275552
Coordinator: Zrinka Jakl
Operators: Agata Kovačev, Matea Martinović

Habitat characterization and disturbance (potential pressures in the area and signs of impact):

A lot of mud and dead matte. Bad visibility.

A lot of bottles, cans plastic containers.

Posidonia meadow is not compact and doesn't have continuity

Seagrass: *Posidonia oceanica*

Other Seagrasses: No

Meadow continuity: yes / no Yes

Type of substrate: Sand, mud, meadow

For *Posidonia oceanica* : Upper limit depth / Lower limit depth:

Presence of alien species: No

Algal blooms and filamentous algae: No

Presence of *Pinna nobilis* : yes / no No

Shoot density

Size of sampling units: 40 x 40 cm

Replicate	No of shoots	Depth (m)	Notes
1	21	14,0	
2	23	13,9	
3	19	13,9	
4	36	13,3	
5	27	13,4	
6	31	13,5	

Collection of shoots for laboratory analyses: yes / no Yes

Collection of sediment for laboratory analyses: yes / no Yes

Zone and sampling station: Kravljačica bay, Z1C

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% Coverage Size of sampling units: transect 10 m

Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
D	30		D	20		D	100	
P	60		P	60		P	110	
D	130		D	90		D	130	
P	170		P	120		P	140	
D	190		D	190		D	200	
P	200		P	220		P	210	
D	220		D	250		D	270	
P	230		P	320		P	290	
D	260		D	400		D	310	
P	410		P	420		P	340	
D	470		D	470		D	360	
P	480		P	510		P	390	
D	510		D	640		D	410	
P	520		P	660		P	420	
D	540		D	790		D	430	
P	590		P	810		P	500	
D	640		D	820		D	530	
P	650		P	830		P	570	
D	700		D	880		D	620	
P	740		P	910		P	680	
D	760		D	940		D	720	
P	770		P	950		P	730	
D	840		D	1000		D	760	
P	850					P	780	
D	910					D	840	
P	1000					P	890	
						D	1000	

C = categories

P = *P. oceanica*
 Cn = *C. nodosa*
 Zm = *Z. marina*
 Zn = *Z. noltei*

D = Dead *matte*
 M = Mud
 Sa = Sand
 St = Stones/Pebbles
 R = Rock

O = other species

i = intercept (cm)

Notes:

Presence and density of *Pinna nobilis* *

Replicate	No of alive individuals	No of dead individuals
1	No alive individuals	No dead individuals
2		
3		

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

WP 3.3 - Monitoring Campaigns

Page: 1/2

Date: 25.5.2021. **Zone and sampling station:** Kravljačica bay, Z2A
Depth: 13,0 m
Coordinates: 43,824574 15,275312
Coordinator: Zrinka Jakl
Operators: Fedra Dokoza

Habitat characterization and disturbance (potential pressures in the area and signs of impact):

A lot of mud and dead matte. Bad visibility.

A lot of bottles, cans plastic containers.

Posidonia meadow is not compact and doesn't have continuity

Seagrass: Yes
Other Seagrasses: No
Meadow continuity: yes / no No
Type of substrate: Sand, mud, meadow
For *Posidonia oceanica* : Upper limit depth ...?... / Lower limit depth:?.....

Presence of alien species: No
Algal blooms and filamentous algae: No
Presence of *Pinna nobilis* : yes / no No

Shoot density

Size of sampling units: 40 x 40 cm

Replicate	No of shoots	Depth (m)	Notes
1	18	12,6	
2	10	13,5	
3	15	12,4	
4	14	13,3	
5	10	13,2	
6	15	12,9	

Collection of shoots for laboratory analyses: yes / no Yes
Collection of sediment for laboratory analyses: yes / no Yes

Zone and sampling station: Kravljačica bay, Z2A

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% Coverage Size of sampling units: transect 10 m

Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
D	180		P	230		P	30	
P	200		D	240		D	70	
D	350		P	290		P	90	
P	460		D	310		D	570	
D	570		P	420		P	630	
P	640		D	440		D	800	
D	710		P	550		P	820	
P	930		D	610		D	900	
D	1000		P	630		P	910	
			D	650		D	950	
			P	670		P	1000	
			D	700				
			P	750				
			D	840				
			P	900				
			D	930				
			P	970				
			D	990				
			P	1000				

C = categories

P = *P. oceanica*
Cn = *C. nodosa*
Zm = *Z. marina*
Zn = *Z. noltei*

D = Dead *matte*
M = Mud
Sa = Sand
St = Stones/Pebbles
R = Rock

O = other species

i = intercept (cm)

Notes: _____

Presence and density of *Pinna nobilis**

Replicate	No of alive individuals	No of dead individuals
1	No alive individuals _____	No dead individuals _____
2	_____	_____
3	_____	_____

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

WP 3.3 - Monitoring Campaigns

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Date: 25.5.2021. Zone and sampling station: Kravljačica bay, Z2B
 Depth: 15.5 m
 Coordinates: 43,824856 15,275503
 Coordinator: Zrinka Jakl
 Operators: Fedra Dokoza

Habitat characterization and disturbance (potential pressures in the area and signs of impact):

A lot of mud and dead matte. Bad visibility.

A lot of bottles, cans plastic containers.

Posidonia meadow is not compact and doesn't have continuity

Seagrass: Posidonia oceanica

Other Seagrasses: No

Meadow continuity: yes / no Yes

Type of substrate: Mud, sand, meadow

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: No

Algal blooms and filamentous algae: No

Presence of *Pinna nobilis*: yes / no No

Shoot density

Size of sampling units: **40 x 40 cm**

Replicate	No of shoots	Depth (m)	Notes
1	22	15,2	
2	16	15,5	
3	13	16,1	
4	18	15,4	
5	30	15,7	
6	20	16	

Collection of shoots for laboratory analyses: yes / no Yes

Collection of sediment for laboratory analyses: yes / no Yes

Zone and sampling station: Kravljačica bay, Z2B

% Coverage **Size of sampling units: transect 10 m**

Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
D	30		D	40		D	10	
P	90		P	70		P	70	
D	150		D	160		D	110	
P	190		P	270		P	150	
D	220		D	290		D	210	
P	250		P	330		P	280	
D	540		D	420		D	350	
P	610		P	460		P	380	
D	800		D	650		D	400	
P	900		P	680		P	820	
D	930		D	720		D	880	
P	1000		P	780		P	920	
			D	810		D	1000	
			P	900				
			D	1000				

C = categories O = other species i = intercept (cm)

P = P. oceanica D = Dead *matte*
 Cn = C. nodosa M = Mud
 Zm = Z. marina Sa = Sand
 Zn = Z. noltei St = Stones/Pebbles
 R = Rock

Notes: _____

Presence and density of *Pinna nobilis* *

Replicate	No of alive individuals	No of dead individuals
1	No alive individuals	No dead individuals
2	_____	_____
3	_____	_____

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

WP 3.3 - Monitoring Campaigns

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Date: 25.5.2021. Zone and sampling station: Kravljačica bay, Z2C

Depth: 15,2 m

Coordinates: 43,825092 15,275833

Coordinator: Zrinka Jakl

Operators: Zrinka Jakl, Matea Špika

Habitat characterization and disturbance (potential pressures in the area and signs of impact): A lot of mud and dead matte. Bad visibility.

A lot of bottles, cans plastic containers.

Posidonia meadow is not compact and doesn't have continuity

Seagrass: *Posidonia oceanica*

Other Seagrasses: No

Meadow continuity: yes / no Yes

Type of substrate: Sand, mud, meadow

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: No

Algal blooms and filamentous algae: No

Presence of *Pinna nobilis*: yes / no No

Shoot density

Size of sampling units: 40 x 40 cm

Replicate	No of shoots	Depth (m)	Notes
1	8	15,7	
2	14	15,8	
3	17	15,4	
4	30	15,2	
5	22	15,2	
6	11	15,7	

Collection of shoots for laboratory analyses: yes / no Yes

Collection of sediment for laboratory analyses: yes / no Yes

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Page: 1/2

Date: 23.5.2021. **Zone and sampling station:** Island Balun, Z3A
Depth: 9,0 m
Coordinates: 43,809083 15,255250
Coordinator: Zrinka Jakl
Operators: Matea Špika, Denis Grubišić

Habitat characterization and disturbance (potential pressures in the area and signs of impact): Good visibility.

Posidonia meadow is compact and has continuity

Seagrass: *Posidonia oceanica*

Other Seagrasses: No

Meadow continuity: yes / no No

Type of substrate: Posidonia meadow

For *Posidonia oceanica*: Upper limit depth ...?... / Lower limit depth:?.....

Presence of alien species: No

Algal blooms and filamentous algae: No

Presence of *Pinna nobilis*: yes / no No

Shoot density

Size of sampling units: 40 x 40 cm

Replicate	No of shoots	Depth (m)	Notes
1	23	8,8	
2	42	9,3	
3	61	8,8	
4	29	7,8	
5	57	9	
6	56	9,4	

Collection of shoots for laboratory analyses: yes / no Yes

Collection of sediment for laboratory analyses: yes / no Yes

Zone and sampling station: **Island Balun, Z3A**

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% Coverage **Size of sampling units: transect 10 m**

Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
D	160		P	180		P	100	
P	200		D	210		D	140	
D	240		P	390		P	220	
P	340		D	420		D	240	
D	360		P	590		P	310	
P	520		D	750		D	360	
D	570		P	830		P	490	
P	610		D	910		D	580	
D	630		P	970		P	700	
P	680		D	1000		D	730	
D	740					P	830	
P	860					D	1000	
D	900							
P	960							
D	1000							

C = categories

P = *P. oceanica*

Cn = *C. nodosa*

Zm = *Z. marina*

Zn = *Z. noltei*

D = Dead *matte*

M = Mud

Sa = Sand

St = Stones/Pebbles

R = Rock

O = other species

i = intercept (cm)

Notes:

Presence and density of *Pinna nobilis**

Replicate	No of alive individuals	No of dead individuals
1	No alive individuals	No dead individuals
2		
3		

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

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Page: 1/2

Date: 23.5.2021 Zone and sampling station: Island Balun, Z3B

Depth: 9,0 m

Coordinates: 43,808944 15,255055

Coordinator: Zrinka Jakl

Operators: Matea Špika, Denis Grubišić

Habitat characterization and disturbance (potential pressures in the area and signs of impact): Good visibility.

Posidonia meadow is compact and has continuity

Seagrass: *Posidonia oceanica*

Other Seagrasses: No

Meadow continuity: yes / no Yes

Type of substrate: Posidonia meadow

For *Posidonia oceanica* : Upper limit depth / Lower limit depth:

Presence of alien species: No

Algal blooms and filamentous algae: No

Presence of *Pinna nobilis* : yes / no No

Shoot density

Size of sampling units: **40 x 40 cm**

Replicate	No of shoots	Depth (m)	Notes
1	36	8,8	
2	39	8,9	
3	48	9,2	
4	21	9,3	
5	44	9,9	
6	52	9,9	

Collection of shoots for laboratory analyses: yes / no Yes

Collection of sediment for laboratory analyses: yes / no Yes

Zone and sampling station:

Z3B

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% Coverage

Size of sampling units: transect 10 m

Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
D	30		P	240		P	80	
P	60		D	330		D	290	
D	100		P	370		P	530	
P	130		D	390		D	580	
D	160		P	620		P	690	
P	200		D	740		D	790	
D	260		P	870		P	830	
P	290		D	910		D	860	
D	340		P	1000		P	910	
P	400					D	930	
D	490					P	1000	
P	590							
D	640							
P	730							
D	770							
P	800							
D	830							
P	890							
D	920							
P	1000							

C = categories

P = *P. oceanica*
 Cn = *C. nodosa*
 Zm = *Z. marina*
 Zn = *Z. noltei*

D = Dead *matte*
 M = Mud
 Sa = Sand
 St = Stones/Pebbles
 R = Rock

O = other species

i = intercept (cm)

Notes:

Presence and density of *Pinna nobilis* *

Replicate	No of alive individuals	No of dead individuals
1	No alive individuals	No dead individual
2		
3		

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

WP 3.3 - Monitoring Campaigns

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Date: 23.5.2021. **Zone and sampling station:** Island Balun, Z3C
Depth: 10,0 m
Coordinates: 43,808889 15,254861
Coordinator: Zrinka Jakl
Operators: Fedra Dokoza, Matea Martinović

Habitat characterization and disturbance (potential pressures in the area and signs of impact): Good visibility.
 Posidonia meadow is compact and has continuity

Seagrass: *Posidonia oceanica*
Other Seagrasses: No
Meadow continuity: yes / no Yes
Type of substrate: Posidonia meadow
For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: *Posidonia oceanica*
Algal blooms and filamentous algae: No
Presence of *Pinna nobilis*: yes / no No

Shoot density

Size of sampling units: 40 x 40 cm

Replicate	No of shoots	Depth (m)	Notes
1	43	9,4	
2	18	9,5	
3	38	10	
4	27	9,3	
5	32	9,5	
6	18	10,6	

Collection of shoots for laboratory analyses: yes / no Yes
Collection of sediment for laboratory analyses: yes / no Yes

Zone and sampling station: **Z3C**

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% Coverage Size of sampling units: transect 10 m

Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
P	200		P	20		D	20	
D	260		D	60		P	80	
P	350		P	100		D	110	
D	370		D	140		P	280	
P	410		P	160		D	330	
D	500		D	180		P	410	
P	600		P	300		D	430	
D	670		D	340		P	440	
P	1000		P	440		D	450	
			D	480		P	480	
			P	550		D	550	
			D	570		P	780	
			P	770		D	810	
			D	790		P	900	
			P	810		D	960	
			D	880		P	1000	
			P	970				
			D	1000				

C = categories

P = P. oceanica
Cn = C. nodosa
Zm = Z. marina
Zn = Z. noltei

D = Dead matte
M = Mud
Sa = Sand
St = Stones/Pebbles
R = Rock

O = other species

i = intercept (cm)

Notes:

Presence and density of *Pinna nobilis* *

Replicate	No of alive individuals	No of dead individuals
1	No alive individuals	No dead individuals
2		
3		

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

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Date: 25.5.2021. **Zone and sampling station:** Kravljačica bay, BALISE
Depth: 14
Coordinates: NEW: 43,493110 15,163259
Coordinator: Zrinka Jakl
Operators: Agata Kovačev, Matea Martinović

Habitat characterization and disturbance (potential pressures in the area and signs of impact): Posidonietum

Seagrass: Posidonia oceanica
Other Seagrasses: No
Meadow continuity: No
Type of substrate: Sandy, silty
For *Posidonia oceanica* : Upper limit depth / Lower limit depth:

Presence of alien species: No
Algal blooms and filamentous algae: No

Presence of *Pinna nobilis* : No

Shoot density

Size of sampling units: 40 x 40 cm

Replicate	No of shoots	Depth (m)	Notes
1			
2			
3			
4			
5			
6			

Collection of shoots for laboratory analyses: No

Collection of sediment for laboratory analyses: No

Field Data Sheets

RNP Dune Costiere

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Date: 27-02-2021 Zone and sampling station: Z1-A (RNP DUNE COSTIERE)

Depth: 6,8 m

Coordinates: 40°48'59,81" - 17°31'25,11"

Coordinator: A. RISMONDO

Operators: A. RISMONDO - D. CORIEL

Habitat characterization and disturbance (potential pressures in the area and signs of impact): POSIDONIETUM

Seagrass: POSIDONIA OCEANICA

Other Seagrasses: ✓

Meadow continuity: yes / no

Type of substrate: SANDY

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: ✓

Algal blooms and filamentous algae: ✓

Presence of *Pinna nobilis*: yes / no

Shoot density

Size of sampling units: 40 x 40 cm

Replicate	No of shoots	Depth (m)	Notes
1	48	6,8	
2	46	6,7	
3	56	6,7	
4	58	6,6	
5	59	6,7	
6	42	6,8	

Collection of shoots for laboratory analyses: yes / no

Collection of sediment for laboratory analyses: yes / no

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Date: 27-02-2021 Zone and sampling station: Z1-B (RNP DUNE COSTIERE)

Depth: 6,9 m

Coordinates: 40°48'59,83" - 17°31'24,42"

Coordinator: A. RISMONDO

Operators: A. RISMONDO - D. CURIEL

Habitat characterization and disturbance (potential pressures in the area and signs of impact): POSIDONIA ETUM

Seagrass: POSIDONIA OCEANICA

Other Seagrasses: /

Meadow continuity: yes / no

Type of substrate: SANDY

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: /

Algal blooms and filamentous algae: /

Presence of *Pinna nobilis*: yes / no

Shoot density

Size of sampling units: 40 x 40 cm

Replicate	No of shoots	Depth (m)	Notes
1	45	6,8	
2	41	6,8	
3	59	6,9	
4	39	6,9	
5	43	6,9	
6	37	6,8	

Collection of shoots for laboratory analyses: yes / no

Collection of sediment for laboratory analyses: yes / no

Zone and sampling station: ZI-B (RNP DUNE COSTIERE)

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% Coverage Size of sampling units: transect 10 m

Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
D	200		D	250		D	610	
P	410		P	1000		P	1000	
D	650							
P	840							
M	1000							

C = categories
 P = P. oceanica
 Cn = C. nodosa
 Zm = Z. marina
 Zn = Z. noltei

D = Dead *matte*
 M = Mud
 Sa = Sand
 St = Stones/Pebbles
 R = Rock

O = other species
 Notes: _____

i = intercept (cm)

Presence and density of *Pinna nobilis* *

Replicate	No of alive individuals	No of dead individuals
1	_____	_____
2	_____	_____
3	_____	_____

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

WP 3.3 - Monitoring campaigns

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Date: 27-02-2021 Zone and sampling station: Z1-C (RNP DUNE COSTÈRE)

Depth: 6,7 m

Coordinates: 40°48'59,81" - 17°31'23,78"

Coordinator: A. RISMONDO

Operators: A. RISMONDO - D. CURCEL

Habitat characterization and disturbance (potential pressures in the area and signs of impact): POSIDONIETUM

Seagrass: POSIDONIA OCEANICA

Other Seagrasses:

Meadow continuity: yes / no

Type of substrate: SANDY

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species:

Algal blooms and filamentous algae:

Presence of *Pinna nobilis*: yes / no

Shoot density

Size of sampling units: 40 x 40 cm

Replicate	No of shoots	Depth (m)	Notes
1	29	6,6	
2	47	6,6	
3	58	6,7	
4	52	6,6	
5	40	6,7	
6	57	6,7	

Collection of shoots for laboratory analyses: yes / no

Collection of sediment for laboratory analyses: yes / no

Zone and sampling station: Z1-C (RNP DUNE COSTIERE) Page: 2/2

% Coverage Size of sampling units: transect 10 m

Replicate 1			Replicate 2			Replicate 3		
C	i	O	C	i	O	C	i	O
P	390		P	1000		P	1000	
D	600							
P	1000							

C = categories
P = P. oceanica
Cn = C. nodosa
Zm = Z. marina
Zn = Z. noltei

D = Dead matte
M = Mud
Sa = Sand
St = Stones/Pebbles
R = Rock

O = other species
Notes: _____

i = intercept (cm)

Presence and density of *Pinna nobilis* *

Replicate	No of alive individuals	No of dead individuals
1	_____	_____
2	_____	_____
3	_____	_____

* density is measured counting all individuals encountered within a 1 m corridor for both sides of each of three transects 10 m long and evaluating their status (dead or alive)

WP 3.3 - Monitoring campaigns

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Date: 27-02-2021 Zone and sampling station: ZZ-A (RNP DUNE COSTIERE)

Depth: 6,9 m

Coordinates: 40°49'00,32" - 17°31'25,01"

Coordinator: A. RISMONDO

Operators: A. RISMONDO - D. CURIEL

Habitat characterization and disturbance (potential pressures in the area and signs of impact): POSIDONIETUM

Seagrass: POSIDONIA OCEANICA

Other Seagrasses: /

Meadow continuity: yes / no

Type of substrate: SANDY

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: /

Algal blooms and filamentous algae: /

Presence of *Pinna nobilis*: yes / no

Shoot density

Size of sampling units: 40 x 40 cm

Replicate	No of shoots	Depth (m)	Notes
1	54	6,9	
2	48	6,9	
3	39	7,0	
4	47	7,0	
5	52	7,1	
6	50	7,0	

Collection of shoots for laboratory analyses: yes / no

Collection of sediment for laboratory analyses: yes / no

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Date: 27-02-2021 Zone and sampling station: Z2-B (RNP DUNE COSTIERE)

Depth: 8,0 m

Coordinates: 40° 49' 00,39" - 17° 31' 24,38"

Coordinator: A. RISMONDO

Operators: A. RISMONDO - D. CURIEL

Habitat characterization and disturbance (potential pressures in the area and signs of impact): POSIDONIETUM

Seagrass: POSIDONIA OCEANICA

Other Seagrasses: /

Meadow continuity: yes / no

Type of substrate: SANDY

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: /

Algal blooms and filamentous algae: /

Presence of *Pinna nobilis*: yes / no

Shoot density

Size of sampling units: 40 x 40 cm

Replicate	No of shoots	Depth (m)	Notes
1	34	8,2	
2	47	8,1	
3	41	8,0	
4	49	8,0	
5	53	7,9	
6	45	8,0	

Collection of shoots for laboratory analyses: yes / no

Collection of sediment for laboratory analyses: yes / no

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Date: 27-02-2021 Zone and sampling station: Z2-C (RNP DUNE COSTIERE)

Depth: 7,1 m

Coordinates: 40° 49' 00,43" - 17° 31' 23,51"

Coordinator: A. RISMONDO

Operators: A. RISMONDO - D. CURIEL

Habitat characterization and disturbance (potential pressures in the area and signs of impact): POSIDONIETUM

Seagrass: POSIDONIA OCEANICA

Other Seagrasses: /

Meadow continuity: yes / no

Type of substrate: SANDY

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: /

Algal blooms and filamentous algae: /

Presence of *Pinna nobilis*: yes / no

Shoot density

Size of sampling units: 40 x 40 cm

Replicate	No of shoots	Depth (m)	Notes
1	51	7,2	
2	39	7,2	
3	45	7,1	
4	41	7,0	
5	53	7,0	
6	37	7,0	

Collection of shoots for laboratory analyses: yes / no

Collection of sediment for laboratory analyses: yes / no

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Date: 27-02-2024 Zone and sampling station: Z3-A (RNP DUNE COSTIERE)

Depth: 8,4 m

Coordinates: 40° 49' 00,91" - 17° 31' 24,93"

Coordinator: A. RISMONDO

Operators: A. RISMONDO - D. CURIER

Habitat characterization and disturbance (potential pressures in the area and signs of impact): POSIDONIETUM

Seagrass: POSIDONIA OCEANICA

Other Seagrasses: /

Meadow continuity: yes / ~~no~~

Type of substrate: SANDY

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: /

Algal blooms and filamentous algae: /

Presence of *Pinna nobilis*: yes / ~~no~~

Shoot density

Size of sampling units: 40 x 40 cm

Replicate	No of shoots	Depth (m)	Notes
1	<u>32</u>	<u>8,4</u>	
2	<u>31</u>	<u>8,4</u>	
3	<u>45</u>	<u>8,3</u>	
4	<u>55</u>	<u>8,4</u>	
5	<u>39</u>	<u>8,4</u>	
6	<u>49</u>	<u>8,3</u>	

Collection of shoots for laboratory analyses: ~~yes~~ / no

Collection of sediment for laboratory analyses: ~~yes~~ / no

WP 3.3 - Monitoring campaigns

Page: 1,2 / 1,2

Date: 27-02-2021 Zone and sampling station: Z3-B (RNP-DUNE COSTIERE)

Depth: 8,4 m

Coordinates: 40°49'00,87" - 17°31'24,10"

Coordinator: A. RISMONDO

Operators: A. RISMONDO - D. CURIEL

Habitat characterization and disturbance (potential pressures in the area and signs of impact): POSIDONIETUM

Seagrass: POSIDONIA OCEANICA

Other Seagrasses: /

Meadow continuity: yes / ~~no~~

Type of substrate: SANDY

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: /

Algal blooms and filamentous algae: /

Presence of *Pinna nobilis*: yes / ~~no~~

Shoot density

Size of sampling units: 40 x 40 cm

Replicate	No of shoots	Depth (m)	Notes
1	34	8,4	
2	39	8,5	
3	53	8,5	
4	57	8,4	
5	36	8,4	
6	49	8,3	

Collection of shoots for laboratory analyses: ~~yes~~ / no

Collection of sediment for laboratory analyses: ~~yes~~ / no

WP 3.3 - Monitoring campaigns

Page: 1/2

Date: 27-02-2021 Zone and sampling station: Z3-C (RNP DUNE COSTIERE)

Depth: 8,2 m

Coordinates: 40° 49' 00,92" - 17° 31' 23,17"

Coordinator: A. RISMONDO

Operators: A. RISMONDO - D. CURIEL

Habitat characterization and disturbance (potential pressures in the area and signs of impact): POSIDONIETUM

Seagrass: POSIDONIA OCEANICA

Other Seagrasses: /

Meadow continuity: yes / no /

Type of substrate: SANDY

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: /

Algal blooms and filamentous algae: /

Presence of *Pinna nobilis*: yes / no /

Shoot density

Size of sampling units: 40 x 40 cm

Replicate	No of shoots	Depth (m)	Notes
1	45	8,2	
2	48	8,2	
3	42	8,1	
4	39	8,2	
5	44	8,2	
6	37	8,1	

Collection of shoots for laboratory analyses: yes / no /

Collection of sediment for laboratory analyses: yes / no /

WP 3.3 - Monitoring campaigns

Page: 1/2

Date: 27-02-2021 Zone and sampling station: BALISE (RNP DUNE COSTIERE)

Depth: 7,6 m

Coordinates: 40° 49' 00,08" - 17° 31' 23,99"

Coordinator: A. RISMONDO

Operators: A. RISMONDO - D. CURIEL

Habitat characterization and disturbance (potential pressures in the area and signs of impact): POSIDONIETUM

→ THE BALISE N.2 (THAT WAS NOT FOUND DURING THE CAMPAIGN IN OCTOBER 2020) WAS REPOSITIONED (FOUND A FEW METERS AWAY FROM ITS ORIGINAL POSITION, COVERED BY SAND)

Seagrass: POSIDONIA OCEANICA

Other Seagrasses: /

Meadow continuity: yes / no

Type of substrate: SANDY

For *Posidonia oceanica*: Upper limit depth / Lower limit depth:

Presence of alien species: /

Algal blooms and filamentous algae: /

Presence of *Pinna nobilis*: yes / ~~no~~

Shoot density

Size of sampling units: x cm

Replicate	No of shoots	Depth (m)	Notes
1			
2			
3			
4			
5			
6			

Collection of shoots for laboratory analyses: yes / ~~no~~

Collection of sediment for laboratory analyses: yes / ~~no~~

Laboratory Data Sheets

Bay of Panzano (Monfalcone)

Zone and sampling station: Monfalcone - Z1A

Seagrass: *Cymodocea nodosa*

Page: 1./2.

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
1	5,4	6,5	0,20	1
2	4,7	6,1	0,20	2
2	4,7	2,4	0,20	1
3	6	5	0,20	2
3	6	3,6	0,20	1
4	3,7	3,6	0,20	1
5	4,5	4,3	0,20	1
6	6,7	5,3	0,30	2
6	6,7	1,9	0,25	1
7	5,6	6	0,20	2
7	5,6	5,3	0,20	1
8	5,9	6,1	0,20	2
8	5,9	2,3	0,20	1
9	5,5	5,9	0,20	2
10	5,2	5,8	0,20	2
10	5,2	3,1	0,20	1
11	4,8	5,5	0,20	2
11	4,8	2,8	0,20	1
12	5,3	5,3	0,20	2
13	4,5	4,8	0,20	2
14	5,1	4,9	0,20	2
14	5,1	3,2	0,20	2
15	5,8	6,3	0,20	2
16	5,4	6,1	0,20	2

Zone and sampling station: Monfalcone - Z1A

Seagrass: *Cymodocea nodosa*

Page: 2/2

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
17	5,5	6,4	0,20	2
17	5,5	2,9	0,20	1
18	5,9	6,6	0,20	2
19	6,1	6,4	0,20	2
20	5,9	6	0,25	2
20	5,9	3,5	0,20	2

Note: _____

Zone and sampling station: Monfalcone - Z1B

Seagrass: *Cymodocea nodosa*

Page: 1./2.

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
1	5,5	6,6	0,20	2
1	5,5	5,1	0,20	1
2	8,3	6,9	0,20	2
2	8,3	6,2	0,20	2
3	4,6	7,4	0,20	2
3	4,6	3,6	0,20	1
4	8,3	8,7	0,25	2
4	8,3	2,9	0,20	1
5	4,3	9,7	0,20	3
5	4,3	1,2	0,20	1
6	4,4	11,6	0,20	3
6	4,4	1	0,20	1
7	6,5	11,9	0,25	3
7	6,5	7,3	0,25	2
7	6,5	0,8	0,20	0
8	5,2	7,1	0,20	2
8	5,2	3,8	0,20	2
9	7,2	8,8	0,20	3
9	7,2	4,1	0,20	1
10	6,3	6,8	0,20	2
10	6,3	3,3	0,20	2
11	6,6	6,1	0,20	3
11	6,6	4,9	0,20	2
12	6,7	7,5	0,25	3

Zone and sampling station: Monfalcone - Z1B

Seagrass: *Cymodocea nodosa*

Page: 2/2

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
12	6,7	4,1	0,20	2
13	6,8	6,9	0,25	3
14	4,9	10,8	0,25	3
14	4,9	6,9	0,25	3
14	4,9	1,5	0,20	0
15	6,7	7,1	0,25	3
15	6,7	3,8	0,20	2
16	4,8	9,2	0,25	3
16	4,8	2,2	0,20	2
17	5,1	10,7	0,25	3
17	5,1	1,9	0,20	1
18	7,2	8,3	0,25	3
18	7,2	2,4	0,20	2
19	4,9	6,7	0,25	3
20	6,3	10,7	0,25	3
20	6,3	5,9	0,20	2

Note:

Zone and sampling station: Monfalcone - Z2A

Seagrass: *Zostera noltei*

Page: 1./4

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
1	1,9	12,1	0,15	0
1	1,9	9,3	0,15	0
1	1,9	2,9	0,10	0
1	1,9	1,4	0,10	0
2	1,7	6,4	0,10	1
2	1,7	5,7	0,10	1
2	1,7	3,8	0,10	0
2	1,7	1,3	0,10	0
3	2,4	8,7	0,10	0
3	2,4	7,7	0,10	0
3	2,4	5,4	0,10	0
3	2,4	2,1	0,10	0
4	2,4	8,9	0,10	0
4	2,4	6,6	0,10	0
4	2,4	2	0,10	0
5	1,8	5,4	0,10	0
5	1,8	4,7	0,10	0
5	1,8	2,4	0,10	0
5	1,8	1,2	0,10	0
6	2,1	7,9	0,10	0
6	2,1	5,5	0,10	0
6	2,1	3,1	0,10	0
6	2,1	0,9	0,10	0
7	2	6,8	0,10	0

Zone and sampling station: Monfalcone - Z2A

Seagrass: *Zostera noltei*

Page: 2/4

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
7	2	4,4	0,10	0
7	2	1,9	0,10	0
8	2,3	11,2	0,15	1
8	2,3	7,8	0,10	0
8	2,3	4,2	0,10	0
8	2,3	1,1	0,10	0
9	1,9	8,7	0,10	0
9	1,9	5,1	0,10	0
9	1,9	3,3	0,10	0
9	1,9	1,6	0,10	0
10	1,9	11,8	0,15	1
10	1,9	8,9	0,10	0
10	1,9	2,6	0,10	0
10	1,9	1,1	0,10	0
11	2,2	9,9	0,15	1
11	2,2	6,2	0,10	0
11	2,2	4,1	0,10	0
11	2,2	1,9	0,10	0
12	2,1	8,7	0,10	0
12	2,1	5,5	0,10	0
12	2,1	2,2	0,10	0
13	1,8	6,3	0,10	0
13	1,8	4,1	0,10	0
13	1,8	2,7	0,10	0

Zone and sampling station: Monfalcone - Z2A

Seagrass: *Zostera noltei*

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
13	1,8	1,3	0,10	0
14	2,4	7,1	0,10	0
14	2,4	6,2	0,10	0
14	2,4	2,1	0,10	0
14	2,4	1,2	0,10	0
15	2,2	8,9	0,15	1
15	2,2	5,3	0,10	0
15	2,2	3	0,10	0
15	2,2	1,8	0,10	0
16	1,7	6,1	0,10	0
16	1,7	4,9	0,10	0
16	1,7	1,1	0,10	0
17	1,9	10,7	0,15	1
17	1,9	8,8	0,10	0
17	1,9	2,7	0,10	0
17	1,9	1,5	0,10	0
18	2,3	8,7	0,10	0
18	2,3	5,8	0,10	0
18	2,3	3,3	0,10	0
18	2,3	0,9	0,10	0
19	2,5	12,9	0,15	1
19	2,5	9,9	0,15	1
19	2,5	5,8	0,10	0
19	2,5	3,1	0,10	0

Zone and sampling station: Monfalcone - Z2A

Seagrass: *Zostera noltei*

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Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
19	2,5	0,4	0,10	0
20	2,1	7,9	0,10	0
20	2,1	3,9	0,10	0
20	2,1	1,7	0,10	0

Note: _____

Zone and sampling station: Monfalcone - Z2B

Seagrass: *Cymodocea nodosa*

Page: 1./2.

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
1	11,1	9,6	0,25	3
1	11,1	6,9	0,25	2
2	10,4	12,6	0,25	4
2	10,4	8,3	0,25	3
3	8,8	13,1	0,25	5
4	14,1	10,3	0,25	5
5	9,7	9,7	0,25	1
6	7,5	13,3	0,25	4
6	7,5	10,5	0,25	3
7	15,7	16,3	0,30	6
7	15,7	9,6	0,25	4
7	15,7	1,6	0,25	3
8	12,5	11,9	0,30	3
8	12,5	10,2	0,25	2
9	8,9	11,2	0,30	3
10	9,7	10,8	0,30	4
10	9,7	7,9	0,25	2
11	10,5	12,1	0,30	5
11	10,5	8,1	0,25	2
12	8,8	9,7	0,25	2
13	10,1	12,4	0,30	5
13	10,1	10,9	0,25	4
14	9,1	9,8	0,30	3
15	9,9	10,5	0,30	4

Zone and sampling station: Monfalcone - Z2B

Seagrass: *Cymodocea nodosa*

Page: 2/2

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
16	10,4	11,7	0,30	5
16	10,4	8,2	0,25	2
17	10	11,1	0,30	4
18	13,9	15,4	0,30	6
18	13,9	9,9	0,30	5
18	13,9	2,7	0,25	1
19	10,7	9,5	0,30	3
19	10,7	5,9	0,25	2
20	11,4	14,9	0,30	4
20	11,4	9,2	0,30	3

Note: _____

Zone and sampling station: Monfalcone - Z2C

Seagrass: *Cymodocea nodosa*

Page: ...1./2.

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
1	5,4	5,3	0,15	1
1	5,4	1,1	0,15	1
2	4,7	4,8	0,20	1
3	6,8	3,3	0,20	2
3	6,8	0,6	0,15	0
4	4,8	4	0,20	1
4	4,8	2,1	0,20	1
5	4,7	4,4	0,20	1
6	5,5	4	0,15	1
6	5,5	0,7	0,15	1
7	4,3	2,8	0,15	1
7	4,3	1,6	0,15	1
8	4,1	3,1	0,15	2
8	4,1	2,2	0,15	1
9	4,4	4,3	0,15	2
9	4,4	2,9	0,15	1
10	4,5	4,1	0,15	2
10	4,5	2,8	0,15	1
11	4,8	5,6	0,20	2
12	3,9	3,9	0,15	2
12	3,9	2,2	0,15	2
13	4,4	4,5	0,15	2
13	4,4	2,8	0,15	1
14	4,9	6,2	0,20	2

Zone and sampling station: Monfalcone - Z2C

Seagrass: *Cymodocea nodosa*

Page: 2/2

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
14	4,9	5,3	0,20	1
14	4,9	3,1	0,15	1
15	4,2	3,3	0,15	1
15	4,2	0,9	0,15	0
16	4,1	4,5	0,15	1
16	4,1	2,8	0,15	0
17	3,9	4,2	0,20	2
18	4,6	4,6	0,15	2
18	4,6	0,9	0,15	0
19	4,7	4,4	0,15	1
19	4,7	0,7	0,15	0
20	4,3	4,4	0,20	2
20	4,3	1,5	0,15	1

Note: _____

Zone and sampling station: Monfalcone - Z3A

Seagrass: *Zostera marina*

Page: 1/4

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
1	9,8	46,2	0,50	3
1	9,8	28,7	0,45	1
1	9,8	21,4	0,45	1
1	9,8	9,2	0,40	0
2	11,1	39,5	0,50	4
2	11,1	27,8	0,45	1
2	11,1	22,5	0,45	1
2	11,1	11,4	0,40	0
2	11,1	2,1	0,40	0
3	10,9	41,1	0,50	2
3	10,9	29,9	0,45	1
3	10,9	19,7	0,45	0
3	10,9	7,5	0,40	0
4	9,5	43,7	0,50	3
4	9,5	28,4	0,45	1
4	9,5	18,6	0,40	0
4	9,5	3,2	0,40	0
4	9,5	0,8	0,40	0
5	11	36,4	0,45	2
5	11	21,1	0,45	1
5	11	12,6	0,40	0
5	11	2,7	0,40	0
6	10,1	49,5	0,50	3
6	10,1	37,6	0,45	2

Zone and sampling station: Monfalcone - Z3A

Seagrass: *Zostera marina*

Page: 2/4

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
6	10,1	29,3	0,45	2
6	10,1	10,5	0,40	0
7	11,5	49,8	0,50	3
7	11,5	39,9	0,45	1
7	11,5	31,1	0,45	1
7	11,5	18,6	0,45	0
7	11,5	1,9	0,40	0
8	10,4	47,5	0,50	2
8	10,4	31,2	0,50	2
8	10,4	27,8	0,45	0
8	10,4	11,5	0,40	0
9	10,8	51,1	0,50	2
9	10,8	44,3	0,50	2
9	10,8	37,7	0,50	2
9	10,8	19,6	0,45	0
10	11	53,2	0,50	3
10	11	41,1	0,50	2
10	11	39,9	0,50	2
10	11	22,7	0,45	0
10	11	12,8	0,45	0
11	10,5	50,1	0,50	2
11	10,5	40,7	0,50	1
11	10,5	29,6	0,45	0
11	10,5	21,2	0,45	0

Zone and sampling station: Monfalcone - Z3A

Seagrass: *Zostera marina*

Page: 3/4

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
11	10,5	8,6	0,40	0
12	9,9	47	0,50	2
12	9,9	31,2	0,45	1
12	9,9	20,9	0,45	0
12	9,9	11,2	0,40	0
13	10,7	51,2	0,50	2
13	10,7	40,1	0,50	3
13	10,7	37,7	0,50	1
13	10,7	26,9	0,45	0
13	10,7	3,1	0,40	0
14	10,8	48,2	0,50	2
14	10,8	39,9	0,50	1
14	10,8	30,4	0,45	1
14	10,8	18,9	0,45	0
14	10,8	4,5	0,40	0
15	11,3	53,1	0,50	2
15	11,3	46,7	0,50	2
15	11,3	35,5	0,45	2
15	11,3	27,7	0,45	0
15	11,3	6,4	0,40	0
16	11,4	51,7	0,50	2
16	11,4	39,1	0,50	2
16	11,4	31,2	0,45	1
16	11,4	19,2	0,45	0

Zone and sampling station: Monfalcone - Z3A

Seagrass: *Zostera marina*

Page: 4./4.

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
16	11,4	4,9	0,40	0
16	11,4	0,8	0,40	0
17	9,8	45,7	0,50	3
17	9,8	33,1	0,45	2
17	9,8	27,4	0,45	2
17	9,8	5,4	0,40	0
18	12,2	50,3	0,50	3
18	12,2	42,3	0,50	2
18	12,2	37,7	0,50	2
18	12,2	21,5	0,45	1
18	12,2	11,2	0,40	0
19	11,2	53,8	0,50	2
19	11,2	42,4	0,50	2
19	11,2	37,3	0,45	1
19	11,2	19,8	0,40	0
19	11,2	11,4	0,40	0
19	11,2	4,4	0,40	0
20	8,9	39,9	0,50	2
20	8,9	31	0,45	2
20	8,9	22,7	0,45	1
20	8,9	12,9	0,40	0
20	8,9	1,9	0,40	0

Note: _____

Zone and sampling station: Monfalcone - Z3B

Seagrass: *Cymodocea nodosa*

Page: ...1./2.

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
1	6,6	4,9	0,20	1
2	5,2	3,9	0,20	1
2	5,2	1,6	0,20	1
3	5,9	5,2	0,25	0
4	4,1	9,4	0,25	1
4	4,1	6,1	0,25	1
5	6,9	15,6	0,30	2
5	6,9	4,2	0,25	1
6	6,2	7,6	0,30	1
6	6,2	1,2	0,25	0
7	5,4	7,6	0,25	2
7	5,4	1,8	0,25	0
8	6,1	5,1	0,25	1
9	5,5	6,9	0,30	1
9	5,5	1,7	0,25	0
10	5,8	6,2	0,25	1
10	5,8	2,1	0,20	0
11	5,9	6,3	0,25	1
11	5,9	2,7	0,20	0
12	6,8	14,9	0,30	2
12	6,3	5,1	0,25	1
13	5,8	6,4	0,25	1
14	5,7	5,9	0,25	1
14	5,7	3,3	0,25	0

Zone and sampling station: Monfalcone - Z3B

Seagrass: *Cymodocea nodosa*

Page: 2/2

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
15	5,8	6,1	0,25	1
15	5,8	2,9	0,25	0
16	5,3	4,9	0,25	1
16	5,3	2,7	0,25	0
17	4,1	4,3	0,25	1
17	4,1	1,1	0,20	0
18	4,4	8,5	0,25	1
18	4,4	5,3	0,25	1
19	6,7	13,7	0,30	2
20	5,1	5,5	0,25	1
20	5,1	2,1	0,25	0

Note: _____

Zone and sampling station: Monfalcone - Z3C

Seagrass: *Cymodocea nodosa*

Page: ...1./2.

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
1	5,2	6,4	0,25	1
1	5,2	2	0,25	0
2	4,5	5,9	0,20	1
2	4,5	2,7	0,20	0
3	4,7	4,4	0,25	1
3	4,7	2,2	0,20	0
4	4,6	4,9	0,15	1
4	4,6	0,8	0,15	0
5	3,9	7,2	0,20	1
6	6	10,6	0,25	1
6	6	2,9	0,20	0
7	5	5,1	0,20	1
7	5	2,2	0,20	1
8	4,8	6,1	0,25	1
8	4,8	2,2	0,20	0
9	5,1	6,5	0,25	1
9	5,1	3,1	0,20	0
10	6,2	11,5	0,25	2
10	6,2	3,2	0,20	0
11	5,7	6,6	0,20	1
11	5,7	1,9	0,20	0
12	5,4	6,3	0,20	1
12	5,4	1,7	0,20	0
13	5,6	6,5	0,20	1

Zone and sampling station: Monfalcone - Z3C

Seagrass: *Cymodocea nodosa*

Page: 2/2

Leaves				
Shoot n.	Leaf sheath (cm)	Length (cm)	Width (cm)	Necrosis (%)
13	5,6	1,8	0,20	0
14	3,8	6,9	0,20	1
15	5,9	6,8	0,25	1
15	5,9	2,9	0,20	0
16	5,2	5,5	0,20	1
16	5,2	2,3	0,20	0
17	4,9	5,7	0,20	0
17	4,9	2,3	0,20	0
18	5,8	7,8	0,20	1
19	4,8	5,9	0,20	1
19	4,8	2,2	0,20	0
20	4,5	5,7	0,20	1
20	4,5	2,1	0,20	0

Note: _____

Laboratory Data Sheets

Kornati NP

Zone and sampling station: Kornati NP - Z1A

Page: ..1./2.

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Grazing
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	si - / no +
1	27,2	0,8	4	0					+
1	14,4	0,8	4	0					+
1	0,9	0,8	4	0					+
1					3,4	19,5	0,8	1	+
1					3	29,4	0,8	0	+
1					3,5	13,5	0,9	0	+
1					3,9	13,9	0,9	0	+
2	21,5	0,8	4	0					+
2	8	0,8	4	0					+
2	0,9	0,8	4	0					+
2					3	23,4	0,8	0	+
2					3,4	12,4	0,8	0	+
3	23,2	0,8	4,5	0					+
3	9,2	0,8	4,7	0					+
3	24,3	0,8	3,8	0					+
3					4	14	0,8	0	+
4	15,9	0,7	3,5	0					+
4	20,8	0,7	3,5	0					+
4	0,4	0,7	3	0					+
4					2,6	15,1	0,8	1	+
4					1,7	22,4	0,8	1	-
4					2,2	12,9	0,8	4	+
5	20,6	0,7	4	0					+
5	30,9	0,7	4	0					+

Zone and sampling station: Kornati NP - Z1A

Page: 2./2.

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Grazing
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	si - / no +
5					2,7	31,1	0,8	0	+
5					2,9	20	0,8	0	+
5					3,1	11,4	0,8	1	-
6	33,7	0,8	3	0					+
6	12,4	0,8	3	0					+
6					3	27,9	0,8	0	+
6					2,9	19,3	0,8	0	+
6					2,9	13,1	0,8	2	-

(* non-photosynthetic tissue)

(** + = intact apex / - = eroded apex)

Note: _____

Zone and sampling station: Kornati NP - Z1B

Page: ..1./2.

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Grazing
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	si - / no +
1	0,8	0,9	3	0					+
1	42,1	0,9	3	0					+
1	19,4	0,8	4,5	0					+
1	38,9	0,8	4,5	0					+
1	35,6	0,8	4,5	0					+
1	18,3	0,8	4,5	0					+
1					3,3	24,6	0,9	0	+
1					3,3	17,3	0,9	0	+
1					3,1	14,4	0,9	0	+
2	8,7	0,8	4	0					+
2	30,6	0,8	2,8	0					+
2	24,8	0,8	4	0					+
2					2,6	18,5	0,8	0	-
2					2,7	13,6	0,8	0	+
3	0,3	0,7	2	0					+
3	32,3	0,8	2	0					+
3	25,8	0,8	2	0					+
3					2,2	25,5	0,8	0	+
4	0,4	1	3	0					+
4	16,2	0,9	3	0					+
4	23,8	0,9	3	0					+
4	12,6	0,9	3	0					+
4	31,9	0,9	3	0					-
4	25,9	0,9	3	0					+

Zone and sampling station: Kornati NP - Z1B

Page: 2/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Grazing
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	si - / no +
4					3,1	19,3	1	0	-
4					3	17,6	1	0	-
4					3	16,1	1	0	+
5	4,2	0,7	4	0					+
5	41,7	0,8	4	0					+
5	29,2	0,8	4	0					+
5					3	41	0,8	0	+
5					3,6	18,1	0,8	0	+
5					4	24,6	0,8	0	+
6	23,6	0,8	4	0					-
6	18,2	0,8	3,8	0					+
6					3	17,1	0,8	0	-
6					3	9,8	0,9	0	-

(* non-photosynthetic tissue)

(** + = intact apex / - = eroded apex)

Note: _____

Zone and sampling station: Kornati NP - Z1C

Page: ...1./...2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Grazing
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	si - / no +
1	10,5	0,9	2	0					+
1	21,5	0,9	2,2	0					+
1	32,5	0,9	3,2	0					+
1	42,8	0,9	3,2	0					+
1					3,5	25,5	1	0	+
1					3,5	18,2	1	0	+
1					3,5	32,7	1	0	+
2	3,2	0,9	2,8	0					+
2	7,5	0,9	3	0					+
2	14,9	0,9	3	0					+
2					3,8	32,1	1	0	+
2					3,8	42,8	1	0	+
2					3,9	12,7	1	0	+
2					3,9	10,8	1	0	+
2					3,9	16,8	1	80	-
3	3,8	0,9	2,9	0					+
3	19,1	0,9	3	0					+
3	17,5	0,9	3	0					+
3	36,2	0,9	3	0					+
3					3,2	25,3	1	0	+
3					3,3	12,4	1	0	+
3					3,3	36,2	1	0	+
3					3,3	40,9	1	0	+
3					3,4	39,3	1	0	+

Zone and sampling station: Kornati NP - Z1C

Page: 2/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Grazing
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	si - / no +
3					2,9	42,6	1	0	+
4	3,9	0,9	3,2	0			1	0	+
4	6,9	0,9	3,2	0			1	0	+
4	15,7	0,9	3,2	0			1	0	+
4					3,6	25,7	1	0	+
4					3,8	37,1	1	0	+
5	3,8	0,9	2,9	0			1	0	+
5	8,9	0,9	2,9	0			1	0	+
5	10,7	0,9	2,9	0			1	0	+
5					2,6	30,8	1	0	+
5					2,8	30,2	1	0	+
6	3,4	0,9	3,9	0					+
6	16,8	0,9	4	0					+
6	22,1	0,9	4	0					+
6					2,9	13,9	1	0	+
6					2,9	11,7	1	0	+
6					3	29,8	1	0	+
6					3	21,6	1	0	+

(* non-photosynthetic tissue)

(** + = intact apex / - = eroded apex)

Note: _____

Zone and sampling station: Kornati NP - Z2A

Page: ..1./..2.

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Grazing
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	si - / no +
1	28,8	0,8	4,5	0					+
1	34,4	0,8	4,5	4					+
1					2,5	30,2	0,9	1	-
1					3,8	6,1	0,9	0	-
2	47,1	0,9	4,5	0					+
2	25,8	0,9	4,5	0					+
2	39,2	0,9	4,5	0					+
2					3,8	19,7	0,9	0	+
2					3,4	36,6	0,9	1	+
3	19,7	0,8	4,5	0					+
3	27,6	0,8	3	0					+
3	27,9	0,8	3	0					+
3					2,8	16,5	0,8	2	+
3					2,7	12,4	0,8	4	-
4	30,6	0,8	4	1					-
4	18,8	0,7	4	0					+
4	28,4	0,8	3,5	0					+
4					2,5	12	0,8	1	-
4					2,7	8,9	0,8	1	-
5	25,1	0,8	4,5	0					+
5	17,7	0,8	4	0					+
5					2,3	24	0,8	1	-
5					2,7	12,1	0,8	6	-
6	22,7	0,8	4	1					-

Zone and sampling station: Kornati NP - Z2A

Page: 2/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Grazing
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	si - / no +
6	20	0,7	4	0					+
6					2,4	22,6	0,8	0	+
6					3	7,9	0,8	1	-

(* non-photosynthetic tissue)

(** + = intact apex / - = eroded apex)

Note: _____

Zone and sampling station: Kornati NP - Z2B

Page: ..1./2.

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Grazing
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	si - / no +
1	28,7	0,8	4	0					+
1	15,7	0,8	4	0					+
1					3	31,1	0,9	4	-
1					3,2	9,8	0,9	2	+
2	35,1	0,9	4	1					-
2	17,6	0,8	4	0					+
2	41,5	0,9	4	1					+
2					3,5	17,4	0,9	0	+
2					3,3	28,3	0,9	0	+
2					3	15,9	0,9	0	+
3	24,9	0,8	4,5	0					+
3	37,4	0,8	4,5	2					+
3	38,8	0,8	3,5	2					+
3					3,3	22,2	0,9	4	+
3					3,3	13,6	0,8	6	-
4	26,2	0,8	4,5	0					+
4	39	0,8	4,5	0					+
4					3,8	19	0,9	10	+
4					2,9	40,1	0,9	0	+
4					3,3	12,8	0,9	0	+
5	4,9	0,8	4,5	0					+
5	41,4	0,8	4,5	1					+
5	32,3	0,8	4,5	0					+
5					3,4	30,4	0,9	1	-

Zone and sampling station: Kornati NP - Z2B

Page: 2/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Grazing
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	si - / no +
5					3,5	18,2	0,9	2	-
5					3,4	10,3	0,9	2	-
6	4,8	0,9	4,5	0					+
6	27,9	0,9	4,5	0					+
6	37,7	0,9	4,5	0					+
6	18,1	0,9	4,5	0					+
6	30,8	0,9	4	0					+
6					3	36,7	0,9	0	+
6					3,6	22,9	0,9	0	+
6					3,4	13,7	0,9	2	-
6					3,5	18,2	0,9	0	+

(* non-photosynthetic tissue)

(** + = intact apex / - = eroded apex)

Note: _____

Zone and sampling station: Kornati NP - Z2C

Page: ...1./...2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Grazing
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	si - / no +
1	18,2	1	3,2	0			1	0	+
1	33,5	1	3,1	0			1	0	+
1	27,3	1	3,2	0			1	0	+
1	38,5	1	3,5	0			1	0	+
1					3,1	25,6	1	0	+
1					3,1	44,3	1	0	+
2	1,5	0,9	1,5	0					
2	15,8	0,9	2,1	0					
2	22,7	0,9	2,1	0					
2					2,1	13,4	1	0	+
2					2,2	11,6	1	10	-
2					2,3	29,8	1	0	+
2					2,3	38,1	1	0	+
3	2,1	0,9	2,1	0					+
3	4,6	0,9	2,2	0					+
3	11,4	0,9	2,2	0					+
3	26,7	1	2,2	0					+
3	32,9	1	2,2	0					+
3	40,8	1	2,2	0					+
3					2,5	34,6	1	0	+
3					2,5	38,7	1	0	+
3					2,6	24,9	1	0	+
3					2,6	40,2	1	0	+
4	3,4	0,9	2,8	0					+

Zone and sampling station: Kornati NP - Z2C

Page: 2/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Grazing
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	si - / no +
4	20,5	0,9	2,8	0					+
4	25,6	0,9	3	0					+
4					2,4	20,4	1	0	-
5	17,1	0,9	3	0					+
5	30,8	0,9	3	0					+
5	40,2	0,9	3	0					+
5					4,1	17,8	1	0	+
5					4	38,9	1	0	+
5					4	45,8	1	0	+
5					4	49,8	1	0	+
6	2,9	0,9	2,8	0					+
6	9,8	0,9	2,8	0					+
6	33	0,9	3	0					+
6					3,1	23,4	1	0	+
6					3,1	31,8	1	0	+

(* non-photosynthetic tissue)

(** + = intact apex / - = eroded apex)

Note: _____

Zone and sampling station: Kornati NP - Z3A

Page: ..1./..2.

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Grazing
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	si - / no +
1	22,9	0,7	4	0					+
1	6,7	0,7	4	0					+
1	27	0,7	4	2					+
1					2,4	13,3	0,7	6	-
1					2,4	23,9	0,7	2	-
2	26,6	0,8	5	0					+
2	52,1	0,8	5	6					+
2	41,2	0,8	5	2					+
2					4,5	23	0,8	10	-
2					4,8	35,6	0,8	4	-
3	1,8	0,7	3	0					+
3	17,1	0,7	3	0					-
3	25,2	0,7	3	0					+
3					2,3	12,6	0,7	2	-
4	30,6	0,8	5	0					+
4	16,5	0,8	5	0					+
4	38,3	0,8	5	0					+
4					3,4	26,1	0,8	0	+
4					2,5	37,8	0,8	0	+
4					3,1	16,7	0,8	2	-
5	25,2	0,7	4	0					+
5	5,7	0,7	4	0					+
5	20,8	0,7	4	0					+
5					2,2	25,7	0,7	0	+

Zone and sampling station: Kornati NP - Z3A

Page: 2/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Grazing
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	si - / no +
5					2,2	17,1	0,8	2	+
5					2	11	0,8	3	-
6	2,2	0,7	4	0					+
6	11,6	0,7	4,3	0					+
6	19,5	0,7	4	0					+
6	16,7	0,7	4	0					+
6					1,8	16,4	0,7	1	-
6					2	12,5	0,7	6	-

(* non-photosynthetic tissue)

(** + = intact apex / - = eroded apex)

Note: _____

Zone and sampling station: Kornati NP - Z3B

Page: ..1/.2.

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Grazing
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	si - / no +
1	43,8	0,7	4	0					+
1	23,2	0,7	4	0					+
1	30,7	0,7	4	0					+
1					2,5	17,2	0,7	0	+
1					2,5	24,8	0,7	3	-
1					2,5	13,4	0,7	1	-
2	30,2	0,7	4	0					+
2	6,6	0,7	4	0					+
2	25,3	0,7	4	0					+
2	28,3	0,7	4	0					+
2					2,7	19,4	0,7	0	+
2					2,4	12,7	0,7	0	-
3	0,3	0,6	1,7	0					+
3	11,1	0,7	2	0					+
3	6,7	0,7	2	0					+
3	12,9	0,7	1,7	0					+
3	13,4	0,7	2	0					+
3					1,5	11,2	0,7	1	+
3					1,5	8,9	0,7	1	+
3					1,5	4,8	0,7	3	-
4	33,8	0,8	5,5	0					-
4	48,8	0,8	5,5	2					+
4					3,9	30,4	0,8	6	-
4					2,6	52,4	0,8	2	+

Zone and sampling station: Kornati NP - Z3B

Page: 2/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Grazing
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	si - / no +
4					3,6	20,9	0,8	2	-
5	0,2	0,7	3,5	0					+
5	0,1	0,7	3,1	0					+
5	2,1	0,7	3,5	0					+
5	18,4	0,7	4	0					+
5	1,8	0,7	4	0					+
5	13,4	0,7	4	0					+
5	13,5	0,7	4	0					+
5	10,7	0,7	4	0					+
5	18,1	0,7	4	0					+
5	22	0,7	4,5	0					-
5	18,4	0,7	3,5	0					-
5	19,1	0,7	4	0					+
5	19,5	0,7	4	0					-
5					2,6	19,8	0,8	0	+
5					2,6	13,1	0,8	0	+
5					2,6	14,5	0,8	0	+
6	0,2	0,8	3,3	0					+
6	27,7	0,8	3,5	0					+
6	33,7	0,8	4	0					+
6	18,2	0,8	4	0					+
6	32,3	0,8	4	0					+
6					2,6	23,6	0,8	0	+
6					2,6	15,1	0,8	0	+

(* non-photosynthetic tissue)

(** + = intact apex / - = eroded apex)

Note: _____

Zone and sampling station: Kornati NP - Z3C

Page: ..1/.2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Grazing
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	si - / no +
1	30,8	0,9	2,9	0					+
1	45,8	0,9	2,9	0					+
1	18,9	0,9	2,9	0					+
1					3,8	13,8	1	60	-
1					4	19,1	1	70	-
2	40,2	0,9	2,5	0					+
2	33	0,9	2,6	0					+
2	35,9	0,9	3	0					+
2					3,5	29	1	50	-
2					3,5	28,4	1	50	-
3	2	0,9	1,5	0					+
3	16,8	0,9	2,5	0					+
3	23,7	0,9	2,5	0					+
3					2,8	28,6	1	0	+
3					2,8	34,8	1	0	+
3					3,1	41,9	1	0	+
3					3	55,6	1	50	+
3					3	60,8	1	50	-
4	1,5	0,8	1,5	0			1		+
4	3,1	0,9	2	0			1		+
4	14,8	0,9	3,4	0			1		+
4	21,8	0,9	3,8	0			1		+
4	18,9	0,9	3,9	0			1		+
4	27,6	0,9	3,8	0			1		+

Zone and sampling station: Kornati NP - Z3C

Page: 2/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Grazing
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	si - / no +
4					2,8	16,8	1	50	-
4					2,9	14,8	1	50	-
4					2,8	21,9	1	0	+
4					2,8	33,7	1	10	-
4					2,9	40,9	1	20	-
5	26,2	0,9	2,1	0					+
5	23,8	0,9	2,4	0					+
5	14,9	0,9	2,4	0					+
5					3,1	31,9	1	60	-
5					3,1	24,1	1	70	-
6	2,5	0,9	2	0					+
6	13,9	0,9	2	0					+
6	39,4	0,9	2	0					+
6	46,8	1	2,1	0					
6	50,7	1	2,2	0					
6					3,2	48,4	1	0	+
6					3,2	43,1	1	40	-
6					3,2	32,7	1	50	-

(* non-photosynthetic tissue)

(** + = intact apex / - = eroded apex)

Note: _____

Laboratory Data Sheets

RNP Dune Costiere

Zone and sampling station: RNP Dune Costiere - Z1A

Page: ..1../.2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Apex
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	+ / - **
1					4,2	29,2	0,9	10	-
1					4,2	20,1	0,9	2	+
1	46,5	0,9	4,2	0					
1	30,2	0,9	5	0					
1	15	0,8	5	0					
1	39,8	0,8	5	0					
2					4,2	16	0,8	2	+
2					4,5	21,7	0,8	0	+
2					3,8	10,9	0,8	0	+
2					3,8	31,7	0,8	2	+
2	7,1	0,8	3,5	0					
2	35,7	0,8	3,5	0					
2	21,5	0,8	3,5	0					
3					3,7	34,8	0,8	0	+
3					4,1	13,5	0,8	0	+
3	30,4	0,8	5	0					
3	6,4	0,8	5	0					
3	41,1	0,8	5	0					
4					3,4	25,1	0,8	0	+
4					2,7	35,7	0,8	0	+
4	30,1	0,8	3,2	0					
4	38,4	0,8	3,5	0					
4	18,2	0,8	3,5	0					
4	0,8	0,7	3,5	0					

Zone and sampling station: RNP Dune Costiere - Z1A

Page: 2/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Apex
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	+ / - **
5					3,7	14,7	0,9	0	+
5					3,5	24,4	0,8	0	+
5	29,6	0,8	3,8	0					
5	18,8	0,8	5	0					
5	3,4	0,8	4	0					
5	34,1	0,8	3,8	0					
6					3,8	20,9	0,9	0	+
6					3	36,8	0,9	0	+
6	38,7	0,9	4,5	0					
6	27,7	0,9	4,5	0					
6	9,8	0,8	5,3	0					
6	1,1	0,8	4,3	0					

(* non-photosynthetic tissue)

(** + = intact apex / - = eroded apex)

Note: _____

Zone and sampling station: RNP Dune Costiere - Z1B

Page: 1/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Apex
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	+ / - **
1					4,3	23,3	0,9	0	+
1					3	43,4	0,9	0	+
1	42,2	0,9	4,2	0					
1	26,7	0,8	4,2	0					
2					3,8	8,7	0,8	0	+
2	20,9	0,8	4,2	0					
2	28,4	0,8	5,8	0					
3					4,1	24,2	1	0	+
3					4,1	35,7	1	0	+
3	34,3	0,9	4,1	0					
3	21,1	0,9	5,5	0					
3	0,8	0,9	5,5	0					
4					4,2	17,4	0,9	0	+
4					4,1	28,6	0,9	0	-
4	30,9	0,8	5,5	0					
4	15,2	0,8	5,5	0					
4	7,8	0,8	5,5	0					
5					3	33,6	0,9	0	+
5					4	18,1	0,9	0	+
5	12,4	0,8	5,2	0					
5	25,8	0,8	5,6	0					
6					4,2	14,1	0,8	0	+
6	38,9	0,8	4,2	0					
6	36,7	0,8	4,2	0					

Zone and sampling station: RNP Dune Costiere - Z1B

Page: 2/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Apex
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	+ / - **
6	20,4	0,8	4,2	0					

(* non-photosynthetic tissue)

(** + = intact apex / - = eroded apex)

Note: _____

Zone and sampling station: RNP Dune Costiere - Z1C

Page: ..1./..2.

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Apex
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	+ / - **
1					2,8	24,3	0,8	0	+
1	34,1	0,8	3,5	0					
1	17,3	0,8	3,5	0					
1	21,2	0,8	3,5	0					
2					3,7	29	0,9	0	+
2	34,7	0,9	5,5	0					
2	47	0,8	5,5	0					
2	19,7	0,8	5,5	0					
3					4,2	14,4	0,9	0	+
3					3,6	28,8	0,9	0	+
3	34,6	0,8	5	0					
3	45,7	0,8	5	0					
3	16,6	0,8	5	0					
4					3,7	24,1	0,9	0	+
4					3	38,4	0,9	0	+
4	25,1	0,8	3,8	0					
4	34,2	0,8	4	0					
4	14,3	0,7	4,5	0					
5					3,2	16,3	0,8	2	-
5					3,5	30,2	0,8	0	+
5	37,8	0,8	4	0					
5	31,7	0,8	4	0					
5	10,9	0,8	4	0					
5	5,6	0,8	3,8	0					

Zone and sampling station: RNP Dune Costiere - Z1C

Page: 2/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Apex
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	+ / - **
6					2,8	15,1	0,9	0	+
6					3	28,2	0,9	0	+
6	27,2	0,8	4	0					
6	18,2	0,8	4	0					
6	0,7	0,8	4	0					

(* non-photosynthetic tissue)

(** + = intact apex / - = eroded apex)

Note: _____

Zone and sampling station: RNP Dune Costiere - Z2A

Page: ..1./..2.

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Apex
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	+ / - **
1					3,5	19,4	0,8	0	+
1	13,2	0,8	4	0					
1	35,2	0,8	4	0					
1	39	0,8	4	0					
2					4,5	26,6	0,8	3	+
2					3,1	37,5	0,8	4	+
2	20,1	0,8	5	2					
2	5,9	0,8	5	0					
2	33,7	0,8	5	0					
3					4,1	20,6	0,9	1	-
3					4,2	35,7	0,9	0	+
3	21,5	0,9	5	0					
3	42,1	0,9	5	0					
3	34,8	0,9	5	0					
3	1,9	0,9	5	0					
4					4	21,1	0,9	2	-
4					3,4	36,8	0,9	0	+
4	27,8	0,9	5	0					
4	42,6	0,9	5	0					
4	7,4	0,8	5	0					
5					4,3	20,8	0,9	0	+
5					3,6	37,1	0,9	0	+
5	39,8	0,8	5,2	0					
5	7,2	0,8	5,5	0					

Zone and sampling station: RNP Dune Costiere - Z2A

Page: 2/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Apex
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	+ / - **
5	30,1	0,9	5,5	0					
6					3,8	13,8	0,9	0	+
6					3,6	29	0,9	2	-
6	36,4	0,9	5	0					
6	23,8	0,8	5	0					
6	4,7	0,8	5	0					

(* non-photosynthetic tissue)

(** + = intact apex / - = eroded apex)

Note: _____

Zone and sampling station: RNP Dune Costiere - Z2B

Page: ..1./..2.

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Apex
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	+ / - **
1					3,2	24,7	0,8	0	-
1	32,8	0,8	4	0					
1	25	0,8	4	0					
1	5,6	0,8	4	0					
2					4	17,9	0,9	0	+
2					3,5	35,7	0,9	0	+
2	36,7	0,9	3,5	0					
2	22,1	0,9	3,5	0					
2	1,4	0,8	3,5	0					
3					3,1	26,1	0,8	0	+
3	29,1	0,8	3,5	0					
3	36,3	0,8	3,5	0					
3	16,7	0,8	3,5	0					
4					4	34,8	0,8	0	+
4					4	21,3	0,8	0	+
4	39,6	0,8	4	0					
4	21,6	0,7	4	0					
5					3,8	21,5	0,9	0	+
5					3,5	33,4	0,8	0	+
5	11,6	0,8	5	0					
5	27,9	0,8	5	0					
5	36,7	0,8	5	0					
6					3,5	28,2	0,8	2	+
6	30,8	0,8	5	0					

Zone and sampling station: RNP Dune Costiere - Z2B

Page: 2/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Apex
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	+ / - **
6	38,2	0,8	5	0					
6	20,6	0,8	5	0					
6	1,9	0,8	5	0					

(* non-photosynthetic tissue)

(** + = intact apex / - = eroded apex)

Note: _____

Zone and sampling station: RNP Dune Costiere - Z2C

Page: .../... 1./2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Apex
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	+ / - **
1	3,6	18,4	0,9	0					+
1	3,3	33,8	0,9	0					+
1					38,8	0,8	5	0	
1					7,8	0,8	5	0	
1					25,1	0,8	5	0	
2	3,3	17,9	0,8	5					-
2					27,8	0,8	4,5	0	
2					29,9	0,7	4,5	1	
2					13	0,7	4,5	0	
3	3,8	29,2	0,7	6					-
3					33,2	0,7	4,5	0	
3					31,4	0,7	4,5	3	
3					15,3	0,7	4,5	0	
4	3,2	23,1	0,9	5					-
4	3,6	22	0,9	0					+
4					30,3	0,9	5	0	
4					21,8	0,9	5	0	
4					37,4	0,8	5	0	
4					6,9	0,8	5	0	
5	3,7	21,8	1	2					+
5	3,6	15,7	1	30					-
5					30	1	4,5	0	
5					17,8	0,9	4,5	0	
5					29,1	0,9	4,5	0	

Zone and sampling station: RNP Dune Costiere - Z2C

Page: 2/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Apex
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	+ / - **
5					4,9	0,9	4,5	0	
6	4,1	14	0,8	0					-
6	3,3	25,8	0,7	0					+
6					25,7	0,7	4	1	
6					19,4	0,7	4	0	
6					4,9	0,7	4	0	

(* non-photosynthetic tissue)

(** + = intact apex / - = eroded apex)

Note: _____

Zone and sampling station: RNP Dune Costiere - Z3A

Page: 1/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Apex
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	+ / - **
1	33	0,9	2,8	0					
1	40,5	0,9	3,2	0					
1	18	0,9	3,8	0					
1	15	0,9	4	0					
1					3,5	26,4	0,9	0	+
2	54	0,8	3,5	0					
2	12,3	0,8	3,5	0					
2					3,8	52	0,9	0	+
2					3,9	41	0,9	10	+
2					4	45	0,9	0	+
3	7,8	0,8	4	0					
3	20,1	0,8	4,8	0					
3	31,7	0,8	4,2	0					
3					3,8	67	0,9	0	+
3					4	58	0,9	0	+
4	4,5	0,8	3,7	0					
4	11,8	0,9	4	0					
4	24	0,9	4	0					
4					4,2	51	0,9	0	+
4					4	47	0,9	0	-
5	10,3	0,8	3,5	0					
5	17	0,8	3,5	0					
5	22	0,8	4	0					
5					4	44	0,9	0	+

Zone and sampling station: RNP Dune Costiere - Z3A

Page: 2/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Apex
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	+ / - **
6	8,7	0,8	3	0					
6	15	0,9	3,2	0					
6	31	0,9	4	0					
6					4	54	0,9	0	+
6					4	60	0,9	0	+
6					4	55	0,9	0	+

(* non-photosynthetic tissue)

(** + = intact apex / - = eroded apex)

Note: _____

Zone and sampling station: RNP Dune Costiere - Z3B

Page: 1/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Apex
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	+ / - **
1	25	0,9	3	0					
1	46	0,9	3	0					
1	12	0,9	3,4	0					
1	33	0,9	3,5	0					
1					4	27	0,9	0	+
2	24	0,9	2,8	0					
2	30	0,9	2,8	0					
2	37	0,9	3	0					
2	32	0,9	3	0					
2					3,5	20	0,9	0	+
2					3,5	20	0,9	0	+
3	20	0,9	3	0					
3	34	0,9	3	0					
3	42	0,9	4,2	0					
3	45	0,9	4,2	0					
3					4	51	0,9	0	+
3					4	43	0,9	0	+
4	15	0,9	3	0					
4	26	0,9	3	0					
4					3,4	38	0,9	0	+
5	24	0,9	2,8	0					
5	29	0,9	2,8	0					
5	37	0,9	3	0					
5	49	0,9	3,2	0					

Zone and sampling station: RNP Dune Costiere - Z3B

Page: 2/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Apex
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	+ / - **
5					4	48	0,9	0	+
5					4	55	0,9	0	+
6	10	0,9	3	0					
6					4	49	0,9	0	-
6					4	55	0,9	0	+

(* non-photosynthetic tissue)

(** + = intact apex / - = eroded apex)

Note:

Zone and sampling station: RNP Dune Costiere - Z3C

Page: 1/2

Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Apex
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	+ / - **
1	19	0,9	4	0					
1	44	0,9	4	0					
1	25	0,9	4	0					
1					3	43	0,9	0	+
1					3	30	0,9	0	+
2	10	0,8	2	0					
2	13,5	0,8	2,2	0					
2					3	15	0,9	0	+
2					3	18	0,9	0	+
3	14,5	0,9	3,5	0					
3	22	0,9	3,5	0					
3					3,2	31	0,9	0	+
3					3,2	35	0,9	0	+
4	17	0,9	3	0					
4	29	0,9	3	0					
4					3	43	0,9	0	+
4					3,5	56	0,9	0	+
5	9,8	0,9	3	0					
5	11	0,9	3	0					
5	24	0,9	3	0					
5					4	54	0,9	0	+
5					4	61	0,9	0	+
6	19	0,9	3	0					
6	32	0,9	3	0					

Zone and sampling station: RNP Dune Costiere - Z3C

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Seagrass: *Posidonia oceanica*

Shoot n.	Juvenile and intermediate leaves				Adult leaves				Apex
	Length (cm)	Width (cm)	non-ph. (cm) *	Necrosis (%)	Leaf base (cm)	Length (cm)	Width (cm)	Necrosis (%)	+ / - **
6	39	0,9	3,5	0					
6					4	45	0,9	0	+

(* non-photosynthetic tissue)

(** + = intact apex / - = eroded apex)

Note: _____