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UNIVERSITÀ
POLITECNICA
DELLE MARCHE

Dipartimento
di Scienze
della Vita
e dell'Ambiente
DISVA

MONITORAGGIO DELLA QUALITÀ AMBIENTALE DELLA BAIA DI PORTONOVO PER L'INDIVIDUAZIONE DEGLI EVENTUALI IMPATTI DERIVANTI DA ATTIVITÀ DI RIPASCIMENTO

MAGGIO-SETTEMBRE 2020

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1. Premessa

Il Comune di Ancona ha conferito all'Università Politecnica delle Marche - Dipartimento di Scienze della Vita e dell'Ambiente (d'ora in poi DiSVA) l'incarico di effettuare indagini ambientali finalizzate alla valutazione della qualità ambientale della Baia di Portonovo per l'individuazione degli eventuali impatti derivanti dalla manutenzione degli arenili ivi comprese attività di ripascimento.

In particolare, l'incarico prevedeva di effettuare nell'area di indagine:

-analisi video dei principali popolamenti e/o habitat;

-analisi della localizzazione spaziale ed estensione delle principali biocenosi di fondo duro con particolare riferimento a *Cystoseira* spp. presente nella Baia di Portonovo ed allo sviluppo di questi popolamenti a macro-alghe di particolare pregio naturalistico e conservazionistico;

- Analisi dello stadio di sviluppo e reclutamento della *Cystoseira sp*. nell'area oggetto di indagine.

In questo documento si analizza sinotticamente l'insieme dei risultati ottenuti nel periodo maggio-settembre 2020 per la valutazione dei potenziali impatti derivanti dall'attività di movimentazione/ripascimento avvenuta nel luglio del 2018, lungo il paraggio costiero Ramona-Molo di Portonovo.

2. Indagini effettuate nell'area di studio

2.1 Analisi video delle principali tipologie di substrato e dei popolamenti associati

Rilievi video/fotografici sono stati effettuati sia da natante sia in immersione lungo i 5 transetti (Figura 2.1.1) precedentemente identificati e monitorati da ARPAM-UNIVPM durante la prima campagna 2013-2014 effettuata per la valutazione degli eventuali impatti derivanti dalle attività di ripascimento condotte nell'estate 2013 come stabilito dalla Conferenza dei Servizi della Regione Marche P.F. Valutazioni ed Autorizzazioni Ambientali (27/05/2013).



Figura 2.1.1 Localizzazione dei transetti video secondo il Piano di Monitoraggio per lo studio dei principali habitat presenti nell'area di studio

Transetti subacquei geo-referenziati sono stati realizzati mediante l'utilizzo di telecamera subacquea ad alta definizione trainata da natante (a partire da 3 metri di profondità fino ad oltre 10 metri) e mantenuta in posizione tramite verricello. La telecamera inoltre è stata collegata tramite cavo in fibra ottica direttamente ad un terminale alloggiato a bordo dell'imbarcazione, permettendo l'acquisizione in tempo reale delle registrazioni. La registrazione è avvenuta in continuo al fine di poter sincronizzare il time-code video con la traccia GPS registrata dall'imbarcazione. L'obiettivo di tale indagine è stato quello di approfondire su una più ampia scala spaziale le principali tipologie di substrato presenti ed i popolamenti associati.

2.2. Analisi della localizzazione spaziale ed estensione delle principali biocenosi

L'analisi della localizzazione spaziale ed estensione delle principali biocenosi di fondo duro è stata effettuata tra maggio-luglio 2020 mediante il posizionamento in immersione di quadrati (di lato di 50 cm) distribuiti in maniera random in differenti paraggi costieri, sia in corrispondenza dell'area a mare prospiciente il tratto Ramona-Molo interessato dalle attività di ripascimento del luglio 2018, sia nei paraggi contigui non direttamente soggetti ad attività di ripascimento e/o di movimentazione della spiaggia emersa (Figura 2.2.1). Ciascuno dei quadrati posizionati in immersione nell'area oggetto di indagine è stato fotografato (metodo non distruttivo) mediante macchina fotografica ad alta definizione munita di scafandro (Tot. **247** quadrati). Le fotografie effettuate in immersione sono state analizzate in laboratorio per il riconoscimento tassonomico dei principali taxa presenti e mediante software specifico di analisi di immagine photoQuad (Trygonis & Sini, 2012) è stata valutato il ricoprimento relativo (Figura 2.2.2), espresso in % per unità di superficie.

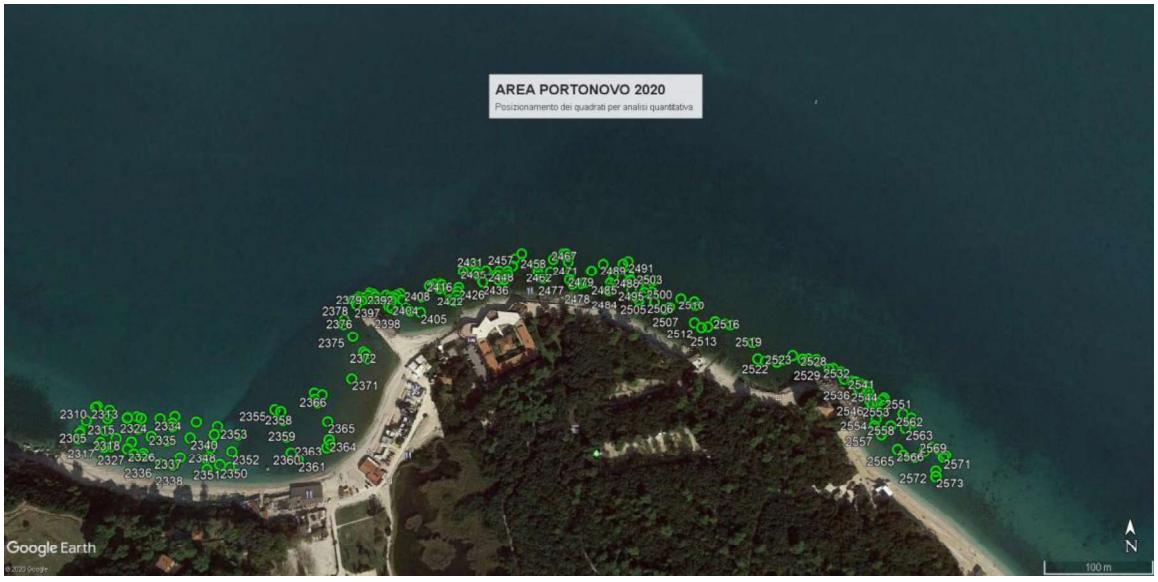


Figura 2.2.1 Localizzazione delle stazioni per analisi del ricoprimento da parte dei differenti popolamenti presenti nell'area di studio (247 quadrati allocati).

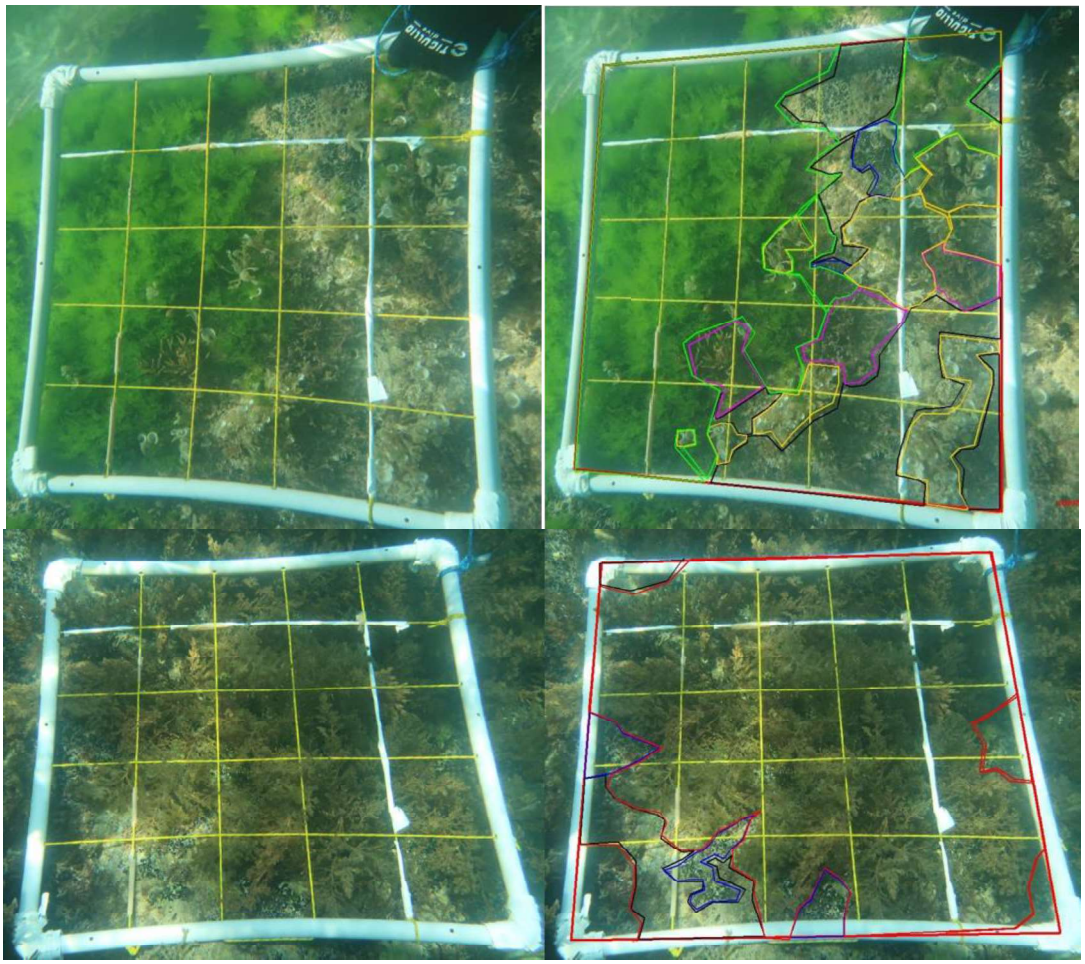


Figura 2.2.1 Esempio di analisi di immagine mediante photoQuad per la valutazione della percentuale di ricoprimento dei differenti taxa (quadrati numero 2467, 2528 in tabella).

2.3. Analisi dello stadio di sviluppo e reclutamento della Cystoseira sp. nell'area oggetto di indagine

Analisi fenologiche sono state effettuate sui popolamenti a *Cystoseira sp*. ove presenti (Figura 2.3.1) per valutare stadio di sviluppo e potenzialità di reclutamento tra maggio e luglio 2020. Sono state effettuati survey fotografici in immersione e sono state prelevate piccole porzioni di alghe per la valutazione dello stadio di maturazione degli apici

riproduttivi. Le fotografie effettuate in immersione ed i campioni raccolti, sono state analizzati in laboratorio ed i ricettacoli osservati al microscopio.



Figura 2.3.1 Area di Portonovo antistante il Fortino Napoleonico dove sono presenti i popolamenti a Cystoseira sp.

3. Risultati

3.1. Analisi video delle principali tipologie di substrato identificati

Sulla base dei transetti video effettuati tramite imbarcazione ed immersione sono stati identificati le principali tipologie di substrato presenti nell'area, che evidenziano una elevata eterogeneità anche su piccola scala spaziale (Figura 3.1.1).

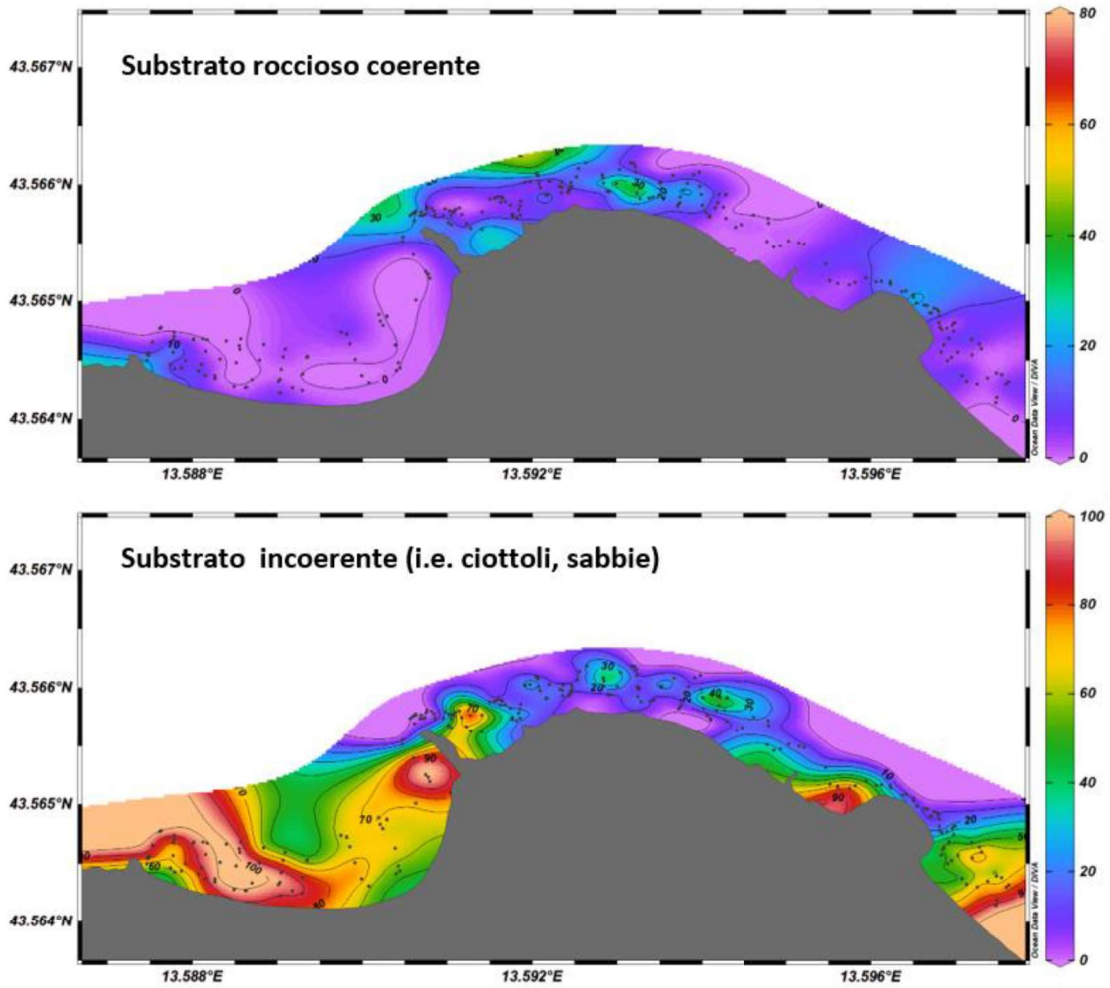


Figura 3.1.1 Distribuzione dei principali substrati identificati attraverso transetti video

3.2. Mappatura delle comunità vegetali e macrozoobentoniche più abbondanti nell'area di indagine

L'analisi tassonomica dei principali popolamenti vegetali ed animali presenti nell'area di indagine identificati attraverso immagini fotografiche ad alta definizione effettuate in immersione nei quadrati posizionati nell'area oggetto di studio unitamente all'utilizzo di software specifici di analisi di immagine per la valutazione della percentuale di ricoprimento hanno consentito di censire in maniera quantitativa la loro distribuzione lungo il litorale di Portonovo (Tabella 3.2.1). Al fine di visualizzare al meglio distribuzione e copertura (espressa come percentuale di ricoprimento per unità di superficie) dei differenti popolamenti si riportano di seguito le immagini ottenute mediante specifico software grafico. La figura 3.2.1 mostra la distribuzione di *Cystoseira spp.* (tra cui con certezza *Cystoseira compressa*) nell'area oggetto di indagine, la quale durante il periodo di indagine mostra, come già documentato in precedenza, le più elevate percentuali di ricoprimento nel paraggio tra il Fortino e la Torre de Bosis.

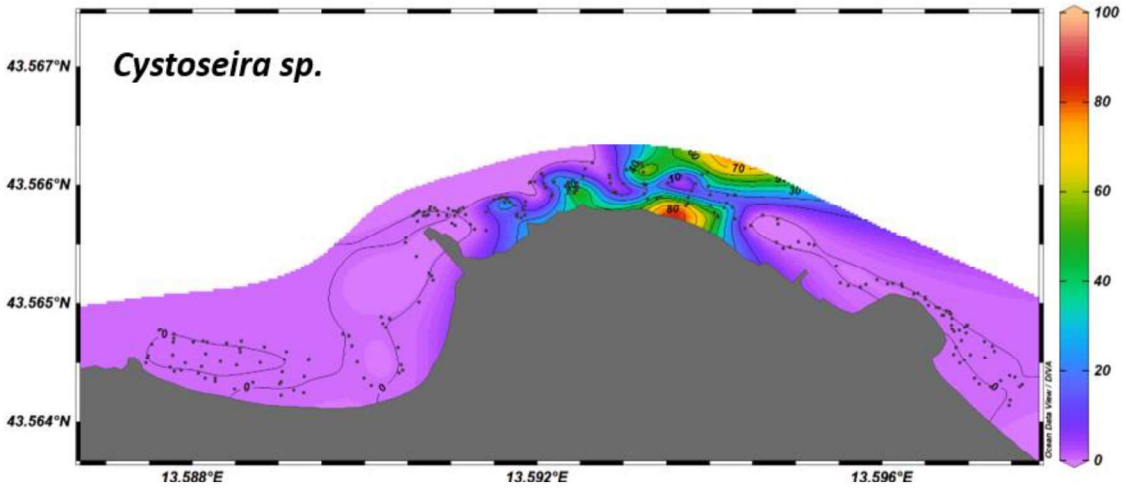


Figura 3.2.1 Distribuzione espressa come percentuale di ricoprimento del genere *Cystoseira* nell'area oggetto di indagine.

Altri taxa vegetali identificati e quantificati in termini di superficie di ricoprimento nell'area oggetto di indagine includono *Dictyopteris sp.* (Figura 3.2.2) e *Feltro algale, Alsidium corallium* e *Alghe Coralline articolate*

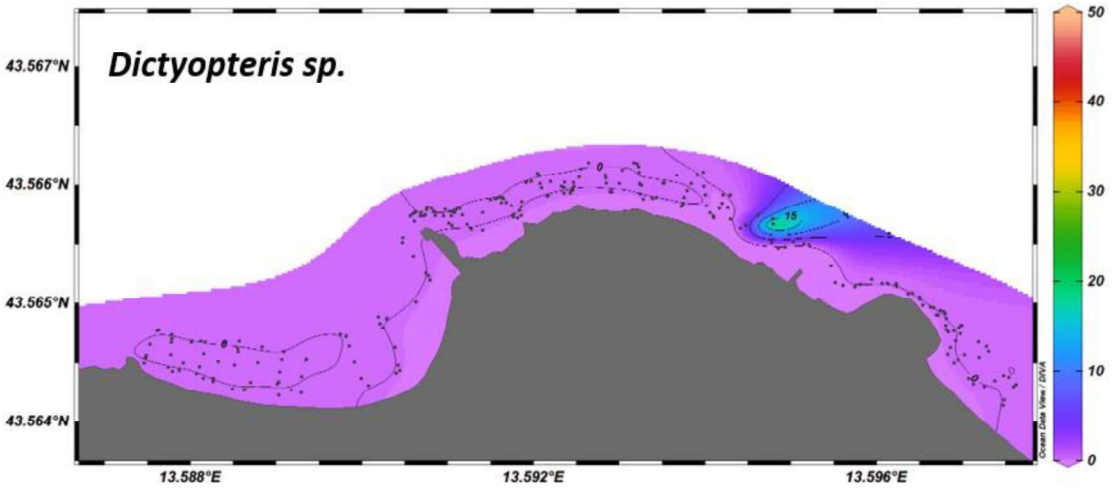


Figura 3.2.2 Distribuzione espressa in % di ricoprimento di *Dictyopteris sp.* nell'area oggetto di indagine

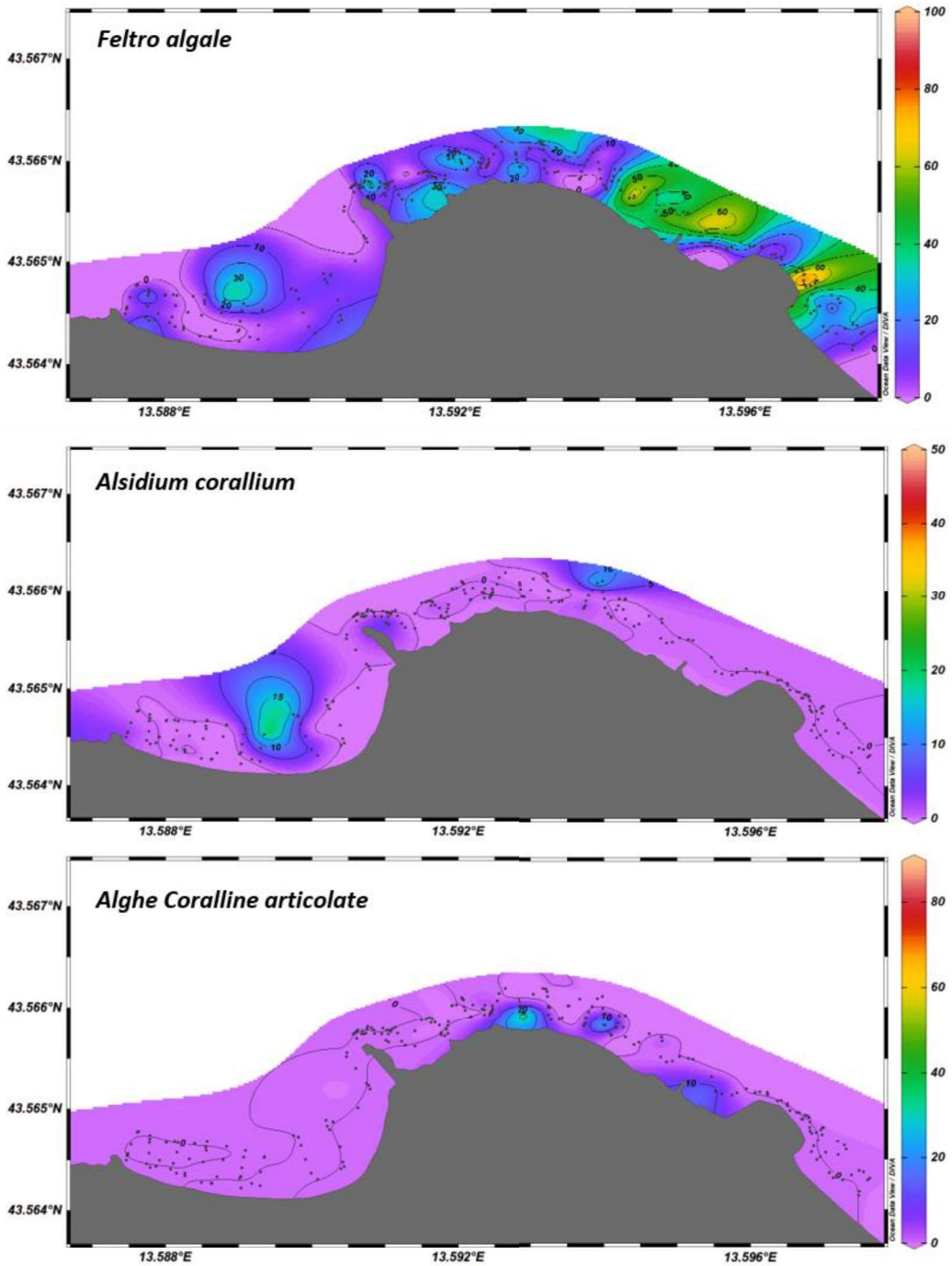


Figura 3.2.3 Distribuzione di ricoprimento espressa in % di *Feltro algale., Alsidium corallium* ed *Alghe Coralline articolate* nell'area oggetto di indagine.

Analogamente a quanto riportato per la componente vegetale, è stata mappata la distribuzione delle più abbondanti componenti animali bentoniche di fondo duro (Tabella 3.2.1). Come evidenziato dalla figura 3.2.4, *Mytilus galloprovincialis* è presente nell'area antistante il Fortino e nei substrati rocciosi sparsi presenti di fronte il Molo.

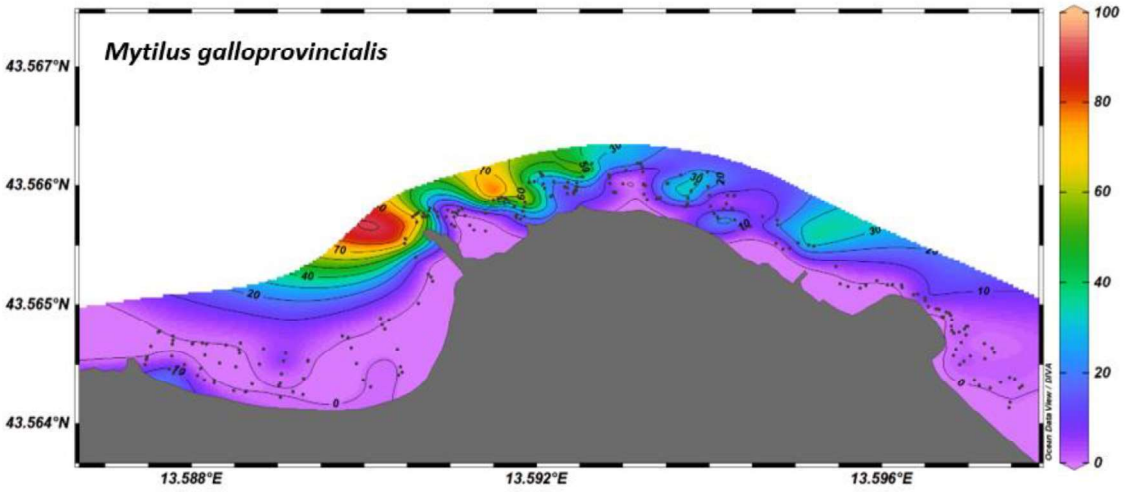


Figura 3.2.4 Distribuzione del ricoprimento di *Mytilus galloprovincialis* (espressa in percentuale di ricoprimento) nell'area oggetto di indagine.

La spugna perforante *Cliona sp.* è stata rilevata con basse percentuali di ricoprimento solo in prossimità della Torre de Bosis (Figura 3.2.5). Inoltre, nell'area di studio è stata rilevata la presenza a di spugne massive (Figura 3.2.6).

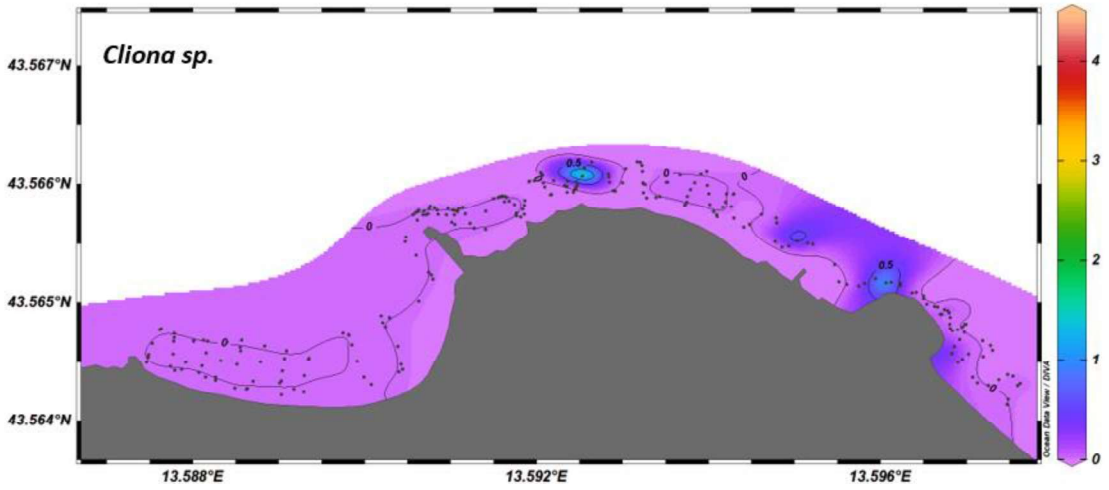


Figura 3.2.5 Distribuzione espressa in % di ricoprimento di *Cliona sp.* nell'area oggetto di indagine

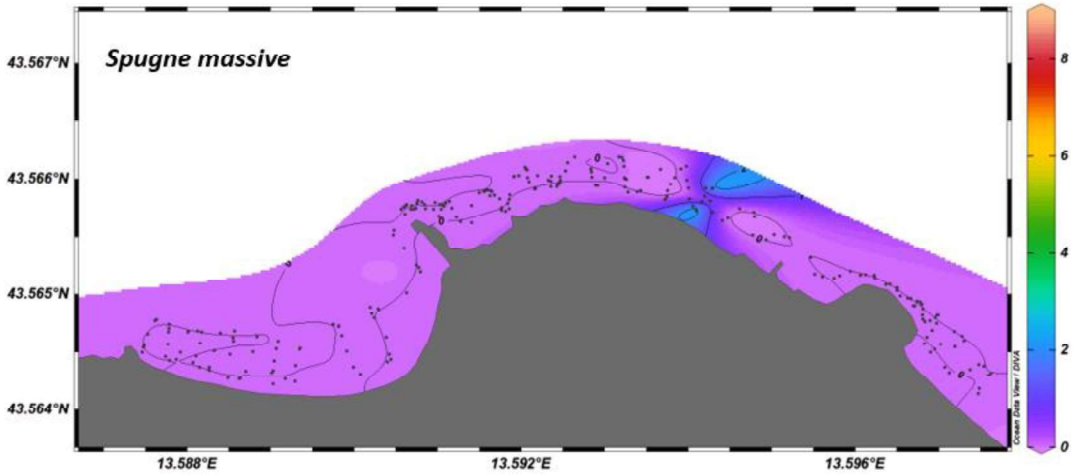


Figura 3.2.6 Distribuzione espressa in % di ricoprimento di *spugne massive.* nell'area oggetto di indagine

Tabella 3.2.1 Percentuale di ricoprimento dei principali taxa vegetali ed animali nell'area oggetto di indagine

Lat	Long	N. quadrato	Cystoseira spp.	Alsidium corallinum	Palisada perforata	Dyctyiota dicotoma	Hypnea musciformis	Rhodymenia ardissone	Dyctiopteris sp.	Coralline articolate	Acetabularia sp	Gracilaria sp.	Padina pavonica	Ulva sp	Feltro algale	Anemonia spp.	Cliona sp.	Spugne massive	Litophaga litophaga	Mytilus galloprovincialis	Subastrato roccioso	Substrato Incoerente (i.e. Ciottoli, sabbie)
43.56450	13.58746	2305	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.7	44.0
43.56455	13.58747	2306	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	87.8
43.56454	13.58748	2307	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56456	13.58748	2308	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56466	13.58753	2309	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56477	13.58761	2310	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56478	13.58763	2311	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56474	13.58778	2312	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56471	13.58778	2313	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56467	13.58777	2314	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	61.4	0.0	0.0	0.0	0.0	0.0	0.0	35.1
43.56457	13.58777	2315	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0	47.0	44.7
43.56447	13.58774	2316	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	87.5
43.56443	13.58779	2317	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	43.6	0.0	0.0	0.0	0.0	45.2	0.0	4.1
43.56444	13.58787	2318	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56450	13.58791	2319	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56468	13.58801	2320	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56469	13.58801	2321	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56469	13.58812	2322	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56467	13.58817	2323	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56458	13.58815	2324	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.3	0.0	0.0	0.0	0.0	0.0	0.0	89.2
43.56447	13.58810	2325	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56441	13.58807	2326	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	4.9	0.0	0.0	0.0	0.0	33.8	48.6
43.56437	13.58815	2327	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56435	13.58826	2328	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56437	13.58826	2329	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56452	13.58832	2330	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56467	13.58840	2331	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56469	13.58857	2332	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56463	13.58855	2333	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56460	13.58855	2334	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56448	13.58851	2335	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56428	13.58849	2336	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56427	13.58862	2337	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56427	13.58863	2338	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56433	13.58870	2339	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56450	13.58878	2340	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56464	13.58883	2341	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	51.5	0.0	0.0	0.0	0.0	0.0	0.0	38.7
43.56460	13.58909	2344	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	38.5	0.0	0.0	0.0	0.0	3.3	2.2	49.6
43.56453	13.58906	2345	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.4	5.8	78.0
43.56442	13.58904	2346	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56434	13.58903	2347	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56432	13.58901	2348	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	97.5
43.56423	13.58903	2349	0.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	10.9	80.3
43.56427	13.58917	2350	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	96.8
43.56425	13.58929	2351	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	91.0
43.56438	13.58929	2352	0.0	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.2
43.56453	13.58934	2353	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.0	0.0	0.0	0.0	26.1	0.0	0.0	0.0	0.0	0.0	0.0	48.1
43.56453	13.58935	2354	0.0	45.6	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	43.7
43.56474	13.58974	2355	0.0	24.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	70.2
43.56473	13.58981	2356	0.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	19.6	61.9
43.56473	13.58981	2357	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.1	8.2	0.0	0.0	0.0	0.0	0.0	66.7
43.56465	13.58985	2358	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.6	18.8	0.0	0.0	0.0	0.0	0.0	56.4
43.56451	13.58991	2359	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.1	0.0	0.0	0.0	0.0	0.0	75.3
43.56437	13.58999	2360	0.0	8.9	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85.6
43.56431	13.59008	2361	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	24.2	0.0	0.0	0.0	0.0	0.0	52.1
43.56441	13.59040	2362	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.9	35.0	0.0	0.0	0.0	0.0	0.0	47.8
43.56444	13.59044	2363	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.4	18.1	0.0	0.0	0.0	0.0	0.0	59.4
43.56448	13.59042	2364	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.0	17.9	0.0	0.0	0.0	0.0	0.0	55.1
43.56463	13.59038	2365	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.8	0.0	0.0	0.0	0.0	0.0	72.4
43.56480	13.59024	2366	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.6	14.7	0.0	0.0	0.0	0.0	0.0	56.9
43.56483	13.59020	2367	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.4	0.0	0.0	0.0	0.0	0.0	72.3
43.56489	13.59019	2368	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	9.6	0.0	0.0	0.0	0.0	0.0	81.5
43.56488	13.59029	2369	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	29.7	0.0	0.0	0.0	0.0	0.0	53.2
43.56487	13.59029	2370	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.5	12.0	0.0	0.0	0.0	0.0	0.0	72.6
43.56501	13.59063	2371	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.1	0.0	0.0	0.0	0.0	0.0	67.9
43.56520	13.59079	2372	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56524	13.59077	2373	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56526	13.59074	2374	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56540	13.59060	2375	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56551	13.59047	2376	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
43.56556	13.59047	2377	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	0.0	0.0	0.0	0.0	0.0	0.0	61.3	28.2	0.0
43.56570	13.59061	2378	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	74.4	17.4	0.0
43.56574	13.59056	2379	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.9	0.0	0.0	0.0	0.0	0.0	0.0	40.5	31.3	10.5
43.56576	13.59059	2380	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	83.7	7.4	0.0
43.56576	13.59061	2381	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	81.4	14.2	0.0
43.56578	13.59062	2382	0.0	0.0	0.0	0.0	1.2	0.5	0.0	0.0	0.0	0.0	5.6	0.3	0.0	0.0	0.0	0.0	0.0	25.6	59.3	0.0
43.56577	13.59069	2383	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.4	2.4	0.0	0.0	0.0	0.0	0.0	52.9	17.5	0.0
43.56574	13.59067	2384	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	92.8	5.8	0.0
43.56574	13.59071	2385	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	72.0	21.0	0.0
43.56575	13.59074	2386	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	15.7	0.0	0.0	0.0	0.0	52.8	17.9	7.5
43.56579	13.59075	2387	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	0.0	48.8	0.0	0.0	0.0	0.0	43.6	0.0	0.0
43.56582	13.59076	2388	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.1	0.0	35.0	0.0	0.0	0.0	0.0	25.2	4.5	0.0
43.56580	13.59081	2389	0.0	0.0	0.0	0.0	59.2	0.0	0.0	0.0	0.0	0.0	31.1	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43.56578	13.59084	2390	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.1	0.0	63.3	0.0	0.0	0.0	0.0	7.0	0.0	0.0
43.56575	13.59085	2391	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	8.3	81.8	0.0	0.0	0.0	0.0	0.0	0.0	1.4
43.56574	13.59095	2392	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.9	0.0	20.4	0.0	0.0	0.0	0.0	0.0	10.8	0.0
43.56579	13.59097	2393	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	73.1	0.0	6.9	0.0	0.0	0.0	0.0	0.0	2.4	12.9
43.56578	13.59102	2394	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	45.2	0.0	34.0	0.0	0.0	0.0	0.0	6.9	0.0	3.6
43.56578	13.59106	2395	0.0	0.0	0.0	0.0	35.5	0.0	0.0	0.0	0.0	0.0	32.6	0.5	0.0	0.0	0.0	0.0	0.0	11.3	14.1	0.0
43.56574	13.59104	2396	0.0	0.0	0.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0	84.0	0.0	4.1	0.0	0.0	0.0	0.0	4.9	0.0	0.0
43.56568	13.59101	2397	0.0	15.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.8	20.5
43.56566	13.59105	2398	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56576	13.59108	2399	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56579	13.59109	2400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56581	13.59114	2401	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56575	13.59117	2402	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.4	0.0	0.0	0.0	0.0	0.0	0.0	74.4
43.56567	13.59122	2403	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.9	0.0	0.0	0.0	0.0	0.0	0.0	78.1
43.56563	13.59127	2404	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.9	6.4	11.2	0.0	0.0	0.0	0.0	0.0	0.0	67.8
43.56562	13.59141	2405	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.4	2.2	0.0	0.0	0.0	0.0	42.3	19.4
43.56577	13.59140	2408	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56588	13.59150	2409	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	93.6	5.7	0.0
43.56589	13.59155	2410	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	1.2	0.0	0.0	2.4	0.0	0.0	0.0	80.2	10.6	0.0
43.56590	13.59156	2411	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	92.6	6.4	0.0
43.56590	13.59160	2412	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	90.4	3.9	0.0
43.56590	13.59163	2413	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.1	0.0	0.0	0.0	0.0	0.0	0.0	58.9
43.56589	13.59165	2414	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.0	0.0	0.0	82.8	10.1	0.0
43.56585	13.59163	2415	90.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.2	2.2	0.0
43.56586	13.59168	2416	28.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.0	0.0	0.0	0.0	0.0	8.6	0.0	45.0
43.56582	13.59174	2418	27.1	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.6	21.2	2.5
43.56575	13.59176	2419	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	55.8	0.0	0.0	0.0	0.0	0.0	0.0	41.7
43.56575	13.59176	2420	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.8	0.0	0.0	0.0	0.0	12.3	0.0	42.6
43.56573	13.59177	2421	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.6	0.0	0.0	0.0	0.0	25.0	6.4	14.8
43.56572	13.59181	2422	58.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.5	17.2	0.0
43.56575	13.59185	2423	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.3	0.0	0.0	0.0	0.0	30.4	2.2	25.5
43.56579	13.59184	2424	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.8	0.0	0.0	0.0	0.0	0.0	2.3	68.3
43.56582	13.59185	2425	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.5	0.0	0.0	0.0	0.0	0.0	0.0	69.3	10.3	0.0
43.56586	13.59186	2426	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
43.56602	13.59191	2428	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	86.3	11.3	0.0
43.56602	13.59191	2429	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	73.2	0.0	0.0	0.0	0.0	11.1	11.1	0.0
43.56603	13.59197	2430	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56610	13.59204	2431	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.7	73.0	0.0
43.56609	13.59205	2432	7.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	86.4	0.0	0.0
43.56608	13.59207	2433	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.1	0.0	0.0	0.0	0.0	3.6	20.5	31.6

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DELLE MARCHE

Lat	Long	N. quadrato	Cystoseira spp.	Alsidium corallinum	Palisada perforata	Dyctyiota dicotoma	Hypnea musciformis	Rhodymenia ardissone	Dyctiopteris sp.	Coralline articolate	Acetabularia sp	Gracilaria sp.	Padina pavonica	Ulva sp	Feltro algale	Anemonia spp.	Cliona sp.	Spugne massive	Litophaga litophaga	Mytilus galloprovincialis	Subastrato roccioso	Substrato Incoerente (i.e. Ciottoli, sabbie)
43.56601	13.59207	2434	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	71.4	0.0	0.0	0.0	0.0	11.0	0.0	12.9
43.56598	13.59209	2435	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	28.2	0.0	0.0	0.0	0.0	58.5	3.2	0.0
43.56591	13.59216	2436	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.0	0.0	0.0	0.0	0.0	0.0	21.3	45.5
43.56591	13.59217	2437	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	10.2	0.0	0.0	0.0	0.0	31.2	20.1	0.0
43.56603	13.59220	2438	81.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.0	0.0	0.0
43.56599	13.59232	2441	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53.0	0.0	0.0	0.0	0.0	17.7	17.0	0.0
43.56602	13.59236	2442	0.0	0.0	0.0	0.0	32.1	0.0	0.0	12.3	0.0	0.0	5.6	0.0	21.4	0.0	0.0	0.0	0.0	13.4	5.8	0.0
43.56598	13.59235	2443	0.0	0.0	0.0	0.0	9.3	0.0	0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84.5
43.56593	13.59235	2445	0.0	0.0	0.0	0.0	62.2	0.0	0.0	0.0	0.0	0.0	15.5	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	13.3
43.56593	13.59242	2447	76.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	20.3	0.0	0.0
43.56595	13.59243	2448	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43.56596	13.59245	2449	87.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	4.7	4.9	0.0
43.56596	13.59245	2451	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	8.4	0.0	3.5	0.0	0.0	0.0	0.0	62.1	11.9	6.7
43.56597	13.59245	2452	71.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	21.8	0.0	0.0
43.56599	13.59247	2453	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	4.0	0.0	0.0	0.0	0.0	4.6	44.1	40.4
43.56602	13.59246	2454	60.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.2	3.1	0.0
43.56607	13.59253	2455	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4	0.0	0.0	0.0	4.3	0.0	0.0	62.9	20.4	0.0
43.56614	13.59255	2456	6.8	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	1.4	0.0	0.0	0.0	0.1	0.0	0.0	87.7	0.0	0.0
43.56619	13.59264	2457	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.7	0.0	0.0	0.0	0.0	9.6	30.5	30.2
43.56609	13.59283	2458	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53.1	0.0	0.0	0.0	0.0	0.0	2.2	40.4
43.56606	13.59284	2459	0.0	0.0	0.0	0.0	42.3	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	0.0	46.5
43.56602	13.59284	2460	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	3.4	0.0	0.0	0.0	0.0	0.0	49.9	40.8
43.56595	13.59288	2461	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	82.4	0.0	0.0	0.0	0.0	11.6	2.0	0.0
43.56595	13.59291	2462	0.0	0.0	0.0	0.0	0.0	0.0	0.0	88.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.9	0.0	0.0
43.56601	13.59300	2463	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	57.9	38.6
43.56613	13.59304	2464	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.1	16.0	56.9
43.56619	13.59317	2465	43.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53.2	0.0	0.0
43.56619	13.59320	2466	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.1	8.8	0.0	0.0	0.0	0.0	12.3	0.0
43.56616	13.59322	2467	86.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	7.9	0.0
43.56611	13.59323	2468	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43.56601	13.59324	2471	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43.56601	13.59324	2472	33.2	0.0	0.0	0.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.2	0.0	0.0	0.0	0.0	6.0	35.2	0.0
43.56600	13.59326	2474	0.0	0.0	0.0	0.0	36.2	0.0	0.0	0.0	0.0	0.0	5.3	0.0	28.9	0.0	0.0	0.0	0.0	1.3	22.4	0.0
43.56600	13.59326	2475	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	0.0	4.0	0.0	0.0	0.0	0.0	0.0	74.4	12.8
43.56593	13.59324	2476	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	13.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.8	7.6
43.56589	13.59328	2477	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.8	0.0	0.0	0.0	0.0	0.4	34.2	50.3
43.56589	13.59339	2478	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43.56590	13.59343	2479	44.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.5	32.8	0.0
43.56602	13.59350	2480	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.2	0.0	0.0	0.0	62.0	8.0	0.0
43.56602	13.59352	2481	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.8	12.0	0.0	0.0	0.0	0.0	0.0	70.7
43.56608	13.59366	2482	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	62.9	4.0	0.0	0.0	0.0	0.0	0.0	30.2
43.56583	13.59372	2484	90.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	4.2
43.56582	13.59372	2485	77.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	13.0	0.0
43.56585	13.59374	2486	59.9	6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	18.1	12.6
43.56590	13.59375	2487	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	8.8	0.0	0.0	0.0	77.1	9.5	0.0
43.56595	13.59379	2488	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.4	3.4	0.0	0.0	0.0	13.8	35.8	10.2
43.56601	13.59383	2489	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.7	0.0	0.0	0.0	46.9	21.8	0.0
43.56609	13.59391	2490	0.0	35.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	50.8	8.5	0.0
43.56611	13.59398	2491	85.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.4	3.9	1.8
43.56599	13.59398	2492	70.6	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.9	0.4	2.8
43.56592	13.59400	2493	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.6	66.8
43.56583	13.59401	2494	0.0	0.0	0.0	0.0	0.0	0.0	0.0	73.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	21.5	0.0
43.56577	13.59405	2495	33.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.6	11.2	0.0	0.0	0.0	2.7	21.2	5.9
43.56574	13.59409	2496	86.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.4	0.0	11.6	0.0	0.0
43.56573	13.59410	2497	31.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.3	0.0	0.0	0.0	41.9	0.0	0.0
43.56581	13.59417	2499	90.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.4	0.0	0.0
43.56585	13.59419	2500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	98.3
43.56592	13.59420	2501	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.2	0.8	0.0	0.0	0.0	0.0	0.0	85.2
43.56592	13.59429	2502	60.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.4	0.0	0.0	0.0	0.0	17.0	2.9	0.0
43.56592	13.59429	2503	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.9	0.0	0.0	6.5	0.0	8.4	12.0	33.7
43.56581	13.59426	2504	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65.1	0.0	0.0	0.0	0.0	0.0	0.0	33.9
43.56571	13.59429	2505	0.0	0.0	2.8	0.0	9.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.2	0.0	0.0	0.0	0.0	41.6	0.4	0.0
43.56564	13.59441	2506	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	69.3	0.0	0.0	0.0	0.0	0.0	0.0	28.3
43.56566	13.59447	2507	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	86.1	7.2	0.0	0.0	0.0	0.0	5.1	0.0
43.56575	13.59462	2508	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	57.6	6.4	0.0	0.0	0.0	0.0	0.0	32.8
43.56572	13.59478	2509	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	73.6	0.0	0.0	0.0	0.0	0.7	0.0	24.3
43.56567	13.59479	2510	0.0	0.0	0.0	0.0	7.7	0.0	45.5	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.3	0.0	0.0
43.56551	13.59477	2511	0.0	0.0	0.0	0.0	41.2	0.0	0.0	0.0	0.0	0.0	0.0	1.8	18.6	0.0	0.0	0.0	0.0	0.0	0.0	33.6
43.56547	13.59485	2512	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	43.2	0.0	0.0	0.0	0.0	0.0	0.0	55.6
43.56548	13.59493	2513	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85.8	0.0	0.0	0.0	0.0	0.0	0.0	12.9
43.56552	13.59503	2514	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	62.2	3.3	1.7	0.0	0.0	7.5	4.8	15.0
43.56550	13.59515	2515	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0	0.0	0.0	90.3	0.0	0.0
43.56549	13.59521	2516	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.2	6.3	0.0	0.0	0.0	0.0	0.0	27.6
43.56532	13.59547	2519	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	76.1	0.0	0.0	0.0	0.0	0.0	12.0	10.4
43.56518	13.59551	2520	0.0	0.0	0.0	0.0	25.8	0.0	0.0	25.3	0.0	0.0	0.0	9.8	0.0	0.0	0.0	0.0	0.0	0.0	8.3	35.2
43.56516	13.59560	2521	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	97.4
43.56514	13.59574	2522	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56516	13.59581	2523	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.2	0.0	0.0	0.0	0.0	0.0	0.0	61.2
43.56520	13.59594	2524	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61.8	0.0	0.0	0.0	0.0	0.0	1.5	35.6
43.56517	13.59606	2525	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.9	0.0	3.7	0.0	0.0	0.3	28.4	39.2
43.56518	13.59612	2526	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	2.3	0.0	27.9	0.0	0.0	0.0	0.0	0.0	0.0	66.3
43.56517	13.59623	2527	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	71.8	0.0	0.0	0.0	0.2	0.0	0.0	0.0	24.2	0.0
43.56515	13.59623	2528	0.0	0.0	0.0	6.6	0.0	0.0	0.0	0.0	0.0	0.0	16.0	50.2	0.0	0.0	0.0	0.0	0.0	1.5	20.7	0.0
43.56508	13.59636	2529	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.2	0.0	19.0	0.0	0.0	0.0	0.0	0.0	0.0	43.3
43.56509	13.59641	2530	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.3	0.0	59.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.0	0.0
43.56506	13.59650	2531	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	14.2	0.0	22.0	0.0	18.3	0.0	0.0	0.0	0.0	30.6	4.2	3.7
43.56504	13.59650	2532	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.4	0.0	15.5	0.0	0.0	0.0	0.0	0.0	0.0	3.6	52.1	0.0
43.56499	13.59654	2533	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	36.6	0.0	0.0	0.0	0.0	0.0	27.3	30.9
43.56497	13.59662	2534	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	0.0	87.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.2	0.0
43.56496	13.59667	2535	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	6.1	0.0	68.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.0	0.0
43.56490	13.59669	2536	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	87.3	0.0	0.0	0.0	0.0	0.0	9.3	0.0
43.56490	13.59671	2537	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.5	0.0	28.8	0.0	20.3	0.0	0.0	0.0	0.0	0.0	31.4	0.0
43.56494	13.59674	2540	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	92.7	0.0	0.0	0.0	0.0	5.5	0.0	0.0
43.56493	13.59678	2541	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0	0.0	0.4	0.0	0.0	0.0	0.0	36.4
43.56492	13.59679	2542	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	1.3	0.0	11.7	0.0	0.0	0.0	0.0	0.0	54.5	23.1
43.56488	13.59681	2543	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	95.6	0.0	0.0	0.0	0.0	0.0	0.0	4.0
43.56482	13.59680	2544	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.7	0.0	0.0	0.0	0.0	0.6	4.0	0.0
43.56478	13.59681	2545	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	67.8	0.0	0.0	0.0	0.0	0.0	0.0	30.4
43.56476	13.59683	2546	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94.9	0.0	0.0	0.0	0.0	0.0	0.0	4.3
43.56478	13.59690	2547	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0	80.3	0.0	0.0	0.0	0.0	12.1	0.0	0.0
43.56480	13.59696	2548	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	56.6	0.0	0.0	0.0	0.0	0.0	0.0	41.6
43.56482	13.59698	2550	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	59.4	0.0	0.0	0.0	0.0	1.3	0.0	36.0
43.56482	13.59699	2551	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	97.5	0.0	0.0	0.0	0.0	0.0	0.0	1.4
43.56475	13.59697	2552	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	1.4	0.0	17.0	0.0	0.0	0.0	0.0	0.0	0.0	71.8
43.56469	13.59692	2553	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.6	0.0	0.0	0.0	0.0	0.0	21.8	38.9
43.56463	13.59686	2554	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
43.56457	13.59683	2555	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	77.9	0.0	0.9	0.0	0.0	0.0	7.8	9.8
43.56450	13.59690	2557	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	94.2
43.56453	13.59695	2558	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	83.8	0.0	0.0	0.0	0.0	8.8	0.0	0.0
43.56457	13.59702	2559	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	81.7
43.56468	13.59718	2560	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.0	0.0	7.0	0.0	43.7	0.0	0.0	0.0	0.0	0.0	23.9	0.0
43.56464	13.59728	2561	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.0	0.0	0.0	0.0	0.0	0.0	0.0	80.4
43.56460	13.59730	2562	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.6	0.0	0.0	0.0	0.0	0.0	0.0	73.6
43.56455	13.59719	2563	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	96.6
43.56437	13.59707	2564	0.0	0.0	7.8	0.0	0.0	0.0	0.0	0.0	7.5	0.0	0.0	0.0	26.1	0.0	0.0	0.0	0.0	0.0	20.6	27.9
43.56433	13.59713	2565	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.3	0.0	0.0	0.0	26.3	0.0	0.0	0.0	0.0	0.0	0.0	56.4
43.56430	13.59725	2566	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.9	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	83.6
43.56435	13.59737	2567	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	87.9
43.56439	13.59748	2568	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	87.2	0.9	0.0	0.0	0.0	5.3	0.0	2.9
43.56438	13.59754	2569	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.7
43.56432	13.59762	2570	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.7
43.56430	13.59759	2571	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.5	0.0	0.0	0.0	0.0	0.0	16.3	60.3
43.56419	13.59748	2572	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.7	0.0	0.0	0.0	0.0	0.0	0.0	76.6
43.56414	13.59747	2573	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0

3.3. Stadio di sviluppo e reclutamento della Cystoseira sp. nell'area oggetto di indagine

L'analisi delle caratteristiche fenologiche dei popolamenti di *Cystoseira sp.* presenti nell'area compresa tra il Fortino Napoleonico e la Torre de Bosis (Figure 3.3.1-3.3.2) evidenzia la presenza di giovanili e individui anche di notevoli dimensioni (30-40 cm) con ricettacoli riproduttivi che sono stati osservati da maggio e che permangono anche fino ad oltre la seconda metà del mese di luglio. Ciò suggerisce che tale periodo dell'anno possa rappresentare un momento cruciale per la riproduzione della macroalga presente nell'area di indagine. Si fa presente, tuttavia, che tale periodo di riproduzione potrebbe subire delle variazioni inter-annuali legate alla variabilità delle condizioni delle caratteristiche edafiche in grado di influenzare la biologia riproduttiva della macroalga.



Figura 3.3.1 Popolamenti di *Cystoseira sp.* antistante il Fortino Napoleonico a Portonovo durante le attività di monitoraggio 2020



Figura 3.3.2 Analisi fenologiche dei popolamenti a *Cystoseira sp.* durante le attività di monitoraggio 2020

4. Conclusioni

Sulla base delle indagini effettuate durante il periodo di indagine si può concludere quanto segue:

1. le biocenosi di fondo duro lungo il litorale di Portonovo, non mostrano evidenze di alterazione o danneggiamento dovuto al materiale a alle attività di ripascimento effettuate;
2. i popolamenti di macroalghe di interesse comunitario (i.e., *Cystoseira compressa, cod RAC/SPA III.6.1.25*) localizzati tra il Fortino Napoleonico e la Torre de Bosis sono caratterizzati da una biomassa relativamente elevata (con individui anche di 30-40 cm), sebbene con una distribuzione a patch, e presentano ricettacoli riproduttivi, risultando complessivamente in un buono stato di salute tale da escludere effetti significativi connessi alle attività di ripascimento e/o movimentazioni pregresse.

Complessivamente, i risultati della presente indagine supportano ulteriormente quanto riportato nei monitoraggi precedenti dell'assenza di un rapporto di causa-effetto sullo stato di salute delle comunità e habitat marini presenti nella Baia di Portonovo riconducibili alle attività di ripascimento effettuate o ad attività di manutenzione del ripascimento stesso.