



Project ZoRRO

Reintroduction of the eelgrass
in the Berre lagoon

ZoRRO4 – following-up report (Spring 2025) – English version

Association **8 vies pour la planète**

15 chemin Embarben 13250 St Chamas

Directeur : Damien Bonnet – 33 (0)6 77 54 51 34 - damien@8vies.fr

For the association, project followed by :

Pascal Bazile – 33 (0)6 63 65 28 72 - pascal.bazile@sfr.fr



DÉCENNIE DES NATIONS UNIES POUR LA
**RESTAURATION
DES ÉCOSYSTÈMES**
2021-2030

rev 1
July 2025

1 – Project presentation	3
2 – History of reintroduction attempts	4
2.1_ GIPREB 2009	
2.2 Activists attempts (2016-2020)	
2.3 ZoRRO1 (2021)	
2.4 ZoRRO2 (2022)	
2.5 ZoRRO3 (2023)	
2.6 ZoRRO4 (2024)	
3 – Spring 2025 follow-up	11
3.1 Martigues / St Mitre les Remparts	
3.2 Istres	
3.3 St Chamas	
3.4 Berre L'Etang	
3,5 Summary of existing spots of eelgrass and comparison with previous years	
4 – Conclusion	25

1 Project presentation

The aim of the ZoRRO project is to help eelgrass (*Zostera marina*) recolonize the Berre lagoon (étang de Berre, southern France).

Eelgrass, once dominant along almost the entire shoreline of the lagoon, disappeared in the 1970s. At the beginning of the project in 2021, we thought that good physical and biological conditions were back, particularly as the recolonization of the lagoon by dwarf eelgrass (*Zostera noltii*) was significant and documented. Eelgrass, on the other hand, had yet to make a comeback. The project promoters assumed that man could accelerate the process.

From a biological point of view, a large eelgrass meadow

- improves the physico-chemical stability of the water mass (oxygen production, regular consumption of inputs limiting plankton blooms) ;
- depending on the bottom, can also fix sediment, helping to improve water transparency ;
- it also enhances biodiversity, with many species dependent on its presence ;
- and, perhaps, store carbon in the seabed (there are scientific publications to this effect, but we're not totally convinced).

In both respects, an eelgrass meadow is presumed to be better than a dwarf eelgrass or cymodocea meadow.

From a legal and administrative point of view, a significant eelgrass meadow is one of the objectives of the Water Framework Directive (WFD) for the Berre lagoon. Failure on this point would put France under threat of penalties. However, the WFD is indifferent to the type of eelgrass - dwarf or seagrass - that is dominant in the meadow. Given that dwarf eelgrass is booming, the risk of a penalty is fading away.

The ZoRRO project is based on citizen volunteerism, without subsidies and generally without sponsors or patrons.

The ZoRRO project, our association *8 Vies Pour la Planète* has been accepted as an “actor of the United Nations Decade for Ecosystem Restoration” in 2023.

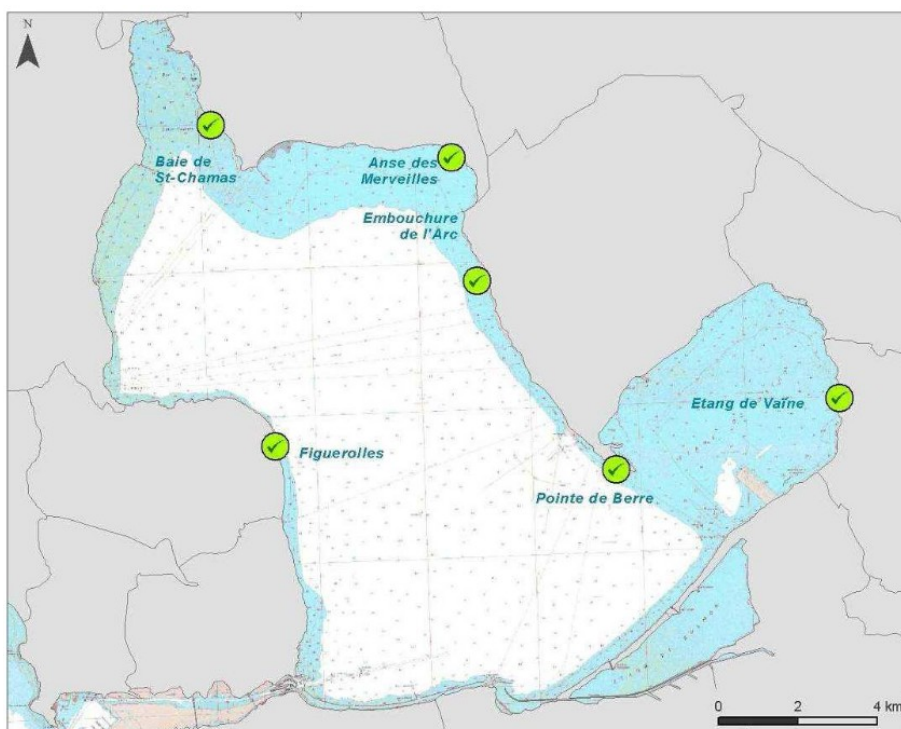


2 History of reintroduction attempts

2.1 GIPREB 2009

The GIPREB is the official structure in charge of the lagoon.

In 2009, GIPREB conducted an experiment to transplant eelgrass (and dwarf eelgrass) to 6 sites around the lagoon.



This experiment was deemed a failure and follow-up was discontinued after three years. Nevertheless, in 2017 there was

- a patch of eelgrass at the “Embouchure de l'Arc” site
- a few patches of eelgrass at the “Pointe de Berre” site

in each case in the middle of numerous dwarf eelgrass beds.

At the “Pointe de Berre” site, we believe that, before 2018, the eelgrass had spread by swarming.

2.2 Activist plantations (2016-2020)

These plantings were carried out without administrative authorization for this protected plant, so it's difficult to talk about them. Nevertheless, the success of some of them is undoubtedly at the root of the ZoRRO project's acceptance by the authorities, and still motivates its volunteers today, so we'll talk about them.

Some transplants have been applied to cymodoceae, based on misidentification of stranded rhizomes.

The locations where transplants have taken place are as follows



Boxes circled in red are sites where transplants (eelgrass or cymodocea) were considered successful in spring 2022.

Date	Action	GPS point
2019	4 eelgrass anchors in the rocky coast of Istres	43°29'3.20"N 5° 0'11.87"E
2019	8 eelgrass anchors in Figuerolles	43°26'34.72"N 5° 3'16.60"E
2018	Cymodocea in Le Ranquet	43°28'45.01"N 5° 0'5.23"E
2017	Cymodocea in Beaurivage	43°31'34.46"N 5° 5'5.85"E

2.3 ZoRRO1 (2021)

In the first year, the ZoRRO project essentially involved

- collecting eelgrass seeds (around 10,000) from the Port-Saint-Louis-du-Rhône seagrass bed, presumed to be in good condition and large enough
- transporting them to our lagoon, shelling them and sowing them in the lagoon on the same day at 4 points of Figuerolles beach (St-Mitre-les-Remparts).

Stranded rhizomes were also collected and transplanted to 3 locations in the lagoon. These were submerged, by attaching them to rebar anchors (around 4 or 5 cuttings per anchor),

- on Figuerolles (4 anchors) at the same sites as the seeds
- at Beurivage (8 anchors) from floating rhizomes
- at Ranquet (6 anchorages), using rhizomes collected mainly on beaches.

In all, we estimated that around a hundred cuttings were transplanted, spread over some twenty anchorages.



Date	Action	GPS Point
june	8 anchors on Beurivage (+ 4 anchors of the association L'Étang Nouveau in september)	43°31'34.46"N 5° 5'5.85"E
june	6 anchors in Le Ranquet	43°28'45.01"N 5° 0'5.23"E
june	4 anchors on Figuerolles	43°26'47.95"N 5° 3'19.42"E
may- june	10 000 seeds on 4 locations in Figuerolles	43°26'35.64"N 5° 3'16.93"E
		43°26'37.98"N 5° 3'16.93"E
		43°26'47.95"N 5° 3'19.42"E
		43°26'40.98"N 5° 3'17.75"E

2.4 ZoRRO2 (2022)

The second year, we worked 4 days (4 Sundays),

- we went to collect seeds from the herbarium in Port-Saint-Louis-du-Rhône. We only collected around 5,000 of them (500 spathes ($\approx$ spikes) from around 200 reproductive stems), because maturity was earlier than in 2021 and, as we only wanted harvesters who “swam” (so as not to trample the herbarium any more), participation was less. In response to a question put to Mr. Orth (the most successful American scientist in the experiment), we harvested the whole reproductive stems rather than just the spathes (as we had done for ZoRRO1).
- we transported them to the lagoon, and sowed them in the lagoon the same day using two methods:
 - a few stems in weighted hessian bags placed at the bottom of the pond
 - or a few reproductive stems placed in “dispersing buoys”.

Obviously, the stranded rhizomes present on those days were picked up and transplanted too.

A few “rhizome days” were also carried out in autumn for the first time.



Date	Action	Point GPS
Autumn	X Anchors on the rocky coast of Istres	43°29'2.26"N 5° 0'11.89"E
June	Seeds and 11 anchors on the rocky coast of Istres	43°29'2.26"N 5° 0'11.89"E
June	Seeds + 7 anchors in St Chamas (EDF power station)	Non noté et Inretrouvables !
	2 anchors bouldrome St Chamas	43°32'53.37"N 5° 1'42.98"E
May	Seeds + 10 anchors Bouquet (Berre L'Etang)	43°29'39.45"N 5° 7'13.32"E
May	Seeds + 7 anchors in St Chamas (Petite Camargue)	43°31'57.41"N 5° 2'14.65"E

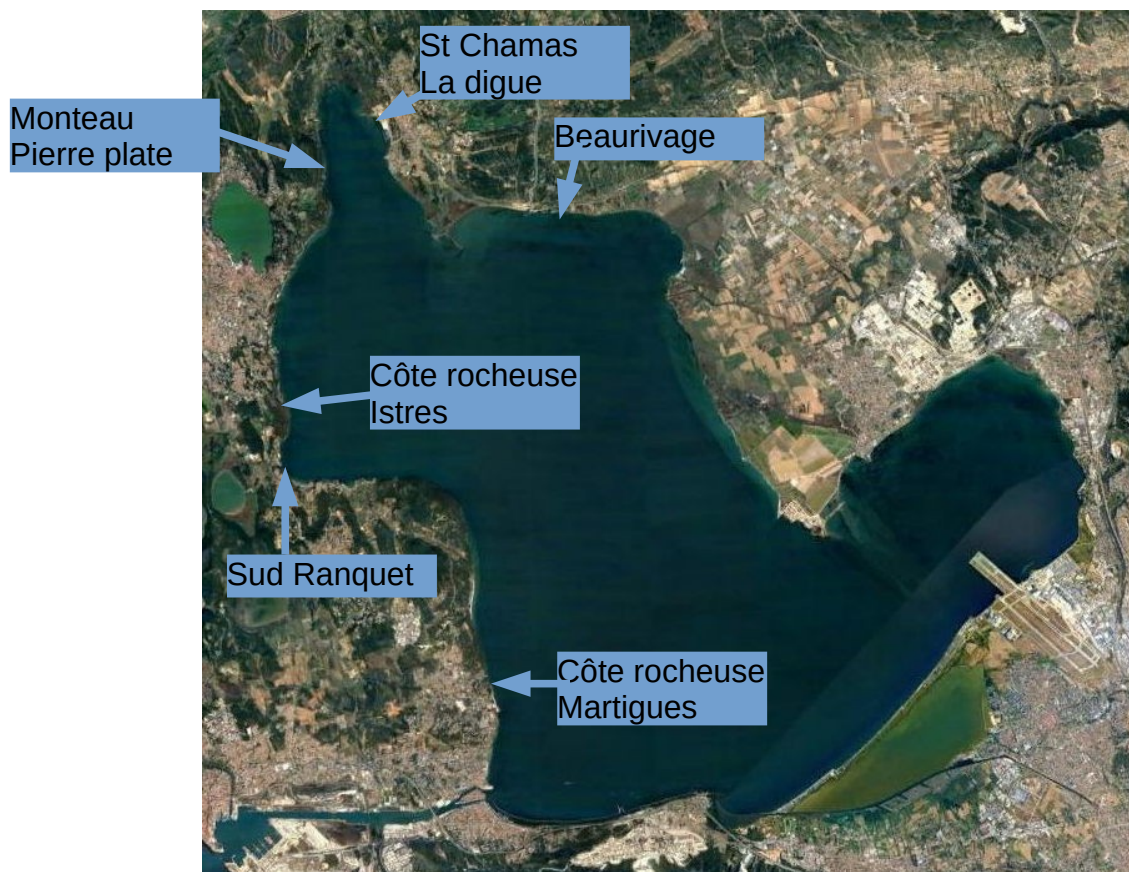
2.4 ZoRRO3 (2023)

For the third year of the project, 8 vies could build two seed maturation site : a caravan and a permanent site at the port of Beaurivage. We were also still allowed to collect eelgrass rhizomes and, once again, we collected them all autumn.

The seeds were not treated optimally : water renewal in the tanks was not automatic and the water often “turned”, with bacterial growth sometimes significant. Nevertheless, around 100,000 seeds were recovered. These seeds were sown in two locations:

- 90% under the Monteau cliffs (northern Istres, east coast of St-Chamas cove) ;
- 10% at “la Digue” in Saint-Chamas.

The stranded rhizomes were placed in the following sites:



Date	Action	GPS Points
dec	10 anchors on the rocky coast of Martigues	43°25'55.07"N 5° 3'27.40"E
nov	5 anchors on the rocky coast of Martigues	43°26'1.79"N 5° 3'26.22"E
nov	15 anchors in Pierre Plate (Monteau / Istres) 15 hessian bags of seeds in Pierre Plate (Monteau / Istres)	43°31'28.64"N 5° 0'51.38"E
	2 hessian bags in St Chamas	?
	2 hessian bags in Istres (rocky coast)	43°29'4.18"N 5° 0'12.12"E
oct	12 anchors in St Chamas La Digue (filmed by Tifenn Ripoll)	43°32'23.95"N 5° 1'53.83"E
sept	4 anchors in the rocky coast of Istres (for the TV-program <i>Échappées Belles</i>)	43°29'2.26"N 5° 0'11.89"E

June	6 anchors in the marina of St Chamas	43°32'37.15"N 5° 1'59.53"E
	2 anchors in the Beaurivage harbour (St Chamas)	43°31'35.24"N 5° 4'51.76"E
June	2 anchors in Ranquet-South	43°28'24.65"N 5° 0'4.69"E
May	2 anchors on the rocky coast of Martigues	43°25'55.07"N 5° 3'27.40"E
	4 anchors on Beaurivage beach (St Chamas)	43°31'34.35"N 5° 4'52.79"E
May	4 anchors on the rocky coast of Istres (in front of Odile's)	43°29'25.25"N 5° 0'3.25"E
april	6 anchors on the coast of Saint-Chamas (with Claude)	43°32'5.61"N 5° 2'4.20"E
january	4 anchors in Beaurivage beach	43°31'34.40"N 5° 4'54.36"E

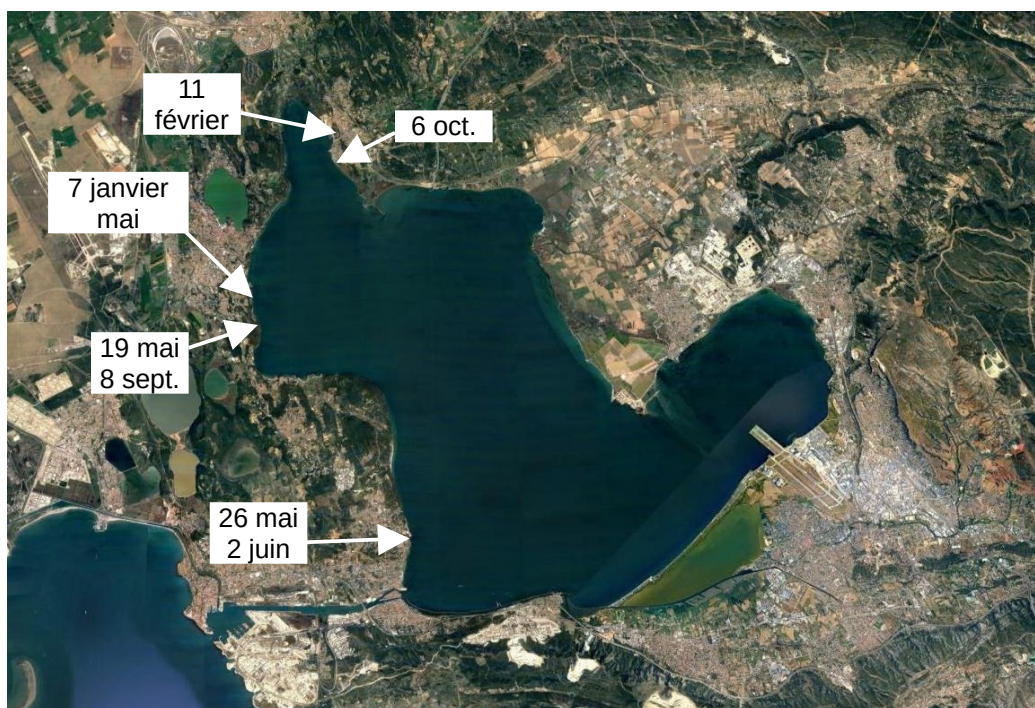
2.6 ZoRRO4 (2024)

As far as seeds are concerned, in 2024 we harvested around 4,000. The big drop compared with 2023 was due to a smaller number of collectors and poor timing : we started to collect too late and a lot of spathe lay at the bottom, especially on the last two Sundays. We had copied the dates of previous years, but the eelgrass ripened earlier.

Seed treatment, on the other hand, was much better than in 2023, thanks to automated water renewal in the tanks at both ripening sites. Seeds were sown in hessian bags with silt. The bags were stapled in muddy or sandy places on three sites in November.



As for rhizomes, efforts were made to collect them all year round. There were some good days, but overall there were fewer than in 2023. Anchors were installed at 5 sites.



3 – Suivi du printemps 2024

For a complete follow-up, you need to :

- look for spots where you sowed or planted the previous year (N-1) ;
- check whether spots from previous years (N-2 and before) have continued to grow or have died;
- find out whether other spots have sprung up in the vicinity, as a result of natural swarming or cuttings that have detached from their anchorage and found themselves in a favorable location.

As with ZoRRO3 spring monitoring, a distinction was made between spots ($S > 0.25 \text{ m}^2$, and usually over a year old) and starts (cuttings or natural swarms less than a year old, with just a few leaves). Spot area was also estimated.

We therefore have **4 quantification parameters** for the project :

- **the number of “success sites” (places where spots are found)**
- **the number of spots**
- **the surface area of these spots (plants over one year old, with a minimum surface area of 0.25 m^2)**
- **the number of starts (plants less than one year old, generally composed of just a few leaves)**

As last year, we thought it would be simpler to monitor each location. Taking this idea one step further, we have grouped the following communes:

- Martigues/St Mitre les Remparts
- Istres
- Saint-Chamas
- Berre L'Étang

We went back to Berre-L'Étang, which is a very remote site for us, and which is the commune that hosts GIPREB, to find out what had become of the spot still seen in 2023.

We still include

- cymodoceae, which for us are limited to the two spots resulting from cuttings planted by mistake (confusion with eelgrass rhizomes)
- and ruppies, which to our knowledge are limited to the Ranquet site in Istres.

Dwarf eelgrass is sometimes cited in this report for its relationship (which we consider rather conflictual) with eelgrass. However, they are present at all sites, sometimes in very large and dense beds (Bassin EDF, Anse du Ranquet, Beaurivage...), sometimes only in scattered but increasingly numerous patches (rocky coast of Istres, Figuerolles...).

In 2024, GIPREB launched its ReHAB project, which involves transplanting dwarf eelgrass from certain areas of the lagoon to others, using considerable resources. These dwarf eelgrass plantations could pose a problem for eelgrass plantations.

3.1 Martigues / St Mitre les Remparts

Until August 2022, Figuerolles beach (point A) was home to three large patches, the result of militant planting in 2019, but the red tides of summer 2022 (very localized in this area) killed them off. By 2024, however, 8 new patches had been found, no doubt derived from seeds from the three previous patches. : <https://youtu.be/ikvhVaL3MOA?si=i-UPWMH6o5L1dsyK>.

In the spring of 2025, these spots have been rediscovered. They are still on mattes of dwarf eelgrass, but craters have appeared in these mattes and some eelgrass patches are on the edge of the crater and seem to be disintegrating. The rhizomes that are pulled out will plant themselves further away... or die.

Two patches of ZoRRO4 cuttings have appeared a little to the south, on the edge of the dwarf eelgrass meadow, which has suffered considerable losses in this area. This probably explains why the other cuttings planted there did not survive.

The rocky coastline of Martigues (point B) resembles that of Istres, so it seemed appropriate to plant there, but for the moment everything seems to have failed.



Zone A (Figuerolles)

Date	Action	Point GPS	suivi	
June 24	20 anchors		2 living patches pascal june 25	Green
June 21	4 anchors	43°26'47.95"N 5° 3'19.42"E	1 spot grew until the summer of 2022 and then died under the red tides of that summer in this part of the lagoon	Red
2019	8 anchors	43°26'34.72"N 5° 3'16.60"E	3 spots alive until the summer of 2022, and dead under the red tides of that summer. 8 new spots found in May 2024 (swarming...) still alive in june 25	Green

Zone B (rocky coast)

Date	Action	Point GPS	suivi	
Mars 24	1 anchors Martigues rocky coast	43°25'55.07"N 5° 3'27.40"E	Nothing Pascal june 25	
Dec 23	10 anchors Martigues rocky coast	43°25'55.07"N 5° 3'27.40"E	Nothing june 25 Pascal	
Nov 23	5 anchors Martigues rocky coast	43°26'1.79"N 5° 3'26.22"E	Nothing june 25 Pascal	
June 23	2 anchors Martigues rocky coast	43°25'55.07"N 5° 3'27.40"E	Nothing june 25 Pascal	



Figure 2: A patch of eelgrass on the edge of the “crater of disintegration” of the dwarf eelgrass mat on which it had grown. Will it survive?



Figure 1: one of the 2 new spots (from cuttings) which is already producing seeds...



Figure 3: the second new spot. The anchor can still be seen

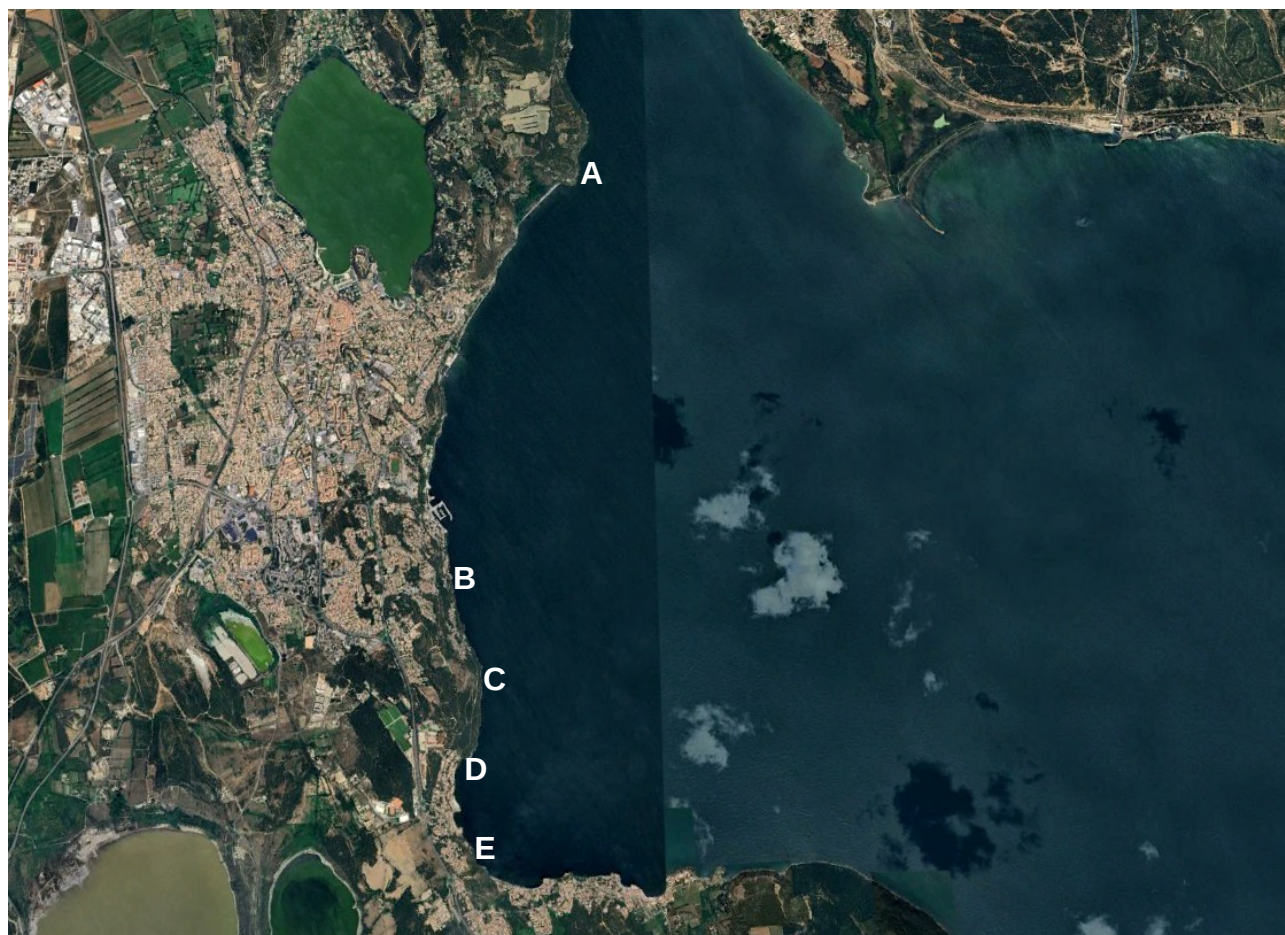
3.2 Istres

Istres still presents the major site that makes us optimistic for the project : the rocky coast site where there are some twenty spots and several small starts. A video can be found here : <https://youtu.be/dWoKpOmQVSs> .

At the other two sites that showed departures in 2023, there are now spots, although there has been a slight loss between the number of departures in spring 2024 and the spots in spring 2025. These two sites have become "success sites".

The Ranquet spot is still there.

The cymodocea spot and Ranquet's spiral ditchgrass are also still present.



Zone A (Monteau cliff – Pierre plate)

Date	Action	GPS Point	follow-up	
Nov 23	15 anchors 15 hessian bags of seeds	43°31'28.64"N 5° 0'51.38"E	4 spots Pascal / Delphine et Damien (independently)	Green

Zone B (Rocky coast - Houses)

Date	Action	GPS Point	follow-up	
Jan 24	11 anchors (small harbour)	43°29'17.76"N 5° 0'6.35"E	2 spots + 1 start Pascal june 25	Green
Mai 23	4 anchors (in front of Odile's)	43°29'25.25"N 5° 0'3.25"E	Nothing pascal June 25	Red

Zone C (Rocky coast – pine wood)

Date	Action	GPS Point	follow-up	
Sept 23	4 anchors rocky coast Istres (for the Tv program <i>Échappées Belles</i>)	43°29'2.26"N 5° 0'11.89"E	20 spots + several starts	Green

Autumn 22	X Anchors rocky coast of Istres + seeds		Pascal June 25 among them 1 spot dated 2019, bigger than last year 10 m²	
June 22	11 anchors rocky coast Istres			
2019	4 anchors rocky coast Istres			

Zone D (Ranquet North)

Date	Action	GPS point	follow-up	
July 2023	2 spots discovered there, probably from cuttings that have wandered	43°28'46.84"N 5° 0'8.17"E	The large spot is still there pascal May 25	
June	6 anchors	43°28'45.01"N 5° 0'5.23"E	2 starts could be seen in the spring of 2022 but they disappeared after that under the dwarf seagrass	
2018	Cymodocea	43°28'45.01"N 5° 0'5.23"E	Pascal June 25 the spot is still there	
natural	Spiral Tasselweed		In May 25 Pascal still could find some (a few)	

Zone E (Ranquet South)

Date	Action	GPS point	follow-up	
Nov 24	12 hessian bag of seeds	43°28'24.65"N 5° 0'4.69"E	No spot or start dwarf eelgrass meadow very dense Pascal June 25	
June 23	2 anchors			



Figure 4: start from natural swarming on a rocky substrate with mussels. photo from early 2023



Figure 5: what it became in 2025



Figure 6: young start (through cladophora seaweed) - june 2025



Figure 7: the start of the small harbour - june 2025



Figure 8: the prettiest spot of the rocky coast (in april) : it chose to produce MANY seeds

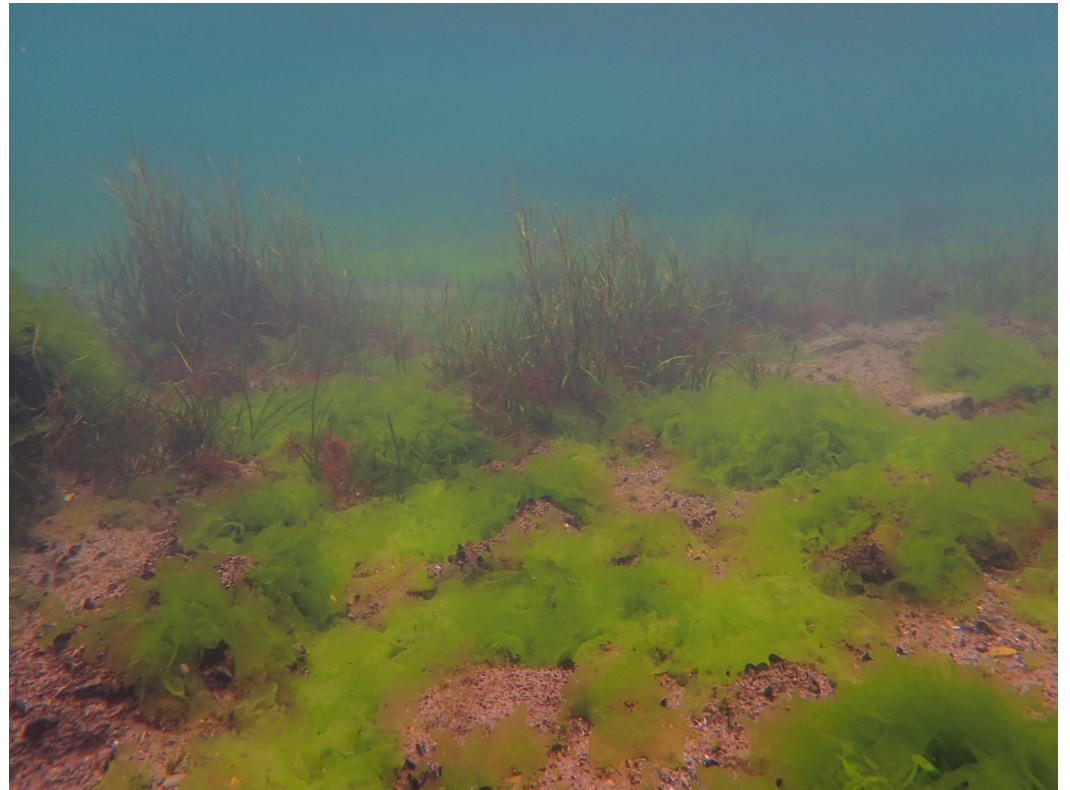


Figure 9: picture of the good extension of eelgrass in the rocky coast area

3.3 Saint-Chamas

For a long time, this area was essentially a failure zone, which caused a lot of grief among our volunteers (8 vies pour la Planète is headquartered in Saint-Chamas, and many of our volunteers are based there).

For this reason on mid 2024,

- the discovery on the “La Digue” site of around twenty starts from our seeds
- the survival of a spot on the Beaurivage site

have consoled us, and even more, for the failure (at this stage of the follow-up...) of other attempts.

The dike site has survived and developed well, which is very encouraging. GIPREB, for its ReHAB project, came to plant dwarf eelgrass around June 3, 2025, without warning us. We'll see what happens, but we're concerned that our patches will be surrounded, and potentially worse, by dwarf eelgrass in an area that we think is more favorable (flat muddy bottom) for them in the current state of the lagoon.



Zone A (Boulodrome)

Date	Action	GPS point	follow-up	
Feb 24	3 anchors (in bad state)	43°32'53.37"N 5° 1'42.98"E	Hard to follow (bad visibility)	
June 22	2 anchors	43°32'53.37"N 5° 1'42.98"E	Nothing (2023 pascal)	

Zone B (marina)

Date	Action	GPS point	follow-up	
June 23	6 anchors	43°32'37.15"N 5° 1'59.53"E	Nothing (Pascal april 24)	

Zone C (Digue)

Date	Action	GPS point	follow-up	
Nov 24	30 injections of seeds + 4 hessian bags of seeds	45,5397°N 5,0316°E	At least 1 start in june (Pascal) and july (Pascal + Laure) dans les plantations de ReHAB...	

Oct 23	12 anchors (filmed by Tifenn Ripoll)	43°32'23.95"N 5° 1'53.83"E	Nothing (april 2024 Pascal + Delphine) (malicious intent ?)	
Nov 23	seeds	43°32'22.9"N 5°01'52.9"E	Over 20 starts (may 2024 Delphine)	

Zone D (Wash house)

Date	Action	GPS point	follow-up	
Avril 23	6 anchors (with Claude)	43°32'5.61"N 5° 2'4.20"E	Nothing (Pascal + Delphine) april 2024)	

Zone E (Petite Camargue)

Date	Action	GPS point	follow-up	
May 22	Seeds + 7 anchors of cuttings	43°31'57.41"N 5° 2'14.65"E	Nothing (2023 Pascal)	

Zone F (Beaurivage)

Date	Action	GPS point	follow-up	
Nov 24	12 hessians bags of seeds +1 injection	43°31'34,2" N 5°05'05,3" E	Nothing Pascal + Laure july 2025	
June 23	2 anchors in the harbour	43°31'35.24"N 5° 4'51.76"E	Nothing (pascal april 2024)	
Mai 23	4 anchors off the beach	43°31'34.35"N 5° 4'52.79"E	Nothing en june (carried away by the too big waves)	
jan 23	4 anchors off the beach (CNBR border)	43°31'34.40"N 5° 4'54.36"E	Nothing before summer (carried away by the too big waves)	
June 21	8 anchors in the cove (+ 4 anchors of the association L'Étang Nouveau in septembre)	43°31'34.46"N 5° 5'5.85"E	1 spot pascal + Laure july 25	
2017	Cymodocée	43°31'34.46"N 5° 5'5.85"E	still alive in 2025 (Pascal + Laure)	

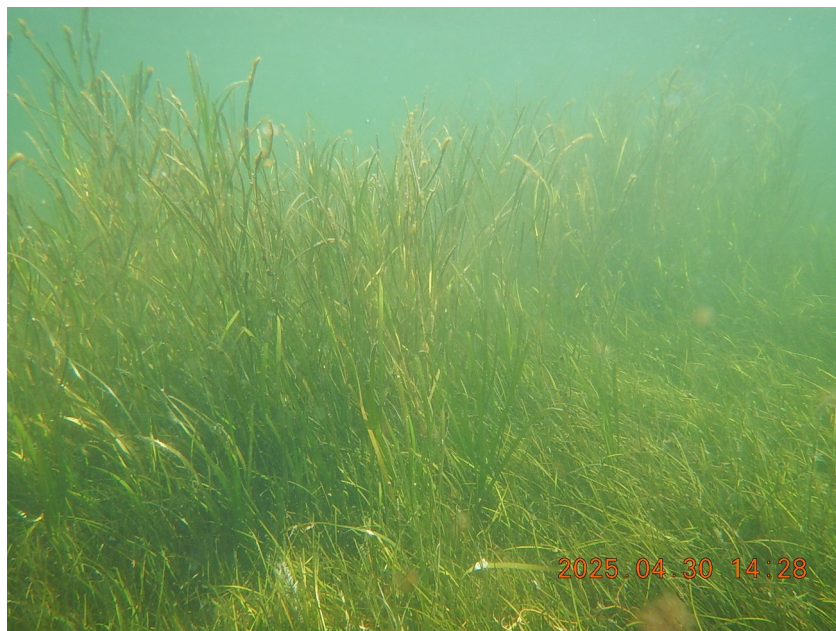


Figure 10: the spot of Beaurivage, still on the edge of the dwarf eelgrass matting

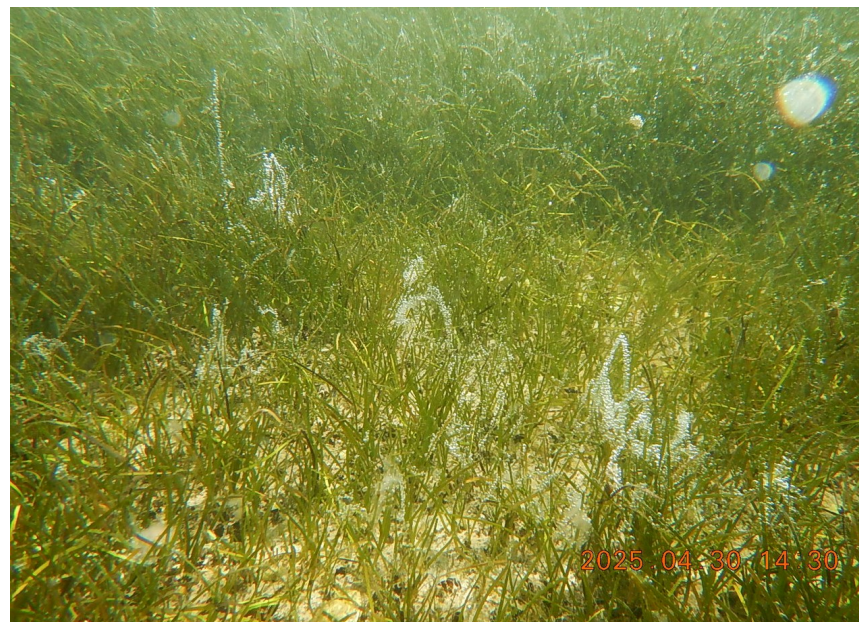


Figure 11: the cymodocea spot of Beaurivage (very small in early may)



Figure 12: a start in La Digue July 25



Figure 13: the same start in La Digue (avec Laure)



Figure 15: one of the largespots of La Digue



Figure 14: another spot of La Digue



Figure 16: another spot of the La Digue site

3.4 Berre L'Étang

GIPREB's planting of dwarf eelgrass on the La Digue site rekindled our fears that eelgrass patches would disappear under the onslaught of dwarf eelgrass.

For this reason, we returned to the Pointe de Berre site, where

- there were 2 patches of eelgrass in 2022 ;
- one of the two patches had disappeared by 2023 and the other was surrounded by dwarf eelgrass.

In 2024 we did not return to this site, considering it to be “within the GIPREB zone”. We didn't find any eelgrass patches (or starts) on this site in 2025, and the dwarf eelgrass seems to be in particularly good shape (high density, no craters).

In January 2025, bags of seeds and a few direct injections were made at the Bouquet site, GIPREB's main site for its ReHAB eelgrass transplant project. We consider this to be a ZoRRO4 action, since the seeds date back to 2024. We leave the follow-up of this site to GIPREB.



A - Pointe de Berre

Date	Action	Point GPS	suivi	
GIPREB 2009	Cuttings / rootball removal		2 spots en 2022 1 en 2023 no following in 2024 no spot in 2025 (Pascal + delphine)	

B - Bouquet (site projet ReHAB 2024)

Date	Action	Point GPS	suivi	
january 25	Seeds sown near the dwarf eelgrass spots of project ReHAB from 2024		Waiting for GIPREB's follow-up	

3.5 Summary of existing spots of eelgrass and comparison with previous years

site	Nb of Zostera marina spots	Date of transplantation (known or supposed)	Estimated surface (m ²) spring 2025	Estimated surface (m ²) spring 2024	Estimated surface (m ²) spring 2023	note
Martigues Figuerolle sud	0 8 2	2019 swarming 2022 (?) cuttings 2024	0 8 x 1 m ² 2 x 0,5 m ²	0 8 x 1	0	Les 2 seules nouvelles taches
Le Ranquet	1	2021 and 2018	1 x 1 m ²	1 x 0,5	1 x 0,5	
Côte rocheuse Istres	1 20	2019 2022 - 2023	1 x 10 m ² 10 x 1 m ² 10 x 0,5 m ² + natural starts	1 x 3 15 x 0,5 + natural starts	1 x 2 12 x 0,25	
Côte rocheuse « petit port »	2	Cuttings 2023	2 x 0,5 m ² 1 start	5 starts		
Falaise Monteau	4	Cuttings 2023	4 x 1 m ²	2 starts		
La Digue	8	Seeds 2023 seeds 2024	8 x 1 m ² + 1 or 2 starts	over 20 starts		
Beaurivage	1	2021	1 x 1,5 m ²	1 x 1,5	1 x 1,5	
Pointe de Berre	0	2009	0	Not followed	1 x 2	Not found in 2025 !
total	47		49,5 m ²	26 spots 16,5 m ²	16 spots 9 m ²	

There is progress

- in the number of spots (quite clearly) ;
- in surface area (even more markedly) ;
- and in the number of sites with spots (the “success sites”) ;

compared with the spring 2024 follow-up, thanks to

- the increase in the surface area of spots at the 3 “success” sites in 2024 (rocky coast of Istres, Figuerolles, La Digue) ;
- the upgrading of many existing 2024 departures to spot level.

On the other hand, successes linked to the ZoRRO4 campaign are extremely low : no starts linked to seeds (maybe one or two), and only 2 spots linked to cuttings.

4 – Conclusion

The 2024 campaign was the fourth in the ZoRRO project. Authorization for a fifth season (ZoRRO5) has been already obtained (and the seed campaign has already been completed).

What can we learn from ZoRRO4 in the spring following the campaign? And from previous plantings?

1. ZoRRO4 inputs are very low

Only 2 spots due to cuttings (Figuerolles) (+ maybe one or two on the Istres Rocky coast)

Maybe 1 or 2 departures due to seeds at La Digue

We don't really have an explanation. We certainly had fewer seeds in 2024 than in 2023...

2. Many 2023 starts have become spots, and many 2023 spots have grown.

3. The disappearance of the Pointe de Berre spot and the critical situation of many spots in beach areas “bordering craters” of dwarf eelgrass mattes seem to prove the superiority of dwarf eelgrass in these areas.

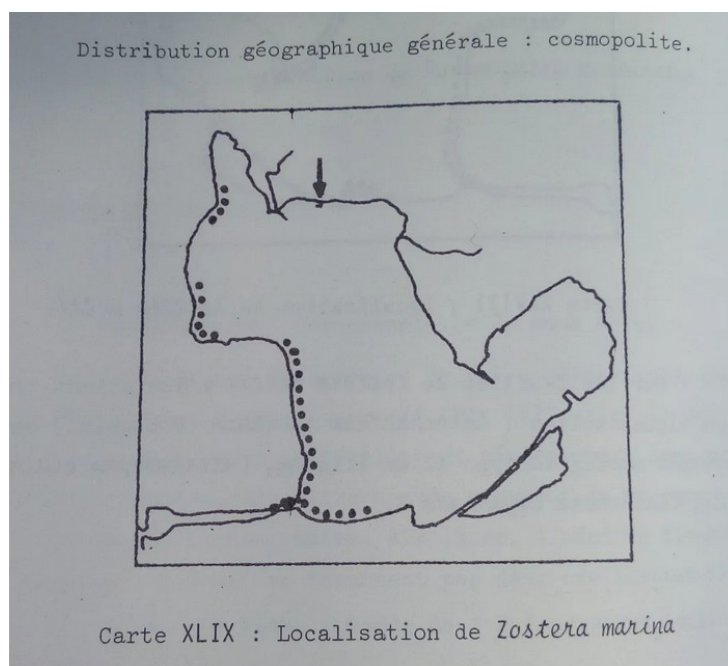
The spot at the Pointe de Berre site has not been found, and the dwarf eelgrass meadow has developed considerably. The situation at the Figuerolles spot (where the 2024 swarming took place) and the Beaurivage spot is worrying, as part of the rhizome can often be seen swimming in the water, on the edge of the “cliff” where the dwarf eelgrass mat is disintegrating. On the contrary, despite regular die-offs (with the formation of craters in the matte), the dwarf eelgrass seems to be growing (very clear at Pointe de Berre, where there were few craters).

The La Digue site is more of a beach. GIPREB's planting of dwarf eelgrass around our eelgrass beds is all the more worrying.

4. Spots on rocky coastal sites seem to be doing better than those on beaches

The spots on the rocky coasts (Monteau, the two sites on the rocky coast of Istres) are less surrounded by dwarf eelgrass and are under less pressure, or are large enough to withstand it. There are also fewer seaweed stranding or drifting seaweed slicks.

The preference for rocky coasts is reminiscent of Riouall's 1971 map: they had disappeared more slowly on rocky coasts than on beaches.



5. The Berre lagoon's meadow is spreading quickly but is made of 99,99 % dwarf eelgrass, that grow naturally very fast. This evolution does not correspond to the choice of the reference state (1925-1965), which was still officially targeted for ecological restoration, as the seagrass beds at that time were dominated by eelgrass.

- the ReHAB-project of GIPREB take part of this evolution,
- cymodocea remain confined to the two patches transplanted by mistake in 2018 and 2019 (Beaurivage and Ranquet) - they do not mix with dwarf eelgrass and are no longer growing. There does not appear

to be a mixed cymodocea/dwarf eelgrass meadow, as confirmed by our observations in the Gulf of Fos.

- Spiral tasselweeds remain confined to the Ranquet site - they are more mixed with dwarf eelgrass and perhaps mixed spiral ruppies/dwarf eelgrass beds exist, but in the case of the pond this is anecdotal.
- the eelgrass spots are already numerous enough to draw statistical laws
 - the soft-bottom patches, often in contact with dwarf eelgrass patches (and often encircled), still seem to be on borrowed time: the Berre patch has disappeared (nothing remains of the GIPREB plantations of 2009) and time will tell whether the others (Beaurivage, Figuerolles) will survive.
 - The rocky coast patches seem to be doing better, while the dwarf eelgrass seems a little less at ease. Perhaps there's a positive interaction with the mussels that favors the eelgrass. The battle with dwarf eelgrass seems less unequal.
 - The La Digue site will be interesting to follow to see whether a mixed meadow is created or whether one species takes precedence over the other. On its flat but loose bottom,
 - there are patches of eelgrass that grow well since spring 2024 ;
 - we have sown eelgrass seeds in November 2024 but only 1 or 2 starts seem to be growing from these seeds ;
 - GIPREB came to plant numerous clumps of dwarf eelgrass in June 2025 ;
 - there was dwarf eelgrass patches already but they seemed to grow quite slowly.