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Sediment suitability of Frisian Front search areas for European flat oyster (*Ostrea edulis*) restoration

Author(s): Pauline Kamermans[1], Jack Perdon[1] & Joost Bergsma[2]

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Contents

Summary

In the North Sea agreement an area 100 km^2 at the Frisian Front will be designated for European flat oyster (*Ostrea edulis*) restoration. This report presents results from a field survey in two search areas, of 100 km^2 each, concerning the suitability for restoration of European flat oysters. Sediment was sampled for grain size determination. High silt or very coarse sediment is considered unsuitable. In addition, pictures of the sea bed were taken to determine the presence of shells as potential settlement substrate for larvae. Based on the results of the field survey and subsequent laboratory analysis, both search areas at the Frisian Front are considered suitable for European flat oyster restoration, although the presence of shells was low. Within each location there were no clear gradients observed in presence of shells, which is considered suitable for the development of European flat oyster reefs, or low silt content, which is also considered suitable for the reef development. On average, the northern half of both locations seems to be more suitable than the southern half. Large-scale active restoration of European flat oyster beds is not without risks and presently unknown factors may influence the process. To enhance the success rate and spread the risk it is therefore advised to designate the northern half of both locations to reach the agreed total of 100 km^2.

Samenvatting

In het Noordzee akkoord is afgesproken dat er voor het herstel van platte oesters (*Ostrea edulis*) een gebied van 100 km^2 op het Friese Front wordt aangewezen. In dit onderzoek wordt in het veld onderzocht welke delen binnen de twee huidige zoekgebieden het meest geschikt zijn voor oesterherstel. Hiertoe zijn sedimentmonsters genomen die op korrelgrootte zijn geanalyseerd. Te veel slib of te grof sediment wordt als ongeschikt beschouwd. Daarnaast zijn beelden van de bodem gemaakt om te zien hoeveel lege schelpen aanwezig zijn, als potentieel hechtingsmateriaal voor larven. De resultaten laten zien dat beide gebieden op het Friese Front geschikt zijn voor herstel van de platte oester, hoewel de aanwezigheid van schelpen laag is. Binnen ieder gebied zijn geen duidelijke gradiënten geobserveerd in aanwezigheid van schelpen, wat gezien wordt als geschikt voor platte oesterherstel, of lage slibgehaltes, wat ook wordt beschouwd als geschikt voor rifontwikkeling. Gemiddeld genomen is de noordelijke helft van beide locaties geschikter dan de zuidelijke helft. Grootschalig actief herstel van platte oesterbedden is niet zonder risico en vooralsnog onbekende factoren kunnen dit proces beïnvloedden. Om het succes te vergroten en het risico te spreiden is het advies om de noordelijke helft van beide locaties aan te wijzen en zo de overeengekomen 100 km^2 te bereiken.

1 Introduction

The return and recovery of biogenic reef structures (such as the European flat oyster) in the North Sea is one of the environmental targets of the Dutch government (Dutch Marine Strategy Part 1; I&W and LNV, 2018). The North Sea Programme (2022 – 2027) (Min. IenW *et al.*, 2022) comprises several activities to protect biogenic reefs and to increase their probabilities of recovery. This includes restoration in designated Natura 2000 areas. As part of the "North Sea Agreement" (OFL, 2020), designated areas in the no-fisheries zones on the Frisian Front will be used for European flat oyster restoration. To this end, two search areas have recently been selected, both measuring 100 km^2. In the present report these two areas are assessed on their sediment suitability to re-establish European flat oysters reefs on the seabed. For this, a field survey was carried out in March 2022. Together with the results of a desk study in which a number of abiotic and biotic factors are considered (van Duren et al., 2022) the results of this study will form the basis on which the final choice of (sub)areas with a total surface of 100 km^2 will be based.

Sediment composition is important for European flat oysters as it determines substrate suitability for recruitment (Smaal et al., 2017). Shells and existing oyster beds will promote recruitment. Sediment grain size is the most commonly used parameter. Hydrodynamic conditions have impact on sediment composition. Silt tends to accumulate in sheltered spots, while coarser sediment particles are found in exposed areas. As a rule, average grain size varies according to the average current velocity (Michels, 2000). Burial under a layer of fine sediment will impede oyster survival (Wasson, 2010).

Smaal et al. (2017) describe sediment with grain sizes coarser than 210 µm as unsuitable for European flat oysters, sediment with grain sizes lager than 63 µm as moderately suitable and gravel and silt with shell fragments as suitable. The oyster status assessment by OSPAR indicates that European flat oysters are highly sensitive to high silt deposition (OSPAR, 2020). An analysis by Herman and Van Rees (2022) indicates that European flat oysters occur preferentially in habitats with relatively high silt content. This is also confirmed by other observations reported in literature finding that highest numbers were found on substratum of shell, followed by silty sediments (Allison et al., 2020). Very high levels (50-100%) of mainly loosely arranged unconsolidated silt are prohibitive (Houziaux et al., 2011).

2 Assignment

To be able to assess two 100 km^2 search areas for the designation of one or more areas (with a total surface of 100 km^2) within the Frisian Front on their sediment suitability to re-establish European flat oysters reefs on the seabed the following research question was formulated:

What is the potential suitability of the seabed in the search areas for the development of European flat oyster reefs that will show successful recruitment?

Sediment suitability is investigated in terms of grain size and presence of shell material. Other factors that determine habitat suitability for European flat oysters are addressed in the desk study of van Duren et al. (2022), based a.o. on historic distribution data of *O. edulis*, and the presence of mobile sand waves and larval dispersal.

3 Materials and Methods

3.1 Locations and sampling grid

The two search areas for the designation of one or more areas (with a total surface of 100 km^2) for the restoration of European flat oyster reefs within the Frisian Front are shown in Figure 1 and were sampled according to a grid shown in Figure 2. The planned sample grid consisted of 10-11 transects from West to East with 5-6 stations along each transect. The distance between the planned transects was 2000 m and between stations 2000 m. At each station a grab sample of the sediment was collected and a picture was taken with an underwater camera. The survey was carried out between 14-17 March 2022. The first and last day were used to sail to and from the area. To make sure that the effort was spread evenly over the two areas half of the transects at Location I were sampled on 15 March and half of the transects at Location II on 16 March. The sampled transects were evenly distributed over the areas of the locations with a distance between the transects of 2000 m and between stations 2000 m, except for the most northern transects, where the distance between the transects was 1000 m and between stations 2000 m.. The plan for 17 March was to continue sampling of the remaining intermediate transects at both locations (Figure 2). However, due to the arrival of adverse weather the survey was ended at 16 March. Nevertheless, as a result of our approach, a balanced sampling grid was still realized with a total of 35 sampled stations at each location (Figure 3 and Appendix 1).

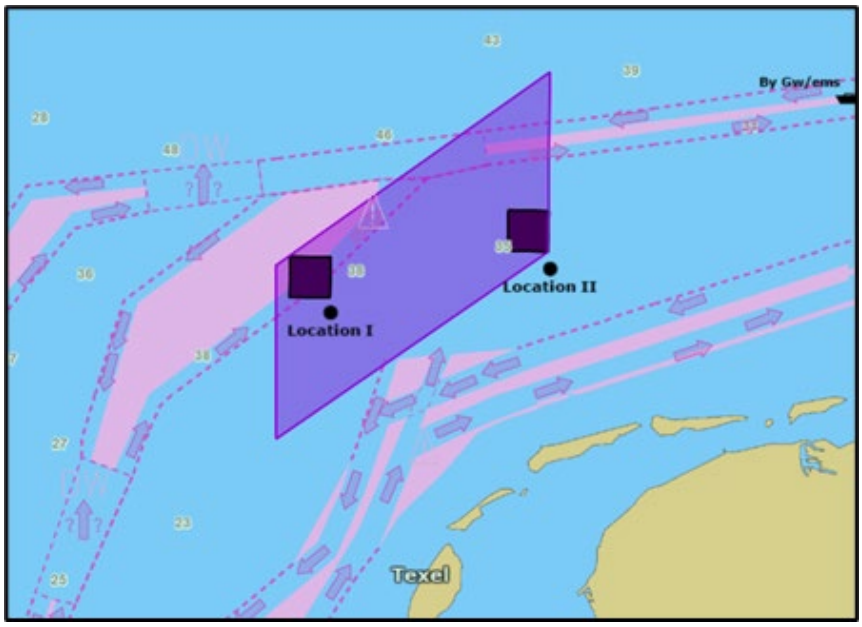


Figure 1. The Frisian Front (large rectangle) and the two 100 km^2 search areas to be used for designation of European flat oyster restoration areas (squares).

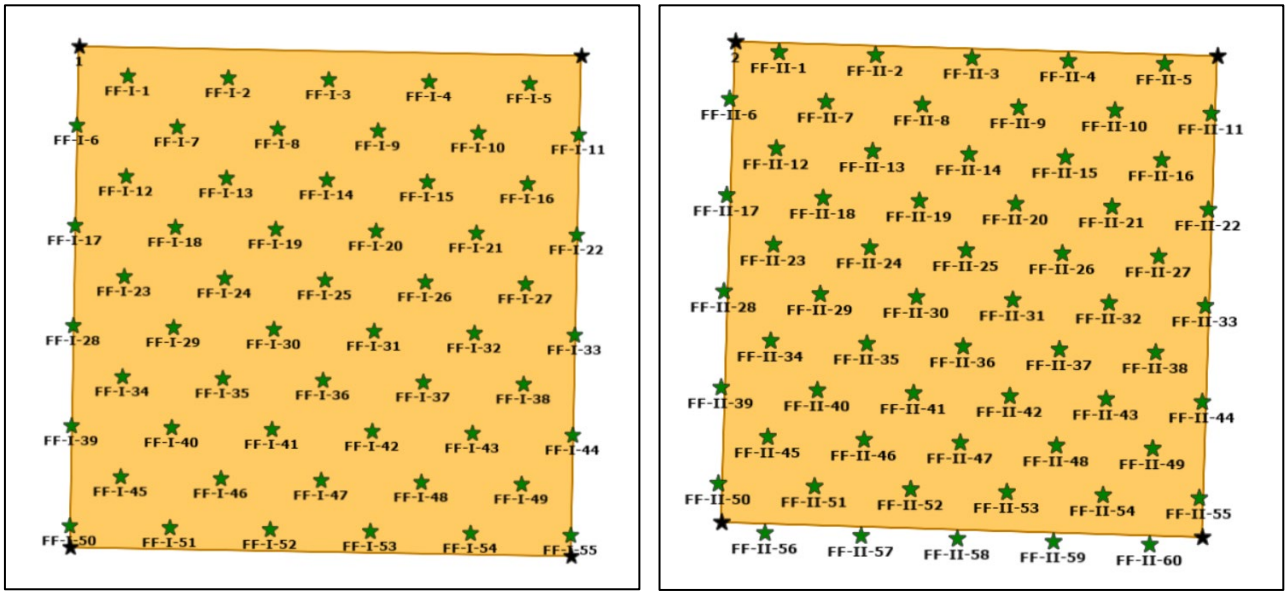


Figure 2. Planned sampling stations at Location I (left) and Location II (right).

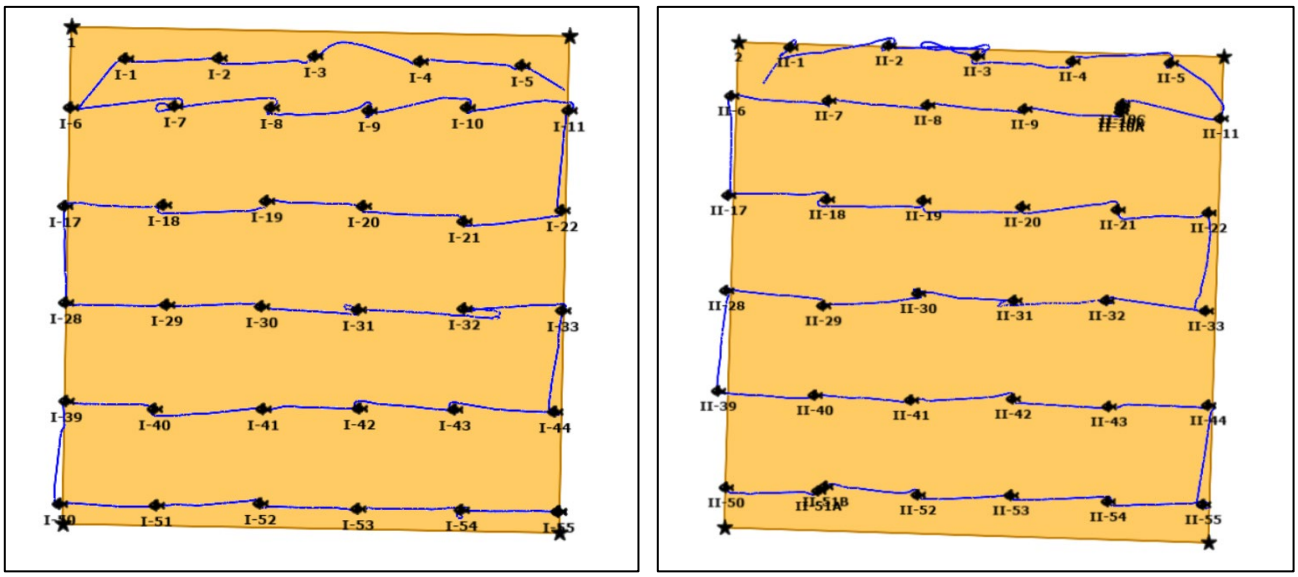


Figure 3. Tracks and realised stations at Location I (left) and Location II (right).

3.2 Drop cam

At each sampling station a drop cam of Bureau Waardenburg was lowered to the bottom (Figure 4). A drop cam is a high definition underwater video camera (4K) with live view, connected to a computer on board, and set in a protective and weighted cage to position light and camera at the right height from the bottom. At each location, the operator makes a short movie and photo of the sea floor.

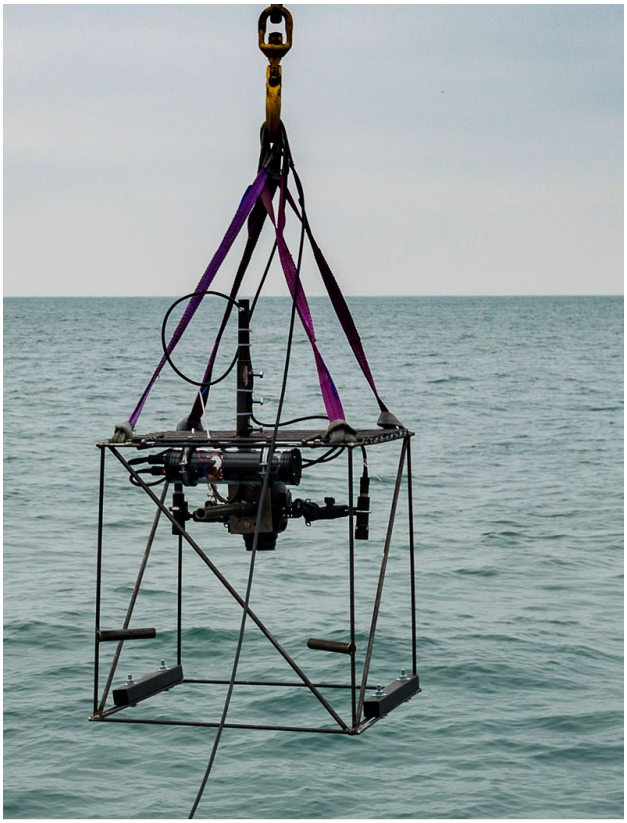


Figure 4. Drop cam. Photo Udo van Dongen (Bureau Waardenburg).

3.3 Sediment sampling

At each sampling station a sediment sample was taken with a Van Veen grab of Wageningen Marine Research-Yerseke (Figure 5). When the grab arrived on deck one of the hatches on top was opened and a sample of 4 cm deep and 3 cm diameter was collected with a syringe. The sample was stored in a vial for later grain size analysis in the laboratory. Next, the content of the grab was dumped on deck and a picture, including the sample vial with code, was taken to get a general impression of the sediment ('dump picture').

Figure 5. Van Veen grab in open position with hatches that can be opened visible in the middle of the picture. Photo Jetze van Zwol (Wageningen Marine Research).

3.4 Picture analysis

The drop-cam pictures were sorted in four sediment categories: 'some shell grit', 'shell grit', 'some shells' and 'NA' (Not Available). Shell grit refers to mall shell fragments. When this was present in small amounts the sediment was categorised as 'some shell grit' (Figure 6). Larger amounts were called 'shell grit' (Figure 7). When complete shells could be observed it was called 'some shells' (Figure 8). Large amounts of shells were never observed. In Figures 6-9 an example of each category is given. Some pictures were not available (NA) due to unfocussed picture.

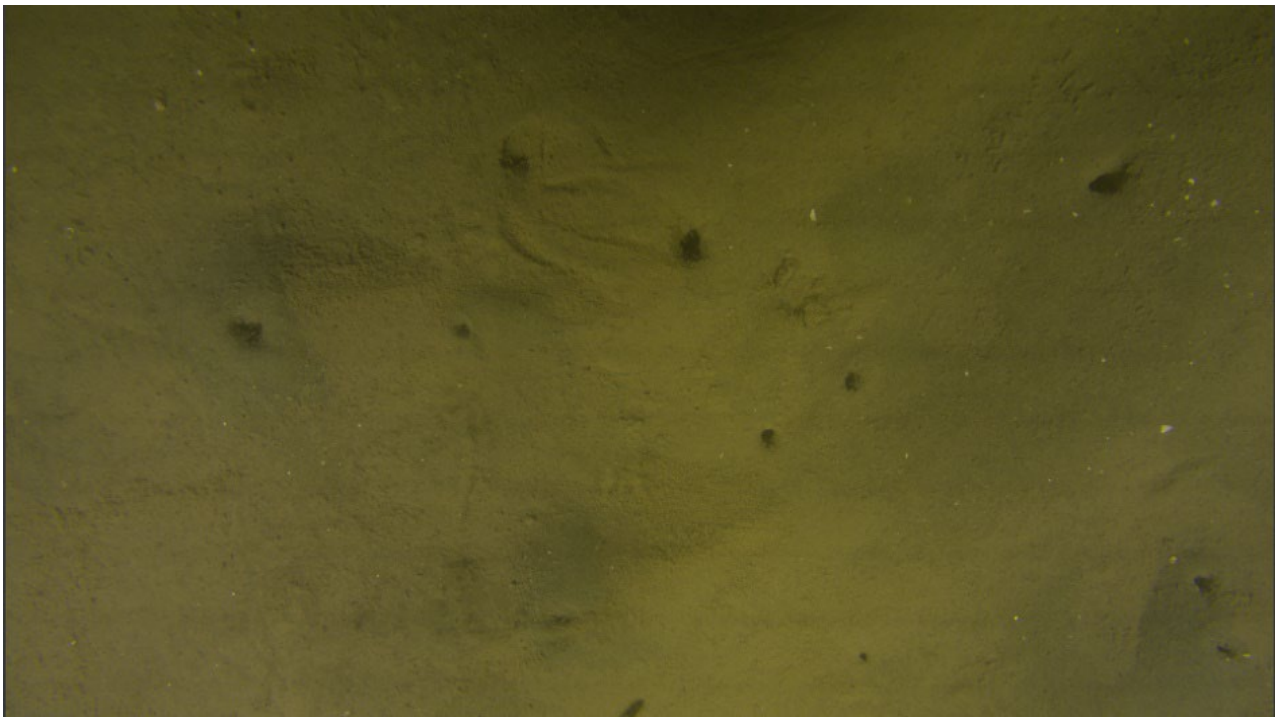


Figure 6. An example of a drop cam picture of the sediment category 'some shell grit'; the white spots on the picture are parts of shell grit.

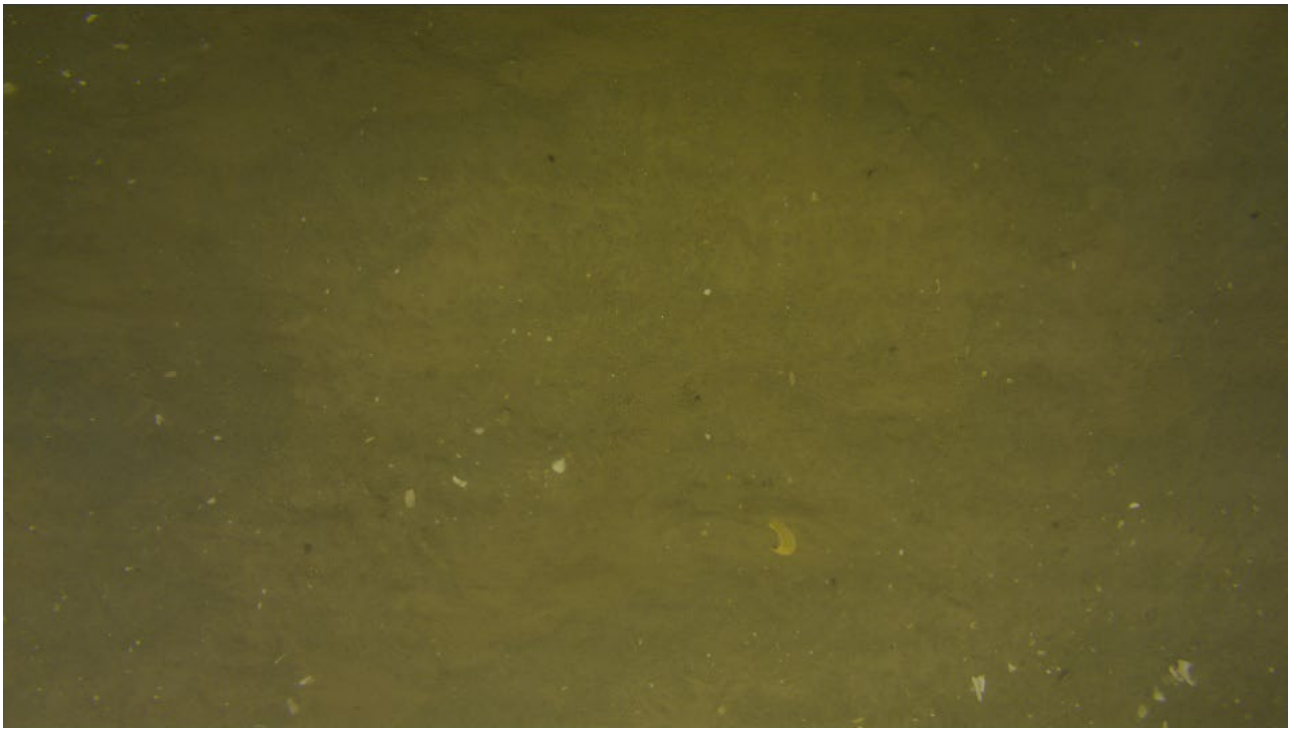


Figure 7. An example of a drop cam picture of the sediment category 'shell grit'; the white and brown spots on the picture are parts of shell grit.

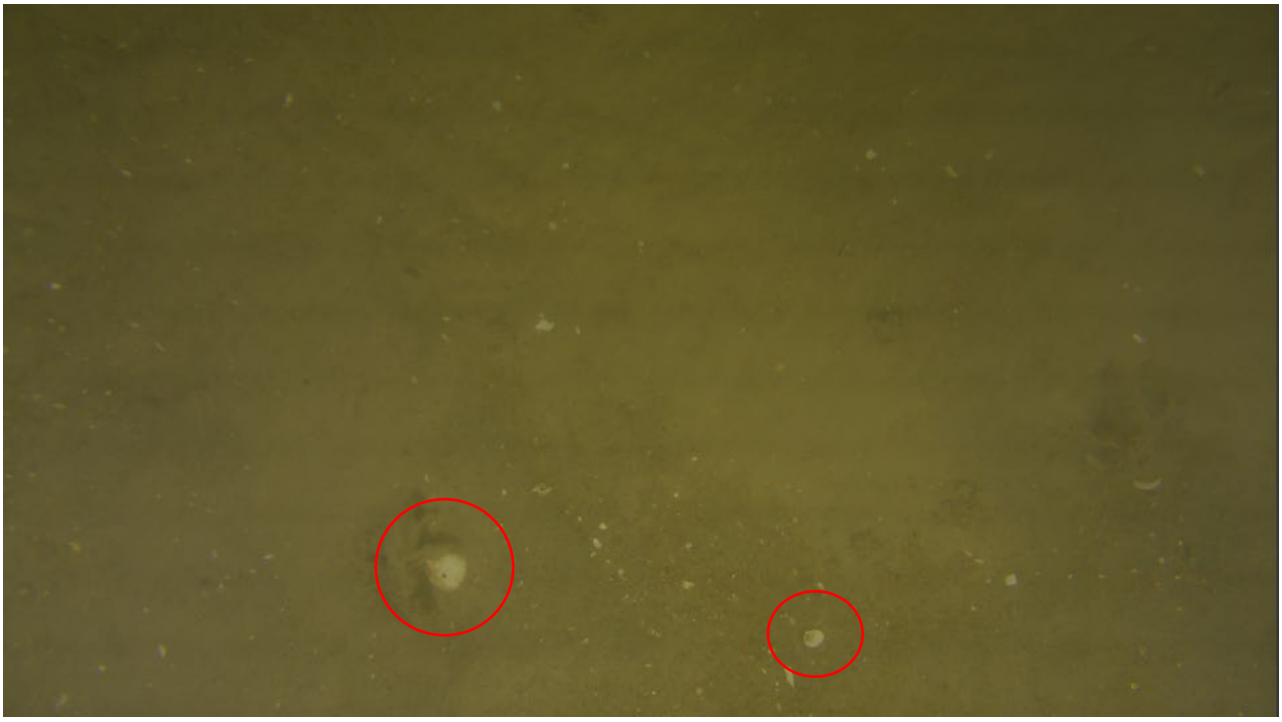


Figure 8. An example of a drop cam picture of the sediment category 'some shells'; within the red circles indicated the whole shells are visible.

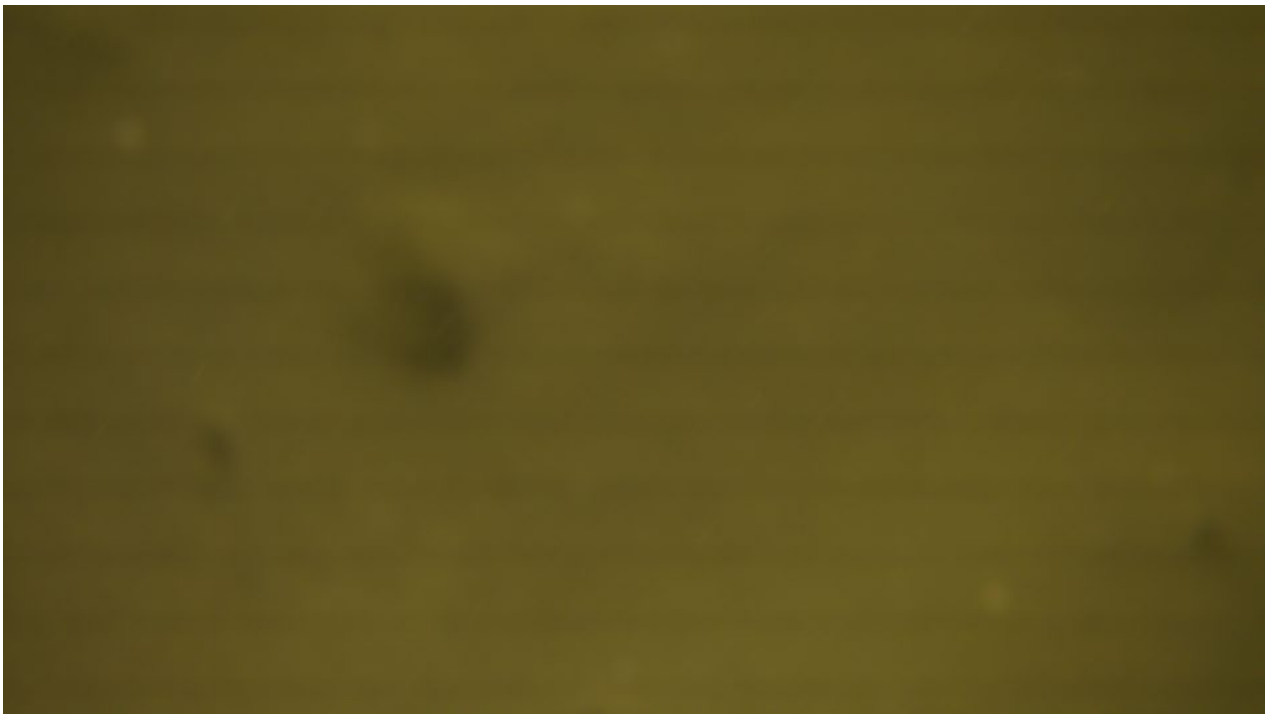


Figure 9. An example of a drop cam picture of the sediment category 'NA (Not Available)'; the extent to which shell grit or shells are present is unclear due to an unfocussed picture.

The ‘dump pictures’ were sorted in three sediment categories: ‘silt’, ‘sand’ and ‘sandy silt’. Silt consisted of very fine sediment (Figure 10). Sand was only sandy sediment (Figure 11). Sandy silt was a mixture of the two (Figure 12).

Figure 10. An example of a dump picture of the sediment category ‘silt’ including the sample vial with code.

Figure 11. An example of a dump picture of the sediment category ‘sand’ including the sample vial with code.

Figure 12. An example of a dump picture of the sediment category 'sandy silt' including the sample vial with code.

3.5 Sediment grain size analysis

Grain size of the sediment was determined at NIOZ-Yerseke by laser diffraction with a Malvern Mastersizer (Malvern Instruments, Worcestershire, United Kingdom, Mastersizer 2000, serial number 34403/139, model APA 2000 with Hydro G 2000 introduction unit and Autosampler 2000). Two categories were distinguished: percentage of particles in sample with grain size larger than 210 µm and percentage of particles in sample with grain size smaller 63 µm.

4 Results

4.1 Sediment from pictures

The drop-cam images revealed that, at both locations, only five stations contained the sediment category 'some shells' (Table 1, Figure 13 and Annex 1). The presence of whole shells is considered suitable for European flat oyster development. The presence of the category 'some shell grit' was slightly higher at location I than at location II. Only at Location II was the category 'shell grit' found present.

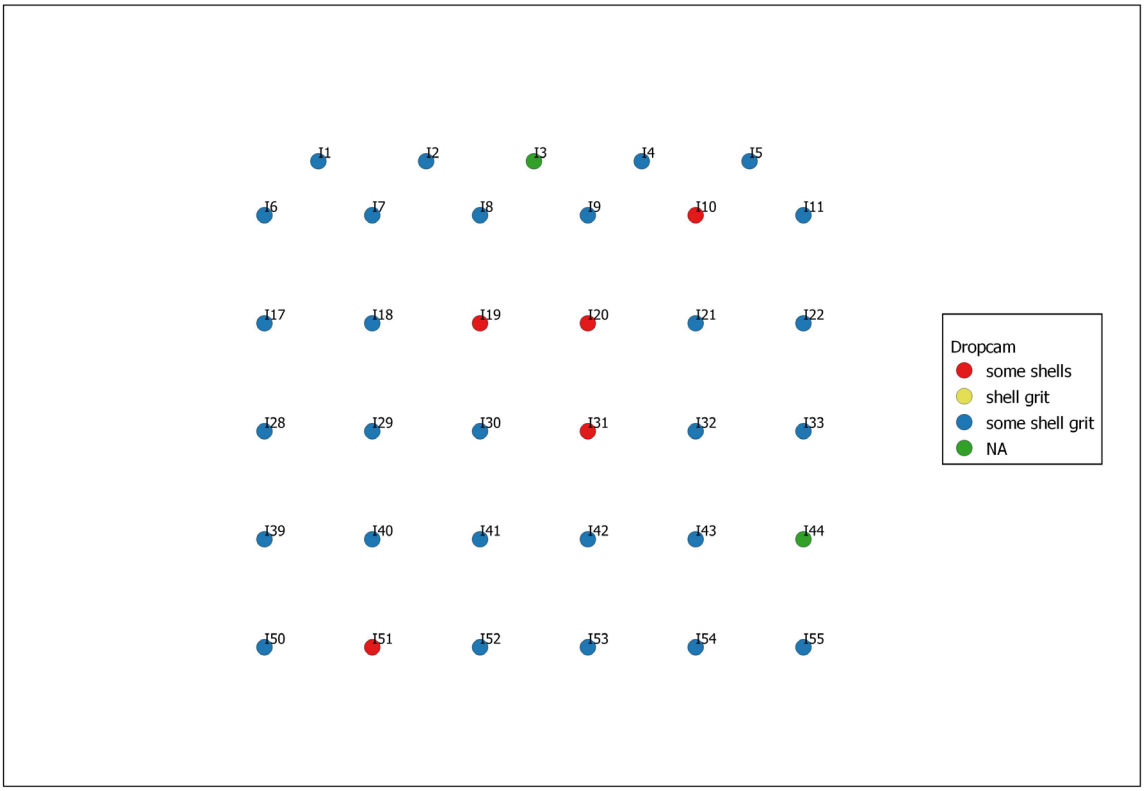
The dump pictures revealed that at Location I sediment of a high silt content (i.e. the category 'silt') was found more frequently (12 stations) than at Location II (5 stations) (Table 2, Figure 14, Annex 1). Sediment with a high silt content is considered unsuitable for European flat oyster development. Only at location II the category 'sand' was found (15 stations). The presence of this category is considered unsuitable since it is an indication of potential higher current velocities. This occurs mostly in the Southern part of location II. The category 'sandy silt' was observed more often at Location I (23 stations) than at Location II (15 stations) (Table 2, Figure 14, Annex 1). Sandy silt is considered suitable for European flat oysters.

Table 1. Number of stations at location I en II for which the different sediment categories of the drop-cam pictures were found present.

Sediment category	Location I	Location II
Some shell grit	28	23
Shell grit	0	7
Some shells	5	5
NA	2	0
Total	35	35

Table 2. Number of stations at location I and II for which the different sediment categories of the dump pictures were found present.

Sediment category	Location I	Location II
Sand	0	15
Sandy silt	23	15
Silt	12	5
Total	35	35



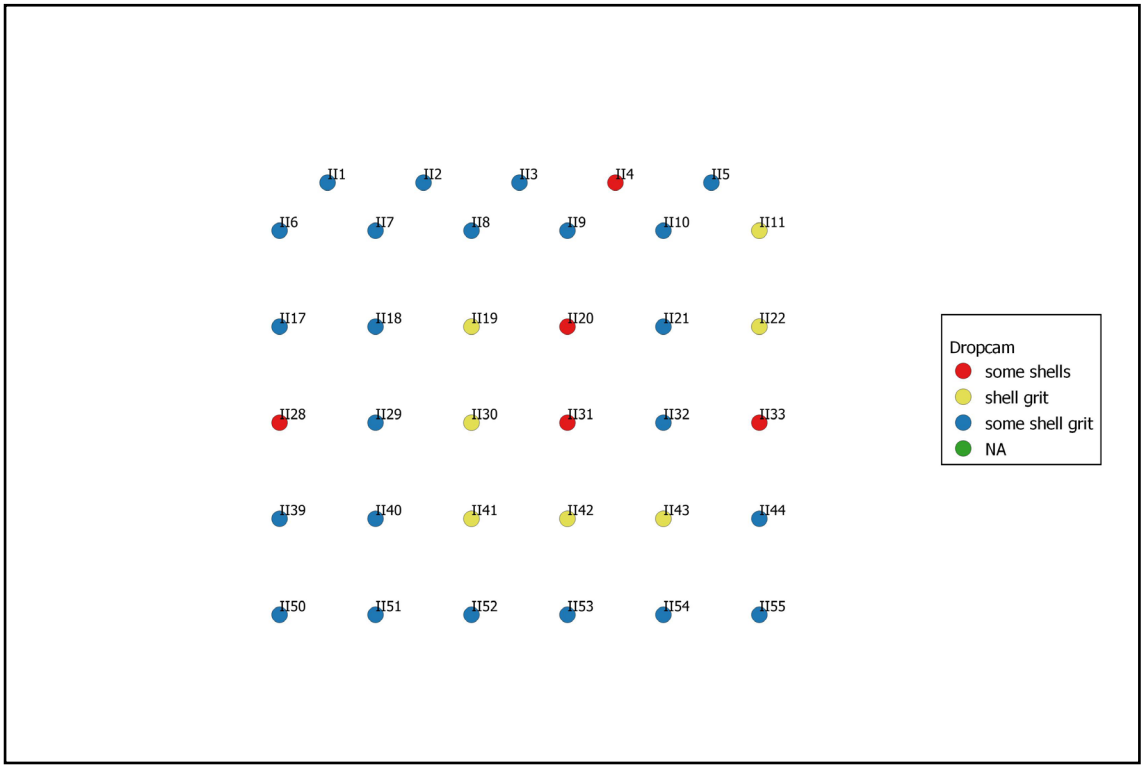


Figure 13. Map of sediment types based on drop-cam results per station at Location I (top) and Location II (bottom).

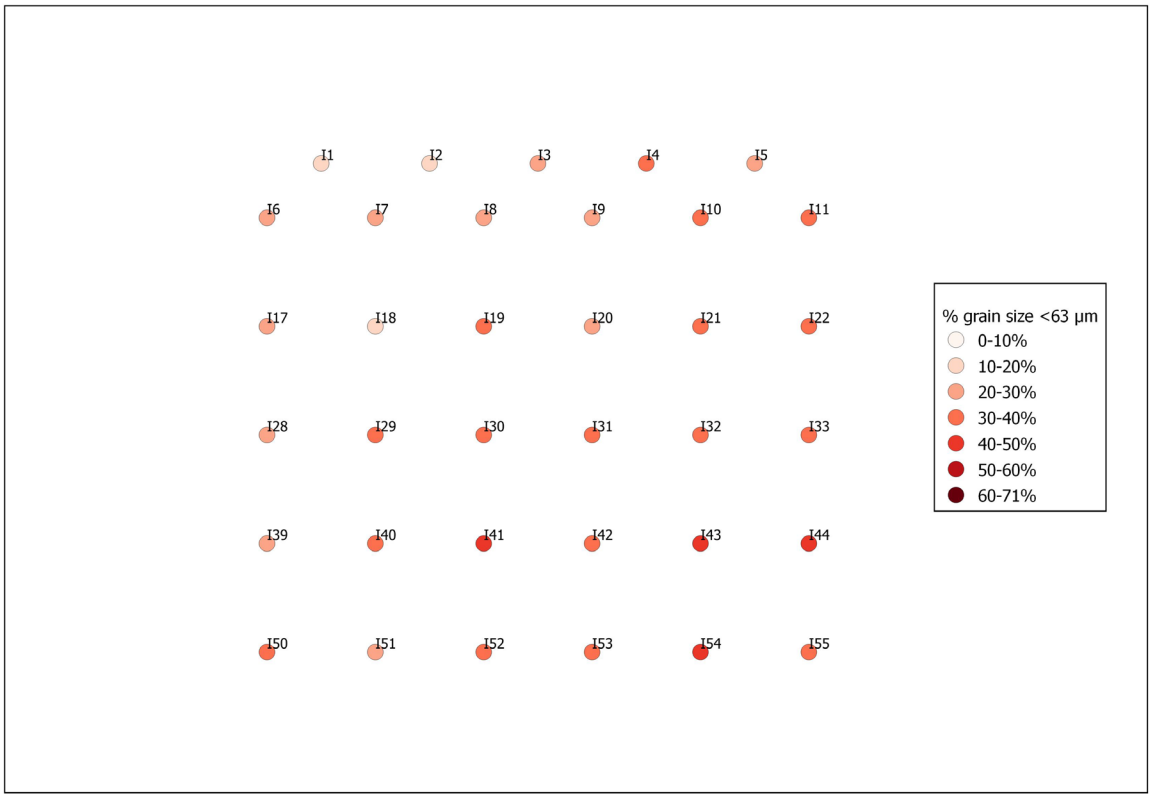
Figure 14. Map of sediment types per station based on 'dump pictures' at Location I (top) and Location II (bottom).

4.2 Sediment grain size

More silty sediment, which is considered unsuitable for the development of European flat oyster reefs, was observed at Location I with the dump pictures (see 4.1). This is confirmed by grain size analysis, as the average percentage of silty sediment (i.e., smaller than 63µm) is 31% at Location I and 18% at Location II. However, on average, the sediment at both locations is not very silty. Two stations at Location II have a silt percentage of more than 50% and no stations with such high percentage were found at Location I (Table 3, Figure 15, Annex 1). Stations with high percentages of sediment grain sizes larger than 210 µm, which are considered unsuitable, were found at Location II, mainly in the Southern part, but not at Location I (Table 3, Figure 16, Annex 1).

Table 3. Number of stations at location I and II for which the different grain size categories were found present on basis of laser diffraction.

Grain size category	Location I	Location II
More than 50% < 63 µm	0	2
Less than 50% < 63 µm	35	33
Total	35	35
More than 50% > 210 µm	0	10
Less than > 210 µm	35	25
Total	35	35



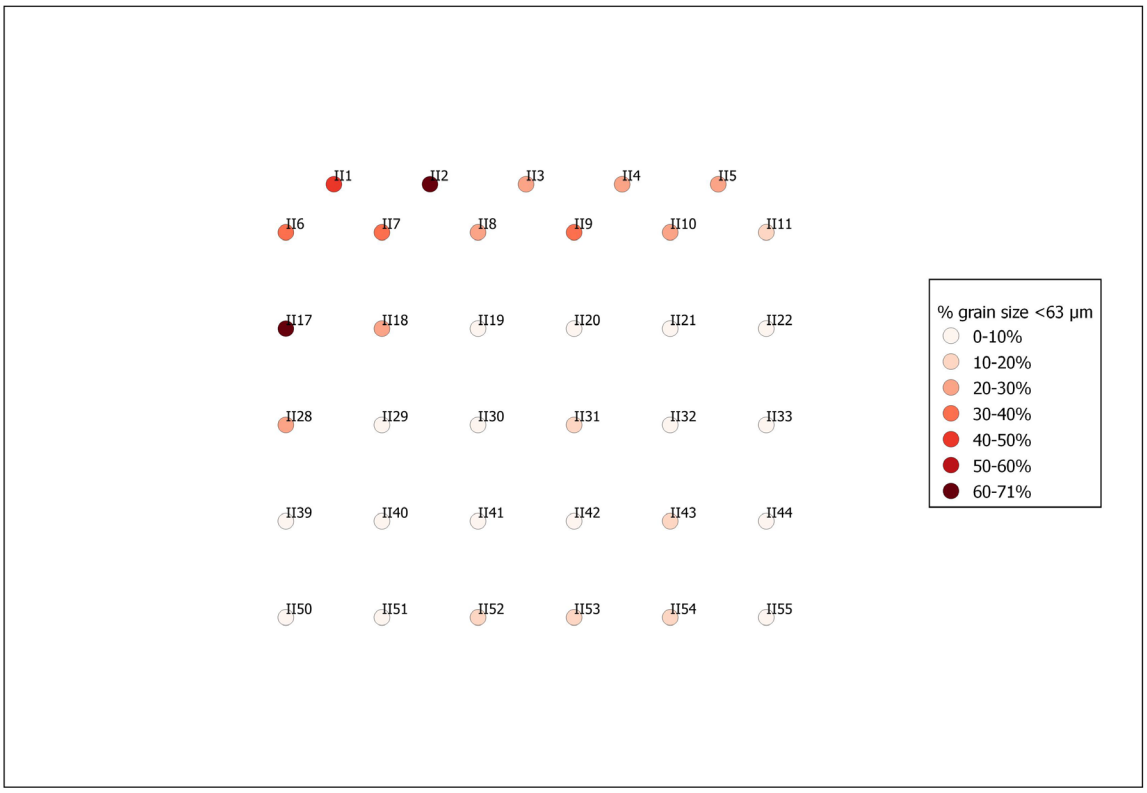


Figure 15. Map of silt content results per station at Location I (top) and Location II (bottom).

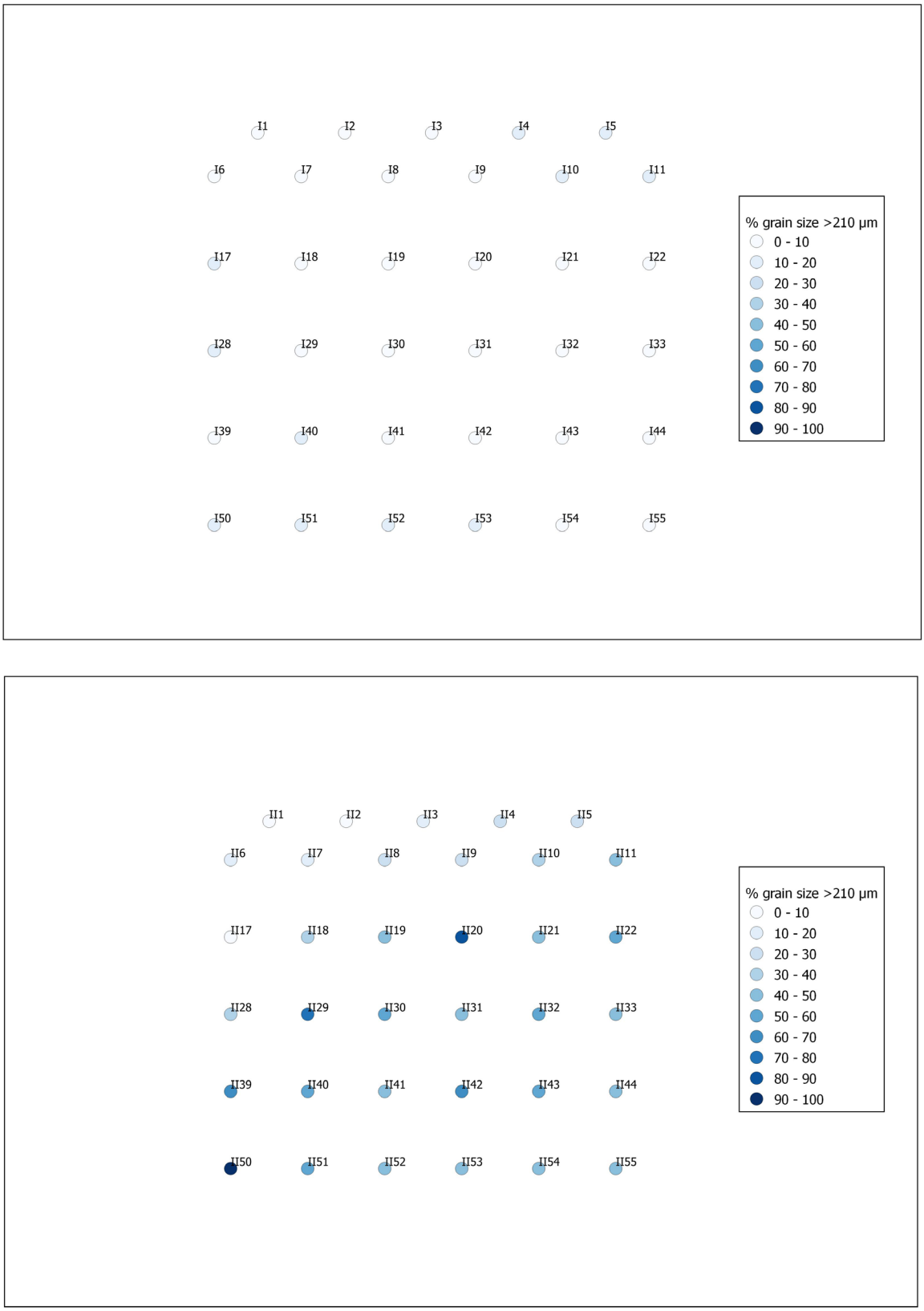


Figure 16. Map of coarse sand results per station at Location I (top) and Location II (bottom).

5 Conclusions and recommendations

Based on the results of the field survey and subsequent laboratory analysis, both search areas for the designation of one or more areas (with a total surface of 100 km2) for the restoration of European flat oyster reefs within the Frisian Front (i.e., Location I and Location II) are considered suitable for European flat oyster restoration. Within each location there are no clear gradients observed in presence of whole shells, which is considered suitable for the development of European flat oyster reefs, or low silt content (20-40%), which is also considered suitable for the reef development. On average the northern half of both locations seems to be more suitable than the southern half, but this pattern is not very convincing. The desk study of van Duren et al (2022) also concludes that there is not much difference between locations. Both analyses, the field survey and the desk study, show more variability at Location II than at Location I, which seems to be more uniform. Large-scale active restoration of European flat oyster beds is not without risks and presently unknown factors may influence the process. To enhance the success rate and spread the risk it is therefore advised to designate the northern half of both Location I and Location II to reach the agreed total of 100 km^2.

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7 Quality Assurance

Wageningen Marine Research utilises an ISO 9001:2015 certified quality management system. The organisation has been certified since 27 February 2001. The certification was issued by DNV.

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Justification

Report C021/22
Project Number: 4318100386

The scientific quality of this report has been peer reviewed by a colleague scientist and a member of the Management Team of Wageningen Marine Research

Approved:	Oscar Bos Marine ecologist
Signature:	
Date:	29-04-2022

Approved:	Drs. J. Asjes MT member Integration
Signature:	
Date:	29-04-2022

Annex 1 Results per station

Station #	Date	Time	Depth (m)	NB	OL	Dump picture	Drop-cam picture	% < 63um	% > 210 um
FF-I-1	15-mrt-22	17:29	43.1	53-48.8926-N	004-16.9833-E	Sandy silt	Some shell grit	19.62	4.43
FF-I-10	15-mrt-22	16:04	42.1	53-48.2825-N	004-23.3428-E	Sandy silt	Some shells	37.57	10.93
FF-I-11	15-mrt-22	15:49	42.1	53-48.2611-N	004-25.1644-E	Sandy silt	Some shell grit	32.97	14.50
FF-I-17	15-mrt-22	14:17	42.1	53-47.2848-N	004-16.0235-E	Silt	Some shell grit	25.19	11.70
FF-I-18	15-mrt-22	14:35	42.1	53-47.2654-N	004-17.8444-E	Silt	Some shell grit	17.27	5.61
FF-I-19	15-mrt-22	14:51	42.1	53-47.2454-N	004-19.6654-E	Sandy silt	Some shells	32.34	6.17
FF-I-2	15-mrt-22	17:42	43.1	53-48.8729-N	004-18.8054-E	Sandy silt	Some shell grit	18.34	9.63
FF-I-20	15-mrt-22	15:05	42.1	53-47.2250-N	004-21.4863-E	Silt	Some shells	20.75	4.62
FF-I-21	15-mrt-22	15:21	41.8	53-47.2042-N	004-23.3071-E	Silt	Some shell grit	32.33	7.36
FF-I-22	15-mrt-22	15:35	41.8	53-47.1829-N	004-25.1280-E	Sandy silt	Some shell grit	35.96	9.61
FF-I-28	15-mrt-22	13:59	41.2	53-46.2065-N	004-15.9910-E	Sandy silt	Some shell grit	26.40	11.39
FF-I-29	15-mrt-22	13:45	41.4	53-46.1871-N	004-17.8112-E	Sandy silt	Some shell grit	37.79	9.72
FF-I-3	15-mrt-22	17:56	42.9	53-48.8527-N	004-20.6275-E	Sandy silt	Picture unclear	25.00	9.32
FF-I-30	15-mrt-22	13:31	41.5	53-46.1671-N	004-19.6313-E	Sandy silt	Some shell grit	31.06	6.37
FF-I-31	15-mrt-22	13:17	41.1	53-46.1468-N	004-21.4515-E	Sandy silt	Some shells	31.47	8.75
FF-I-32	15-mrt-22	11:58	41.1	53-46.1259-N	004-23.2716-E	Silt	Some shell grit	36.15	8.13
FF-I-33	15-mrt-22	11:39	40.6	53-46.1046-N	004-25.0916-E	Sandy silt, limp	Some shell grit	35.56	9.14
FF-I-39	15-mrt-22	10:06	41.5	53-45.1282-N	004-15.9585-E	Sandy silt	Some shell grit	20.20	9.18
FF-I-4	15-mrt-22	18:10	42.8	53-48.8321-N	004-22.4496-E	Sandy silt	Some shell grit	31.79	11.68
FF-I-40	15-mrt-22	10:24	41.4	53-45.1087-N	004-17.7780-E	Sandy silt	Some shell grit	35.87	10.31
FF-I-41	15-mrt-22	10:40	41.1	53-45.0888-N	004-19.5973-E	Sandy silt	Some shell grit	41.00	8.68
FF-I-42	15-mrt-22	10:58	40.8	53-45.0685-N	004-21.4167-E	Silt	Some shell grit	36.19	8.60
FF-I-43	15-mrt-22	11:09	40.5	53-45.0476-N	004-23.2360-E	Silt	Some shell grit	40.12	8.06
FF-I-44	15-mrt-22	11:25	40.2	53-45.0263-N	004-25.0553-E	Sandy silt	Picture unclear	46.89	6.73

FF-I-5	15-mrt-22	18:26	42.5	53-48.8110-N	004-24.2716-E	Sandy silt	Some shell grit	20.44	15.13
FF-I-50	15-mrt-22	9:51	40.8	53-44.0499-N	004-15.9261-E	Silt	Some shell grit	37.90	16.71
FF-I-51	15-mrt-22	9:37	40.8	53-44.0304-N	004-17.7448-E	Silt	Some shells	24.47	15.69
FF-I-52	15-mrt-22	9:21	40.8	53-44.0105-N	004-19.5634-E	Silt	Some shell grit	33.00	14.42
FF-I-53	15-mrt-22	9:05	40.6	53-43.9902-N	004-21.3820-E	Sandy silt	Some shell grit	36.75	12.39
FF-I-54	15-mrt-22	8:44	40.5	53-43.9694-N	004-23.2005-E	Silt	Some shell grit	47.72	8.16
FF-I-55	15-mrt-22	8:23	40.5	53-43.9481-N	004-25.0190-E	Sandy silt, limp	Some shell grit	39.51	9.75
FF-I-6	15-mrt-22	17:17	42.9	53-48.3632-N	004-16.0560-E	Sandy silt	Some shell grit	24.05	4.98
FF-I-7	15-mrt-22	16:59	42.9	53-48.3437-N	004-17.8777-E	Sandy silt	Some shell grit	27.55	8.05
FF-I-8	15-mrt-22	16:40	42.8	53-48.3237-N	004-19.6994-E	Sandy silt	Some shell grit	22.19	6.83
FF-I-9	15-mrt-22	16:22	42.5	53-48.3033-N	004-21.5211-E	Silt	Some shell grit	27.19	5.48
FF-II-1	16-mrt-22	18:08	40.2	53-55.2203-N	005-05.6043-E	Silt	Some shell grit	46.88	9.37
FF-II-10	16-mrt-22	16:12	37.5	53-54.5671-N	005-11.9665-E	Sandy silt	Some shell grit	26.81	31.43
FF-II-11	16-mrt-22	16:32	37.1	53-54.5334-N	005-13.7918-E	Sand, loose chuncks	Shell grit	15.04	43.75
FF-II-17	16-mrt-22	15:00	38.4	53-53.6193-N	005-04.6111-E	Sandy silt, loose chuncks	Some shell grit	60.74	7.91
FF-II-18	16-mrt-22	14:46	37.8	53-53.5875-N	005-06.4359-E	Sandy silt	Some shell grit	25.20	33.55
FF-II-19	16-mrt-22	14:30	36.1	53-53.5553-N	005-08.2606-E	Sandy silt	Shell grit	6.76	47.26
FF-II-2	16-mrt-22	17:52	40.1	53-55.1882-N	005-07.4303-E	Silt	Some shell grit	70.38	5.23
FF-II-20	16-mrt-22	14:15	36.1	53-53.5225-N	005-10.0853-E	Sand, loose chuncks	Some shells	2.63	86.41
FF-II-21	16-mrt-22	14:00	36.1	53-53.4893-N	005-11.9099-E	Sand	Some shell grit	9.39	48.66
FF-II-22	16-mrt-22	13:46	35.6	53-53.4557-N	005-13.7344-E	Sand, loose chuncks	Shell grit	2.03	55.19
FF-II-28	16-mrt-22	11:08	38.1	53-52.5415-N	005-04.5576-E	Sandy silt	Some shells	20.10	33.86
FF-II-29	16-mrt-22	11:24	37.2	53-52.5097-N	005-06.3816-E	Sandy silt, limp	Some shell grit	1.06	79.86
FF-II-3	16-mrt-22	17:19	39.4	53-55.1557-N	005-09.2561-E	Silt	Some shell grit	23.41	20.00
FF-II-30	16-mrt-22	11:38	36.5	53-52.4774-N	005-08.2056-E	Sand	Shell grit	3.83	57.37
FF-II-31	16-mrt-22	11:55	36.2	53-52.4447-N	005-10.0295-E	Sand	Some shells	11.60	46.63
FF-II-32	16-mrt-22	13:12	35.7	53-52.4116-N	005-11.8533-E	Sandy silt	Some shell grit	9.50	57.61
FF-II-33	16-mrt-22	13:25	35.6	53-52.3779-N	005-13.6771-E	Sand	Some shells	7.85	46.42

FF-II-39	16-mrt-22	10:54	37.5	53-51.4636-N	005-04.5042-E	Sand	Some shell grit	8.57	62.31
FF-II-4	16-mrt-22	17:03	38.6	53-55.1227-N	005-11.0820-E	Slib, slap	Some shells	25.03	25.20
FF-II-40	16-mrt-22	10:41	36.9	53-51.4318-N	005-06.3275-E	Sandy silt, mainly sand	Some shell grit	6.20	58.92
FF-II-41	16-mrt-22	10:28	37.1	53-51.3996-N	005-08.1507-E	Sand	Shell grit	3.41	47.14
FF-II-42	16-mrt-22	10:12	37.2	53-51.3669-N	005-09.9738-E	Sand	Shell grit	4.87	61.26
FF-II-43	16-mrt-22	9:59	37.2	53-51.3338-N	005-11.7968-E	Sand	Shell grit	16.23	50.47
FF-II-44	16-mrt-22	9:45	37.2	53-51.3002-N	005-13.6198-E	Sand	Some shell grit	7.64	47.91
FF-II-5	16-mrt-22	16:47	38.1	53-55.0892-N	005-12.9077-E	Sandy silt	Some shell grit	25.68	25.97
FF-II-50	16-mrt-22	8:07	37.2	53-50.3857-N	005-04.4509-E	Zand	Some shell grit	0.00	93.32
FF-II-51	16-mrt-22	8:21	37.5	53-50.3540-N	005-06.2734-E	Sandy silt, mainly silt	Some shell grit	2.41	56.42
FF-II-52	16-mrt-22	8:42	37.4	53-50.3218-N	005-08.0958-E	Sandy silt, mainly silt	Some shell grit	15.47	43.33
FF-II-53	16-mrt-22	8:57	37.1	53-50.2891-N	005-09.9181-E	Sandy silt	Some shell grit	16.79	43.02
FF-II-54	16-mrt-22	9:12	36.8	53-50.2560-N	005-11.7404-E	Sand	Some shell grit	11.33	46.79
FF-II-55	16-mrt-22	9:28	36.4	53-50.2224-N	005-13.5626-E	Sand	Some shell grit	6.38	47.73
FF-II-6	16-mrt-22	15:13	39.2	53-54.6972-N	005-04.6646-E	Sandy silt, limp	Some shell grit	31.60	10.04
FF-II-7	16-mrt-22	15:30	38.9	53-54.6654-N	005-06.4901-E	Silt	Some shell grit	39.82	13.12
FF-II-8	16-mrt-22	15:44	38.8	53-54.6331-N	005-08.3157-E	Sandy silt	Some shell grit	22.59	21.67
FF-II-9	16-mrt-22	15:58	38.5	53-54.6003-N	005-10.1411-E	Sandy silt	Some shell grit	30.16	27.66

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