

Activities for The Rich North Sea – June 2022

REV02 v090622

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1 ROV inspection of oyster and oyster reef

1.1 Background

- There are 23 bigbags (23m³) deployed in nov '21.
- Each bigbag contains approx. 1m³ of small shells and ~68 live adult oysters on top.
- They were installed 1m above the seabed in a small 'mountain'.
- Deployment pattern can be found at the end of this chapter.
- In this document, 'bag', 'patch' and 'substrate' all refer to the deployment of one of the bigbags with 1m³ shell material.
- Bags 3, 5 and 8 have shells which are glued together with a special 'BESE paste' for research purposes and are of extra interest.

RESEARCH QUESTIONS

Research questions to be answered:

1. How many bags out of the 23 can be found with the ROV?
2. How did the substrate patches disperse in these months?
3. Do the oysters still live and are they healthy?
4. What flora and fauna are present and in what numbers?
5. How is the frame on the seabed?

1.2 Main fly route: transects

(Research question 1)

- Transects over oyster patches.
- Depending on the transects we will need to have a general idea of the dispersal pattern of the shell material and living oysters over the seabed. Ranging lasers will be helpful. A more horizontal approach might be necessary in order to range the height of the substrate patch.
- Start transects at the lower left corner of the reef, as the BESE is located there.
- Transects can be named by first and last number of bags in the transect. Eg TS1-13 is between bag/patch 1 and 13
- Slow speed is key. If anything looks important, please take time to hold the ROV still in order for us to analyse the frames afterwards.
- **Start with Transect TS3-11**

1.3 If substrate patches are found

(Research question 2, 3)

- We'd like to have a 360 degree rotation around 5 substrate patches (depending on dispersal) and at least 3 where oysters are visible.
- One of these *must* be bag 3, 5 or 8.
- Please hold still for 5-10sec when the oyster reef is in clear view. This allows us to analyse the data better later on.
- Try to establish how many oysters are inside the immediate area. This means that we'd like the video to be such that we are able to count the oysters *afterwards*.
- Speed: if marine life is visible it is ok, should not take more than 5 min per 360 rotation.

- Depending on visibility macro shots of oysters might be necessary. See below. If oyster shell opening can be seen from further away a macro is not necessary.

Proposed patches eg: 4, 8, 15, 19, 23

If required due to poor visibility:

- When the amount of oysters is made visible, we'd like to zoom and do a 360 rotation around 3 oyster per the above patches.
 - Living oysters have slightly open or closed shells
 - Dead oysters have wide open shells

1.4 If species are encountered

(Research question 4)

If any "special" marine species (mainly fish, lobster) are moving or visible inside the FOV of the ROV, please hold still for 3-5 seconds so that we have a clear picture or video of the animal. If possible photos will be a good addition to the video.

1.5 Inspection at frame

(Research question 5)

See chapter 2 of this document.

At the location of the frame, if the frame is visible, take a 360 turn around it to see how the frame is embedded in the seabed (High sand dunes on one side, marine life, sag into seabed) is it still standing upright or how much it is askew, and to the feet of the frame structure, i.e. how much have these sunken into the mudline.

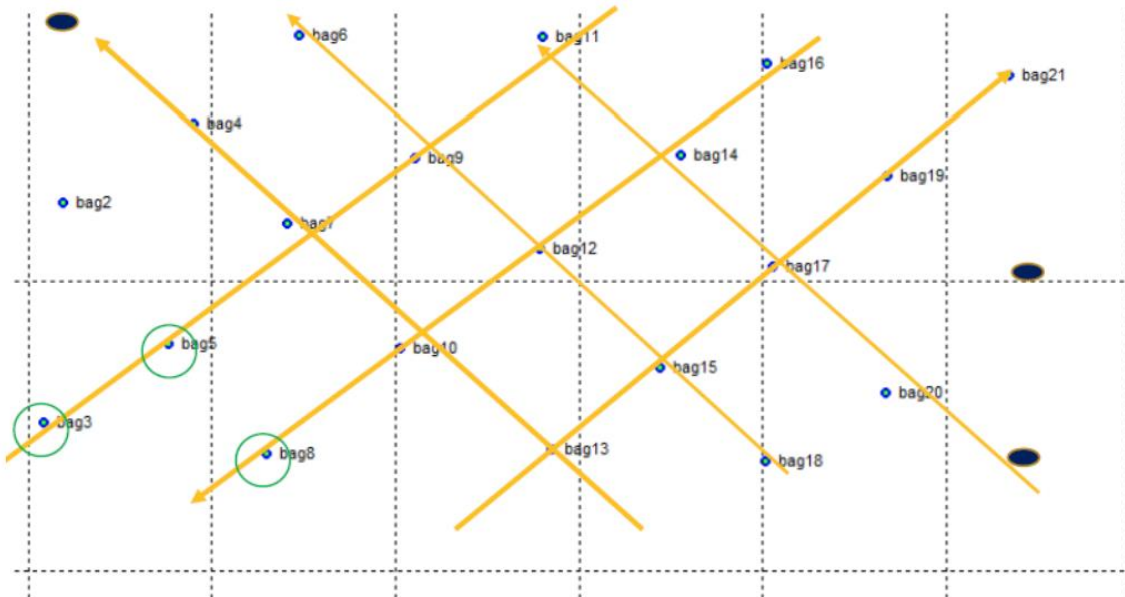
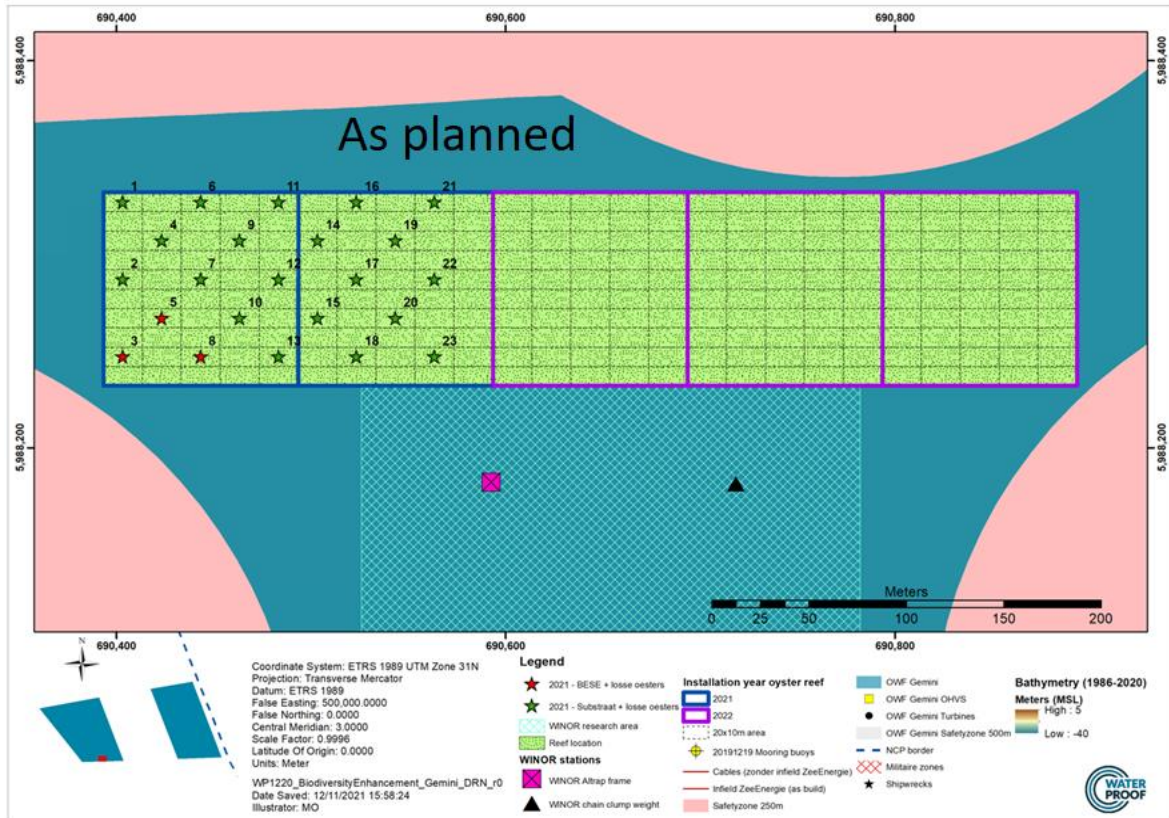
1.6 Backup plan

In case no substrate patches or oysters are found, or visibility is poor, the transects can be changed into a zig-zag pattern or a transect more downstream. Discuss with Bluestream and De Rijke Noordzee (day and night F).

1.7 Checklist

Tally of observed substrate patches					
360 deg rotation at 5 patches and ROV timestamp. Note the (est.) patch number and timestamp of video	Patch 3, 5 or 8 _____	Patch # w/oysters _____	Patch # w/oysters _____	Patch # w/oysters _____	Patch # _____
Species observed (+ timestamp)					

1.8 Reef layout



1.9 Coordinates and labels

Id	Label	Name GPS track	AS PLANNED		AS INSTALLED (APPROX GPS)	
			WGS84 - LAT	WGS84 - LONG	WGS84 - LAT	WGS84 - LONG
1	2021 - Substraat + losse oesters	bag01	54.0080678	5.9056713	<i>data missing</i>	<i>data missing</i>
2	2021 - Substraat + losse oesters	bag02	54.0077087	5.9056463	54.0076317	5.9056
3	2021 - BESE + losse oesters	bag03	54.0073495	5.9056214	54.00725	5.9055467
4	2021 - Substraat + losse oesters	bag04	54.0078807	5.9059637	54.0077683	5.905955
5	2021 - BESE + losse oesters	bag05	54.0075217	5.9059387	54.0073883	5.9058883
6	2021 - Substraat + losse oesters	bag06	54.0080529	5.9062810	54.0079183	5.9062417
7	2021 - Substraat + losse oesters	bag07	54.0076938	5.9062560	54.0075933	5.90621
8	2021 - BESE + losse oesters	bag08	54.0073348	5.9062310	54.0072	5.9061533
9	2021 - Substraat + losse oesters	bag09	54.0078660	5.9065733	54.00771	5.9065583
10	2021 - Substraat + losse oesters	bag10	54.0075069	5.9065482	54.0073817	5.90652
11	2021 - Substraat + losse oesters	bag11	54.0080382	5.9068906	54.0079167	5.9069067
12	2021 - Substraat + losse oesters	bag12	54.0076791	5.9068655	54.0075517	5.9069
13	2021 - Substraat + losse oesters	bag13	54.0073200	5.9068405	54.007205	5.9069317
14	2021 - Substraat + losse oesters	bag14	54.0078512	5.9071828	54.0077117	5.9072833
15	2021 - Substraat + losse oesters	bag15	54.0074922	5.9071578	54.0073467	5.907225
16	2021 - Substraat + losse oesters	bag16	54.0080234	5.9075001	54.0078683	5.90752
17	2021 - Substraat + losse oesters	bag17	54.0076643	5.9074751	54.0075217	5.9075333
18	2021 - Substraat + losse oesters	bag18	54.0073053	5.9074500	54.0071883	5.907515
19	2021 - Substraat + losse oesters	bag19	54.0078365	5.9077924	54.00768	5.9078467
20	2021 - Substraat + losse oesters	bag20	54.0074774	5.9077673	54.0073067	5.90784
21	2021 - Substraat + losse oesters	bag21	54.0080086	5.9081097	54.0078517	5.9081783
22	2021 - Substraat + losse oesters	bag22	54.0076496	5.9080846	<i>data missing</i>	<i>data missing</i>
23	2021 - Substraat + losse oesters	bag23	54.0072905	5.9080596	<i>data missing</i>	<i>data missing</i>
00	Mixlander frame	FRAME (GPS)	54.0066960	5.9084639	54.00656167	5.908398333

2 Retrieval of measurement frame

Step	Action	Caution
0	Careful approach of frame location, as there can be floats and lines on the surface if acoustic release has been triggered unintentionally.	
1	Do a full 360 rotation around the frame with the ROV prior to connecting the cable and hoisting the frame up. Refer to P21-189-PRJ-PLN-001-D05 for retrieval procedure of frame.	Underwater
2	Further, as described in the RAMS P21-189-PRJ-PLN-001-D05 the acoustic release will be tested 5m under water to see if it behaves as required. A video of the test procedure (pressing acoustic release button and seeing the buoy come up) above water	
3	Take lots of pictures from every angle of the frame when the frame is on deck.	

3 Storage and safeguarding of oysters on measurement frame

After the frame is safely installed on the deck the following activities must be completed:

- Removing and storing oysters from measurement equipment
- Removing and storing oysters in the oyster baskets

3.1 Removing oysters from measurement equipment



There are 10 measurement equipment with one oyster glued on each. The measurement equipment is a valve sensor that checks the oyster valve position. See fig 1:






Figure 1: Valve position sensor with mounted oyster on measurement frame

Desired result: There are 10 bags in the freezer with 10 oysters, one oyster per bag. Each bag is marked with an unique serial number corresponding to the correct valve sensor where the oyster came from.

All valve sensors are remaining or re-installed on the frame.

Step	Action	Caution
1	Check if oyster is attached to horizontal black plate only (continue with step 2a) or to vertical part as well (continue with step 2b)	
2a	<p>Oyster attached to horizontal black plate only:</p> <p>In order to remove the oyster the bolts nearest to the oyster must be removed as indicated in fig 2 and 3.</p>  <p><i>Figure 2: Red encircled the two bolts to remove the oyster including the small black plastic plate</i></p>  <p><i>Figure 3: Detail of bolts</i></p> <p>If the bolts are not removable for any reason, continue with step 2b. If the oyster + horizontal plate is removed, continue with step 3.</p>	<p>Be careful not to disturb the oyster too much, the bonding agent is not extremely strong.</p>

Step	Action	Caution
2b	<p>In case the indicated bolt above is not removable, or the oyster has grown in such a way that it has attached to the horizontal part, remove the measurement device from the frame by loosening the two size 16 bolts:</p>  <p><i>Figure 4: Detail of bolts</i></p> <p>Next, remove the two crosshead screws as indicated:</p>  <p><i>Figure 5: Screw location</i></p> <p>The vertical and horizontal plates will come loose. The measurement device can be reinstalled on the frame with the two size 16 bolts. Continue with step 3.</p>	<p>Caution</p> <p>In case the in step 2a indicated bolt above is not removable or oyster has grown onto the vertical black plastic</p>

Step	Action	Caution
3	<p>Note the serial number on the measurement device (see fig 6.) on a binbag with a permanent marker and place the corresponding oyster + part of the black plate in this labelled binbag. Put in freezer.</p>  <p><i>Figure 6: The number on the valve position sensor that needs to be written on the binbag (below the barcode)</i></p>	<p>Never put the valve position sensor or any measurement equipment in the freezer</p>
4	<p>Check: There are 10 bags in the freezer with 10 oysters, one oyster per bag. Each bag is marked with an unique serial number corresponding to the correct valve sensor where the oyster came from. All valve sensors are remaining or re-installed on the frame.</p>	

3.2 Removing and storing oysters in the oyster baskets

There are three shell/oyster baskets attached to the frame. See figure 7. Note that the difference between identical looking baskets 1 and 2 is that basket 1 is **nearest** the acoustic release (green).



Figure 7: Oyster baskets with naming convention

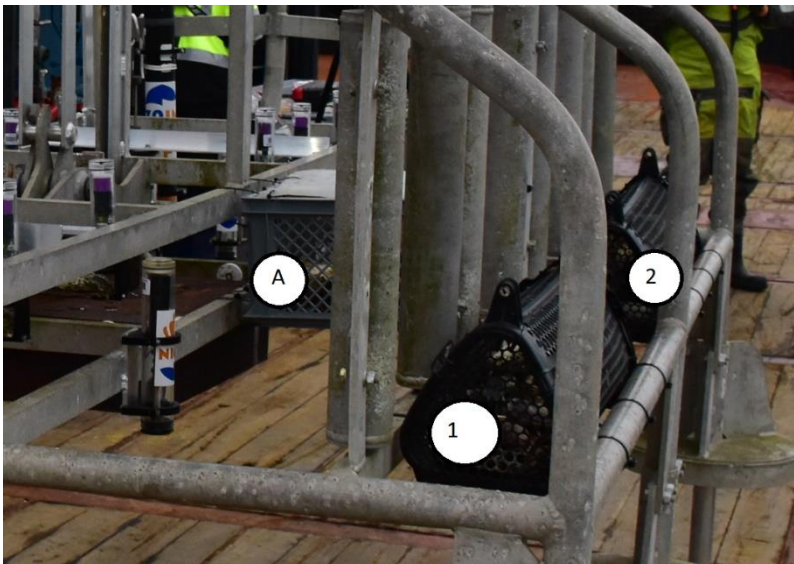


Figure 8: Shell/Oyster baskets detail

Desired result: Pictures of the baskets and contents of the baskets; All contents of each of one basket collected in the corresponding bag with a clear marking (A, 1, or 2) as above.

Bag A contains all contents of basket A (shells)

Bag 1 contains all contents of basket 1, (oysters) nearest the acoustic release

Bag 2 contains all contents of basket 2, (oysters) furthest from acoustic release

Step	Action	Caution
1	Take pictures of the outside of all baskets, both close up and further away (such that the whole basket is in the picture).	
2	Open the basket by cutting the tiwraps (A) or opening the short sides of the baskets (1,2, plastic click clip).	
3	Take pictures inside each basket	
4	Take the contents of each basket and put ALL in a separate bag with the correct marking (A, 1, 2). *	
5	Put all bags in freezer.	

**note there may some oysters with tie wraps around them. No additional action is required for these oysters, the above steps are valid for all the oysters in the baskets.*