Centre for Environment Fisheries & Aquaculture Science

Cefas

RESEARCH VESSEL CRUISE REPORT

RV CEFAS ENDEAVOUR
Survey: C END 02 - 2021

STAFF:

Name	Role
Dave Sivyer	SIC
Eleanor Haigh	2IC/Water sample lead day
Danja Hoehn	Moorings/water sampling
Bryan Goodsir-Thompson	Moorings/water sampling
Axayacatl Molina-Ramirez	Deck
Paul Nelson	Water sample lead nights
Martin Cliffen	Water sampling
Briony Silburn	NIOZ coring

DURATION: 2nd February 2021 - 11th February 2021 (9 days)

LOCATION: North Sea

Site								
Dowsing	53	31.778	N	1	3.204	E	53.530	1.053
W Gabbard	51	57.2599	N	2	6.6839	E	51.954	2.111
Wgab Zoo	51	57.2	N	2	7.2	E	51.953	2.120
Warp	51	32.0117	N	1	2.893	E	51.534	1.048
South Knock WR	51	34.223	N	1	34.675	E	51.570	1.578
Firth of Forth WR	56	11.26	N	2	30.288	W	56.188	-2.505
Tyne/Tees WR	54	43.943	N	0	52.917	W	54.732	-0.882
Torness WR	55	58.775	N	2	24.595	W	55.980	-2.410
Southwold WR	52	18.74	N	1	47.06	E	52.312	1.784
Wash CTD	53	3.5	N	0	28.5	E	53.058	0.475
Humber CTD	53	32	N	0	20	E	53.533	0.333
Tees CTD	54	44	N	0	53	W	54.733	-0.883
Tyne CTD	55	0.5	N	1	8	W	55.008	-1.133
Off Tyne/Tees CTD	54	50	N	1	20	E	54.833	1.333
Off Humber / Wash CTD	54	0	N	2	0	E	54.000	2.000
Southern Bight CTD	52	50	N	2	50	E	52.833	2.833
TP1	51	54.43	N	1	31.355	E	51.907	1.523
TP2	52	11.56	N	1	41.075	E	52.193	1.685
Hu1	54	12	N	0	0	E	54.2	0
Hu2	54	24	N	0	21	W	54.4	-0.35
Hu3	54	33	N	0	36	W	54.55	-0.6

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Hu4	54	36	N	0	51	W	54.6	-0.85
Hu5	55	0	N	1	18	W	55	-1.3
Hu6	55	18	N	1	27	W	55.3	-1.45
Hu7	55	27	N	1	28.2	W	55.45	-1.47
EC1	55	54	N	1	54	W	55.9	-1.9
EC2	55	45	N	1	48	W	55.75	-1.8
EC3	55	30	N	1	24	W	55.5	-1.4

Coring transect:

STN no	deg	mins		deg	mins	
Core 1	55	29.956	N	1	7.612	W
Core 2	55	27.061	N	0	59.207	W
Core 3	55	24.010	N	0	52.015	W
Core 4	55	20.488	N	0	44.326	W
Core 5	55	14.397	N	0	30.857	W
Core 6	55	10.873	N	0	24.441	W
Core 7	55	7.664	N	0	17.719	W
Core 8	54	59.810	N	0	5.060	W
Core 9	54	55.804	N	0	0.870	E
Core 10	54	52.278	N	0	6.319	E
Core 11	54	48.840	N	0	11.602	E
Core 12	54	48.997	N	0	26.222	E
Core 13	54	49.144	N	0	39.713	E
Core 14	54	49.407	N	0	51.827	E
Core 15	54	49.718	N	1	6.093	E
Core 16	54	49.993	N	1	20.007	E
Core 17	54	49.309	N	1	36.946	E
Core 18	54	40.380	N	1	48.794	E
Core 19	54	31.862	N	2	0.024	E
Core 20	54	24.774	N	2	10.238	E
Core 21	54	16.124	N	2	20.402	E
Core 22	54	10.141	N	2	28.259	E
Core 23	54	2.645	N	2	37.774	E
Core 24	54	2.501	N	2	27.826	E
Core 25	54	2.285	N	2	11.896	E
Core 26	54	0.050	N	2	0.003	E
Core 27	54	1.636	N	1	42.848	E
Core 28	54	1.492	N	1	27.999	E
Core 29	54	0.771	N	1	10.411	E
Core 30	54	0.194	N	0	48.498	E

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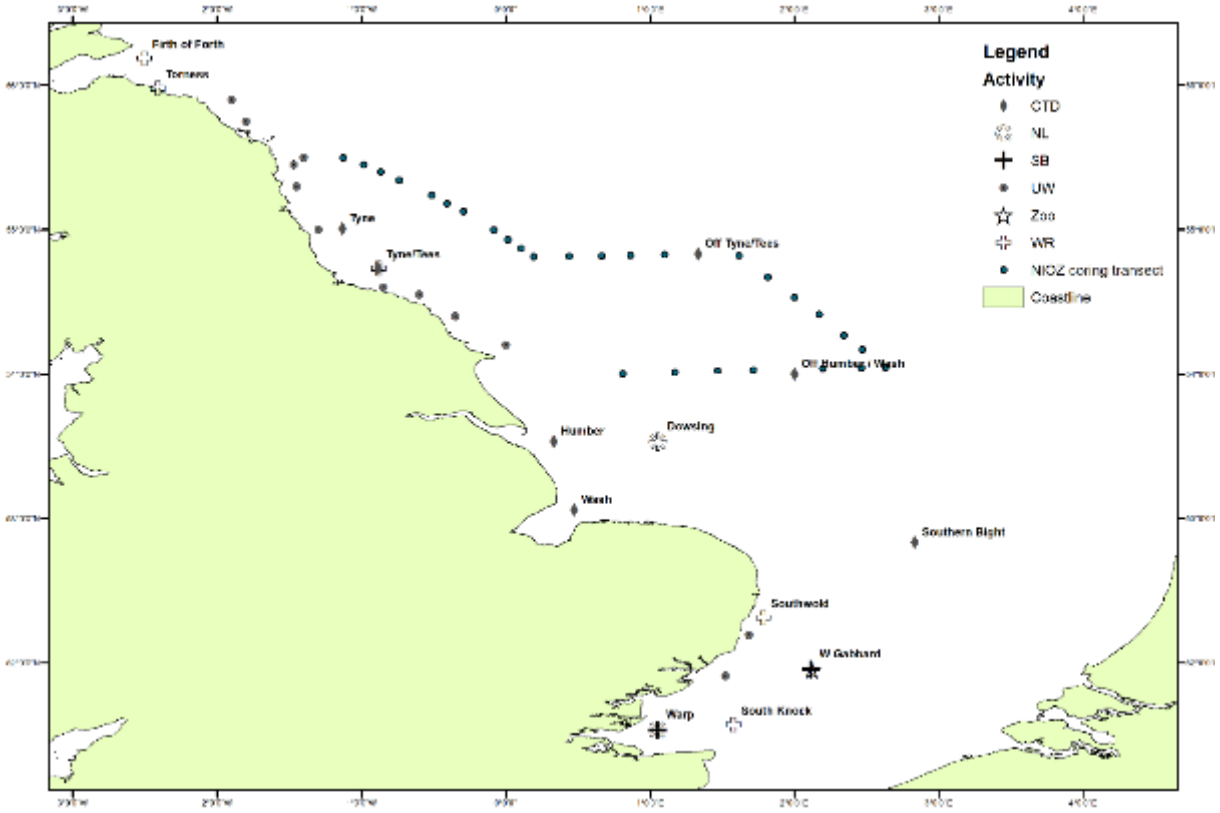


AIMS:

1. Service Noise Landers at Dowsing and Warp
2. Service SmartBuoys at West Gabbard and Warp
3. Service Waveriders at South Knock, Southwold, Tyne/Tees, Firth of Forth, Torness
4. Continuous flow and CTD Rosette water sampling as required on various transects
5. Collection of zooplankton sample at West Gabbard
6. NIOZ coring at Dowsing, West Gabbard, and offshore transect sites

NARRATIVE:
All the time in the narrative is in UTC

30th January 2021: Two members of scientific crew remained on board Cefas Endeavour following the previous survey and were tested for Covid-19 along with the ships crew.

31st January 2021: All persons tested received negative results by 08:30, and mobilisation activities commenced adhering to social distancing measures. SmartBuoys were constructed on-board and gear unpacked.

1st February 2021: The remaining 6 scientific staff boarded the vessel between 08:30 and 10:00 after completing testing for Covid 19 and went into isolation in cabins. Scientist cleared for Covid 19 continued to complete mobilisation activities, including testing of the CTD rosette (Picture

1), and supported the provision of meals and drinks to scientists in isolation. Some members of scientific staff awaiting test results took exercise alone on the quayside in the evening.

Picture 1: CTD Rosette

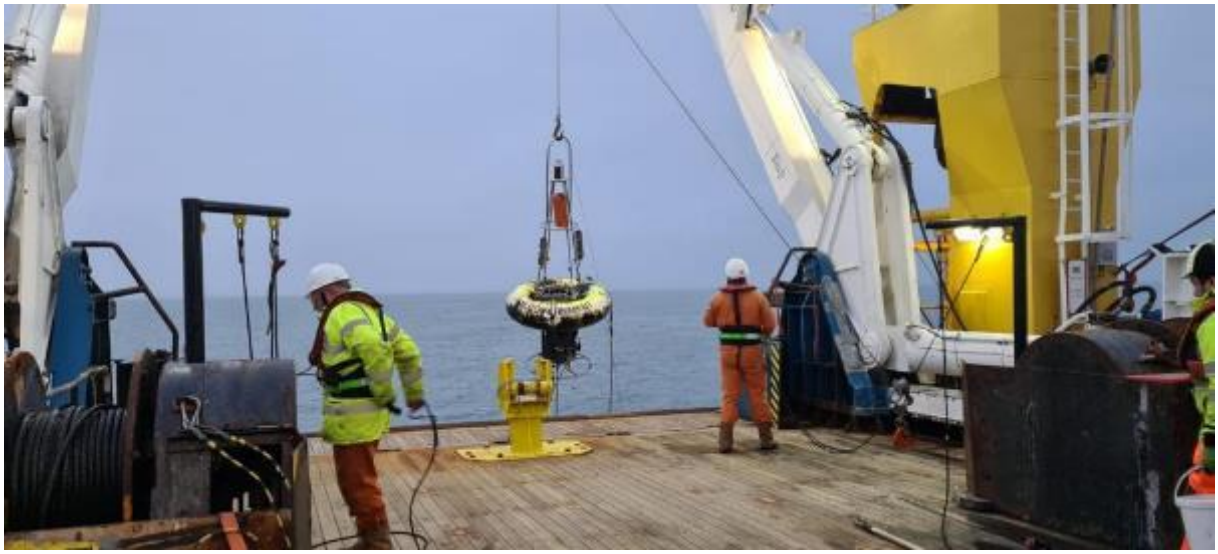
2nd February 2021: All remaining scientific staff received negative test results by 07:30. Scientific staff briefing was held at 08:30, followed by a briefing from the ships crew and safety induction at 10:30. Watches began at midday. Mobilisation work was completed in the garage, and shore staff delivered an additional component to be added to the Warp SmartBuoy. At 13:18 Endeavour departed port and steamed south to the Southwold waverider site. During transit one underway seawater sample was taken. Seawater collected from the underway system will be analysed in the lab for salinity, chlorophyll and nutrient (phosphate, nitrate, nitrite, silicate and ammonium) concentrations, suspended particulate matter, and total alkalinity/dissolved inorganic carbon. These samples contribute to eutrophication assessment but can also be used to calibrate sensors on the FerryBox, increasing the valid spatial coverage of relevant assessment parameters autonomously measured throughout the survey. A toolbox talk was held for the deployment and recovery of the Southwold waverider for both ship and scientific staff, and recovery was completed at 15:19. A new waverider was deployed at 16:10 at 52° 18.7116N, 1° 47.0517E. Waveriders deployed will monitor significant wave height, wave period, wave direction, directional spread, and sea surface temperature continuously until recovery. Transit was then to the Warp survey area where two NIOZ cores were completed following a toolbox talk for staff and scientists, integrating the use of tether lines and COVID 19 protocols in the operation for the first time. Sub-cores will be analysed for PSA/OCN, porosity+chlorophyll.

Pb210/d13, PAH/alkanes and microplastics During transit a further four underway water samples were taken.

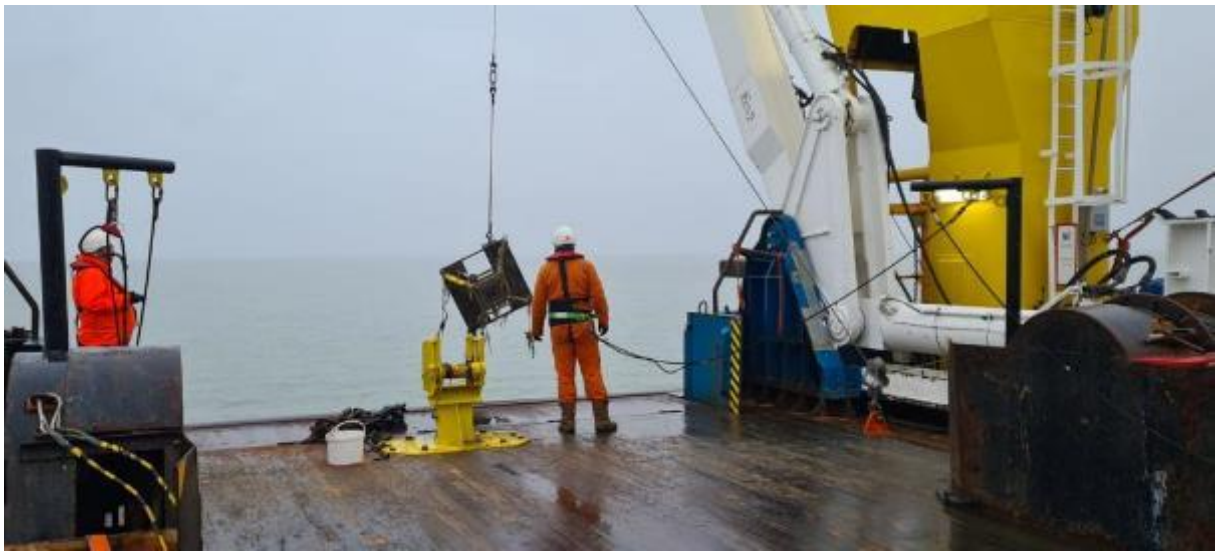
Picture 2: NIOZ corer

3rd February 2021: Overnight anchor was at the Mouse anchorage where two underway water samples were taken. At the Warp site a CTD dip was completed following a toolbox talk at 06:45. The Warp SmartBuoy was recovered at 07:45 (Picture 3), followed by the Noise micro-lander (Picture 4) at 08:30. A new noise micro-lander was deployed at 09:32 at 51° 31.9962N, 1° 2.7158E. A new SmartBuoy was deployed at 09:54 at 51° 31.991N, 1° 2.853E. A post deployment CTD rosette was taken at 10:12. SmartBuoys will autonomously sense multiple parameters, including temperature, salinity, fluorescence, turbidity, oxygen concentration, for three months at a time. Automatic water samplers on the buoys will also collect water for analysis of phytoplankton abundance and species. Pre and Post deployment CTDs used to collect discrete water samples at both the surface and at depth to calibrate SmartBuoy sensors. They will be analysed for oxygen, nutrients, and chlorophyll concentration, along with salinity, suspended particulate matter, total alkalinity/dissolved inorganic carbon, and phytoplankton species composition. Noise landers will record noise levels at the seabed until re-deployment. Two

underway samples were taking during the steam to the South Knock Waverider. The Waverider was hooked at 13:54, and a new Waverider was deployed at 14:23 at 51° 34.231N, 1° 34.720E. Transit was then to the West Gabbard 2 SmartBuoy site, where a CTD rosette was deployed at 17:21. At 18:14 the West Gabbard 2 SmartBuoy was deployed at 51° 57.233N, 2° 6.654E. A post deployment CTD was taken at 18:31, followed by a plankton net of 0.2mm mesh size at 18:49. The NIOZ corer was then deployed at 19:16, 19:28, and 19:41. Adjustments made to the pin improved deployment efficiency of the NIOZ in comparison to the previous evening, but it was not possible to obtain a sample due to a layer of clay at 4cm. Overnight transit was to the Dowsing Noise Lander site.



Picture 3: SmartBuoy recovery.



Picture 4: Noise micro-lander recovery

4th February 2021: Four underway water samples were taken overnight before arrival at the Dowsing site for 06:00. At 06:08 the CTD rosette was deployed at the Dowsing site, followed by the noise mini-lander recovery at 08:19 and re-deployment at 09:36 at 53° 31.742N, 1° 3.378E

(Picture 5). The NIOZ corer was deployed 3 times at 10:37, 10:52, and 11:07, however it was not possible to obtain a sample due to large gravel pieces in the sediment. During transit to the first station of the coring transect, one underway sample was taken. At T24, the first of the coring stations, the corer was deployed at 14:35 and 14:46. Another underway sample was taken before further deployments of the NIOZ corer at T23 (16:11,16:19), T22 (17:38, 17:47), T20 (20:51, 21:01), before returning to T21 to deploy a CTD at 21:23 to collect water at multiple depths for Thorium analysis. The CTD rosette did not descend as it was determined conditions were too rough for deployment. On recovery some damage was incurred on the CTD lifting bar.

Picture 5: Dowsing noise mini-lander recovery

5th February 2021: Transit was then to the next section of the coring transect, T18, where coring began at 08:48, and proceeded until 19:59 that evening covering stations T18, T28, T13, T12 (Off Tyne/Tees) and T29, completing 10 cores in total. Underway water samples were taken throughout the day. Overnight was spent dodging in the region of station T27. 100L of water was taken from the underway system at T12 (Off Tyne/Tees) and at T27 for Thorium analysis.

6th February 2021: At first light it was deemed unsafe to continue coring operations due to worsening weathering conditions, Cefas Endeavour steamed to the Firth of Forth to shelter. Six underway samples were taken en-route. Routine maintenance identified an issue with one engine, which was taken out of service, steaming was on two engines as planned.

7th February 2021: A further three underway samples were taken before dropping anchor in Firth of Forth at 08:00. Weather was continuously monitored but remained unsuitable to continue work so vessel remained at anchor. The third engine was repaired during anchorage.

8th February 2021: Continued to rest at anchor awaiting suitable weather window to resume operations, scientific crew began to pack away equipment in preparation for de-mob, and completed the deconstruction of SmartBuoy equipment previously hindered by poor weather. Scientific staff also participated in emergency drill.

9th February 2021: The anchor was lifted at 04:30 and transit was to Firth of Forth waverider for first light. A first attempt was abandoned due to poor weather. At 11:03 the waverider was successfully hooked and recovered. A new waverider was deployed on site at 11:46. Turnround of Torness waverider was not considered possible due to high onshore swell. A coastal route southward was taken to allow collection of 5 underway water samples in in-shore eutrophication assessment areas. At 18:48 T01, the first station of the final transect of coring sites, was reached. Coring along the transect finished at 23:27, completing 7 cores across stations T01, T03, and T05. Transit was then to the Tyne/Tees waverider station.

10th February 2021: Three underway water samples were taken over night during transit to the Tyne/Tees waverider. Recovery of the waverider began at 08:15 and was completed by 09:30. Cefas Endeavour then steamed south following a coastal route through the Humber area in order to take a further 9 underway samples.

11th February 2021: Cefas Endeavour steamed to Lowestoft, docking by 07:30. Sensitive equipment and samples were removed from the vessel under the assistance of scientific staff, and all scientific staff departed by 10:00. Thank you to the AWSM crew and the scientific staff for a successful cruise under challenging conditions.

RESULTS: In relation to the above-mentioned Aims:

1. Service Noise Landers at Dowsing and Warp: **Achieved**
2. Service SmartBuoys at West Gabbard and Warp: **Achieved**
3. Service Waveriders at South Knock, Southwold, Tyne/Tees, Firth of Forth, Torness: **4/5 Achieved**
4. Continuous flow and CTD Rosette water sampling as required on various transects: **Achieved**
5. Collection of zooplankton sample at West Gabbard: **Achieved**
6. NIOZ coring at Dowsing, West Gabbard, and offshore transect sites: **Achieved**

The detailed breakdown of equipment deployed, and samples collected for analysis can be found in Table 1.

Table 1. Summary of sample collections including deployments and recoveries of gear.

Station number	Date	Time UTC	Station Name	Gear deployed	Latitude	Longitude	Analysis
1	02/02/2021	15:04	Underway	Water pump	52° 18.8194N	1° 47.111E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
2	02/02/2021	15:19	Southwold	Waverider recovered	52° 18.793N	1° 47.075E	Continuous significant wave height, wave period, wave direction, directional spread, sea surface temperature.
3	02/02/2021	16:10	Southwold	Waverider deployed	52° 18.7116N	1° 47.0517E	Continuous significant wave height, wave period, wave direction, directional spread, sea surface temperature.
4	02/02/2020	17:30	Underway	Water pump	52° 7.306N	1° 39.252E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
5	02/02/2021	18:33	Underway	Water pump	51° 57.671N	1° 33.174E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
6	02/02/2021	19:30	Underway	Water pump	51° 47.810N	1° 31.014E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
7	02/02/2021	20:35	Underway	Water pump	51° 40.000N	1° 16.851E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC

Station number	Date	Time UTC	Station Name	Gear deployed	Latitude	Longitude	Analysis
8	02/02/2021	22:04	Warp	NIOZ corer	51° 31.874N	1° 2.980E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
9	02/02/2021	22:24	Warp	NIOZ corer	51° 31.875N	1° 2.980E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
10	03/02/2021	04:23	Underway	Water pump	51° 31.0867	1° 0.4965E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
11	03/02/2021	05:26	Underway	Water pump	51° 31.068N	1° 0.549E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
12	03/02/2021	06:46	Warp	CTD rosette	51° 31.876N	1° 3.049E	Temperature, 2x Salinity, 2x Nutrients, 6x chlorophyll, 2x SPM, 6x dissolved O_2, 1xTADIC
13	03/02/2021	07:45	Warp	SmartBuoy recovery			Continuous salinity, fluorescence, turbidity, oxygen, light, nutrient concentrations, and temperature
14	03/02/2021	08:30	Warp	Noise lander recovery			Continuous ambient noise
15	03/02/2021	09:08	Warp	Noise lander deployment	51° 31.9386N	1° 2.7945E	Continuous ambient noise
16	03/02/2021	09:32	Warp	Noise lander clump deployment	51° 31.9962N	1° 2.7158E	Continuous ambient noise
17	03/02/2021	09:54	Warp	SmartBuoy deployment	51° 31.991N	1° 2.853E	Continuous salinity, fluorescence, turbidity, oxygen, light, nutrient concentrations, and temperature
18	03/02/2021	10:12	Warp	CTD rosette	51° 31.764N	1° 2.9292E	Temperature, 2x Salinity, 2x Nutrients, 6x chlorophyll, 2x SPM, 6x dissolved O_2, 1x phyto, 1xTADIC
19	03/02/2021	12:23	Underway	Water pump	51° 28.480N	1° 19.572E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
20	03/02/2021	13:28	Underway	Water pump	51° 32.969N	1° 34.593E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
21	03/02/2021	13:54	South Knock	Waverider hooked	51° 32.969N	1° 34.593E	Continuous significant wave height, wave period, wave direction, directional spread, sea surface temperature.

Station number	Date	Time UTC	Station Name	Gear deployed	Latitude	Longitude	Analysis
22	03/02/2021	14:08	South Knock	Waverider clump on deck	51° 34.2234N	1° 34.6019E	Continuous significant wave height, wave period, wave direction, directional spread, sea surface temperature.
23	03/02/2021	14:23	South Knock	Waverider clump released	51° 34.231N	1° 34.720E	Continuous significant wave height, wave period, wave direction, directional spread, sea surface temperature.
24	03/02/2021	16:25	Underway	Water pump	51° 50.542N	2° 1.819E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
25	03/02/2021	17:21	West Gabbard	CTD rosette	51° 57.102N	2° 7.082E	Temperature, 2x Salinity, 2x Nutrients, 6x chlorophyll, 2x SPM, 6x dissolved O_2, 1x phyto, 1xTADIC
26	03/02/2021	18:14	West Gabbard	SmartBuoy	51° 57.233N	2° 6.654E	Continuous salinity, fluorescence, turbidity, oxygen, light, nutrient concentrations, and temperature
27	03/02/2021	18:31	West Gabbard	CTD rosette	51° 57.4488N	2° 7.0224E	Temperature, 2x Salinity, 2x Nutrients, 6x chlorophyll, 2x SPM, 6x dissolved O_2, 1xTADIC
28	03/02/2021	18:49	West Gabbard	Plankton net	51° 58.1202N	2° 7.8155E	Plankton community and abundance
29	03/02/2021	19:16	West Gabbard	NIOZ corer	51° 57.4248N	2° 6.9736E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
30	03/02/2021	19:28	West Gabbard	NIOZ corer	51° 57.4248N	2° 6.9736E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
31	03/02/2021	19:41	West Gabbard	NIOZ corer	51° 57.4284N	2° 6.9769E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
32	03/02/2021	23:07	Underway	Water pump	52° 32.698N	1° 59.703E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
33	04/02/2021	01:01	Umderway	Water pump	52° 49.479N	1° 47.801E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
34	04/02/2021	02:57	Underway	Water pump	53° 6.009N	1° 26.631E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
35	04/02/2021	05:00	Underway	Water pump	53° 24.1595N	1° 12.400E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC

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Station number	Date	Time UTC	Station Name	Gear deployed	Latitude	Longitude	Analysis
36	04/02/2021	06:08	Dowsing	CTD rosette	53° 31.6992N	1° 3.7332E	Temperature, 2x Salinity, 2x Nutrients, 6x chlorophyll, 2x SPM, 6x dissolved O_2, 1xTADIC
37	04/02/2021	08:09	Dowsing	Noise lander clump recovery	53° 31.691N	1° 3.301E	Continuous ambient noise monitoring
38	04/02/2021	08:19	Dowsing	Noise lander recovery	53° 31.682N	1° 3.232E	Continuous ambient noise monitoring
39	04/02/2021	09:23	Dowsing	Noise lander deployment	53° 31.745N	1° 3.228E	Continuous ambient noise monitoring
40	04/02/2021	09:36	Dowsing	Noise lander clump deployment	53° 31.742N	1° 3.378E	Continuous ambient noise monitoring
41	04/02/2021	10:37	Dowsing	NIOZ corer	53° 31.866N	1° 3.574E	No sample
42	04/02/2021	10:52	Dowsing	NIOZ corer	53° 31.869N	1° 3.569E	No sample
43	04/02/2021	11:07	Dowsing	NIOZ corer	53° 31.795N	1° 3.763E	No sample
44	04/02/2021	13:00	Underway	Water pump	53° 48.399N	0° 58.833E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
45	04/02/2021	14:35	T24	NIOZ corer	54° 0.7818N	1° 10.4013E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
46	04/02/2021	14:46	T24	NIOZ corer	54° 0.7794N	1° 10.4011E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
47	04/02/2021	15:42	Underway	Water pump	54° 0.628N	1° 22.631E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
48	04/02/2021	16:11	T23	NIOZ corer	54° 1.4928N	1° 28.0210E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
49	04/02/2021	16:19	T23	NIOZ corer	54° 1.497N	1° 28.0197E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics

Station number	Date	Time UTC	Station Name	Gear deployed	Latitude	Longitude	Analysis
50	04/02/2021	17:38	T22	NIOZ corer	54° 1.641N	1° 42.851E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
51	04/02/2021	17:47	T22	NIOZ corer	54° 1.634N	1° 42.856E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
52	04/02/2021	19:17	T21	NIOZ corer	54° 0.0498N	1° 59.998E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
53	04/02/2021	19:28	T21	NIOZ corer	54° 0.0516N	2° 0.001E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
54	04/02/2021	20:51	T20	NIOZ corer	54° 2.361N	2° 11.752E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
55	04/02/2021	21:01	T20	NIOZ corer	54° 2.361N	2° 11.754E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
56	04/02/2021	21:23	T21	CTD rosette	53° 59.943N	2° 0.0119E	Deployment failed
57	05/02/2021	02:30	Underway	Water pump	54° 1.367N	2° 13.424E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
58	05/02/2021	08:48	T18	NIOZ corer	54° 2.642N	2° 37.771E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
59	05/02//2021	09:04	T18	NIOZ corer	54° 2.647N	2° 37.775E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
60	05/02/2021	11:01	Underway	Water pump	54° 17.029N	2° 14.173E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
61	05/02/2021	12:52	T28	NIOZ corer	54° 31.874N	1° 59.965E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
62	05/02//2021	13:00	T28	NIOZ corer	54° 31.874N	1° 59.967E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
63	05/02/2021	13:47	Underway	Water pump	54° 36.06N	1° 54.30E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC

Station number	Date	Time UTC	Station Name	Gear deployed	Latitude	Longitude	Analysis
64	05/02/2021	14:32	Underway	Water pump	54° 44.112N	1° 43.542E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
65	05/02/2021	15:29	T13	NIOZ corer	54° 49.331N	1° 36.938E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
66	05/02//2021	15:39	T13	NIOZ corer	54° 49.317N	1° 36.930E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
67	05/02/2021	17:39	Underway	Water pump	54° 50.035N	1° 20.032E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
68	05/02/2021	17:47	T12	NIOZ corer	54° 50.0502N	1° 20.029E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
69	05/02//2021	17:54	T12	NIOZ corer	54° 50.055N	1° 20.024E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
70	05/02/2021	19:47	T29	NIOZ corer	54° 49.3998N	0° 51.8193E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
71	05/02//2021	19:59	T29	NIOZ corer	54° 49.3992N	0° 51.8191E	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
72	05/02/2021	21:23	Underway	Water pump	54° 49.1348N	0° 39.8764E	Thorium
73	06/02/2021	10:32	Underway	Water pump	54° 48.841N	0° 14.0453E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
74	06/02/2021	12:28	Underway	Water pump	54° 57.488N	0° 10.043W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
75	06/02/2021	14:35	Underway	Water pump	55° 7.069N	0° 40.959W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
76	06/02/2021	16:32	Underway	Water pump	55° 16.379N	1° 11.994W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
77	06/02/2021	17:18	Underway	Water pump	55° 19.379N	1° 23.218W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC

Station number	Date	Time UTC	Station Name	Gear deployed	Latitude	Longitude	Analysis
78	06/02/2021	18:27	Underway	Water pump	55° 22.093N	1° 22.865W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
79	07/02/2021	00:29	Underway	Water pump	55° 37.263N	1° 28.357W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
80	07/02/2021	02:11	Underway	Water pump	55° 41.913N	1° 26.152W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
81	07/02/2021	04:18	Underway	Water pump	55° 53.697N	1° 58.387W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
82	09/02/2021	11:03	Firth of Forth	Waverider hooked	56° 11.236N	2° 30.233W	Continuous significant wave height, wave period, wave direction, directional spread, sea surface temperature.
83	09/02/2021	11:19	Firth of Forth	Waverider clump on deck	56° 11.263N	2° 30.176W	Continuous significant wave height, wave period, wave direction, directional spread, sea surface temperature.
84	09/02/2021	11:46	Firth of Forth	Waverider clump released	56° 11.277N	2° 30.225W	Continuous significant wave height, wave period, wave direction, directional spread, sea surface temperature.
85	09/02/2021	13:23	Underway	Water pump	56° 2.037N	2° 10.845W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
86	09/02/2021	14:22	Underway	Water pump	55° 54.919N	1° 55.688W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
87	09/02/2021	15:25	Underway	Water pump	55° 44.838N	1° 46.061W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
88	09/02/2021	16:26	Underway	Water pump	55° 40.345N	1° 30.731W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
89	09/02/2021	17:23	Underway	Water pump	55° 31.238N	1° 25.622W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
90	09/02/2021	18:48	T01	NIOZ corer	55° 29.9650N	1° 1.7617W	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
91	09/02/2021	18:59	T01	NIOZ corer	55° 29.9630N	1° 1.7608W	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics

Station number	Date	Time UTC	Station Name	Gear deployed	Latitude	Longitude	Analysis
92	09/02/2021	20:43	T03	NIOZ corer	55° 24.0142N	0° 52.003W	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
93	09/02/2021	20:54	T03	NIOZ corer	55° 24.0174N	0° 52.002W	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
94	09/02/2021	23:05	T05	NIOZ corer	55° 14.4026N	0° 30.848W	Sediment PSA/OCN, porosity+chlorophyll. Pb210/d13, PAH/alkanes, microplastics
95	09/02/2021	23:14	T05	NIOZ corer	55° 14.4036N	0° 30.851W	No sample
96a	09/02/2021	23:27	T05	NIOZ corer	55° 14.4060N	0° 30.842W	No sample
96b	09/02/2021	23:36	T05	NIOZ corer	55° 14.4070N	0°30.8315W	No sample
97	10/02/2021	01:47	Underway	Water pump	55° 5.047N	0° 36.409W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
98	10/02/2021	03:58	Underway	Water pump	54° 57.256N	0° 40.723W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
99	10/02/2021	06:03	Underway	Water pump	54° 54.696N	0° 44.221W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
100	10/02/2021	08:28	Tyne/Tees	Waverider	54° 55.187N	0° 45.049W	Continuous significant wave height, wave period, wave direction, directional spread, sea surface temperature.
101	10/02/2021	08:36	Tyne/Tees	Waverider	54° 55.160N	0° 45.034W	Continuous significant wave height, wave period, wave direction, directional spread, sea surface temperature.
102	10/02/2021	09:11	Tyne/Tees	Waverider	54° 55.155N	0° 44.945W	Continuous significant wave height, wave period, wave direction, directional spread, sea surface temperature.
103	10/02/2021	09:15	Tyne/Tees	Waverider	54° 55.154N	0° 44.920W	Continuous significant wave height, wave period, wave direction, directional spread, sea surface temperature.
104	10/02/2021	10:40	Underway	Water pump	54° 45.234N	0° 51.724W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC

Station number	Date	Time UTC	Station Name	Gear deployed	Latitude	Longitude	Analysis
105	10/02/2021	12:05	Underway	Water pump	54° 34.123N	0° 39.554W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
106	10/02/2021	13:02	Underway	Water pump	54° 26.259N	0° 24.644W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
107	10/02/2021	14:01	Underway	Water pump	54° 16.723N	0° 11.723W	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
108	10/02/2021	15:03	Underway	Water pump	54° 6.783N	0° 3.079E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
109	10/02/2021	17:11	Underway	Water pump	53° 43.090N	0° 25.678E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
110	10/02/2021	18:39	Underway	Water pump	53° 30.740N	0° 24.190E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
111	10/02/2021	19:35	Underway	Water pump	53° 22.683N	0° 35.539E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC
112	10/02/2021	20:37	Underway	Water pump	53° 14.793N	0° 39.181E	Temperature, Salinity, 1x Nutrients, 1x salinity, 1x chlorophyll, 1xSPM, 1xTADIC

SIC: Dave Sivyer
2IC: Eleanor Haigh

Date: 12/02/2021

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