Natural England Commissioned Report NECR305

Medway Estuary MCZ 2019 Subtidal Survey Report

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Foreword

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

Background

Following designation, Natural England started a baseline monitoring programme across all marine protected areas.

This report was commissioned as part of an inshore benthic marine survey of the Medway Estuary MCZ.

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Further information
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Medway Estuary MCZ 2019 Subtidal Survey Report

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H. Cumming	09/08/2019	First draft submitted to MPAG for QA.	v.1
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Medway Estuary MCZ 2019 Subtidal Survey Report

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1. Introduction

Following the introduction of the Marine and Coastal Access Act in 2009, the UK Government is creating an ecologically coherent network of Marine Conservation Zones (MCZs) in British waters. The MCZ network will exist alongside other Marine Protected Areas (MPAs), including Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSIs) and Ramsar sites to help conserve marine biodiversity, in particular habitats and species of national importance.

Forming part of this network, the Medway Estuary MCZ was formally designated in 2013. The site has been created to protect a range of subtidal and intertidal features, as well as the nationally scarce Tentacled Lagoon-Worm (*Alkmaria romijni*) (Table 1). Following designation, Natural England* have started a programme of monitoring and the initial datasets gathered will be used to assess feature condition to inform future survey planning and management of the site.

In Tranche 3, an extension to the MCZ was granted on the 31st of May for the protection of the additional Species Feature Of Conservation Importance (FOCI) Smelt (*Osmerus eperlanus*) (Figure 1).

1.1 Site Description

The Medway Estuary MCZ is located on the Kent coast and encompasses the Medway Estuary from Rochester down to its mouth, extending seaward to include an area between Sheerness and the Isle of Grain (Figures 1 and 2). The site boundary encompasses a total area of 60 km^2 and overlaps with three SSSIs (Medway Estuary and Marshes SSSI, South Thames Estuary and Marshes SSSI, Tower Hill to Cockham Wood SSSI), two Ramsars (Medway Estuary and Marshes Ramsar, Thames Estuary and Marshes Ramsar) and three SPAs (Medway Estuary and Marshes SPA, Outer Thames Estuary SPA, Thames Estuary and Marshes SPA). The Swale Estuary MCZ adjoins the site too (Figure 1).

Due to the large range of habitats protected within this zone, this site is capable of supporting some of the most diverse communities in the South-East region (Natural England, 2013). The MCZ protects a geographically restricted but important population of the Tentacled Lagoon-Worm (*Alkmaria romijni*) and their associated habitats. This worm is protected under Schedule 5, Section 9(4) (a) of the Wildlife and Countryside Act 1981 (as amended) and is a nationally scarce species (Tyler-Walters and White, 2017).

*inshore Statutory Nature Conservation Body

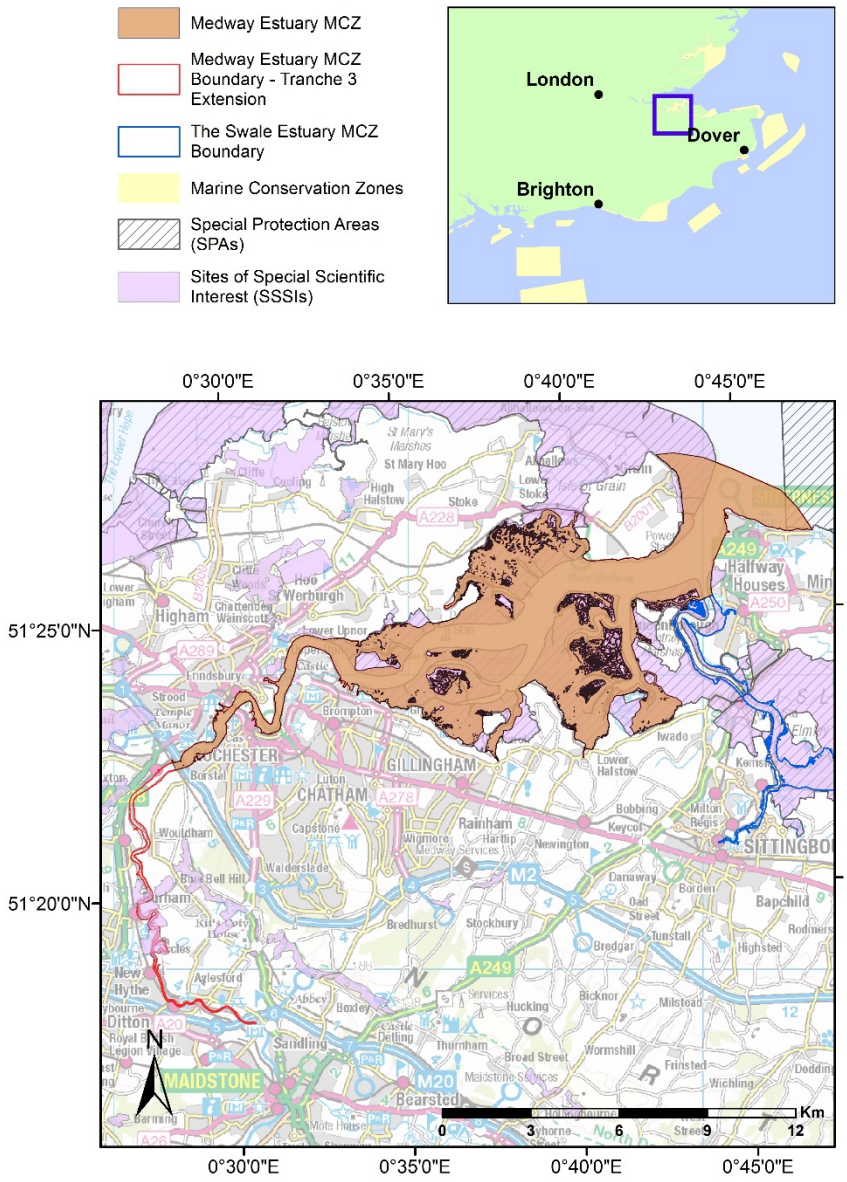

Figure 1. Location of the Medway Estuary MCZ and boundary of the Tranche 3 extension (red) in the context of other MCZs off the southeast of England.

The Features of Conservation Importance (FOCI) protected under the MCZ Designation Order are presented in Table 1 alongside the general management approach. This survey focused on those features indicated by grey shading (Table 1). Current Kent and Essex IFCA (KEIFCA) management measures in place within the MCZ include the No Take Zone (River Medway Nursery Area byelaw) and a Cockle Fishery Flexible Permit byelaw. Further details can be found on their website https://www.kentandessex-ifca.gov.uk/i-want-to-find-out-about/regulations/keifca-byelaws/ [accessed 17/12/2019].

Table 1. Features of conservation importance present in the Medway Estuary MCZ and the current General Management Approach (GMA). The subtidal monitoring survey planned here focused on those features indicated by grey shading.

Feature Type	Features Present	Designated	GMA
Broadscale Habitat (BSH)	A2.2 Intertidal sand and muddy sand	✓	Maintain
	A2.4 Intertidal mixed sediments	✓	Maintain
	A3.3 Low energy intertidal rock	✓	Maintain
	A5.1 Subtidal coarse sediment	✓	Maintain
	A5.2 Subtidal sand	✓	Maintain
	A5.3 Subtidal mud	✓	Maintain
Habitat Feature of Conservation Importance	Estuarine rocky habitats	✓	Maintain
	Peat and clay exposures	✓	Maintain
Species Feature of Conservation Importance	Tentacled Lagoon-Worm (*Alkmaria romijni*)	✓	Maintain
	Smelt (*Osmerus eperlanus*)[1]	✓	Recover

[1] Smelt (*Osmerus eperlanus*) supporting feature information only, due to the sampling techniques employed.

1.2 Survey Aim and Objectives

To undertake a survey of Medway Estuary MCZ designated features (Table 1) to obtain improved evidence providing a dataset which can be used to detect change over time and ascribe condition. This will inform future monitoring and management measures.

There are three objectives for this survey.

Objective 1: Monitoring survey to collect data to investigate the structure, function and distribution of the subtidal MCZ features

The data acquired will;

a) Improve understanding of extent and distribution of MCZ subtidal features across the site

Objective 2: Collect data to investigate the distribution of the MCZ species FOCI Tentacled Lagoon-Worm (*Alkmaria romijni*)

The data acquired will;

a) Verify the presence and extent of Tentacled Lagoon-Worm (*Alkmaria romijni*) within the MCZ

Objective 3: Characterising survey to collect subtidal data within the Tranche 3 site extension

The data acquired will;

a) Improve the understanding of subtidal habitats used by the designated species FOCI Smelt (*Osmerus eperlanus*) within the MCZ extension.

1.3 Survey Team

The Medway Estuary MCZ survey took place between the 4th and 7th June 2019. The survey team comprised of marine monitoring specialists from the Environment Agency. The coastal survey vessel *Thames Guardian,* staffed and operated by Briggs Marine (Figure 2, Annex 7.1), was used to conduct the survey work reported here.

Figure 2. Coastal survey vessel *Thames Guardian,* operated by Briggs Marine.

2. Survey Design and Methods

2.1 Survey Design and Planning Phase

The Environment Agency surveyed the subtidal habitat within the Medway Estuary prior to designation in 2012 for the Water Framework Directive (WFD) monitoring programme. An MCZ monitoring survey of subtidal features was undertaken by the Environment Agency on behalf of Natural England in 2014 but no report was written.

The 2019 survey was designed using historical sampling data and specialist knowledge. Due to low confidence in the existing Medway Estuary MCZ subtidal habitat maps power analysis was not deemed suitable to inform 2019 sampling plan.

Forty-nine 0.1m^2 Day Grab stations were selected for infauna and particle size analysis (PSA) sampling across the MCZ (Figure 3). Eighteen of these stations were historical sampling locations from the 2012 and 2014 surveys to investigate changes in habitat and associated communities over time. Four of these stations were selected for Environmental Quality Standards Directive (EQSD) contaminants analysis (MDWE02, 15, 23, 45). Following the designation of the MCZ Extension on the 31st May 2019 by the UK Government, seven stations were added to provide information on an area of the estuary not previously sampled.

Measurements of near-seabed temperature, dissolved oxygen and turbidity were obtained at every grab station to provide physico-chemical data on the supporting processes of the site features present.

A Before-After-Control-Impact (BACI) style survey was not deemed suitable due to the variable estuarine nature of the site and a lack of non-designated comparable habitat within close proximity.

Marine specialists from the Environment Agency and Natural England reviewed the plan. The following hazards were identified from the UK Hydrographic Office Admiralty charts: underwater obstructions, wharfs, shipping terminals and movements of the Rochester Oyster and Floating Fishery (ROFF) and Peel Ports. Sampling stations were relocated, and the necessary parties were consulted, to avoid these hazards as far as possible. A ‘Notification of an exempt activity form’ was submitted to the Marine Management Organisation prior to the survey being carried out.

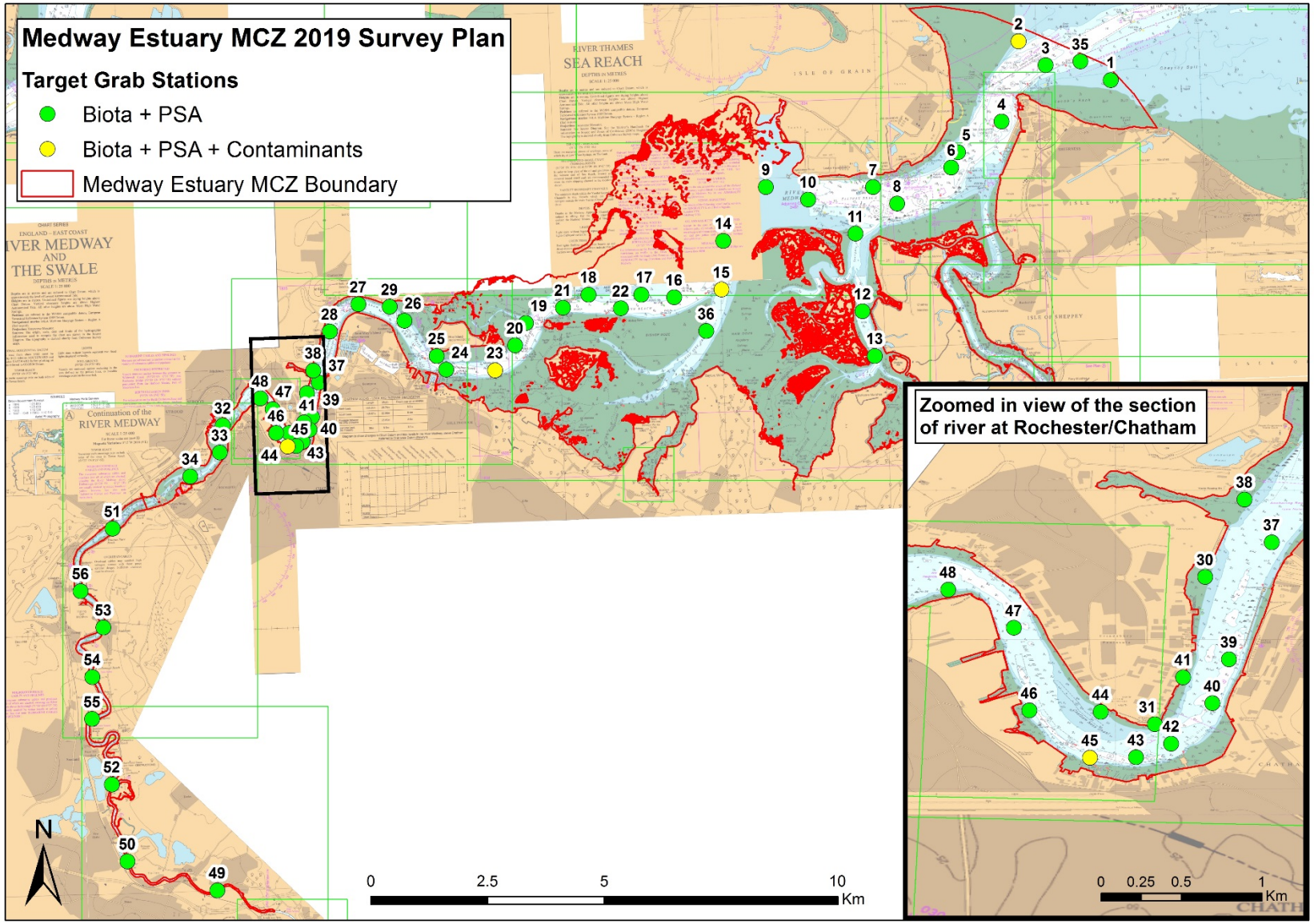

Figure 3. Medway Estuary MCZ Summer 2019 subtidal grab survey plan.

2.2 Sample Collection Methodology

2.2.1 Broadscale Habitat Groundtruthing

A Day Grab (Figure 4), with a surface sampling area of 0.1 m^2 was deployed from the stern gantry of the survey vessel to recover sediment from the seabed as described in the Environment Agency Water Framework Directive (WFD) operational instructions 104_10 (Environment Agency, 2012) and 009_07 (Environment Agency, 2014). Sampling positions were recorded (fixed) using HYDROpro data acquisition software when the gear contacted the seabed. The mid-point of the vessel's stern gantry was used as the default offset for position fixing (see Annex 7.2.1 for further details).

The EA WFD sampling methodology required two similar samples; the first was used to obtain a fauna sample (minimum depth of 5 cm in sand habitat and 7 cm in mud habitat) and the second solely to obtain a sub-sample for particle size analysis. A general description of the sediment was recorded.

The sample was also inspected for a Redox Potential Discontinuity (RPD) or 'black layer', if present, the depth below the surface was recorded. The faunal sample was then processed, by washing over a 0.5 mm mesh sieve (Figure 4). The retained material was photographed on the sieve and preserved in a buffered 10 % formaldehyde solution for transfer ashore to a specialist laboratory for analysis. Further grab attempts were made to acquire a second sample containing similar material to the first (grabs with dissimilar material were discarded). A full depth-integrated core of sediment (approx. volume of 500 ml) was taken from the second sample for particle size analysis.

At four stations, additional grabs were collected to retrieve material for contaminant analyses following the methodology detailed in the Environment Agency operational instruction 10_01 (Environment Agency, 2007). Surface scrapes (i.e. the recently deposited sediment) were removed from each grab to a maximum depth of 1 cm (avoiding the anoxic layer). A metal scoop was used to collect material for organic contaminant analyses and a plastic scoop for heavy metals. The remaining material was then discarded. The upper 1 cm was used as this provides a record of the most recent contaminant levels deposited in the sediment. All samples were frozen at -20°C after collection.

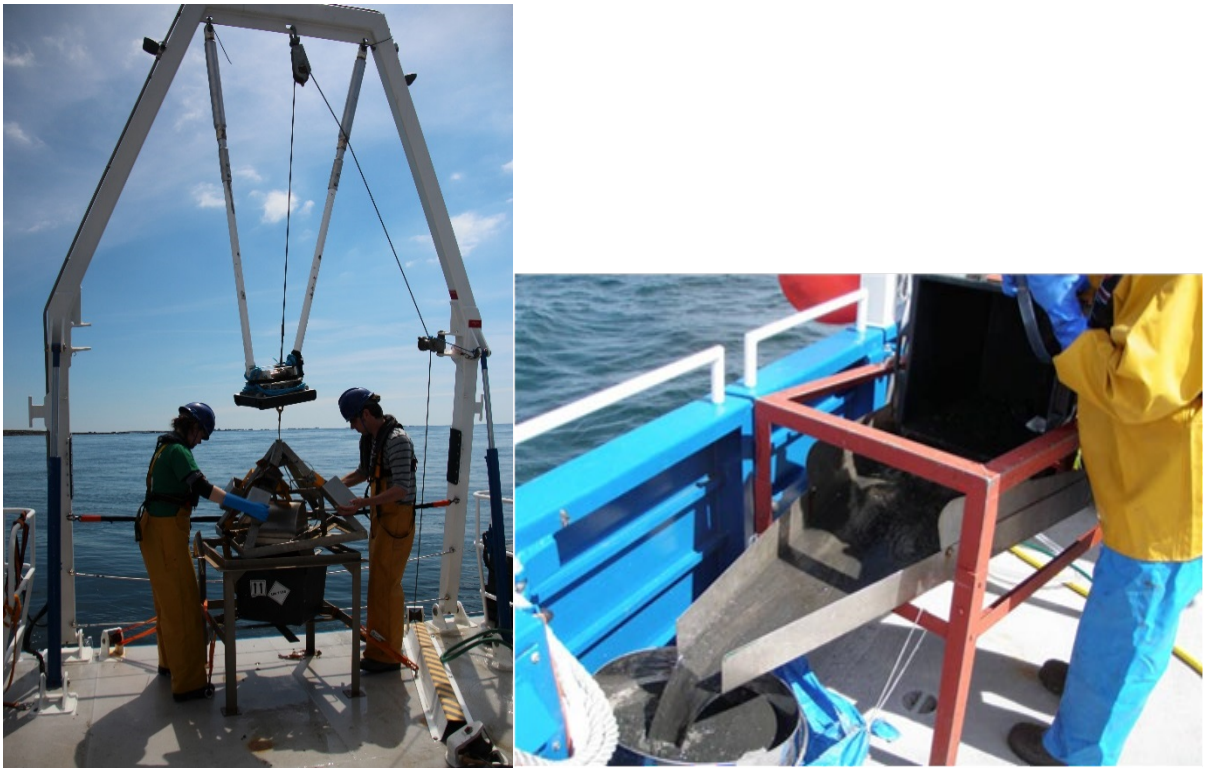

Figure 4. Day Grab (left), and equipment for sieving benthic fauna samples (right).

Sediment descriptions were recorded for each sample collected. For consistency across all the MCZ benthic habitat surveys, these were based on a pictorial field guide produced by Cefas marine sedimentologists, a modified Folk seabed sediment classification system (Long, 2006) (Figure 5) and the Wentworth Scale (Table 2).

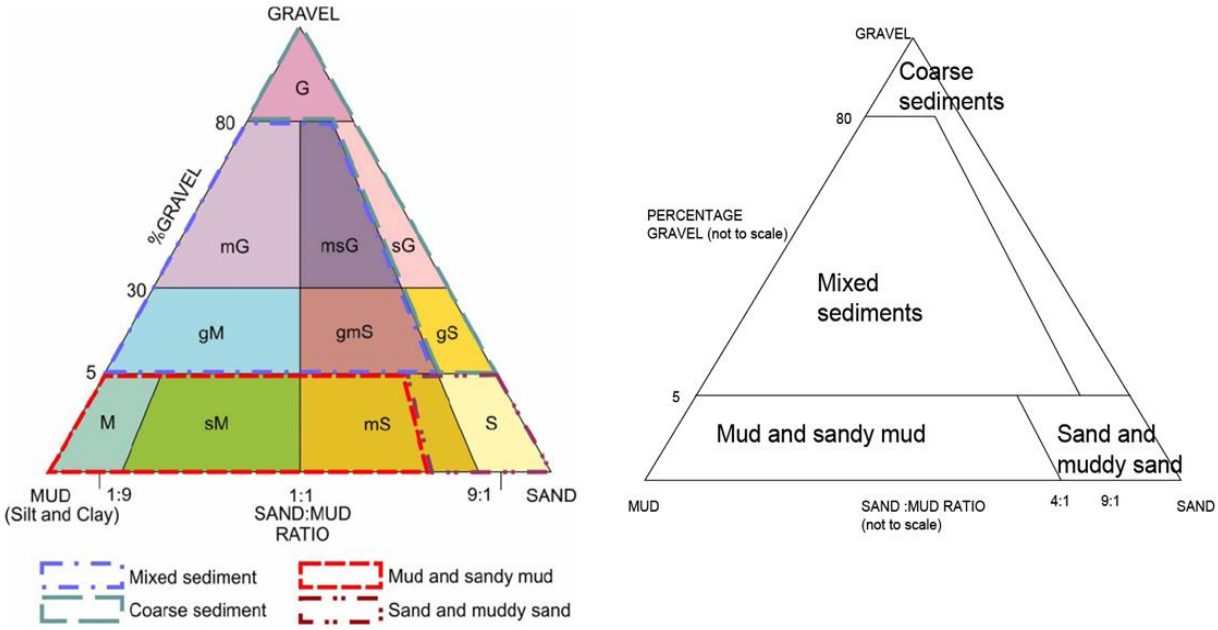

Figure 5. Simplified sediment classification of the Folk triangle for UK SeaMap (Long, 2006).

Table 2. Sediment grade terms and size limits (Wentworth, 1922).

Size	Grade Terms
> 256 mm	Boulder
> 64 - 256 mm	Cobble
4 - 64 mm	Pebble

3. Survey Narrative

Between the 3rd and 6th June 2019, the Medway Estuary MCZ monitoring survey took three 'on-task' days to complete. Daily progress reports for the survey are available from the Environment Agency on request.

Environment Agency survey personnel mobilised to the survey vessel *Thames Guardian,* berthed in Chatham Marina, on Monday 3rd June. Following a vessel safety briefing for the scientific staff on the morning of Tuesday 4th June, the vessel departed the marina at 06:42 UTC and headed out towards the MCZ survey area with a smooth sea state and good visibility. The vessel arrived on station (MDWE01) at 08:06 UTC. Throughout the day, the team successfully completed PSA and biota Day Grab sampling at 24 stations within the Medway Estuary MCZ. Station MDWE03 yielded only discards due to rocks in the jaw of the grab. Grab sampling operations ceased at 15:59 UTC and the vessel returned to Chatham Marina, arriving alongside at 16:31 UTC.

The following morning on Wednesday 5th June, the sea state was smooth with good visibility. The *Thames Guardian* departed Chatham Marina at 06:50 UTC arriving on station at 07:22 UTC. Grab survey operations commenced at MDWE24. At stations MDWE27 and MDWE33 coarse sublittoral sediment was encountered, hampering the recovery of viable samples for infauna analysis, therefore only sediment for PSA was retained. At station MDWE32 the grab sampling proved unsuccessful after multiple attempts. Grab survey operations ceased at 14:36 UTC after completing 23 stations and the vessel returned to Chatham Marina at 15:24 UTC.

On 6th June, *Thames Guardian* departed Chatham Marina at 12:00 UTC to complete the remaining grab surveys and arrived at station MDWE51 at 13:15 UTC. Eight stations were attempted with seven yielding only discards mostly due to cobbles in the jaws of the grab. Station MDWE49 was not attempted as the Aylesford Bridge was deemed impassable. The station was relocated downstream of the bridge, but no viable samples were obtained. Grab survey operations ceased at 15:16 UTC and the vessel returned to Chatham Marina at 16:51. A summary of the samples collected is presented in Section 4 of this report.

4. Data Acquisition

4.1 Sample collection summary

Samples collected during the 2019 Medway Estuary MCZ subtidal monitoring survey are summarised in Table 3.

Table 3. Summary of samples collected during the 2019 Medway Estuary MCZ subtidal monitoring survey.

Equipment	Data type	No. of samples
Day Grab	Biota and PSA	45
	PSA only	3

Viable grab samples to assess the relative structure, function and distribution of subtidal MCZ features were successfully recovered from the majority of the survey area. However, sampling success at the stations within the Tranche 3 extension was limited (Figure 7). Samples for both infauna and particle size analysis were collected at 45 stations, using the Day Grab (Figures 6 and 7). At three stations (MDWE03, MDWE27 and MDWE33), the quantity of sediment collected was only sufficient for PSA. Eight stations (MDWE32, MDWE49, MDWE50, MDWE52, MDWE53, MDWE54, MDWE55 and MDWE56) yielded only discards mostly due to cobbles caught in the jaws of the grab. Definitive classification of habitat features present was not possible prior to the results of the more detailed sample analyses carried out in the laboratory being available.

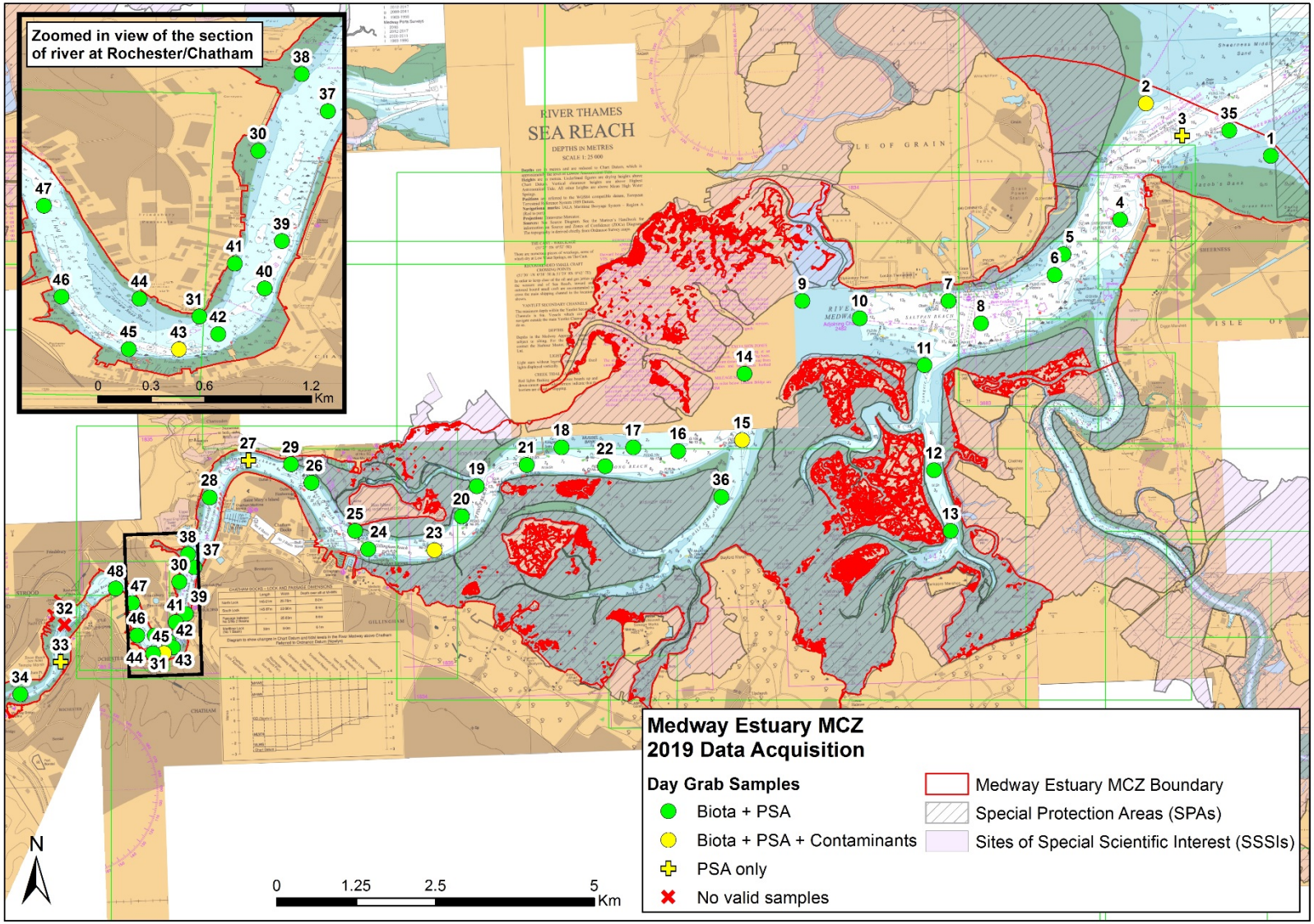

Figure 6. Medway Estuary MCZ Summer 2019 0.1 m^2 Day Grab survey results.

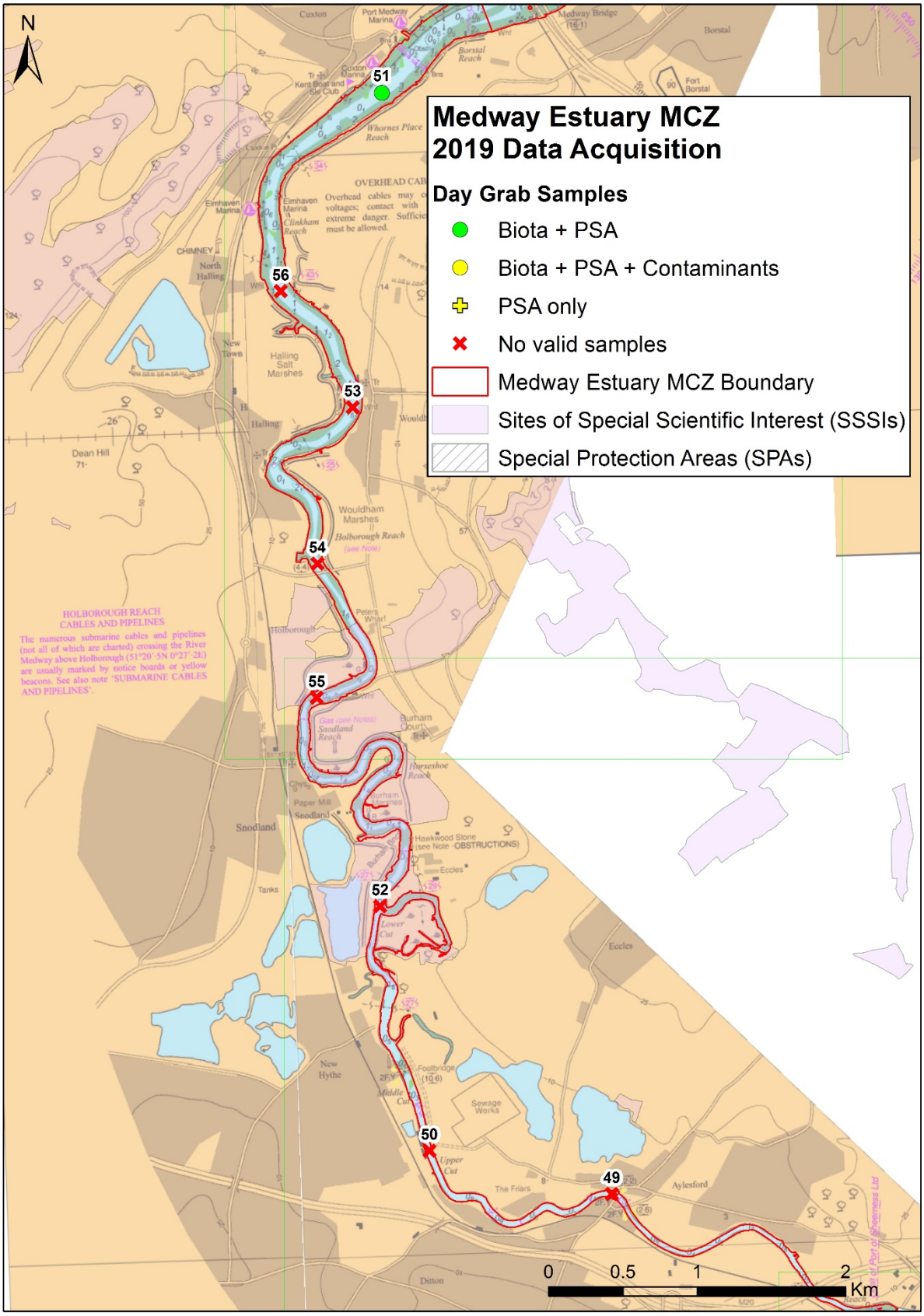

Figure 7. Medway Estuary MCZ Summer 2019 0.1 m^2 Day Grab survey results (Tranche 3 extension).

4.2 Evidence of anthropogenic impacts

A number of items of marine litter were encountered during the Medway Estuary MCZ grab sampling. Bivalves were observed growing on batteries recovered at station MDWE47. A bottle was collected in the grab jaws at MDWE33 and a shoe at MDWE51. Plastic (origin unknown) was also discovered in the sample at station MDWE53.

5. References

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6. General List of Abbreviations

BSH	Broadscale Habitat
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CHP	Civil Hydrography Programme
CS	Camera Sledge
CSV	Coastal Survey Vessel
DC	Drop Video Camera
Defra	Department for Environment, Food and Rural Affairs
DG	Day Grab
EA	Environment Agency
ECMAS	Estuarine and Coastal Monitoring & Assessment Service
ENG	Ecological Network Guidance
FOCI	Features Of Conservation Importance
IFCA	Inshore Fisheries and Conservation Authority
MCZ	Marine Conservation Zone
MESH	Mapping European Seabed Habitats
MHM	Mini-Hamon Grab
PSA	Particle Size Analysis
REC	Regional Environmental Characterisation
ROFF	Rochester Oyster and Floating Fishery
RSG	Regional Stakeholder Group
SAC	Special Area of Conservation
SAD	Site Assessment Document
SNCB	Statutory Nature Conservation Body
SOP	Standard Operating Procedure
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
STR	Subsea Technology and Rentals
UTC	Coordinated Universal Time

7. Annexes

7.1 Coastal Survey Vessel General Information

Briggs Marine and Environmental Services Ltd.
Seaforth House, Seaforth Place, Burtisland, Fife, KY3 9AX.
Tel: +44(0)1592 872939
Email: marketing@briggsmarine.com
Website: www.briggsmarine.com

Thames Guardian

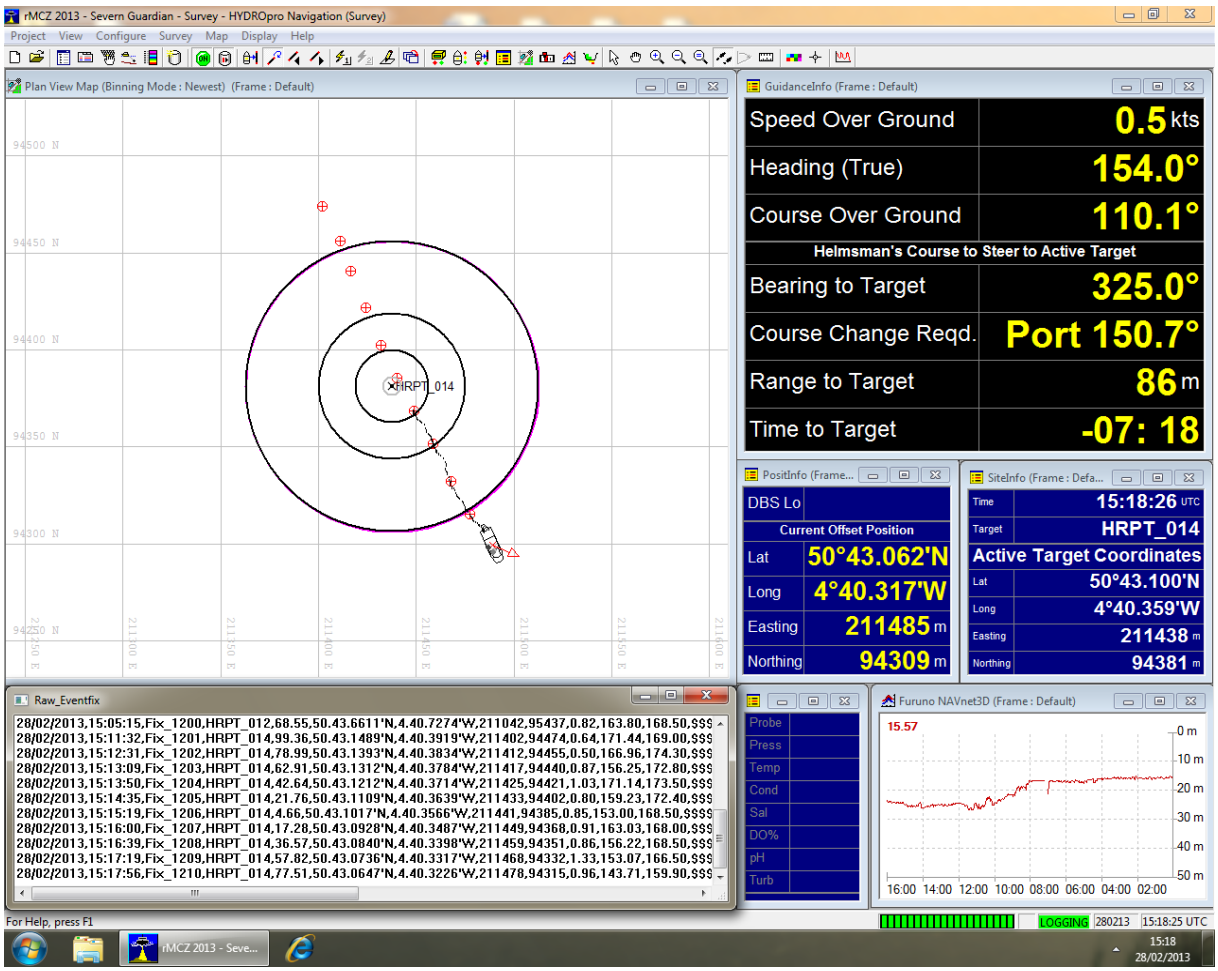
General Information
Length: 14.5 m
Beam: 4.7 m
Draft (light): 1.3 m
Displacement: 13 T
Category Cat 2 Workboat

Main Equipment
Main Engines: 2 x Yanmar type 6LYT-STE @420 HP (each)
Crew: 2 (8 persons maximum)
Trials speed 25 knots /18 knots cruise
Deck Equipment: Pot Hauler 250 kg A-frame including Winch, Data Winch and Instrument Davit.

7.2 Survey Equipment

7.2.1 Navigation and Positioning

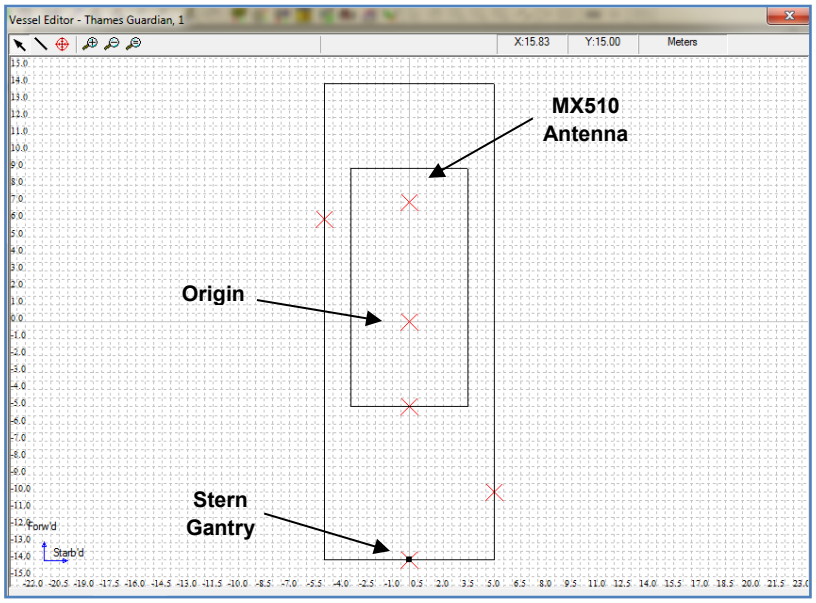
Trimble® HYDRO*pro*™ software is utilised for real-time navigation and survey data acquisition.



Trimble® HYDRO*pro*™ software screen grab displaying real-time navigation and survey data acquisition for a Marine Conservation Zone drop camera survey line.

Navigational and survey equipment offsets on the Coastal Survey Vessel *Thames Guardian* (Environment Agency Estuarine and Coastal Monitoring and Assessment Service).

NMEA Device	Make/Model	Offset Name	Offset (m)		
			X (Starb'd)	Y (Forw'd)	Z +ve (Up)
Gyrocompass	Simrad Robertson RGC50	n/a	-	-	-
Survey Echosounder	Kongsberg EA400	n/a	-	-	-
Survey GPS	SIMRAD MX512 DGPS	MX510 Antenna	0.0	7.0	0.0
n/a	n/a	A-Frame (Stern Gantry)	0.0	-10.25	0.0



Trimble® HYDROpro™ vessel editor screen showing survey equipment offsets from the origin (Environment Agency Estuarine and Coastal Monitoring and Assessment Service).

7.3 Grab Survey Metadata

Date	Time UTC	Station code	WGS84 Latitude DD.DDDD	WGS84 Longitude DD.DDDD	STN (event) number	Hpro fix no.	Water depth (m)	Sediment depth (cm)	Sediment use
04/06/2019	08:06	MDWE1	26.9890	46.3482	1	8828	2.17	6.5	PSA
04/06/2019	08:13	MDWE1	26.9906	46.3413	1	8829	2.32	7.0	Biota
04/06/2019	08:18	MDWE1	26.9907	46.3400	1	8830	2.41	-	Salinity
04/06/2019	08:24	MDWE35	27.2187	45.7930	2	8831	9.36	-	Discarded
04/06/2019	08:27	MDWE35	27.2197	45.7903	2	8833	9.40	7.0	Biota
04/06/2019	08:32	MDWE35	27.2191	45.7977	2	8834	9.43	8.0	PSA
04/06/2019	08:36	MDWE35	27.2153	45.7934	2	8835	9.38	-	Salinity
04/06/2019	08:43	MDWE3	27.1907	45.1524	3	8836	18.22	-	Discarded
04/06/2019	08:46	MDWE3	27.1900	45.1484	3	8837	18.62	7.5	PSA
04/06/2019	08:53	MDWE3	27.1871	45.1479	3	8838	18.68	-	Discarded
04/06/2019	08:56	MDWE3	27.1618	44.9513	3	8839	25.00	-	Discarded
04/06/2019	09:00	MDWE3	27.1911	45.1480	3	8841	18.93	-	Salinity
04/06/2019	09:06	MDWE2	27.4754	44.6708	4	8842	4.80	7.0	Biota
04/06/2019	09:11	MDWE2	27.4787	44.6678	4	8843	4.28	7.0	PSA
04/06/2019	09:16	MDWE2	27.4774	44.6709	4	8844	4.46	-	Sed Chem
04/06/2019	09:21	MDWE2	27.4767	44.6666	4	8845	4.52	-	Salinity
04/06/2019	09:33	MDWE4	26.4970	44.2602	5	8846	19.99	6.0	Biota
04/06/2019	09:38	MDWE4	26.4969	44.2620	5	8847	20.12	-	Discarded
04/06/2019	09:40	MDWE4	26.4974	44.2615	5	8848	20.18	-	Discarded
04/06/2019	09:41	MDWE4	26.4967	44.2592	5	8849	20.18	-	Salinity
04/06/2019	09:43	MDWE4	26.4965	44.2631	5	8850	20.30	5.0	PSA
04/06/2019	09:55	MDWE5	26.2228	43.4730	6	8851	16.25	15.0	Biota
04/06/2019	10:00	MDWE5	26.2217	43.4711	6	8852	16.17	15.0	PSA

Date	Time UTC	Station code	WGS84 Latitude DD.DDDD	WGS84 Longitude DD.DDDD	STN (event) number	Hpro fix no.	Water depth (m)	Sediment depth (cm)	Sediment use
04/06/2019	10:03	MDWE5	26.2212	43.4703	6	8853	16.34	-	Salinity
04/06/2019	10:09	MDWE6	26.0480	43.3440	7	8854	22.03	6.5	Biota
04/06/2019	10:16	MDWE6	26.0498	43.3392	7	8855	22.13	6.0	PSA
04/06/2019	10:19	MDWE6	26.0482	43.3421	7	8856	22.14	-	Salinity
04/06/2019	10:28	MDWE8	25.6607	42.3171	8	8857	15.17	7.5	Biota
04/06/2019	10:34	MDWE8	25.6581	42.3204	8	8858	15.80	7.0	PSA
04/06/2019	10:38	MDWE8	25.6572	42.3174	8	8859	16.09	-	Salinity
04/06/2019	10:43	MDWE7	25.8593	41.8889	9	8860	17.79	16.0	Biota
04/06/2019	10:49	MDWE7	25.8596	41.8863	9	8861	17.72	16.0	PSA
04/06/2019	10:53	MDWE7	25.8572	41.8868	9	8862	18.19	-	Salinity
04/06/2019	11:02	MDWE11	25.3224	41.5312	10	8863	10.50	13.0	Biota
04/06/2019	11:06	MDWE11	25.3276	41.5292	10	8864	10.52	12.5	PSA
04/06/2019	11:09	MDWE11	25.3205	41.5193	10	8865	11.12	-	Salinity
04/06/2019	11:18	MDWE12	24.4268	41.6066	11	8866	8.87	7.0	Biota
04/06/2019	11:25	MDWE12	24.4283	41.6072	11	8867	9.38	9.0	PSA
04/06/2019	11:30	MDWE12	24.4177	41.6089	11	8868	8.50	-	Salinity
04/06/2019	11:38	MDWE13	23.9060	41.8035	12	8869	10.54	7.0	Biota
04/06/2019	11:42	MDWE13	23.9064	41.8017	12	8870	10.33	9.0	PSA
04/06/2019	11:47	MDWE13	23.9036	41.8032	12	8871	10.64	-	Salinity
04/06/2019	12:03	MDWE10	25.7419	40.6759	13	8872	18.24	10.0	Biota
04/06/2019	12:08	MDWE10	25.7407	40.6778	13	8873	18.20	8.0	PSA
04/06/2019	12:12	MDWE10	25.7421	40.6708	13	8874	18.47	-	Salinity
04/06/2019	12:19	MDWE9	25.9045	39.9031	14	8875	6.50	14.5	Biota
04/06/2019	12:23	MDWE9	25.9017	39.9049	14	8876	6.70	16.0	PSA
04/06/2019	12:27	MDWE9	25.9024	39.9060	14	8877	6.69	-	Salinity
04/06/2019	12:38	MDWE14	25.3047	39.0818	15	8879	15.84	10.5	Biota

Date	Time UTC	Station code	WGS84 Latitude DD.DDDD	WGS84 Longitude DD.DDDD	STN (event) number	Hpro fix no.	Water depth (m)	Sediment depth (cm)	Sediment use
04/06/2019	12:42	MDWE14	25.3047	39.0777	15	8880	14.65	11.0	PSA
04/06/2019	12:46	MDWE14	25.3020	39.0772	15	8881	15.51	-	Salinity
04/06/2019	12:55	MDWE15	24.7422	39.0177	16	8882	1.03	10.0	Biota
04/06/2019	13:00	MDWE15	24.7400	39.0182	16	8883	9.10	12.0	PSA
04/06/2019	13:07	MDWE15	24.7404	39.0149	16	8884	9.03	-	Sed Chem
04/06/2019	13:10	MDWE15	24.7389	39.0107	16	8885	9.04	-	Salinity
04/06/2019	13:19	MDWE36	24.2652	38.7086	17	8886	9.76	11.0	Biota
04/06/2019	13:24	MDWE36	24.2657	38.7111	17	8887	9.47	12.0	PSA
04/06/2019	13:29	MDWE36	24.2669	38.7047	17	8888	9.94	-	Salinity
04/06/2019	13:51	MDWE16	24.6687	38.1429	18	8889	11.24	7.5	Biota
04/06/2019	13:58	MDWE16	24.6719	38.1464	18	8890	11.20	8.0	PSA
04/06/2019	14:02	MDWE16	24.6661	38.1369	18	8891	11.21	-	Salinity
04/06/2019	14:07	MDWE17	24.7137	37.5362	19	8892	7.99	11.0	Biota
04/06/2019	14:11	MDWE17	24.7106	37.5357	19	8893	7.72	10.0	PSA
04/06/2019	14:14	MDWE17	24.7132	37.5345	19	8894	7.62	-	Salinity
04/06/2019	14:19	MDWE22	24.5665	37.1390	20	8895	12.43	-	Discarded
04/06/2019	14:23	MDWE22	24.5627	37.1466	20	8896	12.58	13.0	Biota
04/06/2019	14:28	MDWE22	24.5660	37.1554	20	8897	12.39	10.0	PSA
04/06/2019	14:31	MDWE22	24.5628	37.1482	20	8898	12.40	-	Salinity
04/06/2019	14:38	MDWE18	24.7362	36.5635	21	8899	5.13	14.0	Biota
04/06/2019	14:42	MDWE18	24.7356	36.5619	21	8900	5.03	14.0	PSA
04/06/2019	14:46	MDWE18	24.7327	36.5607	21	8901	5.00	-	Salinity
04/06/2019	14:53	MDWE21	24.5970	36.0821	22	8902	14.70	15.0	Biota
04/06/2019	14:58	MDWE21	24.5927	36.0841	22	8903	14.67	15.0	PSA
04/06/2019	15:02	MDWE21	24.5997	36.0917	22	8904	14.51	-	Salinity
04/06/2019	15:09	MDWE19	24.4313	35.3869	23	8905	8.82	-	Empty

Date	Time UTC	Station code	WGS84 Latitude DD.DDDD	WGS84 Longitude DD.DDDD	STN (event) number	Hpro fix no.	Water depth (m)	Sediment depth (cm)	Sediment use
04/06/2019	15:12	MDWE19	24.4313	35.3914	23	8906	9.70	12.0	Biota
04/06/2019	15:16	MDWE19	24.4293	35.3921	23	8907	9.50	12.0	PSA
04/06/2019	15:19	MDWE19	24.4329	35.3920	23	8908	9.41	-	Salinity
04/06/2019	15:27	MDWE20	24.1807	35.1745	24	8909	6.69	10.0	Biota
04/06/2019	15:30	MDWE20	24.1780	35.1784	24	8910	6.58	8.5	PSA
04/06/2019	15:34	MDWE20	24.1783	35.1792	24	8911	6.50	-	Salinity
04/06/2019	15:43	MDWE23	23.9003	34.7873	25	8912	10.28	15.0	Biota
04/06/2019	15:48	MDWE23	23.9011	34.7901	25	8913	10.09	13.0	PSA
04/06/2019	15:55	MDWE23	23.8983	34.7899	25	8914	10.41	-	Sed Chem
04/06/2019	15:59	MDWE23	23.9068	34.7962	25	8915	9.65	-	Salinity
05/06/2019	07:22	MDWE24	23.9288	33.8877	26	8916	7.17	15.0	Biota
05/06/2019	07:27	MDWE24	23.9254	33.8870	26	8917	7.05	13.0	PSA
05/06/2019	07:32	MDWE24	23.9271	33.8837	26	8918	7.03	-	Salinity
05/06/2019	07:37	MDWE25	24.0878	33.7203	27	8919	2.17	15.0	Biota
05/06/2019	07:40	MDWE25	24.0874	33.7223	27	8920	2.26	13.0	PSA
05/06/2019	07:45	MDWE25	24.0906	33.7216	27	8921	3.91	-	Salinity
05/06/2019	07:52	MDWE26	24.5095	33.1509	28	8922	2.57	11.0	Biota
05/06/2019	07:55	MDWE26	24.5088	33.1480	28	8923	2.65	12.0	PSA
05/06/2019	07:58	MDWE26	24.5088	33.1485	28	8924	2.57	-	Salinity
05/06/2019	08:05	MDWE29	24.6728	32.8780	29	8925	1.29	15.0	Biota
05/06/2019	08:08	MDWE29	24.6716	32.8753	29	8926	1.45	16.0	PSA
05/06/2019	08:11	MDWE29	24.6725	32.8749	29	8927	1.44	-	Salinity
05/06/2019	08:19	MDWE27	24.7169	32.3078	30	8928	6.05	9.0	PSA
05/06/2019	08:24	MDWE27	24.7166	32.3120	30	8929	5.95	-	Discarded
05/06/2019	08:27	MDWE27	24.7157	32.3081	30	8930	6.09	-	Discarded
05/06/2019	08:29	MDWE27	24.7167	32.3082	30	8931	6.10	-	Discarded

Date	Time UTC	Station code	WGS84 Latitude DD.DDDD	WGS84 Longitude DD.DDDD	STN (event) number	Hpro fix no.	Water depth (m)	Sediment depth (cm)	Sediment use
05/06/2019	08:32	MDWE27	24.7173	32.3022	30	8932	6.33	-	Salinity
05/06/2019	08:41	MDWE28	24.4145	31.7609	31	8933	4.50	14.0	Biota
05/06/2019	08:45	MDWE28	24.4143	31.7564	31	8934	4.30	15.0	PSA
05/06/2019	08:49	MDWE28	24.4055	31.7618	31	8935	4.28	-	Salinity
05/06/2019	09:02	MDWE38	23.9399	31.4423	32	8936	0.99	14.0	Biota
05/06/2019	09:05	MDWE38	23.9401	31.4422	32	8937	0.90	-	Discarded
05/06/2019	09:07	MDWE38	23.9402	31.4423	32	8938	0.90	7.0	PSA
05/06/2019	09:11	MDWE38	23.9403	31.4418	32	8939	0.90	-	Salinity
05/06/2019	09:40	MDWE37	23.8275	31.5217	33	8940	5.92	13.0	Biota
05/06/2019	09:44	MDWE37	23.8274	31.5254	33	8941	6.01	14.0	PSA
05/06/2019	09:47	MDWE37	23.8253	31.5307	33	8942	5.77	-	Salinity
05/06/2019	09:52	MDWE30	23.7071	31.3106	34	8943	1.08	13.0	Biota
05/06/2019	09:55	MDWE30	23.7071	31.3106	34	8944	1.08	14.0	PSA
05/06/2019	09:59	MDWE30	23.7075	31.3100	34	8945	1.08	-	Salinity
05/06/2019	10:07	MDWE39	23.4370	31.3825	35	8946	7.18	9.0	PSA
05/06/2019	10:12	MDWE39	23.4329	31.3823	35	8947	7.39	11.0	Biota
05/06/2019	10:16	MDWE39	23.4333	31.3801	35	8948	7.46	-	Salinity
05/06/2019	10:21	MDWE41	23.3625	31.2452	36	8949	3.18	-	Discarded
05/06/2019	10:27	MDWE41	23.3628	31.2410	36	8950	2.24	-	Discarded
05/06/2019	10:30	MDWE41	23.3636	31.2405	36	8951	1.55	14.0	PSA
05/06/2019	10:35	MDWE41	23.3644	31.2390	36	8952	2.11	14.0	Biota
05/06/2019	10:39	MDWE41	23.3662	31.2371	36	8953	1.64	-	Salinity
05/06/2019	10:44	MDWE40	23.2890	31.3295	37	8955	8.70	11.0	Biota
05/06/2019	10:48	MDWE40	23.2888	31.3250	37	8956	8.99	9.0	PSA
05/06/2019	10:52	MDWE40	23.2885	31.3263	37	8957	8.82	-	Salinity
05/06/2019	10:59	MDWE42	23.1528	31.1873	38	8958	7.36	-	Discarded

Date	Time UTC	Station code	WGS84 Latitude DD.DDDD	WGS84 Longitude DD.DDDD	STN (event) number	Hpro fix no.	Water depth (m)	Sediment depth (cm)	Sediment use
05/06/2019	11:01	MDWE42	23.1535	31.1866	38	8959	7.47	9.0	PSA
05/06/2019	11:05	MDWE42	23.1502	31.1887	38	8960	7.53	8.0	Biota
05/06/2019	11:08	MDWE42	23.1517	31.1872	38	8961	7.59	-	Salinity
05/06/2019	11:13	MDWE31	23.2036	31.1317	39	8962	2.63	14.0	Biota
05/06/2019	11:17	MDWE31	23.2037	31.1312	39	8963	3.69	16.0	PSA
05/06/2019	11:22	MDWE31	23.2054	31.1297	39	8964	2.88	-	Salinity
05/06/2019	11:26	MDWE43	23.1068	31.0682	40	8965	8.99	-	Discarded
05/06/2019	11:45	MDWE43	23.1078	31.0707	40	8966	8.99	8.0	PSA
05/06/2019	11:49	MDWE43	23.1040	31.0694	40	8967	9.96	8.0	Biota
05/06/2019	11:54	MDWE43	23.1075	31.0707	40	8968	9.36	-	Salinity
05/06/2019	12:28	MDWE45	23.1048	30.9171	41	8969	8.50	14.0	Biota
05/06/2019	12:31	MDWE45	23.1048	30.9145	41	8970	8.54	13.0	PSA
05/06/2019	12:37	MDWE45	23.1046	30.9155	41	8971	8.66	-	Sed Chem
05/06/2019	12:41	MDWE45	23.1050	30.9166	41	8972	8.73	-	Salinity
05/06/2019	12:45	MDWE44	23.2581	30.9491	42	8973	5.18	15.0	Biota
05/06/2019	12:48	MDWE44	23.2584	30.9521	42	8974	5.14	15.0	PSA
05/06/2019	12:52	MDWE44	23.2585	30.9529	42	8975	5.05	-	Salinity
05/06/2019	13:01	MDWE46	23.2639	30.7130	43	8976	7.93	13.0	Biota
05/06/2019	13:06	MDWE46	23.2631	30.7128	43	8977	8.12	10.0	PSA
05/06/2019	13:10	MDWE46	23.2641	30.7056	43	8978	6.33	-	Salinity
05/06/2019	13:16	MDWE47	23.5402	30.6600	44	8979	10.38	8.0	Biota
05/06/2019	13:19	MDWE47	23.5408	30.6587	44	8980	10.39	-	Discarded
05/06/2019	13:21	MDWE47	23.5402	30.6595	44	8982	10.46	7.0	PSA
05/06/2019	13:25	MDWE47	23.5415	30.6624	44	8983	10.61	-	Salinity
05/06/2019	13:35	MDWE48	23.6692	30.4410	45	8984	8.63	15.0	Biota
05/06/2019	13:40	MDWE48	23.6700	30.4398	45	8985	8.77	15.0	PSA

Date	Time UTC	Station code	WGS84 Latitude DD.DDDD	WGS84 Longitude DD.DDDD	STN (event) number	Hpro fix no.	Water depth (m)	Sediment depth (cm)	Sediment use
05/06/2019	13:44	MDWE48	23.6680	30.4447	45	8986	8.83	-	Salinity
05/06/2019	13:55	MDWE32	23.3727	29.7316	46	8987	8.61	-	Discarded
05/06/2019	13:57	MDWE32	23.3707	29.7313	46	8988	8.19	-	Discarded
05/06/2019	13:59	MDWE32	23.3708	29.7316	46	8989	8.21	-	Discarded
05/06/2019	14:09	MDWE33	23.0606	29.6601	47	8990	7.84	-	Discarded
05/06/2019	14:13	MDWE33	23.0598	29.6584	47	8991	7.84	-	Discarded
05/06/2019	14:15	MDWE33	23.0602	29.6612	47	8992	7.74	7.0	PSA
05/06/2019	14:19	MDWE33	23.0607	29.6601	47	8893	7.73	-	Discarded
05/06/2019	14:28	MDWE34	22.7970	29.0983	48	8894	7.50	8.0	Biota
05/06/2019	14:32	MDWE34	22.7968	29.0974	48	8995	7.45	9.0	PSA
05/06/2019	14:36	MDWE34	22.7946	29.1037	48	8996	7.44	-	Salinity
06/06/2019	13:15	MDWE51	22.2231	27.6328	49	8997	5.19	-	Discarded
06/06/2019	13:17	MDWE51	22.2203	27.6314	49	8998	5.19	7.0	Biota
06/06/2019	13:20	MDWE51	22.2230	27.6334	49	8999	5.15	11.0	PSA
06/06/2019	13:25	MDWE51	22.2225	27.6282	49	9000	5.35	-	Salinity
06/06/2019	13:37	MDWE56	21.5130	27.8500	50	9001	5.38	-	Discarded
06/06/2019	13:39	MDWE56	21.5135	27.3200	50	9002	5.14	-	Discarded
06/06/2019	13:41	MDWE56	21.5150	27.4100	50	9003	5.14	-	Misfired
06/06/2019	13:45	MDWE56	21.5148	27.5000	50	9004	5.21	-	Discarded
06/06/2019	13:55	MDWE53	21.0833	27.4010	51	9005	5.22	-	Discarded
06/06/2019	13:57	MDWE53	21.0829	27.4012	51	9006	5.85	-	Discarded
06/06/2019	13:59	MDWE53	21.0890	27.4029	51	9007	5.35	-	Discarded
06/06/2019	14:08	MDWE54	20.5204	27.1675	52	9008	5.58	-	Discarded
06/06/2019	14:09	MDWE54	20.5209	27.1644	52	9009	5.61	-	Discarded
06/06/2019	14:11	MDWE54	20.5196	27.1647	52	9010	5.68	-	Discarded
06/06/2019	14:18	MDWE55	20.0345	27.1379	53	9011	4.96	-	Discarded

Date	Time UTC	Station code	WGS84 Latitude DD.DDDD	WGS84 Longitude DD.DDDD	STN (event) number	Hpro fix no.	Water depth (m)	Sediment depth (cm)	Sediment use
06/06/2019	14:19	MDWE55	20.0362	27.1372	53	9012	4.84	-	Discarded
06/06/2019	14:21	MDWE55	20.0344	27.1385	53	9013	1.24	-	Discarded
06/06/2019	14:34	MDWE52	19.2706	27.4635	54	9014	3.65	-	Discarded
06/06/2019	14:36	MDWE52	19.2719	27.4613	54	9015	3.72	-	Discarded
06/06/2019	14:37	MDWE52	19.2717	27.4617	54	9016	3.76	-	Discarded
06/06/2019	14:53	MDWE49	18.1987	28.7498	55	9017	3.58	-	Discarded
06/06/2019	14:55	MDWE49	18.1991	28.7494	55	9018	4.46	-	Misfired
06/06/2019	14:55	MDWE49	18.1990	28.7494	55	9019	4.31	-	Discarded
06/06/2019	14:57	MDWE49	18.1991	28.7492	55	9020	3.94	-	Misfired
06/06/2019	14:57	MDWE49	18.1994	28.7493	55	9021	4.20	-	Misfired
06/06/2019	14:59	MDWE49	18.1987	28.7486	55	9022	4.94	-	Empty
06/06/2019	15:11	MDWE50	18.3785	27.7028	56	9023	4.29	-	Discarded
06/06/2019	15:13	MDWE50	18.3780	27.7018	56	9024	4.24	2.0	Discarded
06/06/2019	15:16	MDWE50	18.3758	27.7027	56	9025	4.37	-	Discarded

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