

**Cruise Report**  
**FRV "Solea"**  
**Cruise 791**  
**05.05.-18.05.2021**

Cruise Leader: Dr. Holger Haslob

**AWZ Survey – Natura 2000 site Sylter Outer Reef**

**Summary**

This cruise was carried out within the DAM pilot project "Exclusion of Mobile Bottom-Fishing in the German Natura 2000 Areas of the North Sea". The main goal was the investigation of the demersal fish and epibenthic fauna in the area of the Sylter Outer Reef. Beside the standard gear to quantify demersal fish (7m beam trawl with tickler chains) a smaller beam trawl (3m) with a similar rigging was deployed in order to compare the catchability of the two gears. Further, a 2m beam trawl to quantify epibenthic organisms was deployed. In order to test less invasive methods to monitor the fish community in marine protected areas baited remote underwater video devices (BRUV) were deployed on some selected stations. Good weather conditions throughout the cruise enabled successful station work and most of the planned stations were covered with the planned gears. However, because of ongoing activities of pot fishery in the northern and central part of the investigation area not all stations could be fished with the 7m beam trawl.

**Verteiler:**

TI - Seefischerei

**per E-Mail:**

BMEL, Ref. 614

BMEL, Ref. 613

Bundesanstalt für Landwirtschaft und Ernährung, Hamburg

Schiffsführung RV „Dana“

Schiffsführung FFS "Walther Herwig III"

Präsidialbüro (Michael Welling)

Personalreferat Braunschweig

TI - Fischereiökologie

TI - Ostseefischerei Rostock

FIZ-Fischerei

TI - PR

MRI - BFEL HH, FB Fischqualität

Dr. Rohlf/SF - Reiseplanung Forschungsschiffe

Fahrtteilnehmer

Bundesamt für Seeschifffahrt und Hydrographie, Hamburg

Mecklenburger Hochseefischerei GmbH, Rostock

Doggerbank Seefischerei GmbH, Bremerhaven

Deutscher Fischerei - Verband e. V., Hamburg

Leibniz-Institut für Meereswissenschaften IFM-GEOMAR

H. Cammann-Oehne, BSH

Deutscher Hochseefischerei-Verband e.V.

DFFU

## 2. Research programme

This cruise was carried out within the DAM pilot project "Exclusion of Mobile Bottom-Fishing in the German Natura 2000 Areas of the North Sea". The main goal was the investigation of the demersal fish and epibenthic fauna in the area of the Sylter Outer Reef in order to study possible effects of a planned fishery exclusion of mobile bottom gears in large parts of this area. The standard gear to quantify the demersal fish communities was the 7m beam trawl with tickler chains. In addition, a smaller beam trawl (3m) with a similar rigging was deployed in order to compare the catchability of the two gears. Further, a 2m beam trawl to quantify epibenthic organisms was deployed. In order to test less invasive methods to monitor the fish community in marine protected areas baited remote underwater video devices (BRUV) were deployed on some selected stations. The results will be compared with the standard fishing gears used. In parallel to the 791. Cruise of FRV Solea, the RV Heincke operated in the same area to scan sea floor features with hydroacoustic methods. A rendezvous of the two ships was organized so that RV Heincke was able to analyse fresh trawl marks of the 7m beam trawl operated by FRV Solea.

## 3. Narrative

Due to bad weather conditions the departure from Cuxhaven was delayed for one day so that the cruise started at 6<sup>th</sup> May 2021. Station work started in the morning of the 7<sup>th</sup> May west of Amrumbank. Station work continued the following days with the different beam trawls and one BRUV station. Due to technical issues the cruise had to be interrupted at the 12<sup>th</sup> May and FRV Solea headed towards Helgoland. The cruise was continued at the 14<sup>th</sup> May. Due to good weather conditions, station work could be realized as planned in the following days. Deployment and recovery of the BRUV devices was completed without problems. The last station was completed at 17<sup>th</sup> May and FRV Solea headed back towards Cuxhaven where the cruise ended at 18<sup>th</sup> May. Overall, nearly all planned stations were completed successfully. However, due to pot fishing activities in the northern and central part of the Sylter Outer Reef some stations had to be skipped.

## 4. Preliminary results

In total, 17 CTD stations, 34 2m Beam trawl stations, and 27 stations with 7m and 3m beam trawl in parallel were successfully completed (Figure 1; Annex 1). Data obtained by the 2m beam trawl tows were used in order to investigate the detailed epibenthic species communities in the investigation area. Combined with data from the previous year cruise (776. cruise FRV Solea) it was possible to identify seven different species communities in the Sylter Outer Reef depending on different habitats. The abundance and distribution of demersal fish species was investigated with the 7m and 3m beam trawls. Data obtained by the 7m beam trawl hauls are part of a dedicated time series by the Thünen Institute of Sea Fisheries in the Sylter Outer Reef area and will be used to analyse the fish community base line. Results of the 791. cruise confirms the general distribution pattern and abundance of demersal fish (Fig. 2) and epibenthic species in the area (Fig. 2 and Fig. 3). The fish community was dominated by dab, plaice, whiting, solenette, grey gurnard, and dragonets. Dab is clearly the most dominant species, especially in the eastern, shallower parts while at deeper stations in the west, the diversity is in general higher and plaice is highly abundant. The epibenthic community is dominated by *Echinocardium cordatum*, *Asterias rubens*, *Astropecten irregularis*, *Pagurus bernhardus*, *Spisula solida*, and *Corystes cassevilanus*. *Asterias rubens* dominated most of the stations while *Echinocardium cordatum* was the most dominant species on the deeper, muddy stations in the western part. All these data on demersal fish and epibenthos also served as valuable input data for modelling tasks in the DAM MGF pilot project, and in case of epibenthic species the development of a resistance and recovery potential trait index was realised.

Preliminary analyses revealed, that the catchability of the 7m and 3m beam trawl showed a mean biomass ratio between both gears was 2.59 ( $\pm 0.97$  sd;  $n=19$ ). However, across species this ratio showed high variability, e.g. for the roundfish whiting and grey gurnard it

was nearly 1 (Table 1). Overall, 82 species were detected with both gears, 68 and 67 species respectively. That means, some rare occurring species were only caught with the one or the other beam trawl. Fish length distributions showed different results with good agreement, e.g. for plaice and dab (Figure 4, left panel) but also different distributions, e.g. dragonet (Figure 4, right panel).

In cooperation with the University of Oldenburg baited remote underwater video systems (BRUV) were deployed and the results will be compared to the classical beam trawls. First results showed that the BRUVs are able to record a number of fish and epibenthic species. In many cases, a determination to species level is also possible. As expected, a MDS analysis shows two clearly separate cluster for BRUVs and beam trawls, because the beam trawls encounter a higher number of species. However, within the DAM MGF pilot project a detailed comparative analysis will be conducted to evaluate the additional value of BRUVs for future monitoring purpose especially in habitats where trawling is not possible.

## 5. Participants

<b>Name</b>	<b>Institution</b>	<b>Function</b>
1. Dr. Holger Haslob	TI-SF	Cruise leader
2. Dr. Hermann Neumann	TI-SF	Scientist
3. Jana Bäger	TI-SF	Technician
4. Valeria Adrian-Schütte	TI-SF	Technician
5. Dr. Guido Bonthond	ICBM Oldenburg	Scientist

## 6. Acknowledgement

Thanks to Captain Stefan Meier and FRV "Solea" crew members for their excellent support and hospitality and to all participants for their reliable and responsible teamwork.



(Dr. Holger Haslob)

## 7. Tables and Figures

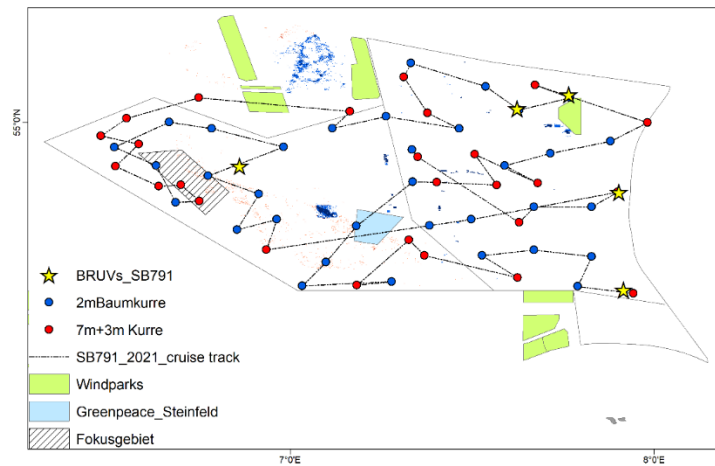


Figure 1: Cruise track and realized trawl and BRUV stations in the Sylter Outer Reef.

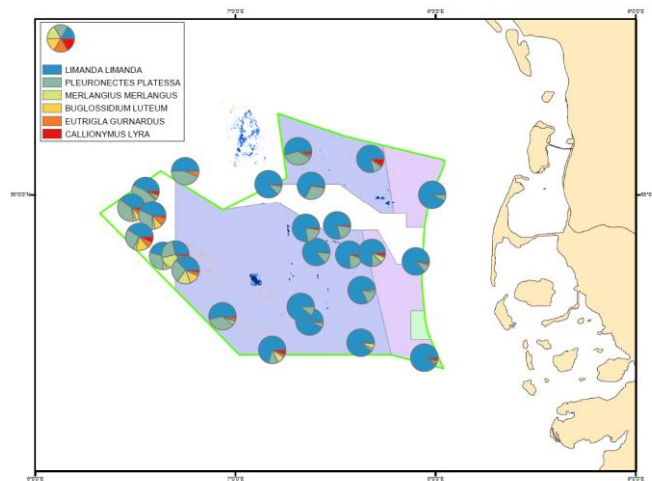


Figure 2: Distribution of the six dominant fish species in the investigation area (7m beam trawl hauls, kg per 15 min).

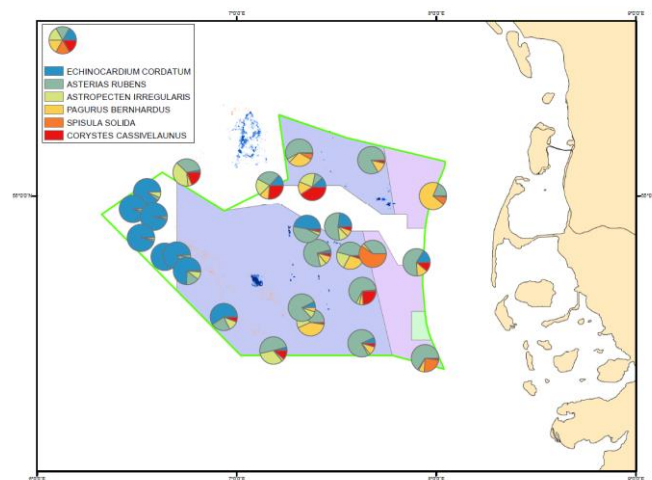


Figure 3: Distribution of the six dominant epibenthos species in the investigation area (7m beam trawl, kg per 15 min).

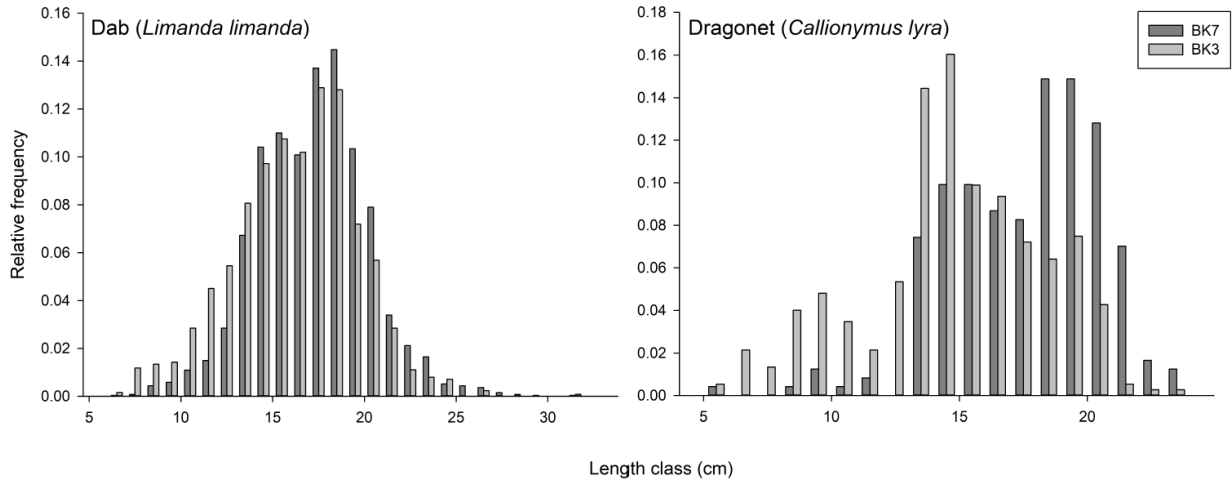


Figure 4: Relative length distributions for dab and dragonet obtained by tows with the 7m and 3m beam trawl.

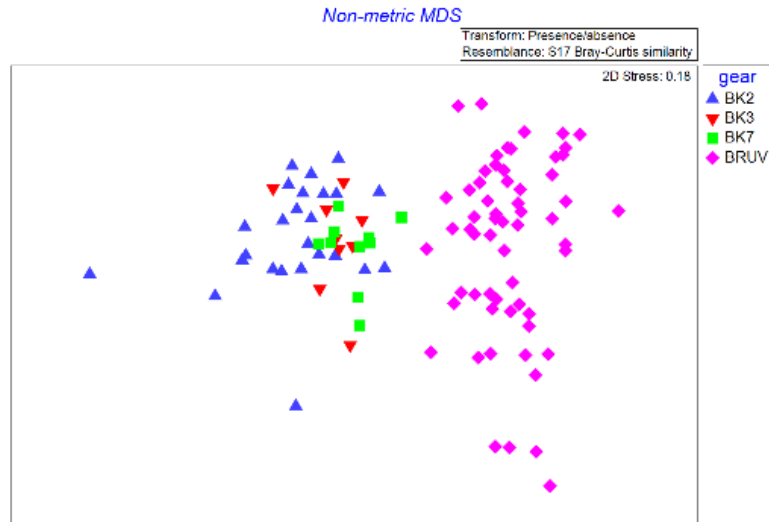


Figure 5: MDS plot comparing the results of the different beam trawls and deployed BRUV in the Sylter Outer Reef investigation area.

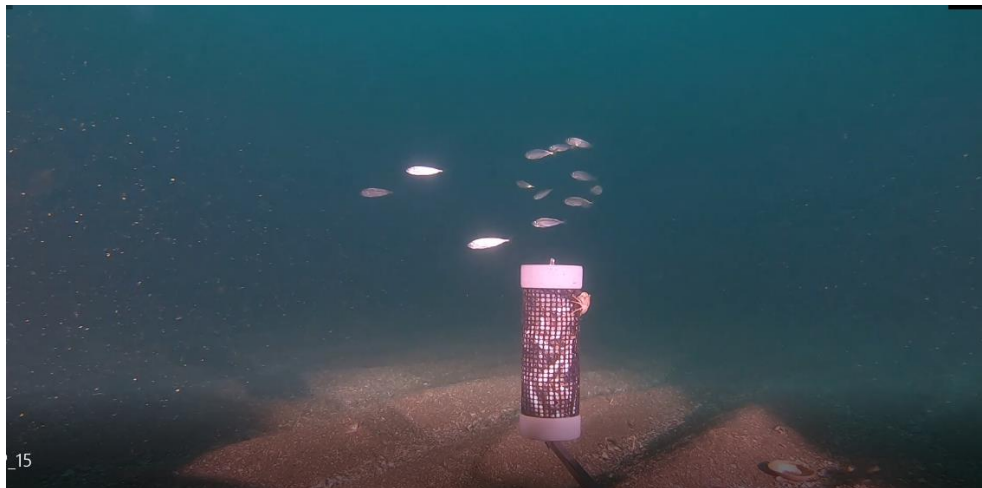


Figure 6: Example of a BRUV footage showing the bait with swimming crab and horse mackerel in the background.

Table 1: 7m and 3m beam trawl total catch of most abundant demersal fish species.

Species	7m beam trawl		3m beam trawl	
	kg	N	kg	N
LIMANDA LIMANDA	178.1	3668	55.36	1368
PLEURONECTES PLATESSA	75.0	1020	26.52	375
MERLANGIUS MERLANGUS	15.8	422	16.03	401
BUGLOSSIDIUM LUTEUM	11.5	1409	7.35	908
EUTRIGLA GURNARDUS	9.2	258	4.19	122
CALLIONYMUS LYRA	9.0	285	9.11	404
SCYLIORHINUS CANICULA	3.2	8	1.19	2
ARNOGLOSSUS LATERNA	2.6	255	2.12	260
AGONUS CATAPHRACTUS	1.8	100	1.09	93
RHINONEMUS CIMBRIUS	0.6	28	0.30	17
POMATOSCHISTUS MINUTUS	0.3	229	1.12	653

## Annex 1 Station list.

Cruise	Station	Date	Time_UTC	Gear	Action	Latitude	Longitude	Depth (m)
SOL791	1-1	07.05.2021	05:27:24	CTD	in the water	54° 31.959' N	007° 56.060' E	19
SOL791	1-2	07.05.2021	05:46:32	7m+3m Kurre	on ground	54° 31.844' N	007° 56.596' E	19
SOL791	2-1	07.05.2021	06:48:23	2mBaumkurre	on ground	54° 32.989' N	007° 47.421' E	20
SOL791	3-1	07.05.2021	07:30:00	2mBaumkurre	on ground	54° 37.919' N	007° 49.740' E	20
SOL791	4-1	07.05.2021	08:14:11	2mBaumkurre	on ground	54° 38.995' N	007° 40.232' E	23
SOL791	5-1	07.05.2021	09:02:18	2mBaumkurre	on ground	54° 38.075' N	007° 31.669' E	25
SOL791	6-1	07.05.2021	10:09:28	7m+3m Kurre	on ground	54° 34.446' N	007° 37.518' E	23
SOL791	7-1	07.05.2021	11:28:38	7m+3m Kurre	on ground	54° 38.102' N	007° 22.186' E	25
SOL791	8-1	07.05.2021	12:03:57	7m+3m Kurre	on ground	54° 40.655' N	007° 19.599' E	24
SOL791	9-1	07.05.2021	13:21:24	7m+3m Kurre	on ground	54° 33.186' N	007° 11.029' E	34
SOL791	10-1	07.05.2021	14:04:30	2mBaumkurre	on ground	54° 33.784' N	007° 16.750' E	31
SOL791	11-1	07.05.2021	15:11:59	2mBaumkurre	on ground	54° 33.090' N	007° 02.047' E	37
SOL791	11-2	07.05.2021	15:31:37	CTD	in the water	54° 33.056' N	007° 02.303' E	37
SOL791	12-1	08.05.2021	05:27:45	CTD	in the water	54° 36.956' N	007° 05.972' E	35
SOL791	12-2	08.05.2021	05:40:14	2mBaumkurre	on ground	54° 36.989' N	007° 05.947' E	35
SOL791	13-1	08.05.2021	06:32:15	2mBaumkurre	on ground	54° 42.950' N	007° 10.962' E	28
SOL791	14-1	08.05.2021	07:35:24	2mBaumkurre	on ground	54° 50.214' N	007° 20.233' E	25
SOL791	15-1	08.05.2021	08:07:09	7m+3m Kurre	on ground	54° 50.138' N	007° 24.211' E	25
SOL791	16-1	08.05.2021	08:59:39	7m+3m Kurre	on ground	54° 49.693' N	007° 34.087' E	23
SOL791	17-1	08.05.2021	10:31:15	7m+3m Kurre	on ground	54° 54.741' N	007° 30.460' E	23
SOL791	18-1	08.05.2021	12:31:51	7m+3m Kurre	on ground	54° 50.012' N	007° 40.851' E	20
SOL791	19-1	08.05.2021	13:22:23	2mBaumkurre	on ground	54° 52.893' N	007° 35.425' E	21
SOL791	20-1	08.05.2021	14:02:30	2mBaumkurre	on ground	54° 54.920' N	007° 42.935' E	20
SOL791	21-1	08.05.2021	14:49:47	2mBaumkurre	on ground	54° 56.909' N	007° 52.856' E	19
SOL791	21-2	08.05.2021	15:08:35	CTD	in the water	54° 56.790' N	007° 52.783' E	19
SOL791	22-1	09.05.2021	05:28:33	CTD	in the water	55° 00.030' N	007° 59.010' E	16
SOL791	22-2	09.05.2021	05:43:15	7m+3m Kurre	on ground	54° 59.996' N	007° 58.962' E	16
SOL791	23-1	09.05.2021	07:18:19	7m+3m Kurre	on ground	55° 06.169' N	007° 40.428' E	22
SOL791	24-1	09.05.2021	08:12:02	2mBaumkurre	on ground	55° 04.063' N	007° 46.172' E	21
SOL791	25-1	09.05.2021	08:53:40	2mBaumkurre	on ground	55° 02.048' N	007° 37.769' E	22
SOL791	26-1	09.05.2021	10:00:50	2mBaumkurre	on ground	55° 05.924' N	007° 32.279' E	22
SOL791	27-1	09.05.2021	10:56:36	2mBaumkurre	on ground	55° 09.775' N	007° 19.938' E	24
SOL791	28-1	09.05.2021	11:23:34	7m+3m Kurre	on ground	55° 07.474' N	007° 18.757' E	23
SOL791	29-1	09.05.2021	12:20:00	7m+3m Kurre	on ground	55° 01.551' N	007° 22.672' E	30
SOL791	30-1	09.05.2021	13:03:25	2mBaumkurre	on ground	54° 58.989' N	007° 27.908' E	27
SOL791	31-1	09.05.2021	13:53:05	2mBaumkurre	on ground	55° 00.993' N	007° 15.838' E	32
SOL791	32-1	09.05.2021	14:36:39	2mBaumkurre	on ground	54° 59.028' N	007° 06.993' E	27
SOL791	32-2	09.05.2021	14:59:36	CTD	in the water	54° 59.095' N	007° 06.479' E	27
SOL791	33-1	10.05.2021	05:26:42	CTD	in the water	55° 01.634' N	007° 10.133' E	32
SOL791	33-2	10.05.2021	05:42:15	7m+3m Kurre	on ground	55° 01.816' N	007° 09.905' E	32
SOL791	34-1	10.05.2021	07:37:45	7m+3m Kurre	on ground	55° 04.073' N	006° 44.960' E	35
SOL791	34-1	10.05.2021	07:52:51	7m+3m Kurre	on ground	55° 04.187' N	006° 43.368' E	35
SOL791	35-1	10.05.2021	08:43:15	7m+3m Kurre	on ground	55° 00.679' N	006° 33.084' E	45
SOL791	36-1	10.05.2021	10:33:25	7m+3m Kurre	on ground	54° 57.793' N	006° 28.831' E	44
SOL791	37-1	10.05.2021	12:32:35	7m+3m Kurre	on ground	54° 56.437' N	006° 35.071' E	43
SOL791	38-1	10.05.2021	14:33:52	7m+3m Kurre	on ground	54° 52.779' N	006° 31.231' E	42
SOL791	38-2	10.05.2021	15:05:19	CTD	in the water	54° 52.121' N	006° 33.138' E	41
SOL791	39-1	11.05.2021	05:28:27	CTD	in the water	54° 49.715' N	006° 37.762' E	41
SOL791	39-2	11.05.2021	05:41:34	7m+3m Kurre	on ground	54° 49.493' N	006° 38.387' E	41
SOL791	40-1	11.05.2021	07:04:45	7m+3m Kurre	on ground	54° 49.724' N	006° 42.019' E	41
SOL791	41-1	11.05.2021	09:04:50	7m+3m Kurre	on ground	54° 47.033' N	006° 45.071' E	41
SOL791	42-1	11.05.2021	11:02:18	2mBaumkurre	on ground	54° 46.841' N	006° 41.151' E	41

## Annex 1 continued

Cruise	Station	Date	Time_UTC	Gear	Action	Latitude	Longitude	Depth (m)
SOL791	43-1	11.05.2021	11:50:14	2mBaumkurre	on ground	54° 52.880' N	006° 37.957' E	42
SOL791	44-1	11.05.2021	12:28:14	2mBaumkurre	on ground	54° 55.939' N	006° 31.051' E	43
SOL791	45-1	11.05.2021	13:19:53	2mBaumkurre	on ground	55° 00.074' N	006° 40.082' E	37
SOL791	46-1	11.05.2021	13:58:34	2mBaumkurre	on ground	54° 58.980' N	006° 47.131' E	35
SOL791	47-1	11.05.2021	14:52:06	2mBaumkurre	on ground	54° 55.977' N	006° 58.968' E	29
SOL791	47-2	11.05.2021	15:05:46	CTD	in the water	54° 55.889' N	006° 59.237' E	28
SOL791	48-1	12.05.2021	05:32:15	BRUV	in the water	54° 52.785' N	006° 51.695' E	33
SOL791	49-1	12.05.2021	06:22:00	CTD	in the water	54° 51.176' N	006° 46.490' E	37
SOL791	49-2	12.05.2021	06:34:23	2mBaumkurre	on ground	54° 51.204' N	006° 46.510' E	37
SOL791	50-1	12.05.2021	07:17:06	2mBaumkurre	on ground	54° 48.203' N	006° 54.882' E	34
SOL791	51-1	12.05.2021	08:10:13	2mBaumkurre	on ground	54° 42.345' N	006° 51.270' E	39
SOL791	52-1	12.05.2021	08:43:24	2mBaumkurre	on ground	54° 44.030' N	006° 57.843' E	37
SOL791	53-1	12.05.2021	10:04:43	7m+3m Kurre	on ground	54° 39.029' N	006° 56.125' E	39
SOL791	48-2	12.05.2021	13:43:36	CTD	in the water	54° 52.825' N	006° 51.635' E	34
SOL791	54-1	14.05.2021	14:02:47	2mBaumkurre	on ground	54° 43.034' N	007° 23.013' E	25
SOL791	55-1	14.05.2021	14:35:08	2mBaumkurre	on ground	54° 44.032' N	007° 29.905' E	23
SOL791	55-2	14.05.2021	14:46:13	CTD	in the water	54° 44.297' N	007° 30.086' E	24
SOL791	56-1	15.05.2021	05:29:46	BRUV	in the water	54° 48.453' N	007° 54.195' E	18
SOL791	57-1	15.05.2021	05:56:13	7m+3m Kurre	on ground	54° 48.534' N	007° 54.016' E	18
SOL791	57-2	15.05.2021	06:18:24	CTD	in the water	54° 49.645' N	007° 53.724' E	18
SOL791	58-1	15.05.2021	06:51:55	2mBaumkurre	on ground	54° 46.105' N	007° 49.753' E	16
SOL791	59-1	15.05.2021	07:34:13	2mBaumkurre	on ground	54° 46.076' N	007° 40.236' E	20
SOL791	60-1	15.05.2021	08:01:51	7m+3m Kurre	on ground	54° 43.538' N	007° 37.782' E	21
SOL791	61-1	15.05.2021	09:59:56	7m+3m Kurre	on ground	54° 54.309' N	007° 21.094' E	26
SOL791	62-1	15.05.2021	10:26:57	2mBaumkurre	on ground	54° 55.514' N	007° 20.119' E	26
SOL791	62-2	15.05.2021	10:36:59	CTD	in the water	54° 55.711' N	007° 20.152' E	26
SOL791	63-1	16.05.2021	05:28:17	BRUV	in the water	55° 04.545' N	007° 45.925' E	21
SOL791	64-1	16.05.2021	10:03:15	BRUV	in the water	55° 02.264' N	007° 37.415' E	22
SOL791	64-2	16.05.2021	10:33:06	CTD	in the water	55° 01.201' N	007° 39.951' E	22
SOL791	65-1	17.05.2021	05:26:40	BRUV	in the water	54° 32.373' N	007° 54.953' E	20
SOL791	65-2	17.05.2021	05:37:54	CTD	in the water	54° 32.728' N	007° 54.547' E	20