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MRV *Scotia*

Survey 0122S

PROGRAMME

5-20 January 2022

Loading: Aberdeen, Monday 20 December 2021

Sailing: Leith, Wednesday 5 January 2022

(scientific crew travel to Leith by hire car and join Tuesday 4 January 2022).

Unloading: Aberdeen, 20 January 2022

In setting the survey programme and specific objectives, etc the Scientist-in-Charge needs to be aware of the restrictions on working hours and the need to build in adequate rest days and rest breaks as set out in Marine Scotland's Working Time Policy (Lab Notice 34/03). In addition, the Scientist-in-Charge must formally review the risk assessments for the survey with staff on-board before work is commenced.

In the interest of efficient data management it is now mandatory to return the Survey Report, to I Gibb and the Survey Summary Report (old ROSCOP form) to M Geldart, within four weeks of a survey ending. In the case of the Survey Summary Report a nil return is required, if appropriate

Fishing gear: BT 137 with Ground gear E;

Sediment Sampling: Day grab;

Litter sampling: Catamaran and neuston trawl

Objectives

1. To undertake water, sediment and biological sampling for the Clean Seas Environmental Monitoring Programme (CSEMP).
2. To collect water samples for nutrient studies as part of the Scottish Coastal Eutrophication Assessment Survey (SCEAS).
3. Monitor and record all litter brought aboard in all trawls. Sample water column for micro-plastic litter.
4. Recover a mooring near the Montrose basin for Ewan Edwards (C80080 – JOMOPANS).

Estimated Days Per Project: 11 days 20461; 1 day 20402, 2 days 20463; 2 days 20234.

Procedure

Surface water will be collected for hydrographic nutrient studies (SCEAS) throughout the survey at fixed time intervals (every 30 minutes for nutrients, every hour for ammonia and every 12 hours for salinity and chlorophyll samples). From the Forth to Berwick initially, north to Montrose Bank then following the sediment/fish sampling track. Nutrient samples will be analysed onboard as far as possible. Any remaining at the end of the survey will be returned to the laboratory for analyses.

Fish sampling for biological effect assessment will be carried out in multiple locations detailed below (Table 1a and 1b). Fish will be sampled for chemical analyses, biological effects and fish diseases (Table 2). Some biological effects measurements will be carried out during the cruise. Full sampling requirements are detailed in SOP 0820 and SOP 0830.

Sediment sampling will be carried out in ten area (Figure 1): Moray firth, West Shetland, Upper Minch, Sea of Hebrides, Forties, Fladen, West of Orkney, Outer Forth and East Coast. The number of stations per area varies from 5 to 15. Sediment sampling will also be carried out at the three CSEMP fixed sites (NMMP85 – North Minch, NMMP95 – Inner Moray Firth, NMMP165 – Montrose Bank). Sediments will be sampled for chemical analyses only at all locations. A second grab will not be undertaken at each sampling locations for MP assessment as the Marine Lab is facing sample storage issues due to problems with Building C. The coordinates of all sediments site is shown in Table 3 (primary sites) and Table 4 (secondary sites – used if sampling a primary site failed) at the end of this programme.

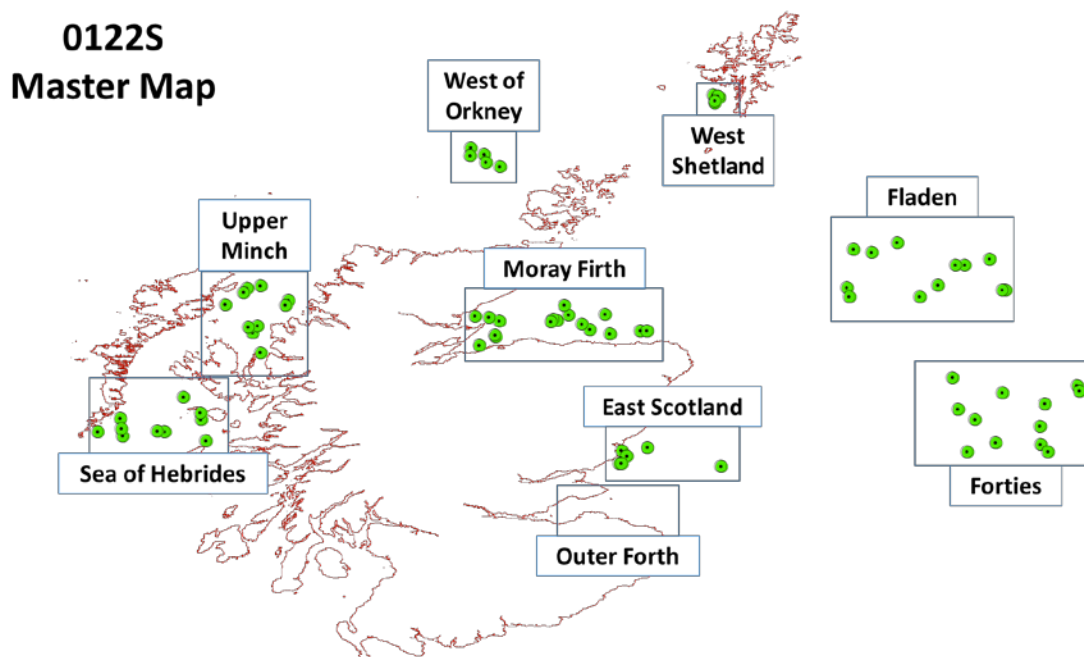


Figure 1: sediment sampling areas

Monitoring of all litter brought on board during trawling operations will continue throughout the survey. The catamaran will be deployed to sample for micro-plastics whenever possible at specific target locations (Table 5). Samples will be processed onboard as far as possible.

A mooring will also be recovered for the Renewables group near the Montrose basin. This is part of the JOMOPANS project (20402 – C80080). The exact location of the mooring is:

Latitude:	56° 37.521' North	56.6253
Longitude:	000° 00.445' West	-0.0074

The depth is approximately 77 m. Details of the recovery procedure have been shared with the scientific crew and the release code for the mooring will be communicated to staff.

General Arrangements

Liquid nitrogen and buffered formalin will be carried aboard for the preservation and storage of biological material. A full list of chemicals to be carried is attached.

Normal contacts will be maintained with the laboratory.

Submitted:
G Hermann and G. Packer
10 December 2021

Approved:
I Gibb
19 December 2021

Table 1a: 0122S Fishing Sites – Priority order and locations (decimal coordinates).

FIELD Name	New Station Code	Nominal Station Latitude	Nominal Station Longitude	Longitude East Limit	Longitude West Limit	Latitude North Limit	Latitude South Limit
E Scotland (Montrose Bk.)	EScotland_EScOpenSea_fi01	56.50	-1.50	-1.37	-2.31	56.54	56.33
SE of Fair Isle*	Fladen_FlaOpenSea_fi02	59.24	-1.50	-1.33	-1.67	59.33	59.10
Long Forties	Forties_Forties-OpenSea_fi01	57.14	0.31	0.40	0.20	57.20	57.10
Hebrides (Gallen Head)**	Hebrides_HebIntermediate_fi01	58.30	-7.05	-6.90	-7.20	58.40	58.20
Minch Malin (Colonsay)**	MinchMalin_Colonsay_fi01	56.11	-6.08	-6.04	-6.37	56.18	55.95
Inner Moray Firth**	MorayF_MorayFirthOffshor_fi01	57.83	-3.66	-3.44	-3.85	58.09	57.66
West Shetland (Burra Haaf)*	WShetland_WShIntermediate_fi01	60.10	-1.70	-1.28	-2.05	60.25	59.90
North Coll	MinchMalin_CollAndTiree_fi01	56.69	-6.60	-6.44	-6.72	56.79	56.62
West Orkney	NScotland_NScOpenSea_fi01	58.86	-3.97	-3.75	-4.17	58.98	58.73
New Central Minch***	N/A	57.28	-6.74		N/A		

* Top priority sites

** High priority sites

*** New Central Minch will only be sampled if North Coll and Colonsay are NOT successful

Table 1b: 0122S Fishing Sites – Target species and locations (degrees coordinates of fishing limits).

FIELD Name	New Station Code	Target Species	Longitude East Limit	Longitude West Limit	Latitude North Limit	Latitude South Limit
E Scotland (Montrose Bank)	EScotland_EScOpenSea_fi01	Dab	001 22.20W	002 18.48W	56 32.69N	56 19.74N
SE of Fair Isle*	Fladen_FlaOpenSea_fi02	Dab	001 19.89W	001 40.00W	59 19.89N	59 6.06N
Long Forties	Forties_Forties-OpenSea_fi01	Dab	000 24.00E	000 12.00E	57 12.00N	57 6.00N
Hebrides (Gallen Head)	Hebrides_HebIntermediate_fi01	Dab	006 54.00W	007 12.00W	58 24.00N	58 12.00N
Minch Malin (Colonsay)	MinchMalin_Colonsay_fi01	Plaice Dab & Plaice	006 2.61W	006 22.17W	56 11.00N	55 57.19N
Inner Moray Firth	MorayF_MorayFirthOffshor_fi01	Plaice	003 26.40W	003 50.76W	58 5.40N	57 39.42N
West Shetland (Burra Haaf)	WShetland_WShIntermediate_fi01	Dab	001 16.80W	002 3.00W	60 15.00N	59 54.00N
North Coll	MinchMalin_CollAndTiree_fi01	Dab	006 26.52W	006 43.32W	56 47.10N	56 37.14N
West Orkney	NScotland_NScOpenSea_fi01	Dab	003 44.76W	004 10.08W	58 58.68N	58 43.98N
New Central Minch	N/A	Dab			N/A	

* **Back up species for this site: plaice**

Table 2: Fish sub-samples required.

	Dab	Cod	Plaice	Flounder
Total no. of fish required	50	25	25	50
Size range of fish (cm)	18 – 30 *	30 – 60	20 – 30 *	18 – 35 *
Disease	50	25 (limited)	N/A	50
Blood	25	25	25	25
Bile	25	25	25	25
Liver (S9 fraction EROD)**	15 MALES	25**	15 MALES	15 MALES
Liver (histology)	50	Only if liver nodule present	N/A	50
Liver (metals) (~ 2g)	25 (5 pools)	25 (5 pools)	25 (5 pools)	25 (5 pools)
Liver (chemistry) (> 4g)	25 (5 pools)	25 (5 pools)	25 (5 pools)	25 (5 pools)
Gonad (histology)	All MALES only	25**	N/A	All MALES only
Otolith	50	25	N/A	50
Flesh (metals) (> 10g)	25 (5 pools)	25 (5 pools)	25 (5 pools)	25 (5 pools)
Flesh (chemistry) (> 30g)	25 (5 pools)	25 (5 pools)	25 (5 pools)	25 (5 pools)

* may decrease by 1 cm for dab, plaice or flounder and by 2 cm if absolutely necessary. In each case this must be noted in cruise report and discussed with relevant DTMs.

** often unable to determine sex of cod at this size range so sample all for EROD and take gonad sample to determine sex, record sex as undetermined in sample record.

Table 3: Sediment grabs locations – PRIMARY SITES.

REGION	Field ID	declat	declong	Latitude	Longitude
Outer Forth	E of Isle of May	56.1994	-2.4096	56 11.96N	002 24.57W
	N of Wheat Stack	55.9998	-2.2497	55 59.99N	002 14.98W
	NE Torness	56.1001	-2.3404	56 6.00N	002 20.42W
	Rath Grounds	56.1593	-2.6593	56 9.56N	002 39.56W
	S of Isle of May	56.1335	-2.5351	56 8.01N	002 32.11W
East Coast	EC1.1	56.5290	-2.4760	56 31.74N	002 28.56W
	EC1.2	56.6540	-2.4480	56 39.24N	002 26.88W
	EC1.3	56.5990	-2.4020	56 35.94N	002 24.12W
	EC1.4	56.6770	-2.1980	56 40.62N	002 11.88W
	EC1.5	56.5310	-2.4460	56 31.86N	002 26.76W
	165se	56.5000	-1.5000	56 30.00N	001 30.00W
Moray Firth	MF1.1	57.8970	-3.6230	57 53.82N	003 37.38W
	MF1.2	57.7420	-3.6530	57 44.52N	003 39.18W
	MF1.3	57.7560	-3.6610	57 45.36N	003 39.66W
	MF1.4	57.9450	-3.8550	57 56.70N	003 51.30W
	MF1.5	57.9260	-3.7180	57 55.56N	003 43.08W
	MF2.1	57.7960	-2.2720	57 47.76N	002 16.32W
	MF2.2	57.8140	-2.7510	57 48.84N	002 45.06W
	MF2.3	57.9600	-2.6070	57 57.60N	002 36.42W
	MF2.4	57.8990	-3.0740	57 53.94N	003 4.44W
	MF2.5	57.7970	-2.2110	57 47.82N	002 12.66W
	MF2.6	57.7730	-2.5600	57 46.38N	002 33.60W
	MF2.7	57.8650	-2.8290	57 51.90N	002 49.74W
	MF2.8	57.9090	-3.1050	57 54.54N	003 6.30W
	MF2.9	57.9520	-2.9620	57 57.12N	002 57.72W
	MF2.10	57.8850	-3.1300	57 53.10N	003 7.80W

	105se	58.0500	-3.0000	58 3.00N	003 00.00W
	95se	57.6667	-3.8167	57 40.00N	003 49.00W
West Shetland	Shet1 1	60.0410	-1.5160	60 2.46N	001 30.96W
	Shet1 2	60.0650	-1.5720	60 3.90N	001 34.32W
	Shet1 3	59.9950	-1.5520	59 59.70N	001 33.12W
	Shet1 4	60.0560	-1.5200	60 3.36N	001 31.20W
	Shet1 5	60.0090	-1.5590	60 0.54N	001 33.54W
The Minch North	UM1.1	58.2100	-6.0410	58 12.60N	006 2.46W
	UM1.2	58.1650	-6.0690	58 9.90N	006 4.14W
	UM1.3	58.2340	-5.9110	58 14.04N	005 54.66W
	UM1.4	58.0950	-5.6420	58 5.70N	005 38.52W
	UM1.5	58.0440	-5.6750	58 2.64N	005 40.50W
	85se	58.0000	-5.6667	58 0.00N	005 40.00W
The Minch South	UM2.1	57.7820	-5.9790	57 46.92N	005 58.74W
	UM2.2	57.5910	-5.9090	57 35.46N	005 54.54W
	UM2.3	58.0520	-6.2490	58 3.12N	006 14.94W
	UM2.4	57.8470	-5.9310	57 50.82N	005 55.86W
	UM2.5	57.8420	-6.0210	57 50.52N	006 1.26W
Sea of Hebrides	SOH1.1	56.7950	-7.2270	56 47.70N	007 13.62W
	SOH1.2	56.9550	-6.4810	56 57.30N	006 28.86W
	SOH1.3	56.8350	-6.8250	56 50.10N	006 49.50W
	SOH1.4	56.7470	-6.4280	56 44.82N	006 25.68W
	SOH1.5	56.8330	-7.4680	56 49.98N	007 28.08W
	SOH1.6	56.8430	-6.8970	56 50.58N	006 53.82W
	SOH1.7	57.1690	-6.6410	57 10.14N	006 38.46W
	SOH1.8	56.9570	-7.2540	56 57.42N	007 15.24W
	SOH1.9	56.8620	-7.2450	56 51.72N	007 14.70W
	SOH1.10	57.0190	-6.4860	57 1.14N	006 29.16W
West Orkney	WOK 1	59.5580	-3.8890	59 33.48N	003 53.34W
	WOK 2	59.4770	-3.9040	59 28.62N	003 54.24W
	WOK 3	59.3790	-3.6160	59 22.74N	003 36.96W
	WOK 4	59.4980	-3.7660	59 29.88N	003 45.96W
	WOK 5	59.4140	-3.7460	59 24.84N	003 44.76W
Fladen 1	FL1.1	58.5500	-0.0600	58 33.00N	000 3.60W
	FL1.2	58.5800	-0.2300	58 34.80N	000 13.80W
	FL1.3	58.6500	0.1900	58 39.00N	000 11.40E
Fladen 2	FL2.1	58.4330	0.8360	58 25.98N	000 50.16E
	FL2.2	58.4360	0.7510	58 26.16N	000 45.06E
	FL2.3	58.4910	1.0810	58 29.46N	001 4.86E
Fladen 3	FL3.1	58.1280	0.4110	58 7.68N	000 24.66E
	FL3.2	58.2190	-0.2960	58 13.14N	000 17.76W
	FL3.3	58.1260	-0.2720	58 7.56N	000 16.32W
Fladen 4	FL4.1	58.1920	1.2280	58 11.52N	001 13.68E
	FL4.2	58.2390	0.5830	58 14.34N	000 34.98E
	FL4.3	58.1900	1.1990	58 11.40N	001 11.94E

Forties 1	FO1.1	57.2090	1.1980	57 12.54N	001 11.88E
	FO1.2	57.0490	0.7750	57 2.94N	000 46.50E
	FO1.3	57.3540	0.7190	57 21.24N	000 43.14E
Forties 2	FO2.1	57.2780	1.9120	57 16.68N	001 54.72E
	FO2.2	57.2260	1.9400	57 13.56N	001 56.40E
	FO2.3	57.1070	1.6060	57 6.42N	001 36.36E
Forties 3	FO3.1	56.6410	0.8630	56 38.46N	000 51.78E
	FO3.2	56.9530	0.9310	56 57.18N	000 55.86E
	FO3.3	56.7280	1.1330	56 43.68N	001 7.98E
Forties 4	FO4.1	56.7140	1.5640	56 42.84N	001 33.84E
	FO4.2	56.6370	1.6330	56 38.22N	001 37.98E
	FO4.3	56.8910	1.5580	56 53.46N	001 33.48E

Table 4: Sediment grabs locations – SECONDARY / BACK-UP SITES.

Site	declat	declong	DegLat	DegLong
EC1 6	56.5300	-2.4850	56 31.80N	002 29.10W
EC1 7	56.5190	-2.4280	56 31.14N	002 25.68W
EC1 8	56.5220	-2.5510	56 31.32N	002 33.06W
EC1 9	56.5560	-2.4250	56 33.36N	002 25.50W
EC1 10	56.5610	-2.4480	56 33.66N	002 26.88W
MF1 6	57.8310	-3.3460	57 49.86N	003 20.76W
MF1 7	57.7820	-3.3480	57 46.92N	003 20.88W
MF1 8	57.7520	-3.4690	57 45.12N	003 28.14W
MF1 9	57.9370	-3.5490	57 56.22N	003 32.94W
MF1 10	57.9030	-3.5490	57 54.18N	003 32.94W
MF2 11	57.8190	-3.2630	57 49.14N	003 15.78W
MF2 12	57.9000	-3.4170	57 54.00N	003 25.02W
MF2 13	57.7650	-3.4370	57 45.90N	003 26.22W
MF2 14	57.9330	-2.1300	57 55.98N	002 7.80W
MF2 15	57.8730	-3.1000	57 52.38N	003 6.00W
Shet2 6	60.0540	-0.6530	60 3.24N	000 39.18W
Shet2 7	60.0240	-0.6860	60 1.44N	000 41.16W
Shet2 8	60.0230	-0.6760	60 1.38N	000 40.56W
UM1.6	58.1500	-5.4820	58 9.00N	005 28.92W
UM1.7	57.9900	-6.2050	57 59.40N	006 12.30W
UM1.8	58.0590	-6.2400	58 3.54N	006 14.40W
UM1.9	58.1940	-5.5060	58 11.64N	005 30.36W
UM2.6	57.6670	-6.4470	57 40.02N	006 26.82W
UM2.7	58.0610	-6.2890	58 3.66N	006 17.34W
UM2.8	58.1260	-5.8960	58 7.56N	005 53.76W
UM2.9	57.8550	-6.1160	57 51.30N	006 6.96W
UM2.10	58.0760	-6.2160	58 4.56N	006 12.96W
SOH1.11	56.8890	-7.1680	56 53.34N	007 10.08W
SOH1.12	56.5850	-7.6040	56 35.10N	007 36.24W
SOH1.13	56.6730	-7.4490	56 40.38N	007 26.94W

SOH1.14	56.9010	-6.6770	56 54.06N	006 40.62W
SOH1.15	56.6440	-7.0560	56 38.64N	007 3.36W
WOK 6	59.5490	-3.8930	59 32.94N	003 53.58W
WOK 7	59.5540	-3.8230	59 33.24N	003 49.38W
WOK 8	59.4950	-3.7720	59 29.70N	003 46.32W
WOK 9	59.4300	-3.8210	59 25.80N	003 49.26W
FL1.4	58.4700	-0.1100	58 28.20N	000 6.60W
FL1.5	58.4400	-0.0400	58 26.40N	000 2.40W
FL1.6	58.4700	0.0700	58 28.20N	000 4.20E
FL2.4	58.6230	0.6480	58 37.38N	000 38.88E
FL2.5	58.4390	1.1450	58 26.34N	001 8.70E
FL2.6	58.5850	0.8960	58 35.10N	000 53.76E
FL3.4	58.0630	-0.3430	58 3.78N	000 20.58W
FL3.5	58.1500	0.0980	58 9.00N	000 5.88E
FL3.6	58.1790	-0.0950	58 10.74N	000 5.70W
FL4.4	58.3240	1.0340	58 19.44N	001 2.04E
FL4.5	58.2840	0.8920	58 17.04N	000 53.52E
FL4.6	58.1430	0.7550	58 8.58N	000 45.30E
FO1.4	57.3220	1.3790	57 19.32N	001 22.74E
FO1.5	57.3100	1.2670	57 18.60N	001 16.02E
FO1.6	57.0350	1.1930	57 2.10N	001 11.58E
FO2.4	57.2050	1.8050	57 12.30N	001 48.30E
FO2.5	57.0320	1.4840	57 1.92N	001 29.04E
FO2.6	57.2670	2.0900	57 16.02N	002 5.40E
FO3.4	56.7940	1.1070	56 47.64N	001 6.42E
FO3.5	56.8690	1.2700	56 52.14N	001 16.20E
FO3.6	56.8240	0.7600	56 49.44N	000 45.60E
FO4.4	56.9010	1.8680	56 54.06N	001 52.08E
FO4.5	56.8870	1.6860	56 53.22N	001 41.16E
FO4.6	56.8610	1.4700	56 51.66N	001 28.20E

Table 5: Catamaran trawl locations.

Area	declat	declong	degLat	degLong
Forth and Tay 1	55.994	-2.35	55 59.64N	002 21.00W
Forth and Tay 2	55.905	-2.035	55 54.30N	002 2.10W
Forth and Tay 3	56.186	-2.434	56 11.16N	002 26.04W
Forth and Tay 4	56.52	-2.543	56 31.20N	002 32.58W
Forth and Tay 5	56.702	-2.224	56 42.12N	002 13.44W
Montrose Bank	56.488	-1.492	56 29.28N	001 29.52W
NE Coast 1	56.882	-2.116	56 52.92N	002 6.96W
NE Coast 2	57.064	-1.901	57 3.84N	001 54.06W
NE Coast 3	57.185	-1.891	57 11.10N	001 53.46W
NE Coast 4	57.252	-1.841	57 15.12N	001 50.46W
NE Coast 5	57.386	-1.739	57 23.16N	001 44.34W
NE Coast 6	57.741	-1.861	57 44.46N	001 51.66W
Moray Firth 1	57.792	-2.142	57 47.52N	002 8.52W

Moray Firth 2	57.762	-2.421	57 45.72N	002 25.26W
Moray Firth 3	57.761	-2.626	57 45.66N	002 37.56W
Moray Firth 4	57.827	-3.01	57 49.62N	003 0.60W
Moray Firth 5	57.852	-3.406	57 51.12N	003 24.36W
Moray Firth 6	57.701	-3.786	57 42.06N	003 47.16W
Moray Firth 7	57.928	-3.724	57 55.68N	003 43.44W
Moray Firth 8	58.132	-3.57	58 7.92N	003 34.20W
Moray Firth 9	58.277	-3.252	58 16.62N	003 15.12W
Moray Firth 10	58.558	-3.022	58 33.48N	003 1.32W
North Coast 1	58.695	-3.513	58 41.70N	003 30.78W
North Coast 2	58.635	-4.196	58 38.10N	004 11.76W
North Coast 3	58.669	-4.792	58 40.14N	004 47.52W
Outer Hebrides 1	58.551	-6.258	58 33.06N	006 15.48W
Outer Hebrides 2	58.443	-6.694	58 26.58N	006 41.64W
Outer Hebrides 3	58.166	-7.186	58 9.96N	007 11.16W
Outer Hebrides 4	57.725	-7.693	57 43.50N	007 41.58W
Outer Hebrides5	57.321	-7.698	57 19.26N	007 41.88W
Outer Hebrides 6	56.946	-7.68	56 56.76N	007 40.80W
Minches 1	58.44	-5.553	58 26.40N	005 33.18W
Minches 2	58.417	-5.927	58 25.02N	005 55.62W
Minches 3	58.016	-5.708	58 0.96N	005 42.48W
Minches 4	57.723	-5.938	57 43.38N	005 56.28W
Minches 5	57.64	-6.691	57 38.40N	006 41.46W
Minches 6	57.496	-6.773	57 29.76N	006 46.38W
Minches 7	57.241	-6.769	57 14.46N	006 46.14W
Minches 8	57.124	-6.371	57 7.44N	006 22.26W
Minches 9	57.012	-6.562	57 0.72N	006 33.72W
SOH 1	56.784	-6.856	56 47.04N	006 51.36W
SOH 2	56.699	-6.416	56 41.94N	006 24.96W
SOH 3	56.598	-7.071	56 35.88N	007 4.26W
SOH 4	56.572	-6.516	56 34.32N	006 30.96W
SOH 5	56.498	-6.649	56 29.88N	006 38.94W
SOH 6	56.407	-6.822	56 24.42N	006 49.32W
SOH 7	56.297	-6.728	56 17.82N	006 43.68W
SOH 8	56.158	-6.107	56 9.48N	006 6.42W
SOH 9	56.095	-6.665	56 5.70N	006 39.90W
Shetland 1	60.7631	-0.7443	60 45.79N	000 44.66W
Shetland 2	60.6352	-1.5595	60 38.11N	001 33.57W
Shetland 3	60.501	-1.777	60 30.06N	001 46.62W
Shetland 4	60.207	-2.445	60 12.42N	002 26.70W
Shetland 5	59.941	-2.87	59 56.46N	002 52.20W
West of Orkney 1	59.244	-3.425	59 14.64N	003 25.50W
West of Orkney 2	59.0917	-3.4765	59 5.50N	003 28.59W