Not to be cited without prior reference to Marine Scotland, Marine Laboratory, Aberdeen

MFV *Walrus*

Survey 1619H

**PROGRAMME**

15-22 July 2019

**Loading:** Aultbea, 14 July 2019
**Boarding:** Aultbea, 15 July 2019
**Unloading:** Aultbea, 22 July 2019

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.

**Project:** 7 days, SP02R0 (20490) + 1 day C80320 (20491)

| **Sampling Gear & Equipment** |
|---|
| 12 Fish traps (6 fleets of 2 traps) |
| 2 Baited Remote Underwater Video Camera (SBRUV) frames |
| 4 LED light assemblies in GPH housing |
| 4 SJ6 Legend cameras and custom-built underwater housings |
| Mini drop frame ('habitat-cam') with GitUp Git 2 camera and Nautilux video light attachments |
| Holding tank for live fish (exact dimensions TBC) |

Cruise 2218H expands on the fish trap and baited camera work undertaken in 2018 and will target nearshore cod, haddock, whiting, and saithe in and around various habitat types within the loch. Video-derived estimates of relative density will be used to parameterise fine-scale distribution models and otoliths from trap-caught fish will provide growth and survivorship data. In addition, juvenile fish from the head of the loch will be captured and transported back to the lab for use in aquarium-based behaviour experiments.

**Objectives**

1. To deploy fish traps over various habitat types within Loch Ewe.

2. To synchronously deploy baited remote underwater video camera frames with twin cameras calibrated for photogrammetric analysis.

3. To supply a range of trap-caught live fish species for behaviour trials.

**Operations**

Scientists will board the vessel on the morning of 15 July. The vessel will operate on a day basis between the hours of 0600 and 1800 UTC.

**Fish Trap Survey**

Traps will be deployed and recovered each day following a minimum soak time of six hours. The approximate positions of each end marker buoy (GPS latitude and longitude), depth (m), soak time, and bait type and quantity will be recorded. Captured fish will be released from each trap, placed inside individually labelled bags, and frozen. Otoliths from gadoid species (cod, haddock, whiting and saithe) will be extracted back at the lab. In addition, a small hand-held drop frame will be used to deploy (~1 minute) a GitUp Git 2 action camera and Nautilux light in the immediate vicinity of the fish traps. Footage will be used to verify the substrate over which traps are positioned. The trap station positions shown in Figure 1 are derived from the midpoints of those sampled in survey 1318H. Latitude and longitude coordinates and depth in metres are given in Table 1**a**. Stations will be surveyed depending on the prevailing weather conditions i.e. if wind strengths or wave heights are adverse, a precautionary approach will be adopted and those with adequate shelter from the weather will be selected.

**SBRUV Survey**

Baited stereo-camera station positions are shown in Figure 1 (open circle). Latitude and longitude coordinates and depth in metres are given in Table 1**b**. Each underwater camera frame will be deployed at a distance sufficient to avoid the trap gear (minimum 500 m between deployments). Each deployment will use two cameras angled approximately ±6° perpendicular to the frame base to record high definition video (1080p @ 60 fps) for a nominal period of 1.5 hours. Footage will be downloaded to external media at the end of each working day. Species identification, relative density (MaxN) and substrate type (assessed visually) will be assigned post-survey.

**Live Fish Capture**

The fish traps will be deployed towards the Poolewe end of the loch for a minimum of six hours. Captured fish will be held in a tank on board the vessel and then transferred to a vivier system for transport back to the lab. A range of species will be targeted, including cod, saithe and whiting. The live fish will be used in the SMARTFISH Horizon 2020 behaviour work currently underway at MSS.

Unloading will occur in Aultbea on the evening of 22 July.

Normal contact will be maintained with the Laboratory.

| Submitted: | | Approved | |
|---|---|---|---|
| J Clarke | 09 July 2019 | F MacKay | 10 July 2019 |

**Figure 1**: Positions of fish trap and SBRUV frame deployment stations.

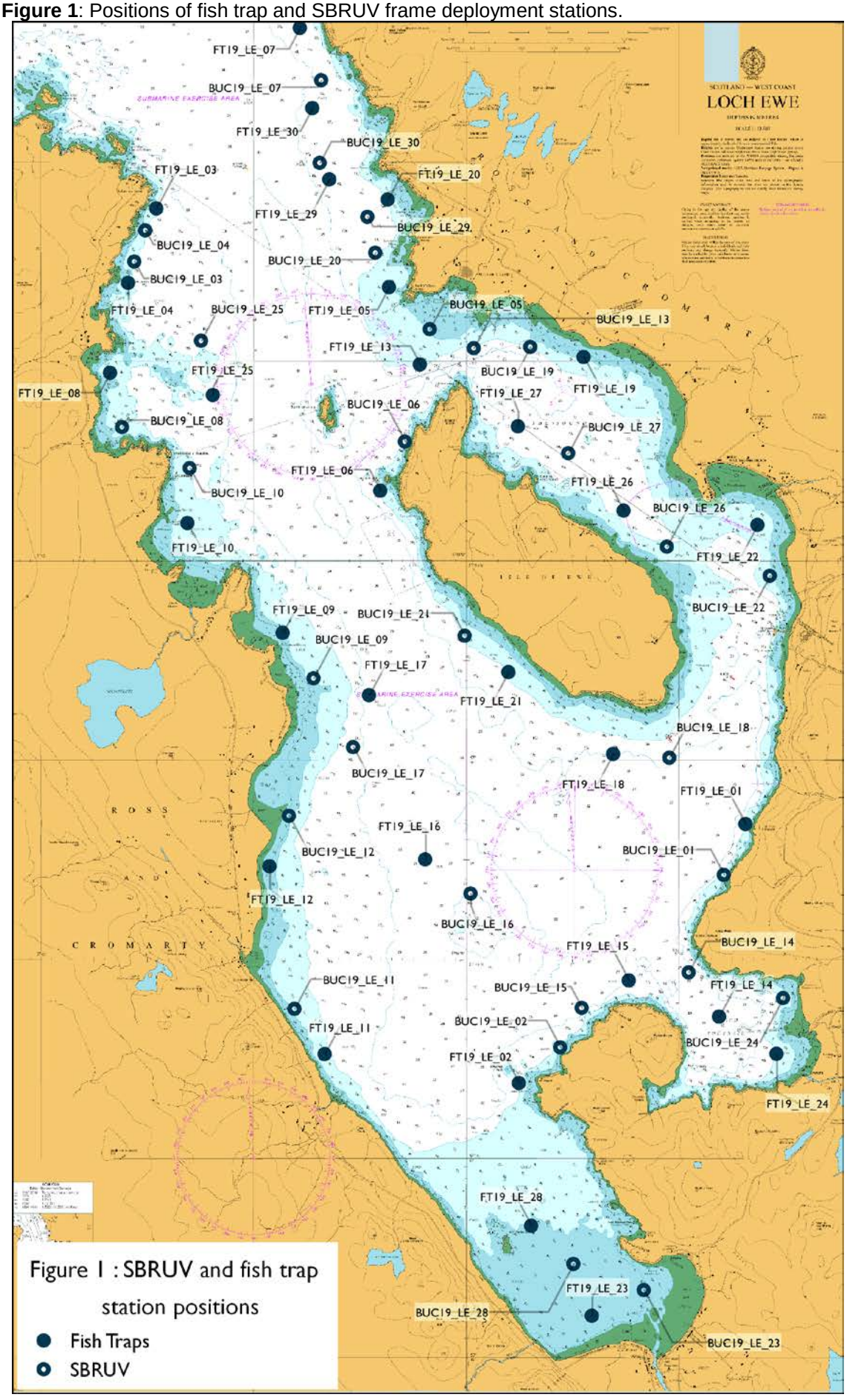

**Table 1a**: Latitude, longitude & depth of fish trap stations.

| Station | Latitude (dd) | Longitude (dd) | Latitude (degree decimal minutes) | Longitude (degree decimal minutes) | Depth (m) |
|---|---|---|---|---|---|
| FT19_LE_01 | 57.8120 | -5.5891 | 057° 48.72000' N | 005° 35.34600' W | -6.7 |
| FT19_LE_02 | 57.7899 | -5.6245 | 057° 47.39400' N | 005° 37.47000' W | -10.4 |
| FT19_LE_03 | 57.8628 | -5.6819 | 057° 51.76800' N | 005° 40.91400' W | -9.6 |
| FT19_LE_04 | 57.8583 | -5.6854 | 057° 51.49800' N | 005° 41.12400' W | -7 |
| FT19_LE_05 | 57.8562 | -5.6454 | 057° 51.37200' N | 005° 38.72400' W | -8 |
| FT19_LE_06 | 57.8392 | -5.6467 | 057° 50.35200' N | 005° 38.80200' W | -9.9 |
| FT19_LE_07 | 57.8779 | -5.6594 | 057° 52.67400' N | 005° 39.56400' W | -14.2 |
| FT19_LE_08 | 57.8492 | -5.6892 | 057° 50.95200' N | 005° 41.35200' W | -5 |
| FT19_LE_09 | 57.8281 | -5.6629 | 057° 49.68600' N | 005° 39.77400' W | -3.1 |
| FT19_LE_10 | 57.8374 | -5.6749 | 057° 50.24400' N | 005° 40.49400' W | -6.6 |
| FT19_LE_11 | 57.7929 | -5.6564 | 057° 47.57400' N | 005° 39.38400' W | -7.6 |
| FT19_LE_12 | 57.8084 | -5.6638 | 057° 48.50400' N | 005° 39.82800' W | -1.9 |
| FT19_LE_13 | 57.8499 | -5.6400 | 057° 50.99400' N | 005° 38.40000' W | -12.2 |
| FT19_LE_14 | 57.7952 | -5.5935 | 057° 47.71200' N | 005° 35.61000' W | -25 |
| FT19_LE_15 | 57.7981 | -5.6080 | 057° 47.88600' N | 005° 36.48000' W | -18.3 |
| FT19_LE_16 | 57.8088 | -5.6409 | 057° 48.52800' N | 005° 38.45400' W | -25.2 |
| FT19_LE_17 | 57.8214 | -5.6488 | 057° 49.28400' N | 005° 38.92800' W | -30.4 |
| FT19_LE_18 | 57.8175 | -5.6067 | 057° 49.05000' N | 005° 36.40200' W | -21.5 |
| FT19_LE_19 | 57.8507 | -5.6151 | 057° 51.04200' N | 005° 36.90600' W | -5.7 |
| FT19_LE_20 | 57.8631 | -5.6454 | 057° 51.78600' N | 005° 38.72400' W | -9.2 |
| FT19_LE_21 | 57.8232 | -5.6250 | 057° 49.39200' N | 005° 37.50000' W | -9.8 |
| FT19_LE_22 | 57.8363 | -5.5875 | 057° 50.17800' N | 005° 35.25000' W | -7.8 |
| FT19_LE_23 | 57.7702 | -5.6135 | 057° 46.21200' N | 005° 36.81000' W | -3.9 |
| FT19_LE_24 | 57.7921 | -5.5845 | 057° 47.52600' N | 005° 35.07000' W | -8.4 |
| FT19_LE_25 | 57.8514 | -5.6824 | 057° 51.08400' N | 005° 40.94400' W | -13.2 |
| FT19_LE_26 | 57.8373 | -5.6073 | 057° 50.23800' N | 005° 36.43800' W | -13.4 |
| FT19_LE_27 | 57.8449 | -5.6252 | 057° 50.69400' N | 005° 37.51200' W | -14.6 |
| FT19_LE_28 | 57.7777 | -5.6230 | 057° 46.66200' N | 005° 37.38000' W | -4.9 |
| FT19_LE_29 | 57.8652 | -5.6547 | 057° 51.91200' N | 005° 39.28200' W | -15.9 |
| FT19_LE_30 | 57.8700 | -5.6499 | 057° 52.20000' N | 005° 38.99400' W | -19.5 |

**Table 1b**: Latitude, longitude & depth of SBRUV stations.

| Station | Latitude (dd) | Longitude (dd) | Latitude (degree decimal minutes) | Longitude (degree decimal minutes) | Depth (m) |
|---|---|---|---|---|---|
| BUC19_LE_01 | 57.8071 | -5.5928 | 057° 48.42600' N | 005° 35.56800' W | -4 |
| BUC19_LE_02 | 57.7926 | -5.6185 | 057° 47.55600' N | 005° 37.11000' W | -1.8 |
| BUC19_LE_03 | 57.8584 | -5.6853 | 057° 51.50400' N | 005° 41.11800' W | -10.1 |
| BUC19_LE_04 | 57.8610 | -5.6836 | 057° 51.66000' N | 005° 41.01600' W | -9.7 |
| BUC19_LE_05 | 57.8527 | -5.6390 | 057° 51.16200' N | 005° 38.34000' W | -4.8 |
| BUC19_LE_06 | 57.8433 | -5.6429 | 057° 50.59800' N | 005° 38.57400' W | -6.2 |
| BUC19_LE_07 | 57.8735 | -5.6560 | 057° 52.41000' N | 005° 39.36000' W | -18.8 |
| BUC19_LE_08 | 57.8445 | -5.6873 | 057° 50.67000' N | 005° 41.23800' W | -5.9 |
| BUC19_LE_09 | 57.8235 | -5.6572 | 057° 49.41000' N | 005° 39.43200' W | -5.6 |
| BUC19_LE_10 | 57.8411 | -5.6766 | 057° 50.46600' N | 005° 40.59600' W | -10 |
| BUC19_LE_11 | 57.7959 | -5.6602 | 057° 47.75400' N | 005° 39.61200' W | -5.1 |
| BUC19_LE_12 | 57.8120 | -5.6611 | 057° 48.72000' N | 005° 39.66600' W | -2.9 |
| BUC19_LE_13 | 57.8511 | -5.6321 | 057° 51.06600' N | 005° 37.92600' W | -15.9 |
| BUC19_LE_14 | 57.7989 | -5.5983 | 057° 47.93400' N | 005° 35.89800' W | -26.1 |
| BUC19_LE_15 | 57.7959 | -5.6151 | 057° 47.75400' N | 005° 36.90600' W | -19.3 |
| BUC19_LE_16 | 57.8055 | -5.6326 | 057° 48.33000' N | 005° 37.95600' W | -18.8 |
| BUC19_LE_17 | 57.8178 | -5.6510 | 057° 49.06800' N | 005° 39.06000' W | -14.8 |
| BUC19_LE_18 | 57.8169 | -5.6014 | 057° 49.01400' N | 005° 36.08400' W | -17.7 |
| BUC19_LE_19 | 57.8512 | -5.6232 | 057° 51.07200' N | 005° 37.39200' W | -13.1 |
| BUC19_LE_20 | 57.8591 | -5.6475 | 057° 51.54600' N | 005° 38.85000' W | -10.5 |
| BUC19_LE_21 | 57.8271 | -5.6335 | 057° 49.62600' N | 005° 38.01000' W | -10.3 |
| BUC19_LE_22 | 57.8321 | -5.5856 | 057° 49.92600' N | 005° 35.13600' W | -7.1 |
| BUC19_LE_23 | 57.7723 | -5.6054 | 057° 46.33800' N | 005° 36.32400' W | -2.1 |
| BUC19_LE_24 | 57.7968 | -5.5835 | 057° 47.80800' N | 005° 35.01000' W | -7.9 |
| BUC19_LE_25 | 57.8517 | -5.6749 | 057° 51.10200' N | 005° 40.49400' W | -10.1 |
| BUC19_LE_26 | 57.8345 | -5.6017 | 057° 50.07000' N | 005° 36.10200' W | -7.1 |
| BUC19_LE_27 | 57.8423 | -5.6172 | 057° 50.53800' N | 005° 37.03200' W | -13.1 |
| BUC19_LE_28 | 57.7745 | -5.6164 | 057° 46.47000' N | 005° 36.98400' W | -4.3 |
| BUC19_LE_29 | 57.8621 | -5.6487 | 057° 51.72600' N | 005° 38.92200' W | -12.6 |
| BUC19_LE_30 | 57.8666 | -5.6562 | 057° 51.99600' N | 005° 39.37200' W | -16.7 |