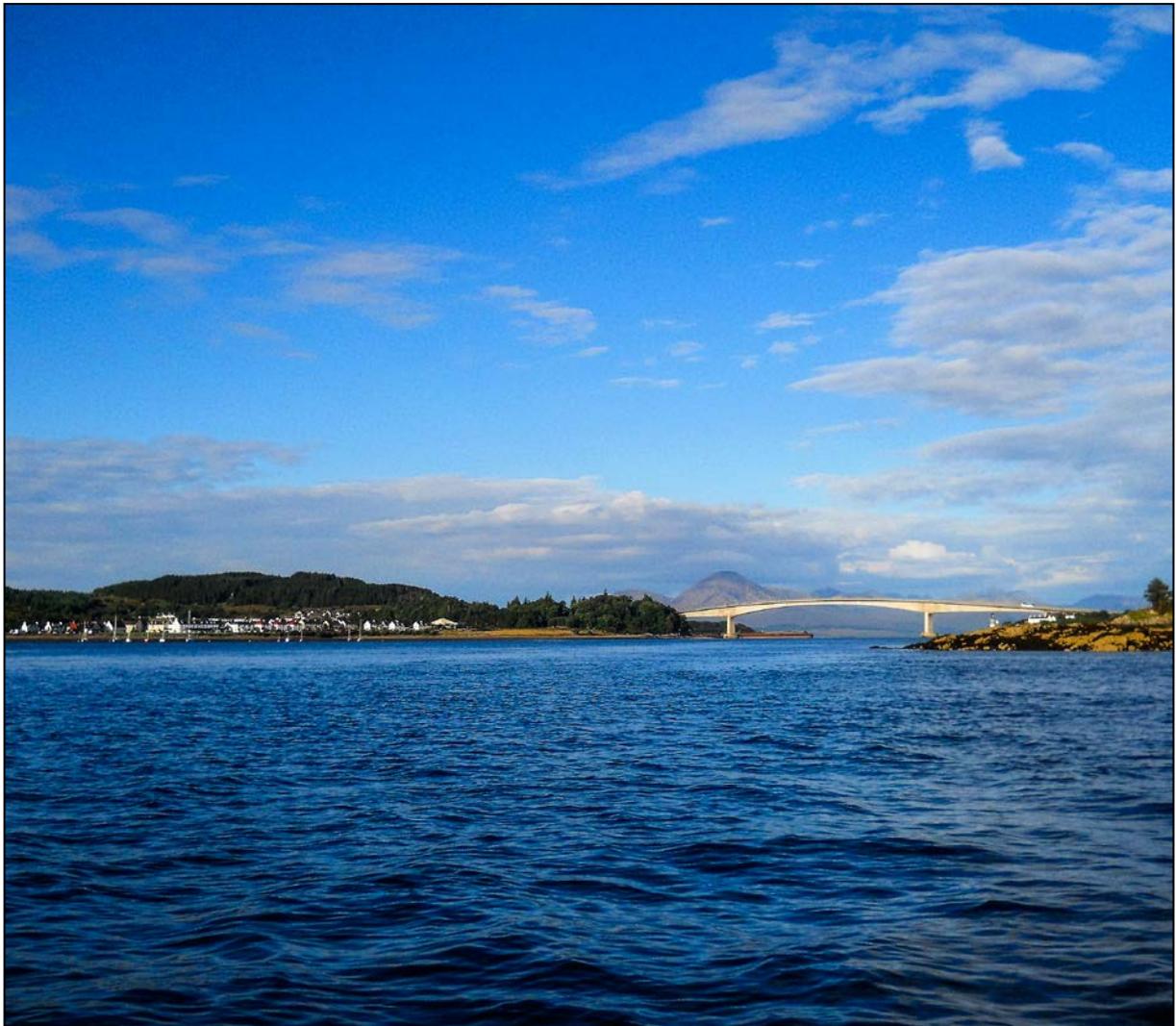


# **A Baseline Sublittoral Survey for the proposed Altanavaig Pier Development**

**For Marine Harvest  
September 2016**



# **A Baseline Sublittoral Survey for the proposed Altanavaig Pier Development**

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September 2016

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Reference: Woombs, M. 2016. A Baseline Sublittoral Survey for the proposed Altanavaig Pier Development. A Report for Marine Harvest

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## Summary

Marine Harvest proposes to build a fish feed mill at Altanavaig Quarry, Isle of Skye. This will involve extending the present pier and dredging the surrounding area to allow large ships to berth.

This project represents an £80 million investment in Marine Harvest's Scottish business.

The facility would create around 55 new full time jobs and, based on experience of a similar plant in Norway, has the potential to encourage a variety of indirect employment and spending throughout the local area and West Coast of Scotland.

Loch Alsh is known to support the largest known flame shell bed in Scotland and the largest reported bed in the world (Moore *et al.*, 2013). In the waters off Kyleakin and through the mouth of Loch Alsh under the Skye Bridge, the flame shell bed covers an area of 93 ha. There are at least 100 million shells, but possibly up to as many as half a billion.

Flame shell beds (a Scottish Marine Priority Feature) are considered scarce in the UK and the Scottish beds are of national importance. The area has recently been designated a Marine Protected Area (MPA).

The MPA also overlaps the Lochs Duich, Long and Alsh Special Area of Conservation (SAC), designated for extensive areas of tide-swept reefs, extremely sheltered rocky reefs and horse mussel beds.

Due to the proximity of the MPA, SAC, flame shell bed and the lack of benthic information around the pier, a benthic survey has therefore been deemed necessary.

The survey indicated a high quality flame shell (*Limaria hians*) bed commencing at the 9.5m depth contour. The demarcation line between flame shells and no flame shells was very clear. A flame shell carpet with virtually 100% coverage gave way to a few flame shell nests at 9.5m bcd before they completely disappeared. No *Limaria hians* were recorded shallower than 9.5m bcd. The substratum was generally coarse sand with broken shells, gravel pebbles and cobbles. The biotope was clearly *Limaria hians* beds in tide swept sublittoral muddy mixed sediment, SS.SMx.IMx.Lim.

Where a population of *Limaria hians* experiences some mortality, but the habitat is not changed, the habitat has the potential to recover within several years, dependent on recruitment. In this case *Limaria* beds have been given a resilience of 'medium' and a recovery time of 2 – 10 years (Tyler-Walters, 2016). However, where the population experiences significant mortality and / or carpet damage then recovery is likely to be prolonged. In this situation *Limaria* beds have been given a resilience of 'very low' and a recovery time of at least 25 years (Tyler-Walters, 2016). Obviously any recovery would be susceptible to a number of factors, including environmental conditions, frequency and intensity of disturbance and the number of pressures on the site at any one time.

Shallower than 9.5m bcd the flame shell biotope was replaced by *Saccharina latissima* (formerly *Laminaria saccharina*) and red seaweeds on infralittoral sediments, SS.SMP.KSwSS.LsacR. This biotope contains a number of sub-biotopes distinguished by the degree of tidal exposure. The majority of the sub-biotope was *Saccharina latissima* and robust red algae on infralittoral gravel and pebbles, SS.SMP.KSwSS.LsacR.Gv. Occasionally the substrate became gravelly sand with a few broken shells. Due to lack of a suitable substrate the abundance of *Saccharina latissima* declined and the sub-biotope began merging into the sub-biotope, *Saccharina latissima* and filamentous red algae on infralittoral sand (SS.SMP.KSwSS.LsacR.Sa). This tended to occur in shallower water where the tidal streams were weaker.

Occasionally where larger boulders were present, the characterizing kelp became *Laminaria hyperborea*. This led to very small areas of the biotope, *Laminaria hyperborea* forest and foliose red seaweeds on tide-swept, upper infralittoral mixed substrata (IR.MIR.KR.LhypTX.Ft). The occasional patches of this biotope rapidly disappeared, as the substrate became predominantly coarse sand with broken shell and gravel.

Kelp and seaweed communities on sublittoral sediments (SS.SMP.KSwSS) is another Priority Marine Feature in Scotland's Seas of which SS.SMP.KSwSS.LsacR.Gv and SS.SMP.KSwSS.LsacR.Sa are sub-biotopes. Similarly *Laminaria hyperborea* forest and foliose red seaweeds on tide-swept infralittoral mixed substrata (IR.MIR.KR.LhypTX.Ft) is also a Priority Marine Feature.

Removal of the substrate through dredging, will remove most of the key species of these biotopes. However if suitable substratum remains, recovery is likely to be rapid as most of the epibiota are known as rapid colonisers and fast growers (Hiscock, 2008). *Saccharina latissima* has been shown to be an early colonizer within algal successions, appearing within two weeks of clearance, and can reach sexual maturity within 15 – 20 months (Stamp & Hiscock, 2015). Resilience of these biotopes has been assessed as 'high' (Stamp, 2015).

Almost all of the seabed from the end of the present pier to the 12m contour appears to be Scottish Priority Marine Features. The flame shell beds are in extremely good condition and cover virtually 100% of the seabed from the 9.5m depth contour. The effect of dredging the *Limaria hians* carpet would probably be severe with loss of habitat and poor recovery. With a shortened pier and controlled dredging the impact on the bed could be minimized.

The kelp and seaweed communities on sublittoral sediment would certainly be affected by dredging and pier construction. However these biotopes are more prevalent in Scotland. They are a lot more resilient and their recovery time is thought to be rapid.

Of note was the abundance of *Sargassum muticum* within the biotope, kelp and seaweed communities on sublittoral sediments (SS.SMP.KSwSS). *Sargassum* is an invasive species, which naturally occurs in Japanese and Chinese waters. It was first found in the Isle of Wight in 1971. *Sargassum* is now found in many parts of the UK, but did not reach Scotland until 2004, when it was found in Loch Ryan. It has subsequently spread up the west coast of Scotland and is now known to occur in a number of areas.

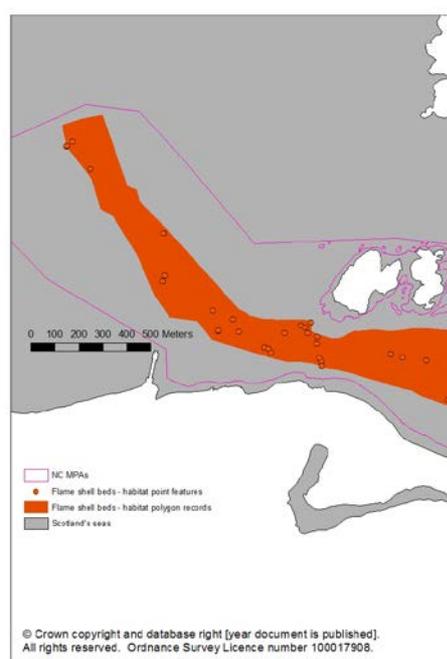
## Introduction

Lochs Duich, Long and Alsh Marine Protected Area (MPA) incorporate a large bed of brightly coloured bivalve molluscs known as flame shells. *Limaria hians*, the flame shell, has been described as the most beautiful British bivalve (Yonge and Thompson, 1976). Despite their long, vibrant orange tentacles (which cannot be retracted), they are very rarely seen above the seabed.



*Limaria hians* or flame shell

Loch Alsh is now known to support the largest known flame shell bed in Scotland and the largest reported bed in the world (Moore *et al.*, 2013). In the waters off Kyleakin and through the mouth of Loch Alsh under the Skye Bridge, the flame shell bed covers an area of 93 ha. There are at least 100 million shells, but possibly up to as many as half a billion. The flame shells create nests by weaving together threads of byssus with surrounding materials such as seaweed, shells, gravel, pebbles and even cobbles. These nests can coalesce together to carpet the entire seabed. These carpets create a new habitat that stabilises the sediments and provides an attachment surface for many additional organisms. These organisms in turn increase the habitat complexity and provide shelter for other species. A rich faunal diversity is also found

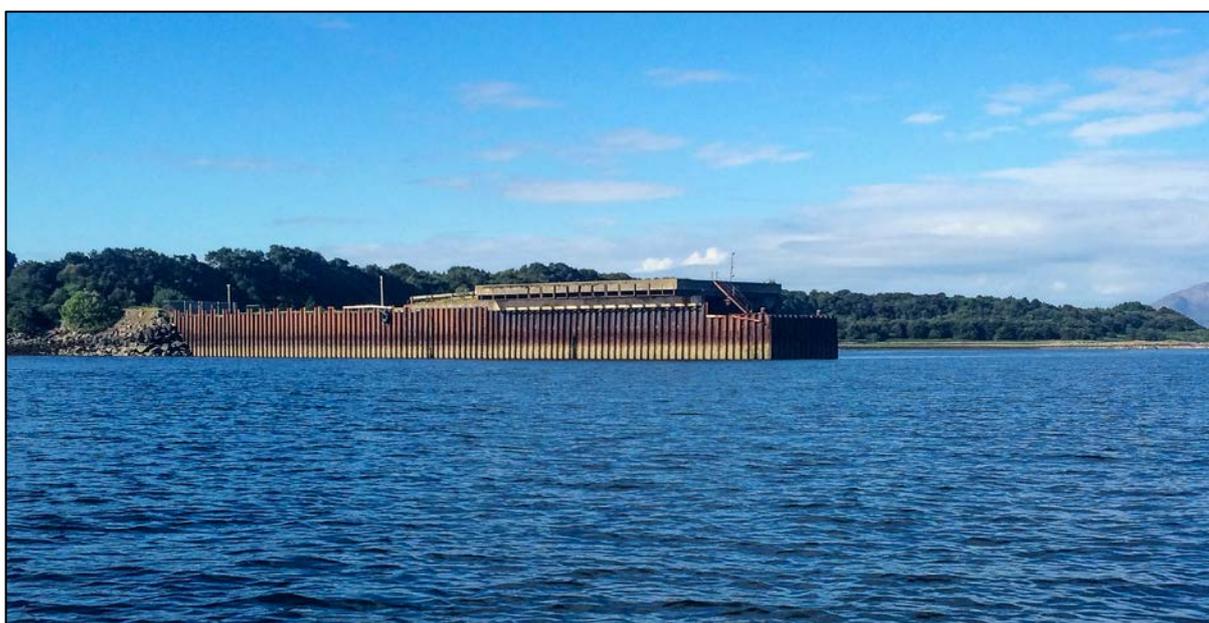


within and below the flame shell bed.

Flame shell beds are considered scarce in the UK and the Scottish beds are of national importance. These beds are thought to be prone to damage from man made impacts and recent evidence suggests they may take more than 100 years to recover following a single dredging event (Tyler-Walters *et al.*, 2016).

The MPA also overlaps the Lochs Duich, Long and Alsh Special Area of Conservation (SAC), designated for extensive areas of tide-swept reefs, extremely sheltered rocky reefs and horse mussel beds.

Marine Harvest proposes to build a fish feed mill and extend the present pier at Altanavaig Quarry, Isle of Skye. This project represents an £80 million investment in Marine Harvest's Scottish business.



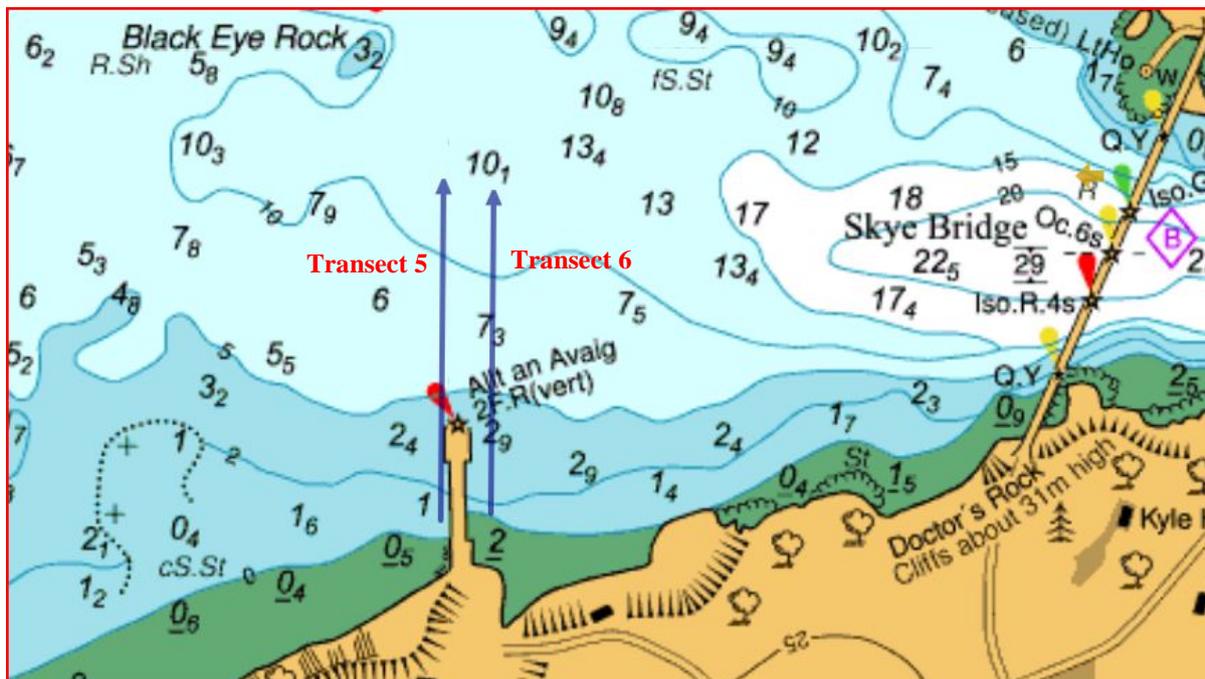
The facility would create around 55 new full time jobs and, based on experience of a similar plant in Norway, has the potential to encourage a variety of indirect employment and spending throughout the local area and West Coast of Scotland.

Marine Harvest's farms in Scotland have until now been supplied with feed from third party companies based on the east coast or central belt of Scotland. However, developing the capacity for feed production has a number of benefits. Firstly, it will make the business more efficient and sustainable in the long term. The intention is that this development will provide complete feed supply to all of Marine Harvest Scotland's fish farms, as well as export to Marine Harvest farms in Ireland, Norway and the Faroe Islands. Secondly, it allows the business to more closely control the whole process of growing salmon. Thirdly, by moving production to the west coast, the feed supply will be far closer to the fish farms and this reduces the overall mileage required for product transport. And finally, the seaside location allows for raw materials for the feed to be delivered directly by sea, which significantly reduces the need for road transport.



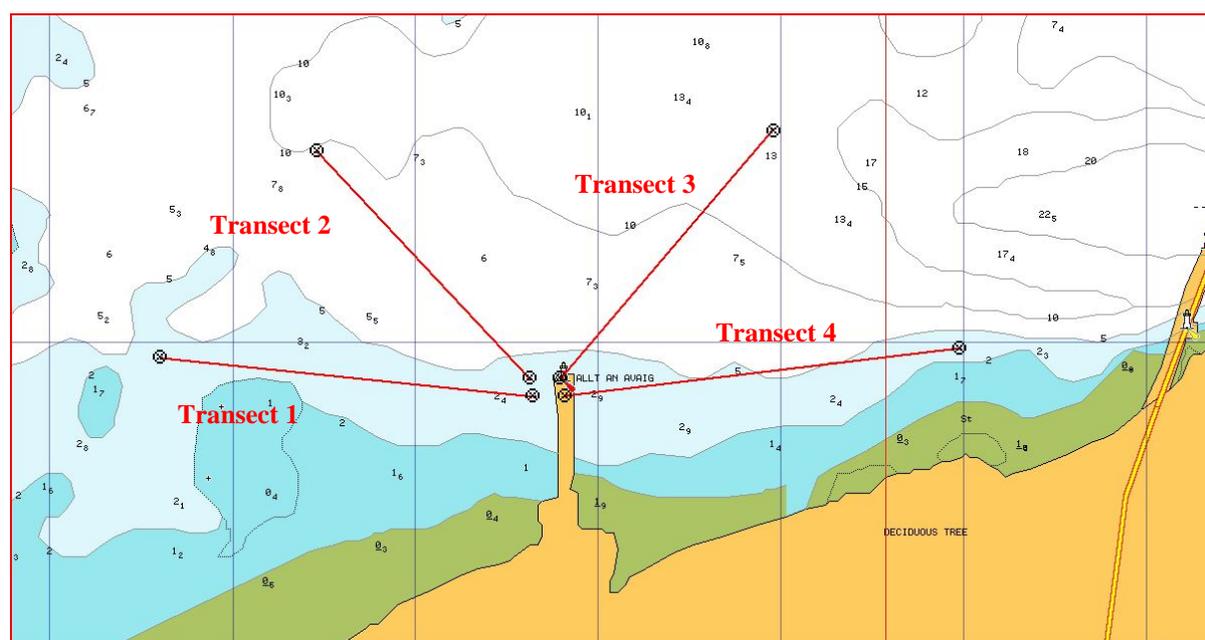
## Methods

An initial exploratory survey was undertaken in January 2016. Two transect dives covering both the proposed pier footprint and the possible dredging area were carried out.



The first transect dive (transect 5) was to start at  $57^{\circ} 16'.61N$ ,  $005^{\circ} 45'.21W$  and follow the line of the existing pier and the proposed pier ( $180^{\circ}T$ ) for 0.19nM. The second transect dive (transect 6) would be carried out 50m to the east of the first transect, starting at  $57^{\circ} 16'.60N$ ,  $005^{\circ} 45'.17W$ . Again, this would follow the line of the pier ( $180^{\circ}T$ ) for 0.17nM.

The following August an additional four transect dives (transects 1-4) were undertaken at the request of Jacobs UK Ltd.



Rather than use the precise starting locations shown on the above chart, it was decided to start all the dives from the end of the pier and to follow a known bearing.

- Transect 1 - 276°(T), 281°(M) for 0.186nM (344m)
- Transect 2 - 317°(T), 322°(M) for 0.155nM (287m)
- Transect 3 - 40°(T), 45° (M) for 0.162nM (299m)
- Transect 4 - 83° (T), 88° (M) for 0.197nM (365m)

There are strong tidal streams under the Skye Bridge which can run at up to three knots. There is only one slack water a day and this lasts for a short period of time. Due to the tidal streams and the length of the transects (up to 365m), some of the dives would be carried out using Pegasus Thrusters (DPVs attached to a divers' cylinder), navigating by an electronic compass. Due to the inability to recharge the Pegasus Thrusters during the slack water period they could only be used for one dive each day.



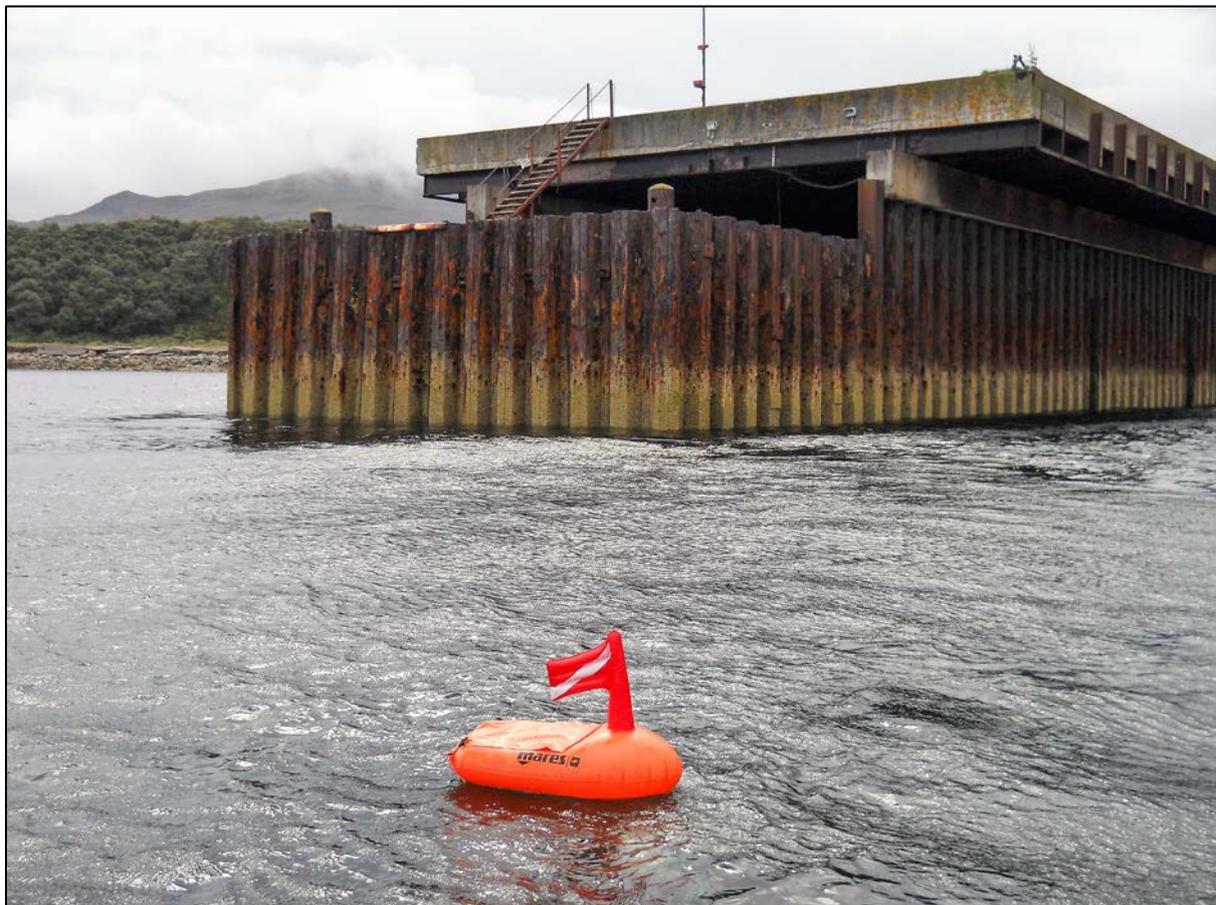
**Pegasus Thruster**

Diving survey methods were based on techniques developed for use on the Marine Nature Conservation Review (MNCR) surveys (Hiscock, 1996) and carried out under HSE diving regulations. All dives were on SCUBA with compressed air. All dives followed 'The Diving at Work Regulations 1997' and the 'Approved Code of Practice for Scientific and Archaeological Diving Projects' (1998).

The diving was carried out from a coded RIB supplied by WA Marine & Environment, with a suitably qualified commercial skipper and carrying all appropriate safety equipment.

A shot line was placed at the seaward end for transects 5 and 6. The end of the pier was used for transects 1 – 4. A pair of divers descended the shot with a surface marker buoy (SMB) containing a Garmin 60 GPS set to record a track. The SMB line was kept reasonably taut to ensure the GPS was over the diver's heads. The GPS was set to record a position every 15 seconds. This allowed the metadata from the photographic record to be compared with the GPS data and hence each underwater image could be given a latitude and longitude position. Similarly, where video was taken the time line could again be related to the GPS data to give positions. A depth / time record was recorded using a Galileo Sol computer. An A flag was flown whenever divers were in the water. When the divers reached the end of the transect they were recalled by continuous tugs on the SMB.

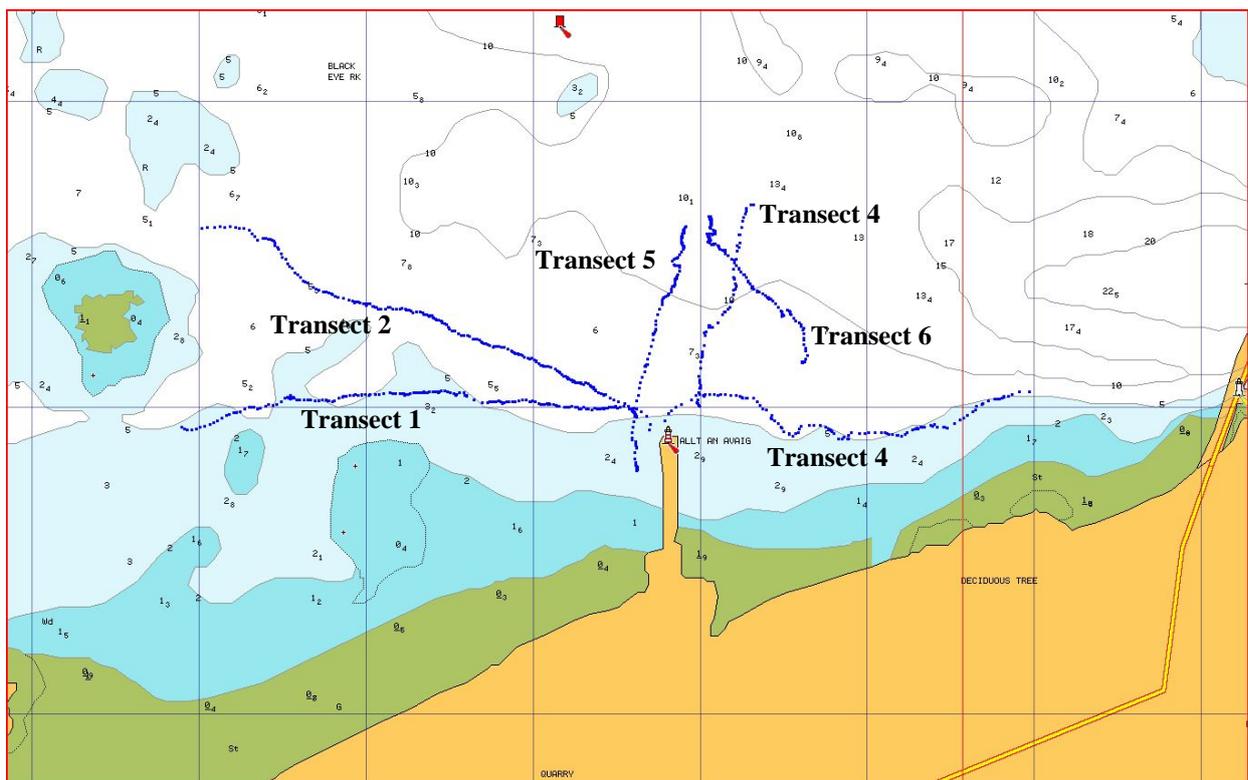
Standard MNCR recording forms, incorporating the species codings of Howson and Picton (1997) and the abundance scales of Hiscock (1996) were completed. Any specimens difficult to identify *in situ* were collected for later identification and, if appropriate, preservation. Underwater video, photographs of biotopes and conspicuous species were taken, using a housed Sony A77 DSLT, and a housed Nikon D750 DSLR, with lenses as appropriate.



**Surface Marker Buoy containing a Garmin 60 GPS**

## Results

Due to the strength of the tidal streams and the length of the transects it proved to be very difficult to keep to the proposed bearings. Often the divers were aware of being pushed off course but could do nothing to counteract the tidal stream. Appendix 2 shows precise GPS locations with time and also the speed the divers were moving. An additional problem occurred with the Pegasus Thruster. Although this was the one means of counteracting the tidal streams, the power switch was magnetic and consequently had an effect on the divers compass.



GPS positions along each transect

Despite the navigational problems, good coverage of the area was achieved, with four of the transects being longer than initially proposed. There is a gap in the coverage between transects 2 and 5, where the flood tide made it impossible to follow the correct bearing for transect 2.

The biotopes, species, abundance and substratum were recorded, along with a good photographic and video record. The depth profile for each transect is shown in Appendix 1.

- Transect 1 – (57° 16'.488N, 005° 45'.217W – 57° 16'.489N, 005° 45'.683W)

<b>Salinity</b>	Fully marine	<b>Substratum</b>	Coarse sand with broken shell, gravel, pebbles and occasional cobbles and small boulders
<b>Wave exposure</b>	Sheltered	<b>Depth (below chart datum)</b>	3.4 – 6.4m bcd
<b>Tidal streams</b>	Moderately strong	<b>MNCR classification</b>	<i>Laminaria saccharina</i> and robust red algae on infralittoral gravel and pebbles SS.SMP.KSwSS.LsacR.Gv
<b>Survey quality</b>	Thorough	<b>Zone</b>	Upper infralittoral
<b>Other features</b>	Kelp and seaweed communities on sublittoral sediment is a Scottish priority marine feature (SS.SMP.KSwSS). The invasive, Pacific, brown seaweed, <i>Sargassum muticum</i> , was present throughout the biotope. The Scottish pmf, <i>Arctica islandica</i> was present, although in very low numbers		

Transect 1 was characterised by *Saccharina latissima* and mixed filamentous and foliose red seaweeds on infralittoral sediments. This biotope contains a number of sub-biotopes distinguished by the degree of tidal exposure. This sub-biotope was clearly *Laminaria saccharina* (now *Saccharina latissima*) and robust red algae on infralittoral gravel and pebbles (SS.SMP.KSwSS.LsacR.Gv). The kelps, *Laminaria hyperborea*, *Alaria esculenta* and *Saccorhiza polyschides* were also present but in a much lower abundance. Other brown algal species present were *Desmarestia aculeata*, *Dictyota dichotoma* and *Chorda filum*, all at low abundance. The invasive brown seaweed, *Sargassum muticum*, was recorded in a much larger form than would be found in its native habitat off the coast of Japan.

The characterising red seaweeds included coralline and encrusting reds, *Callophyllis laciniata*, *Delessaria sanguinea*, *Dilsea carnosa*, *Gracilaria gracilis*, *Phycodrys rubens*, *Plocamium cartilagineum*, *Polyides rotundus*, *Polysiphonia elongata*, *Rhodophyllis divaricata*, *Scinaia trigona* and several unidentified species. The ubiquitous green seaweed, *Ulva lactuca*, was found attached to pebbles and cobbles.

The animal fauna was characterised by the echinoderms, *Asterias rubens*, *Echinus esculentus*, *Marthasterias gracialis* and *Antedon bifida*, along with the crustaceans, *Cancer pagurus*, *Hyas araneus*, *Carcinus maenas*, *Necora puber* and *Liocarcinus depurator*. There was a conspicuous polychaete fauna of *Chone* sp., *Lanice conchilega*, *Myxicola infundibulum* and *Pomatoceros triqueter*. A polychaete infauna was almost certainly present in the sand sections, but this was not investigated. A single *Arctica islandica* was recorded near the end of the transect. A diverse fish fauna included the dragonets *Callionymus lyra* and *Callionymus reticulata*, *Pollachius virens*, *Pomatoschistus* spp. and frequent dogfish, *Scyliorhinus canicula*.

A diverse flora and fauna occurred on the stipes of *Laminaria hyperborea*. Unless conspicuous this was not recorded due to tidal flow and time restrictions.

**Main Cover or Characterising Species**  
**SS.SMP.KSwSS.LsacR.Gv**

Porifera indet.	O	Barnacles indet.	R
		<i>Cancer pagurus</i>	O
Hydroid indet.	R	<i>Carcinus maenas</i>	F
		<i>Hyas araneus</i>	O
<i>Crisia</i> sp.	R	<i>Liocarcinus depurator</i>	F
<i>Cerianthus lloydii</i>	O	<i>Necora puber</i>	O
<i>Electra pilosa</i>	C	<i>Pagurus bernhardus</i>	R
Encrusting bryozoan	R		
<i>Membranipora membranacea</i>	F	<i>Asterias rubens</i>	F
		<i>Antedon bifida</i>	O
<i>Chone</i> sp.	O	<i>Echinus esculentus</i>	O
<i>Lanice conchilega</i>	O	<i>Luidia ciliaris</i>	R
<i>Myxicola infundibulum</i>	O	<i>Marthasterias glacialis</i>	O
<i>Pomatoceros triqueter</i>	O		
		<i>Callionymus lyra</i>	O
<i>Arctica islandica</i>	R	<i>Callionymus reticulata</i>	O
<i>Buccinum undatum</i>	F	<i>Myoxocephalus scorpius</i>	R
<i>Calliostoma zizyphinum</i>	O	<i>Pleuronectes platessa</i>	R
<i>Gibbula cineraria</i>	F	<i>Pollachius pollachius</i>	R
<i>Gibbula magus</i>	O	<i>Pollachius virens</i>	C
<i>Pecten maximus</i>	F	<i>Pomatoschistus minutus</i>	O
		<i>Pomatoschistus pictus</i>	O
<i>Callophyllis laciniata</i>	O	<i>Pomatoschistus</i> sp.	R
Corallinaceae crusts	O	<i>Scyliorhinus canicula</i>	F
Dark encrusting reds	O	<i>Trisopterus luscus</i>	R
<i>Delessaria sanguinea</i>	O	<i>Trisopterus minutus</i>	C
<i>Dilsea carnosa</i>	O		
<i>Gracilaria gracilis</i>	O	<i>Alaria esculenta</i>	O
<i>Phycodrys rubens</i>	O	<i>Chorda filum</i>	O
<i>Plocamium cartilagineum</i>	O	<i>Desmarestia aculeata</i>	O
<i>Polyides rotundus</i>	O	<i>Dictyota dichotoma</i>	O
<i>Polysiphonia elongata</i>	O	<i>Laminaria hyperborea</i>	O
<i>Rhodophyllis divaricata</i>	O	<i>Saccharina latissima</i>	F/C
Rhodophyceae indet.	O	<i>Saccorhiza polyschides</i>	O
<i>Scinaia trigona</i>	F	<i>Sargassum muticum</i>	F
		<i>Ulva lactuca</i>	O



**SS.SMP.KSwSS.LsacR.Gv**



*Gracilaria gracilis & Liocarcinus depurator*



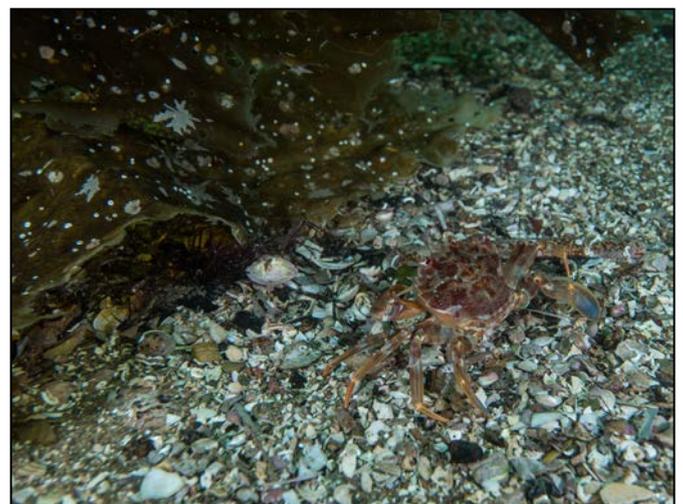
*Buccinum undatum*



*Callionymus lyra*



*Pecten maximus*



*Liocarcinus depurator*



*Pleuronectes platessa*



*Arctica islandica*

- Transect 2 (57° 16'.495N, 005° 45'.230W – 57° 16'.597N, 005° 45'.664W)

<b>Salinity</b>	Fully marine	<b>Substratum</b>	Coarse sand with broken shell, gravel, pebbles and occasional cobbles and small boulders
<b>Wave exposure</b>	Sheltered	<b>Depth (below chart datum)</b>	4.5 – 8.6m bcd
<b>Tidal streams</b>	Moderately strong	<b>MNCR classification</b>	<i>Laminaria saccharina</i> and robust red algae on infralittoral gravel and pebbles SS.SMP.KSwSS.LsacR.Gv
<b>Survey quality</b>	Thorough	<b>Zone</b>	Upper infralittoral
<b>Other features</b>	Kelp and seaweed communities on sublittoral sediment is a Scottish priority marine feature (SS.SMP.KSwSS). The invasive, Pacific, brown seaweed, <i>Sargassum muticum</i> , was present throughout the biotope		

This transect was another good example of the biotope *Laminaria saccharina* and robust red algae on infralittoral gravel and pebbles (SS.SMP.KSwSS.LsacR.Gv), along its entire length. A shallow mixed substrata of coarse sand, gravel, pebbles and broken shells, swept by a moderately strong tidal stream was characterised by *Saccharina latissima* (formerly *Laminaria saccharina*) and stands of red seaweeds. The kelps, *Laminaria hyperborea*, *Alaria esculenta* and *Saccorhiza polyschides* were all present, although at much lower densities than *Saccharina latissima*. Other brown algal species present included *Desmarestia aculeata* and *Chorda filum*. The invasive brown seaweed, *Sargassum muticum*, was recorded, particularly along the earlier stages of the transect.

A diverse range of red algae was established along the whole transect. Coralline and encrusting reds were often found covering the larger pebbles and cobbles. The characterising red seaweeds included *Callophyllis laciniata*, *Delessaria sanguinea*, *Dilsea carnosa*, *Halarachnion ligulatum*, *Phycodrys rubens*, *Plocamium cartilagineum*, *Polyides rotundus*, *Polysiphonia elongata*, *Rhodomela confervoides*, *Scinaia trigona* and several other unidentified species. The green seaweed, *Ulva lactuca* was found attached to larger pebbles and cobbles.

A varied animal fauna was characterised by the echinoderms, *Asterias rubens*, *Echinus esculentus* and *Antedon bifida* and the crustaceans, *Cancer pagurus*, *Carcinus maenas*, *Hyas araneus*, *Liocarcinus depurator* and *Necora puber*.

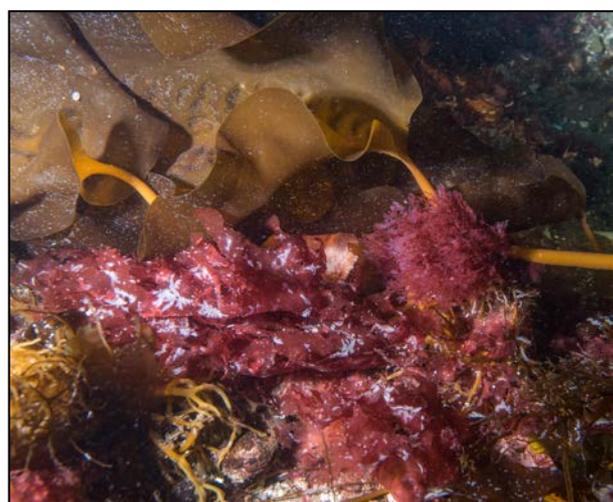
A diverse flora and fauna occurred on the stipes of *Laminaria hyperborea*. Unless conspicuous this was not investigated due to tidal flow and time restrictions.

**Main Cover or Characterising Species  
SS.SMP.KSwSS.LsacR.Gv**

Porifera indet.	R	Barnacles indet.	R
		<i>Cancer pagurus</i>	O
Hydroid indet.	R	<i>Carcinus maenas</i>	O
		<i>Hyas araneus</i>	O
<i>Crisia</i> sp.	O	<i>Liocarcinus depurator</i>	F
<i>Electra pilosa</i>	C	<i>Necora puber</i>	O
<i>Membranipora membranacea</i>	F	<i>Pagurus bernhardus</i>	R
<i>Myxicola infundibulum</i>	R	<i>Asterias rubens</i>	F
<i>Pomatoceros triqueter</i>	F	<i>Antedon bifida</i>	O
		<i>Echinus esculentus</i>	O
<i>Buccinum undatum</i>	O	<i>Marthasterias glacialis</i>	R
<i>Calliostoma zizyphinum</i>	O		
<i>Gibbula cineraria</i>	F	<i>Callionymus reticulata</i>	O
<i>Gibbula magus</i>	O	<i>Pollachius pollachius</i>	O
<i>Pecten maximus</i>	O	<i>Pollachius virens</i>	C
<i>Tonicella marmorea</i>	R	<i>Pomatoschistus minutus</i>	O
		<i>Pomatoschistus</i> sp.	R
Corallinaceae crusts	F	<i>Pomatoschistus pictus</i>	O
Dark encrusting reds	F	<i>Scyliorhinus canicula</i>	O
<i>Callophyllis laciniata</i>	O	<i>Spinachia spinachia</i>	R
<i>Delessaria sanguinea</i>	O	<i>Trisopterus minutus</i>	O
<i>Dilsea carnosa</i>	O		
<i>Halarachnion ligulatum</i>	O	<i>Alaria esculenta</i>	O
<i>Phycodrys rubens</i>	O	<i>Chorda filum</i>	O
<i>Plocamium cartilagineum</i>	F	<i>Desmarestia aculeata</i>	F
<i>Polyides rotundus</i>	O	<i>Laminaria hyperborea</i>	O
<i>Polysiphonia elongata</i>	O	<i>Saccharina latissima</i>	C
<i>Rhodomela confervoides</i>	O	<i>Saccorhiza polyschides</i>	O
Rhodophyceae indet.	O	<i>Sargassum muticum</i>	O
<i>Scinaia trigona</i>	F		
		<i>Ulva lactuca</i>	O



SS.SMP.KSwSS.LsacRGv



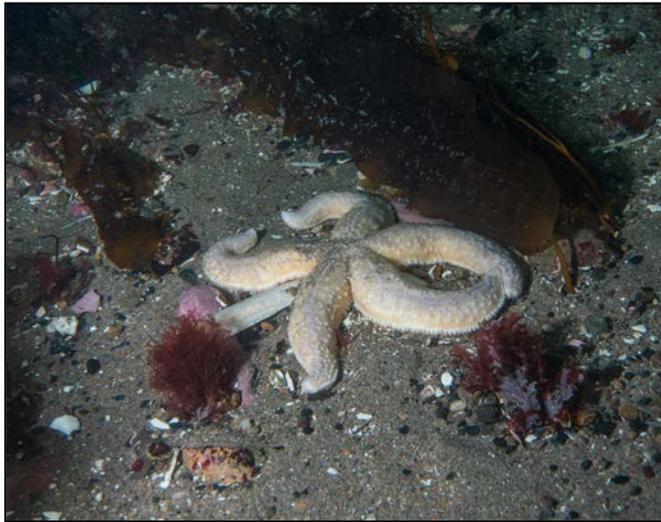
Kelp & red seaweeds



*Tide effected Pecten maximus*



*Saccharina latissima*



*SS.SMP.KSwSS.LsacR.Gv*



*SS.SMP.KSwSS.LsacR.Gv*



*Cancer pagurus*



*Echinus esculentus*

- Transect 3 – Biotope 1 (57° 16'.501N, 005° 0'.45.167W – 57° 16'.557N, 005° 45'.135W)

<b>Salinity</b>	Fully marine	<b>Substratum</b>	Coarse sand with broken shell, gravel, pebbles and occasional cobbles and boulders
<b>Wave exposure</b>	Sheltered	<b>Depth (below chart datum)</b>	4.5 – 9.5m bcd
<b>Tidal streams</b>	Moderately strong	<b>MNCR classification</b>	<i>Laminaria saccharina</i> and robust red algae on infralittoral gravel and pebbles SS.SMP.KSwSS.LsacR.Gv
<b>Survey quality</b>	Thorough	<b>Zone</b>	Upper infralittoral
<b>Other features</b>	Kelp and seaweed communities on sublittoral sediment is a Scottish priority marine feature (SS.SMP.KSwSS). The invasive, Pacific, brown seaweed, <i>Sargassum muticum</i> , was present throughout the biotope		

The start of transect 3 was characterised by a shallow infralittoral kelp community on coarse sand with broken shells, gravel, pebbles and occasional cobbles and boulders. The dominant kelp was *Saccharina latissima* (formerly *Laminaria saccharina*) with occasional *Laminaria hyperborea*, *Alaria esculenta* and *Saccorhiza polyschides*. *Laminaria hyperborea* was present in areas where occasional boulders were found. The invasive brown seaweed, *Sargassum muticum* was also present.

Characteristic red seaweeds included coralline and encrusting reds, *Delessaria sanguinea*, *Dilsea carnosa*, *Gacillaria gracilis*, *Halarachnion ligulatum*, *Phycodrys rubens*, *Plocamium cartilagineum*, *Polyides rotundus*, *Polysiphonia elongata*, *Rhodomela confervoides*, *Rhodophyllis divaricata*, *Scinia trigona* and several unidentified species. The green seaweed, *Ulva lactuca* was found attached to larger pebbles and cobbles.

A varied animal fauna was characterised by the echinoderms, *Asterias rubens* and *Echinus esculentus* and the crustaceans, *Cancer pagurus*, *Hyas araneus* and *Liocarcinus depurator*. Dog fish, *Scyliorhinus canicula*, and their eggs (mermaids purses) were frequently recorded.

A diverse flora and fauna occurred on the stipes of *Laminaria hyperborea*. Unless conspicuous this was not investigated due to tidal flow and time restrictions.

### Main Cover or Characterising Species SS.SMP.KSwSS.LsacR.Gv

Porifera indet.	O	Barnacles indet.	R
		<i>Cancer pagurus</i>	F
Hydroid indet.	R	<i>Carcinus maenas</i>	O
		<i>Hyas araneus</i>	F
<i>Electra pilosa</i>	C	<i>Liocarcinus depurator</i>	F
<i>Membranipora membranacea</i>	F	<i>Necora puber</i>	O
		<i>Pagurus bernhardus</i>	O

<i>Myxicola infundibulum</i>	R		
<i>Pomatoceros triqueter</i>	O	<i>Asterias rubens</i>	F
		<i>Antedon bifida</i>	O
<i>Buccinum undatum</i>	O	<i>Echinus esculentus</i>	F
<i>Calliostoma zizyphinum</i>	O	<i>Marthasterias glacialis</i>	R
<i>Gibbula cineraria</i>	F	<i>Ophiothrix fragilis</i>	R
<i>Gibbula magus</i>	O		
<i>Pecten maximus</i>	R	<i>Callionymus reticulatus</i>	O
<i>Tonicella marmorea</i>	O	<i>Pollachius pollachius</i>	O
		<i>Pollachius virens</i>	C
Corallinaceae crusts	F	<i>Pomatoschistus minutus</i>	O
Dark encrusting reds	F	<i>Pomatoschistus</i> sp.	R
<i>Delessaria sanguinea</i>	O	<i>Scyliorhinus canicula</i>	F
<i>Dilsea carnosa</i>	O	<i>Spinachia spinachia</i>	R
<i>Gracilaria gracilis</i>	O		
<i>Halarachnion ligulatum</i>	O	<i>Alaria esculenta</i>	O
<i>Phycodrys rubens</i>	O	<i>Chorda filum</i>	O
<i>Plocamium cartilagineum</i>	O	<i>Desmarestia aculeata</i>	O
<i>Polyides rotundus</i>	O	<i>Laminaria hyperborea</i>	O
<i>Polysiphonia elongata</i>	O	<i>Saccharina latissima</i>	C/A
<i>Rhodomela confervoides</i>	O	<i>Saccorhiza polyschides</i>	O
<i>Rhodophyllis divaricata</i>	O	<i>Sargassum muticum</i>	O
Rhodophyceae indet.	O		
<i>Scinaia trigona</i>	O	<i>Ulva lactuca</i>	O



SS.SMP.KSwSS.LsacR.Gv biotope



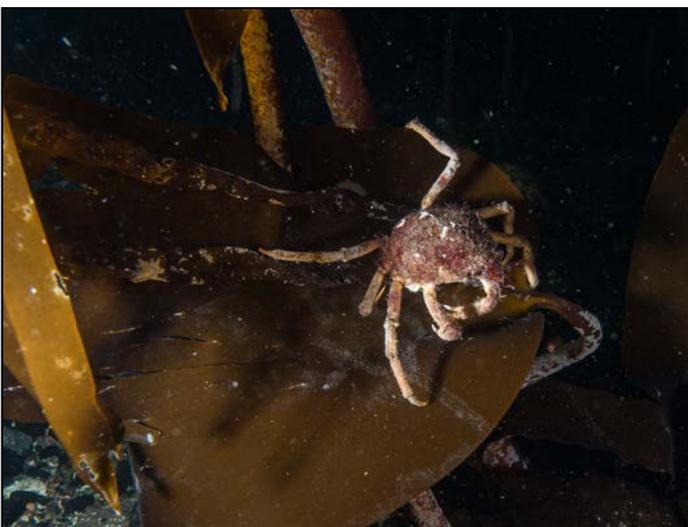
*Echinus esculentus* on coarse sand with broken shell, gravel & pebbles



*Asterias rubens* & *Cancer pagurus*



Kelp & red seaweeds



*Hyas araneus*



*Echinus esculentus*, *Antedon bifida* & kelp

- Transect 3 –Biotope 2 (57° 16'.557N, 005° 45'.135W – 57° 16'.610N, 005° 45'.114W)

<b>Salinity</b>	Fully marine	<b>Substratum</b>	Coarse sand with broken shell, gravel and pebbles
<b>Wave exposure</b>	Sheltered	<b>Depth (below chart datum)</b>	9.5 – 12.2m bcd
<b>Tidal streams</b>	Moderately strong	<b>MNCR classification</b>	<i>Limaria hians</i> beds in tide-swept sublittoral muddy mixed sediment SS.SMX.IMx.Lim
<b>Survey quality</b>	Thorough	<b>Zone</b>	Lower infralittoral / upper circalittoral
<b>Other features</b>	Flame shell beds ( <i>Limaria hians</i> ) are a priority marine feature in Scotland's seas		

At 9.5m bcd, the kelp and red seaweed biotope abruptly changed to a bed of flame shells, *Limaria hians*, in tide swept mixed sediment. The first sign was woven nests or galleries made from byssus and substratum rubble. These quickly coalesced to form a complete carpet with almost 100% coverage. No *Limaria hians* were visible without opening up the byssus nests, however, holes for the entry and exit of water could be clearly seen, helping to calculate numbers of animals present. The flame shell density was very high with possibly 500 individuals / m<sup>2</sup>. Further work would need to be carried out to get an accurate figure.

There was a sparse visible fauna characterised by the horseman anemone, *Urticina eques* and occasional dense beds of the brittle star, *Ophiocomina nigra*. Many more species were presumed to be within the byssus network, but this was not investigated.

Often the carpet of byssus and substratum would be covered by the red alga, *Plocamium cartilaginum*. Occasional kelps (*Laminaria hyperborea* and *Saccharina latissima*) and their associated flora and fauna were also present.

### Main Cover or Characterising Species SS.SMX.IMx.Lim

Porifera indet.	O	<i>Necora puber</i>	R
<i>Alcyonium digitatum</i>	R	<i>Crisia</i> sp.	R
Hydroid indet.	R	<i>Electra pilosa</i>	O
<i>Urticina eques</i>	O	<i>Membranipora membranacea</i>	O
<i>Urticina felina</i>	R		
<i>Pomatoceros triqueter</i>	R	<i>Asterias rubens</i>	R
		<i>Antedon bifida</i>	R
<i>Limaria hians</i>	SA	<i>Echinus esculentus</i>	R
		<i>Ophiocomina nigra</i>	F
Corallinaceae crusts	O	<i>Ophiothrix fragilis</i>	R
<i>Delessaria sanguinea</i>	O		
<i>Dilsea carnosa</i>	F	<i>Pyura microcosmus</i>	R
<i>Phycodrys rubens</i>	R		

<i>Plocamium cartilagineum</i>	C/A	<i>Pollachius virens</i>	O
<i>Polysiphonia elongata</i>	R	<i>Scyliorhinus canicula</i>	R
Rhodophyceae indet.	O		
		<i>Laminaria hyperborea</i>	O
		<i>Saccharina latissima</i>	O



*Limaria hians* & nests



Byssus carpet with *Plocamium cartilagineum*, SS.SMX.IMx.Lim



*Limaria hians*



*Limaria hians*



*Urticina eques*



*Alcyonium digitatum*



*Ophiocomina nigra*

- Transect 4 – (57° 16'.493N, 005° 45'.202W – 57° 16'.509N, 005° 44'.838W)

<b>Salinity</b>	Fully marine	<b>Substratum</b>	Coarse sand with broken shell, gravel, pebbles, cobbles and boulders
<b>Wave exposure</b>	Sheltered	<b>Depth (below chart datum)</b>	2.4 – 7.0m bcd
<b>Tidal streams</b>	Moderately strong	<b>MNCR classification</b>	<i>Laminaria saccharina</i> and robust red algae on infralittoral gravel and pebbles SS.SMP.KSwSS.LsacR.Gv
<b>Survey quality</b>	Thorough	<b>Zone</b>	Upper infralittoral
<b>Other features</b>	Kelp and seaweed communities on sublittoral sediment is a Scottish priority marine feature (SS.SMP.KSwSS). The invasive, Pacific, brown seaweed, <i>Sargassum muticum</i> , was present throughout the biotope		

Transect 4 comprised a shallow infralittoral kelp community on coarse sand with broken shells, gravel, pebbles, cobbles and boulders. As in the previous shallow infralittoral sites the dominant kelp was *Saccharina latissima* (formerly *Laminaria saccharina*) with occasional *Laminaria hyperborea*, *Alaria esculenta* and *Sacchoriza polyschides*. The biotope was *Laminaria saccharina* and robust red algae on infralittoral gravel and pebbles (SS.SMP.KSwSS.LsacR.Gv). At the start of the transect there was a higher abundance of *Laminaria hyperborea* due to small and medium boulders being present. This led to very small areas of the biotope, *Laminaria hyperborea* forest and foliose red seaweeds on tide-swept, upper infralittoral mixed substrata (IR.MIR.KR.LhypTX.Ft). The occasional patches of this biotope rapidly declined as the substrate became predominantly coarse sand with broken shell and gravel. During several short sections of the transect, the substrate was almost entirely slightly gravelly sand with a few broken shells. Due to lack of a suitable substrate the abundance of *Saccharina latissima* declined and the biotope began merging into *Laminaria saccharina* and filamentous red algae on infralittoral sand (SS.SMP.KSwSS.LsacR.Sa). The brown seaweeds, *Chorda filum* and *Desmarestia aculeata* were found throughout the biotope. The invasive brown seaweed, *Sargassum muticum* was also present throughout the site.

Characteristic red seaweeds included coralline and encrusting reds, *Callophyllis laciniata*, *Delessaria sanguinea*, *Dilsea carnosa*, *Gracilaria gracilis*, *Phycodryis rubens*, *Plocamium cartilagineum*, *Polyides rotundus*, *Polysiphonia elongata*, *Rhodomela confervoides*, *Rhodophyllis divaricata*, *Scinaia trigona* and several unidentified species. The importance of encrusting and coralline reds declined with the loss of a boulder and cobble substrate, The ubiquitous green seaweed, *Ulva lactuca*, was found attached to pebbles and cobbles.

A varied, but impoverished animal fauna was characterised by the echinoderms, *Asterias rubens* and *Echinus esculentus* and the crustaceans, *Cancer pagurus*, *Hyas araneus*, *Carcinus maenas*, *Necora puber* and *Liocarcinus depurator*. A polychaete infauna was almost certainly present in the sand sections, although this was not investigated.

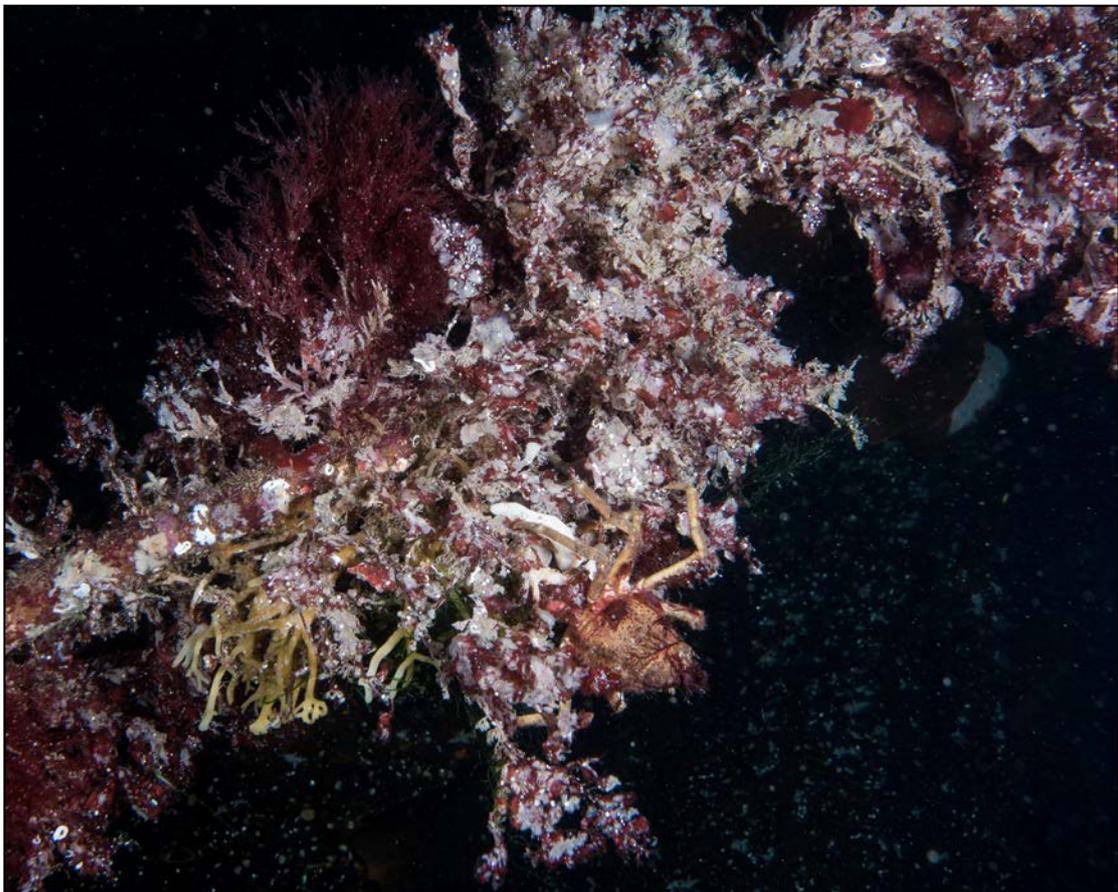
A diverse flora and fauna occurred on the stipes of *Laminaria hyperborea*. Unless conspicuous this was not recorded due to tidal flow and time restrictions.

**Main Cover or Characterising Species  
SS.SMP.KSwSS.LsacR.Gv**

Porifera indet.	O	Barnacles indet.	R
		<i>Cancer pagurus</i>	O
Hydroid indet.	R	<i>Carcinus maenas</i>	F
		<i>Hyas araneus</i>	O
<i>Crisia</i> sp.	R	<i>Liocarcinus depurator</i>	O
<i>Cerianthus lloydii</i>	O	<i>Necora puber</i>	O
<i>Electra pilosa</i>	C	<i>Pagurus bernhardus</i>	R
Encrusting bryozoan	R		
<i>Membranipora membranacea</i>	F	<i>Asterias rubens</i>	F
		<i>Antedon bifida</i>	O
<i>Chone</i> sp.	R	<i>Echinus esculentus</i>	O
<i>Myxicola infundibulum</i>	F		
<i>Pomatoceros triqueter</i>	O	Didemnid ascidian	R
<i>Buccinum undatum</i>	O	<i>Callionymus reticulata</i>	O
<i>Calliostoma zizyphinum</i>	O	<i>Myoxocephalus scorpius</i>	R
<i>Gibbula cineraria</i>	F	<i>Pollachius pollachius</i>	O
<i>Gibbula magus</i>	O	<i>Pollachius virens</i>	C
		<i>Pomatoschistus minutus</i>	F
<i>Pecten maximus</i>	R	<i>Pomatoschistus pictus</i>	O
<i>Callophyllis laciniata</i>	O	<i>Pomatoschistus</i> sp.	R
Corallinaceae crusts	R	<i>Scyliorhinus canicula</i>	R
Dark encrusting reds	R	<i>Spinachia spinachia</i>	R
<i>Delessaria sanguinea</i>	O		
<i>Dilsea carnosa</i>	O	<i>Alaria esculenta</i>	O
<i>Gracilaria gracilis</i>	O	<i>Chorda filum</i>	O
<i>Halarachnion ligulatum</i>	R	<i>Desmarestia aculeata</i>	O
<i>Phycodrys rubens</i>	O	<i>Laminaria hyperborea</i>	O
<i>Plocamium cartilagineum</i>	O	<i>Saccharina latissima</i>	C
<i>Polyides rotundus</i>	O	<i>Saccorhiza polyschides</i>	O
<i>Polysiphonia elongata</i>	O	<i>Sargassum muticum</i>	F
<i>Rhodomela confervoides</i>	O		
<i>Rhodophyllis divaricata</i>	O	<i>Ulva lactuca</i>	O
Rhodophyceae indet.	O		
<i>Scinaia trigona</i>	R		



*Sargassum muticum & Saccharina latissima*



*Laminaria hyperborea stipe*



*Pomatoschistus pictus*



*Carcinus maenas*



*Asterias rubens*



*Saccorhiza polyschides*



*Liocarcinus depurator*

- Transect 5 –Biotope 1 (57° 16'.561N, 005° 45'.199W – 57° 16'.466N, 005° 45'.230W)

<b>Salinity</b>	Fully marine	<b>Substratum</b>	Coarse sand with broken shell, gravel, pebbles and cobbles
<b>Wave exposure</b>	Sheltered	<b>Depth (below chart datum)</b>	2.2 – 9.5m bcd
<b>Tidal streams</b>	Moderately strong	<b>MNCR classification</b>	<i>Laminaria saccharina</i> and robust red algae on infralittoral gravel and pebbles SS.SMP.KSwSS.LsacR.Gv
<b>Survey quality</b>	Thorough	<b>Zone</b>	Upper infralittoral
<b>Other features</b>	Kelp and seaweed communities on sublittoral sediment is a Scottish priority marine feature (SS.SMP.KSwSS).		

At 9.5m bcd the flame shell bed disappeared to be replaced by occasional *Laminaria hyperborea* and *Saccharina latissima* on a substrate of coarse sand, empty shell, gravel, pebbles and cobbles.

Apart from coralline and encrusting reds, the seaweed flora was sparse and less diverse than the previous transects.

Transect 5 was surveyed during January and hence the biotope had a much more depauperate appearance than transects 1 to 4. The ephemeral seaweeds had died back and winter storms, with the tidal streams would have mobilised loose pebbles and cobbles removing all but the most robust seaweeds.

An impoverished animal fauna was characterised by the echinoderms, *Asterias rubens*, *Echinus esculentus* and *Antedon bifida*, and the crustaceans, *Cancer pagurus*, *Hyas araneus*, *Necora puber*, *Pagurus bernhardus* and *Liocarcinus depurator*.

As the transect continued south to the west side of the pier there was a band of empty broken shells followed by a plain of coarse sand with a benthic diatom film. The animal fauna was principally the burrowing anemone, *Cerianthus lloydii* and *Pomatoschistus* spp.

No photographic images were taken whilst surveying this transect, only video footage.

**Main Cover or Characterising Species**  
**SS.SMP.KSwSS.LsacR.Gv**

Porifera indet.	O	Barnacles indet.	O
		<i>Cancer pagurus</i>	O
<i>Cerianthus lloydii</i>	O	<i>Carcinus maenas</i>	R

Hydroid indet.	R	<i>Hyas araneus</i>	O
		<i>Liocarcinus depurator</i>	O
<i>Electra pilosa</i>	O	<i>Necora puber</i>	O
<i>Membranipora membranacea</i>	O	<i>Pagurus bernhardus</i>	F
<i>Parasmittina trispinosa</i>	R		
		<i>Asterias rubens</i>	F
<i>Pomatoceros triqueter</i>	O	<i>Antedon bifida</i>	O
		<i>Echinus esculentus</i>	O
<i>Buccinum undatum</i>	O	<i>Luidia ciliaris</i>	R
<i>Calliostoma zizyphinum</i>	O	<i>Marthasterias glacialis</i>	R
<i>Gibbula cineraria</i>	F	<i>Ophiothrix fragilis</i>	R
<i>Gibbula magus</i>	O		
<i>Pecten maximus</i>	R	<i>Callionymus reticulata</i>	R
<i>Tonicella marmorea</i>	R	<i>Pomatoschistus minutus</i>	F
		<i>Pomatoschistus pictus</i>	O
Corallinaceae crusts	F		
Dark encrusting reds	F	<i>Desmarestia aculeata</i>	O
<i>Delessaria sanguinea</i>	R	<i>Laminaria hyperborea</i>	O
<i>Dilsea carnosa</i>	R	<i>Saccharina latissima</i>	O
<i>Gracilaria gracilis</i>	O		
<i>Plocamium cartilagineum</i>	O		
<i>Polyides rotundus</i>	R		
<i>Polysiphonia elongata</i>	R		
<i>Rhodophyllis divaricata</i>	R		
Rhodophyceae indet.	O		
<i>Scinaia trigona</i>	O		

- Transect 5 –Biotope 2) (57° 16'.599N, 005° 45'.181W – 57° 16'.561N, 005° 45'.199W)

<b>Salinity</b>	Fully marine	<b>Substratum</b>	Coarse sand with broken shell, gravel, pebbles and occasional cobbles
<b>Wave exposure</b>	Sheltered	<b>Depth (below chart datum)</b>	9.5 –11.6m bcd
<b>Tidal streams</b>	Moderately strong	<b>MNCR classification</b>	<i>Limaria hians</i> beds in tide-swept sublittoral muddy mixed sediment SS.SMX.IMx.Lim
<b>Survey quality</b>	Thorough	<b>Zone</b>	Lower infralittoral / upper circalittoral
<b>Other features</b>	Flame shell beds ( <i>Limaria hians</i> ) are a priority marine feature in Scotland's seas		

The biotope was clearly *Limaria hians* beds in tide-swept sublittoral muddy mixed sediment (SS.SMX.IMx.Lim). A substrate of coarse sand, broken shells, pebbles and occasional cobbles supported a spongy layer of *Limaria hians* byssus threads to a depth of approximately 6cm. This was a high quality flame shell bed with almost 100% coverage of dense nest material supporting an associated community. Only at the very edge of the flame shell bed did the carpet give way to smaller *Limaria* nests. The demarcation line between flame shells and no flame shells was very clear. No *Limaria* were recorded shallower than 9.5m CD.

A rough estimate of numbers from turning over hand sized sections of flame shell carpet was approximately 200 – 300 adults m<sup>-2</sup>. This estimate needs to be repeated more accurately if definitive data is required.

There was a sparse kelp park of *Laminaria hyperborea* and *Saccharina latissima* accompanied by a patchy red algal turf, principally of *Plocamium cartilagineum*. Small patches of the brittle star, *Ophiocoma nigra*, were present overlaying the flame shell carpet. Where a suitable substrate was present, encrusting, coralline red algae occurred.

Conspicuous macrofauna included the edible sea urchin, *Echinus esculentus* and the starfish, *Asterias rubens*, *Luidia ciliaris*, *Crossaster papposus*, and *Marthasterias glacialis*. The crustaceans *Cancer pagurus*, *Pagurus bernhardus*, *Hyas araneus*, *Galathea nexa* and barnacles indet. were all recorded as occasional or frequent. The molluscs included *Buccinum undatum*, *Lacuna vincta*, *Pecten maximus* and chitons. The large, solitary, anemone, *Urticina eques* was also occasionally present.

No photographic images were taken whilst surveying this transect, only video footage.

**Main Cover or Characterising Species  
SS.SMX.IMx.Lim**

Porifera indet.	R	Barnacles indet.	O
		<i>Cancer pagurus</i>	O
Hydroid indet.	R	<i>Galathea nexa</i>	F
<i>Urticina eques</i>	O	<i>Hyas araneus</i>	O
		<i>Necora puber</i>	R
<i>Pomatoceros triqueter</i>	R	<i>Pagurus bernhardus</i>	O
Polychaete indet.			
<i>Buccinum undatum</i>	O	<i>Crisia</i> sp.	R
<i>Lacuna vincta</i>	R	<i>Electra pilosa</i>	O
<i>Limaria hians</i>	SA	<i>Membranipora membranacea</i>	O
<i>Pecten maximus</i>	O		
<i>Tonicella marmorea</i>	R	<i>Antedon bifida</i>	O
		<i>Asterias rubens</i>	O
Corallinaceae crusts	O	<i>Crossaster papposus</i>	R
<i>Delessaria sanguinea</i>	R	<i>Echinus esculentus</i>	O
<i>Dilsea carnosa</i>	R	<i>Luidia ciliaris</i>	R
<i>Phycodrys rubens</i>	R	<i>Marthasterias glacialis</i>	O
<i>Plocamium cartilagineum</i>	C	<i>Ophiocomina nigra</i>	F
<i>Polysiphonia elongata</i>	R		
Rhodophyceae indet.	O	<i>Scyliorhinus canicula</i>	R
		<i>Laminaria hyperborea</i>	O
		<i>Saccharina latissima</i>	O

- Transect 6 –Biotope 1 (57° 16'.561N, 005° 45'.102W – 57° 16'.525N, 005° 45'.065W)

<b>Salinity</b>	Fully marine	<b>Substratum</b>	Coarse sand with broken shell, gravel, pebbles and cobbles
<b>Wave exposure</b>	Sheltered	<b>Depth (below chart datum)</b>	7.4 – 9.5m bcd
<b>Tidal streams</b>	Moderately strong	<b>MNCR classification</b>	<i>Laminaria saccharina</i> and robust red algae on infralittoral gravel and pebbles SS.SMP.KSwSS.LsacR.Gv
<b>Survey quality</b>	Thorough	<b>Zone</b>	Upper infralittoral
<b>Other features</b>	Kelp and seaweed communities on sublittoral sediment is a Scottish priority marine feature (SS.SMP.KSwSS).		

At 9.5m bcd the flame shell bed disappeared to be replaced by occasional *Laminaria hyperborea* and *Saccharina latissima* on a substrate of coarse sand, empty shell, gravel, pebbles and cobbles. The demarcation line between flame shells and no flame shells was very clear.

Apart from coralline and encrusting reds, there was an impoverished undergrowth of red seaweeds. As with transect 5 this transect was undertaken in January and no ephemeral or annual seaweeds are likely to be present.

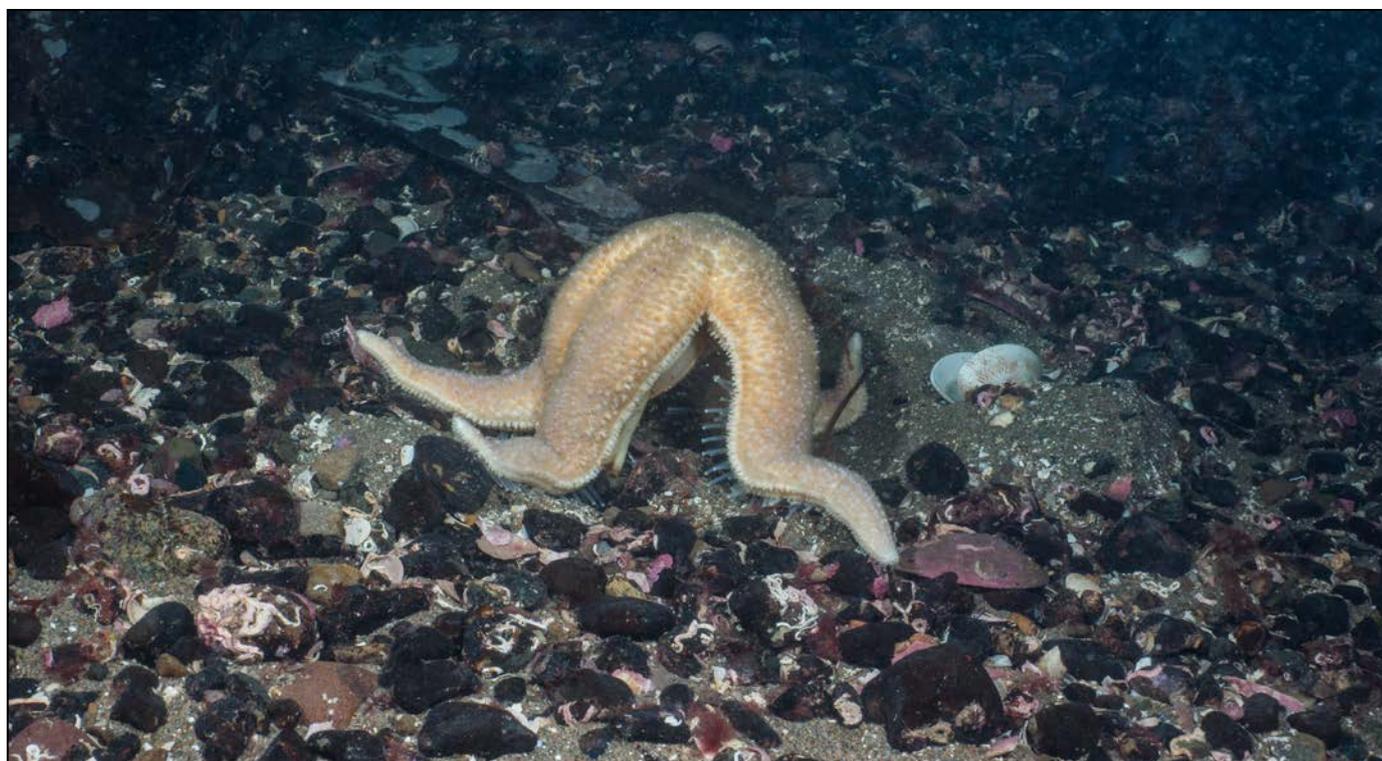
A poor animal fauna was characterised by the echinoderms, *Asterias rubens*, *Echinus esculentus* and *Antedon bifida*, and the crustaceans, *Cancer pagurus*, *Necora puber*, *Pagurus bernhardus* and *Liocarcinus depurator*.



SS.SMP.KSwSS.LsacR.Gv & *Asterias rubens*

**Main Cover or Characterising Species**  
**SS.SMP.KSwSS.LsacR.Gv**

Hydroid indet.	R	Barnacles indet.	O
		<i>Cancer pagurus</i>	O
<i>Electra pilosa</i>	O	<i>Galathea nexa</i>	R
<i>Membranipora membranacea</i>	O	<i>Liocarcinus depurator</i>	O
		<i>Necora puber</i>	O
<i>Pomatoceros triqueter</i>	O	<i>Pagurus bernhardus</i>	O
<i>Buccinum undatum</i>	R	<i>Asterias rubens</i>	F
<i>Calliostoma zizyphinum</i>	R	<i>Antedon bifida</i>	R
<i>Gibbula cineraria</i>	O	<i>Echinus esculentus</i>	O
<i>Gibbula magus</i>	R	<i>Marthasterias glacialis</i>	R
<i>Pecten maximus</i>	R	<i>Ophiothrix fragilis</i>	R
Corallinaceae crusts	F	<i>Myoxocephalus scorpius</i>	R
Dark encrusting reds	O	<i>Pomatoschistus minutus</i>	O
<i>Delessaria sanguinea</i>	R	<i>Pomatoschistus pictus</i>	O
<i>Dilsea carnosa</i>	R		
<i>Gracilaria gracilis</i>	R	<i>Desmarestia aculeata</i>	R
<i>Plocamium cartilagineum</i>	O	<i>Laminaria hyperborea</i>	O
Rhodophyceae indet.	O	<i>Saccharina latissima</i>	O
<i>Sciniaia trigona</i>	R		



*Asterias rubens*

- Transect 6 –Biotope 2 (57° 16'.603N, 005° 45'.156W – 57° 16'.561N, 005° 45'.102W)

<b>Salinity</b>	Fully marine	<b>Substratum</b>	Coarse sand with broken shell, gravel, pebbles and cobbles
<b>Wave exposure</b>	Sheltered	<b>Depth (below chart datum)</b>	9.5 –10.8m bcd
<b>Tidal streams</b>	Moderately strong	<b>MNCR classification</b>	<i>Limaria hians</i> beds in tide-swept sublittoral muddy mixed sediment SS.SMX.IMx.Lim
<b>Survey quality</b>	Thorough	<b>Zone</b>	Lower infralittoral / upper circalittoral
<b>Other features</b>	Flame shell beds ( <i>Limaria hians</i> ) are a priority marine feature in Scotland's seas		

A mixed substratum of coarse sand, broken shell, gravel, pebbles and cobbles was held together with byssus forming a woven carpet created by a dense bed of flame shells, *Limaria hians*. No *Limaria* were visible, hidden away in their byssus, shell and stone nests. The density of nests was such that they had coalesced together to form a carpet with almost 100% seabed coverage, to a depth of 6 - 10cm. At 9.5m bcd the carpet briefly broke up into nests before disappearing completely. No flame shells were recorded shallower than 9.5m bcd.

A very rough estimate of numbers from turning over a hand sized section of flame shell carpet was approximately 300 adults m<sup>-2</sup>. This estimate needs to be repeated more accurately if definitive data is required.

The kelps *Laminaria hyperborea* and *Saccharina latissima* were accompanied by a patchy red algal turf, principally of *Plocamium cartilagineum*. An epifaunal growth of hydroids, bryozoans and ascidians, was present on the stipes of *Laminaria hyperborea*, but this was not investigated. Where a suitable substrate was present, encrusting, coralline red algae occurred.

Dense, but infrequent, patches of the brittle star, *Ophiocomina nigra*, were present overlaying the flame shell carpet.

Conspicuous macrofauna included the echinoderms, *Echinus esculentus*, *Asterias rubens*, *Luidia ciliaris*, and *Marthasterias glacialis*. The crustaceans *Cancer pagurus*, *Pagurus bernhardus*, *Hyas araneus* and *Galathea nexa* were all recorded. The molluscs included *Buccinum undatum*, *Lacuna vincta*, *Pecten maximus* and chitons. The large, solitary, anemone, *Urticina eques* was also occasionally present.

Flame shells create a complex habitat with many animals living within or under the nest material. This habitat was not investigated.

**Main Cover or Characterising Species  
SS.SMX.IMx.Lim**

Porifera indet.	R	Barnacles indet.	O
		<i>Cancer pagurus</i>	O
Hydroid indet.	R	<i>Galathea nexa</i>	F
<i>Urticina eques</i>	O	<i>Hyas araneus</i>	O
		<i>Necora puber</i>	R
<i>Pomatoceros triqueter</i>	R	<i>Pagurus bernhardus</i>	O
Polychaete indet.			
<i>Buccinum undatum</i>	O	<i>Crisia</i> sp.	R
Chiton indet.	R	<i>Electra pilosa</i>	O
<i>Lacuna vincta</i>	R	<i>Membranipora membranacea</i>	O
<i>Limaria hians</i>	SA		
<i>Pecten maximus</i>	O	<i>Antedon bifida</i>	R
<i>Modiolus modiolus</i>	R	<i>Asterias rubens</i>	O
		<i>Crossaster papposus</i>	R
Corallinaceae crusts	O	<i>Echinus esculentus</i>	O
Dark encrusting reds	O	<i>Luidia ciliaris</i>	O
<i>Delessaria sanguinea</i>	R	<i>Marthasterias glacialis</i>	O
<i>Dilsea carnosa</i>	R	<i>Ophiocomina nigra</i>	F
<i>Phycodrys rubens</i>	R	<i>Ophiothrix fragilis</i>	R
<i>Plocamium cartilagineum</i>	C		
<i>Polysiphonia elongata</i>	R	<i>Laminaria hyperborea</i>	O
Rhodophyceae indet.	O	<i>Saccharina latissima</i>	O



SS.SMX.IMx.Lim



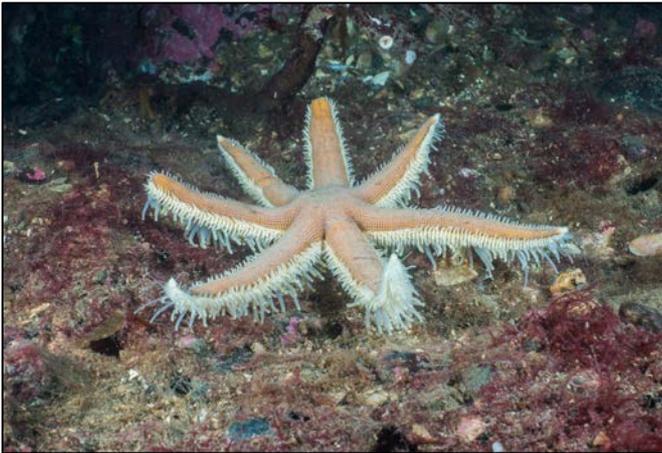
*Limaria hians*



*Urticina eques*



*Limaria hians*



*Luidia ciliaris*



*Ophiocomina nigra*



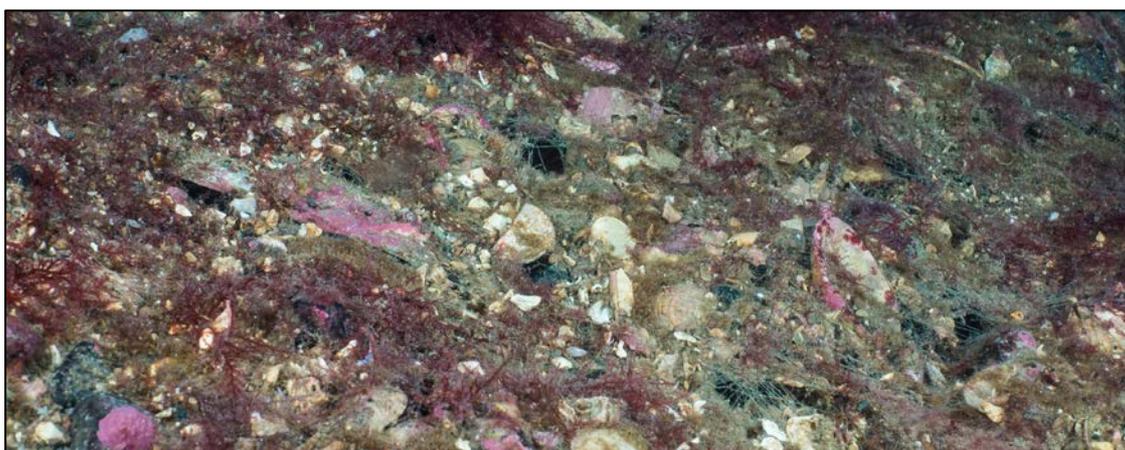
*Limaria hians* nest at 9.5m bcd



*Limaria hians* carpet & *Buccinum undatum*

## Discussion

Transects 3, 5 and 6 very clearly indicate a high quality flame shell (*Limaria hians*) bed commencing at the 9.5m depth contour. The demarcation line between flame shells and no flame shells was very clear. A flame shell carpet with virtually 100% coverage gave way to a few flame shell nests at 9.5m bcd before they completely disappeared. No *Limaria hians* were recorded shallower than 9.5m bcd. The substratum was generally coarse sand with broken shells, gravel pebbles and cobbles. The biotope was clearly *Limaria hians* beds in tide swept sublittoral muddy mixed sediment, SS.SMx.IMx.Lim. The flame shell carpet had a depth of 5 – 10cm, while a crude estimate of the number of flame shells was 200 – 500 m<sup>-2</sup>. Further work would need to be carried out to give a more accurate figure.



***Limaria hians* beds in tide swept sublittoral muddy mixed sediment, SS.SMx.IMx.Lim**

The Kyle Akin area of Loch Alsh supports the largest known flame shell bed in Scotland and probably the largest known bed in the world (Moore *et al.*, 2013). Loch Alsh has 50% of the measured area of dense *Limaria* beds (>50% coverage) in Scottish waters. Previous surveys in Loch Alsh have reported flame shell densities of 275m<sup>-2</sup> (Moore *et al.*, 2013) and 295m<sup>-2</sup> (ERT, 2010), which correlates well with the findings of the present survey. In the waters of Kyle Akin, through the mouth of Loch Alsh and westward under the Skye Bridge, including the present survey area, is a flame shell bed covering an area of 93ha. There are thought to be at least 100 million shells, but possibly as many as half a billion.

Other large beds of *Limaria hians* are found in Laudale Narrows, Loch Sunart and Otter Spit, Loch Fyne. The highest epibiota diversities were also recorded in Loch Alsh (Moore *et al.*, 2013), beating both Laudale Narrows and Otter Spit, with 74 – 78 taxa recorded. Where there was dense brittle star coverage diversity was reduced to 47 taxa. No equivalent work was carried out during the present survey.

Research by Trigg (2009) has indicated that in terms of richness and diversity *Limaria hians* beds are at least as rich as horse mussel (*Modiolus modiolus*) beds and serpulid

reefs. From two west coast of Scotland populations he found 283 species, consisting of 16 phyla. He states there is a pressing need for the conservation status of this biotope to be reassessed and its status as a biogenic reef accepted internationally and appropriate measures put in place.

Hall-Spencer & Moore (2000) studied a flame shell bed over five years, while Minchin (1995) reported that *Limaria hians* was abundant in Mulroy Bay from 1978 – 1982 and had been recorded there a hundred years previously. This suggests *Limaria* beds, once established, are probably relatively stable, unless affected by human impacts or storms (Tyler-Walters & Perry, 2016). Loss or degradation of the flame shells in this biotope would lead to destabilization of the substrate (Minchin, 1995).

Disturbance and damage from dredging can have long term effects on *Limaria* beds. Disturbances that remove vast quantities of bed take far longer to recover from, than instances where bed material remains. A 7.5m wide area of removed bed has been predicted to take over 100 years to recover (Trigg & Moore, 2009). Linear expansion rates of 3.2cm per year have been predicted for regrowth of flame shell beds (Trigg & Moore, 2009). If nest material remains after disturbance *Limaria* quickly recolonizes these areas. Rapid recovery of the epifauna is also likely once the damaging activity stops.

*Limaria* beds are a priority marine feature (PMF) in Scotland's seas (Tyler-Walters *et al.*, 2016). Priority Marine Features are habitats and species that are considered to be marine nature conservation priorities in Scottish waters. Due to their rarity, fragility and the evidence of their threatened and in places, declining nature, the flame shell beds have been incorporated into the MPA network. Lochs Duich, Long and Alsh are now a marine protected area (MPA) for burrowed mud and flame shells which builds on the Lochs Duich, Long and Alsh Special Area of Conservation (SAC), designated for extensive tide-swept and sheltered rocky reefs, and horse mussel beds.

Where a population of *Limaria hians* experiences some mortality, but the habitat is not changed, the habitat has the potential to recover within several years, dependent on recruitment. In this case *Limaria* beds have been given a resilience of 'medium' and a recovery time of 2 – 10 years (Tyler-Walters, 2016). However, where the population experiences significant mortality and / or carpet damage then recovery is likely to be prolonged. In this situation *Limaria* beds have been given a resilience of 'very low' and a recovery time of at least 25 years (Tyler-Walters, 2016). Obviously any recovery would be susceptible to a number of factors, including environmental conditions, frequency and intensity of disturbance and the number of pressures on the site at any one time.

Loch Alsh is also known for its horse mussel beds, which is another PMF. There is a known horse mussel bed at String Rock, which is at least 6 ha in area and has been found to be linked to a second bed off Kyleakin, 500m to the west (c. 12 ha in extent). Both beds were also home to dense flame shells (Moore *et al.*, 2013). However during the present survey only a single horse mussel (*Modiolus modiolus*) was recorded.

Shallower than 9.5m bcd the flame shell biotope was replaced by *Saccharina latissima* (formerly *Laminaria saccharina*) and red seaweeds on infralittoral sediments, SS.SMP.KSwSS.LsacR. This biotope contains a number of sub-biotopes distinguished by the degree of tidal exposure. Transects 1 – 6, all suggest the majority of the sub-biotope is *Laminaria saccharina* and robust red algae on infralittoral gravel and pebbles, SS.SMP.KSwSS.LsacR.Gv. Occasionally the substrate became gravelly sand with a few broken shells. Due to lack of a suitable substrate the abundance of *Saccharina latissima* declined and the sub-biotope began merging into the sub-biotope, *Laminaria saccharina* (*Saccharina latissima*) and filamentous red algae on infralittoral sand (SS.SMP.KSwSS.LsacR.Sa). This would occasionally occur in shallower water where the tidal streams were weaker.



*Laminaria saccharina* and robust red algae on infralittoral gravel and pebbles, SS.SMP.KSwSS.LsacR.Gv

Occasionally where larger boulders were present the characterizing kelp became *Laminaria hyperborea*. This led to very small areas of the biotope, *Laminaria hyperborea* forest and foliose red seaweeds on tide-swept, upper infralittoral mixed substrata (IR.MIR.KR.LhypTX.Ft). The occasional patches of this biotope rapidly disappeared, as the substrate became predominantly coarse sand with broken shell and gravel.

The differences between transects 5 and 6 and 1 to 4 can be attributed to seasonal fluctuations. The biotopes are a product of the level of disturbance they receive. Winter storms can prevent the establishment of certain species, particularly where the substrate is shells and small stones. Seaweed cover may become more ephemeral and fragmented due to mortality rates from damage and detachment. It would also be expected that filamentous seaweeds might be more abundant in spring and summer than autumn and winter (Hiscock, 2008).

Kelp and seaweed communities on sublittoral sediments (SS.SMP.KSwSS) is another Priority Marine Feature in Scotland's Seas of which SS.SMP.KSwSS.LsacR.Gv and SS.SMP.KSwSS.LsacR.Sa are sub-biotopes. Similarly *Laminaria hyperborea* forest

and foliose red seaweeds on tide-swept infralittoral mixed substrata (IR.MIR.KR.LhypTX.Ft) is also a Priority Marine Feature.

Removal of the substrate through dredging, will remove most of the key species of these biotopes. However if suitable substratum remains, recovery is likely to be rapid as most of the epibiota are known as rapid colonisers and fast growers (Hiscock, 2008). *Saccharina latissima* has been shown to be an early colonizer within algal successions, appearing within two weeks of clearance, and can reach sexual maturity within 15 – 20 months (Stamp & Hiscock, 2015). Resilience of these biotopes has been assessed as ‘high’ (Stamp, 2015).

The ocean quahog, *Arctica islandica*, is also a Priority Marine Feature. A single one of these was recorded along transect 1.



*Arctica islandica*



*Sargassum muticum*

Of note was the abundance of *Sargassum muticum* along transects 1-4, all within the biotope, kelp and seaweed communities on sublittoral sediments (SS.SMP.KSwSS). *Sargassum* is an invasive species, which naturally occurs in Japanese and Chinese waters. It was first found in the Isle of Wight in 1971. *Sargassum* is now found in many parts of the UK, but did not reach Scotland until 2004, when it was found in Loch Ryan. It has subsequently spread up the west coast of Scotland and is now known to occur in a number of areas.

Almost all the seabed from the end of the present pier to the 12m contour appears to be Scottish Priority Marine Features. The flame shell beds are in extremely good condition and cover virtually 100% of the seabed from the 9.5m depth contour. The effect of dredging the *Limaria hians* carpet would probably be severe with loss of habitat and poor recovery. With a shortened pier and controlled dredging the impact on the bed could be minimized.

The kelp and seaweed communities on sublittoral sediment would certainly be affected by dredging and pier construction. However these biotopes are more prevalent in Scotland. They are a lot more resilient and their recovery time is thought to be rapid.

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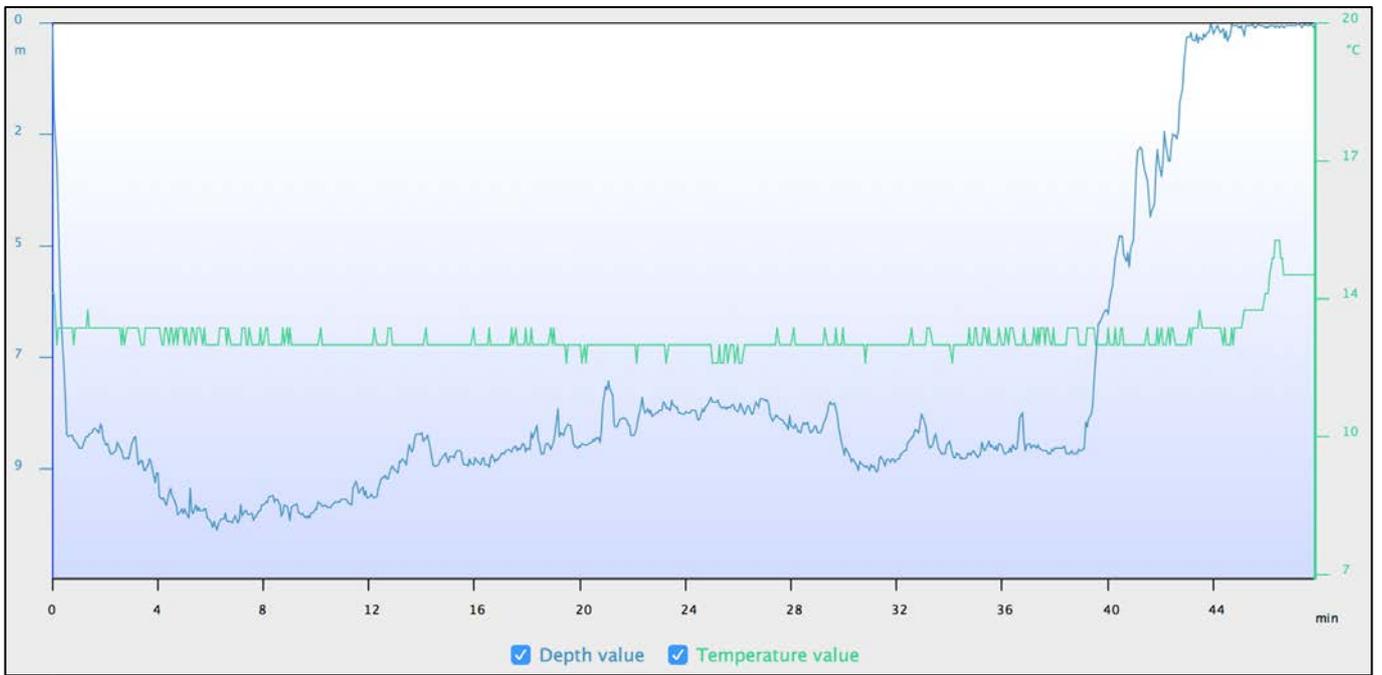
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# Appendix 1 – Dive Profiles

## Transect 1 (26.08.16)

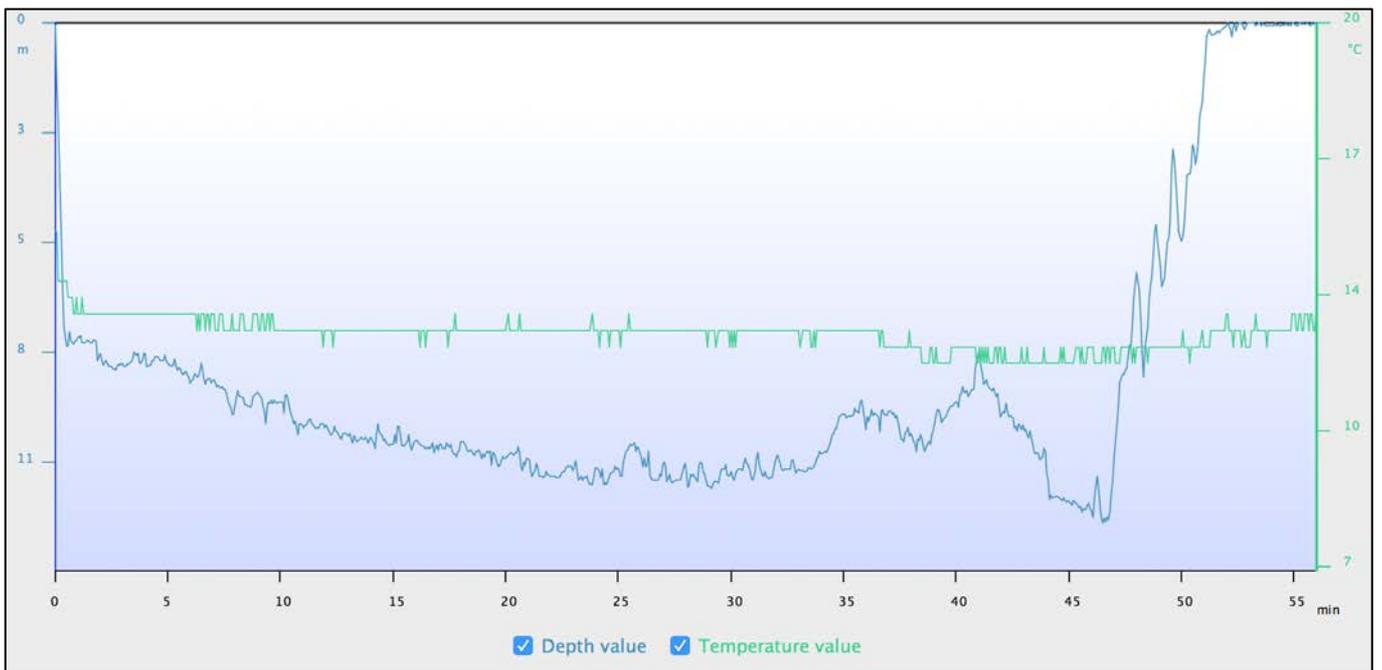


1231 (3.8m acd)

1255 (4.0m acd)

1313 (4.1m acd)

## Transect 2 (26.08.16)

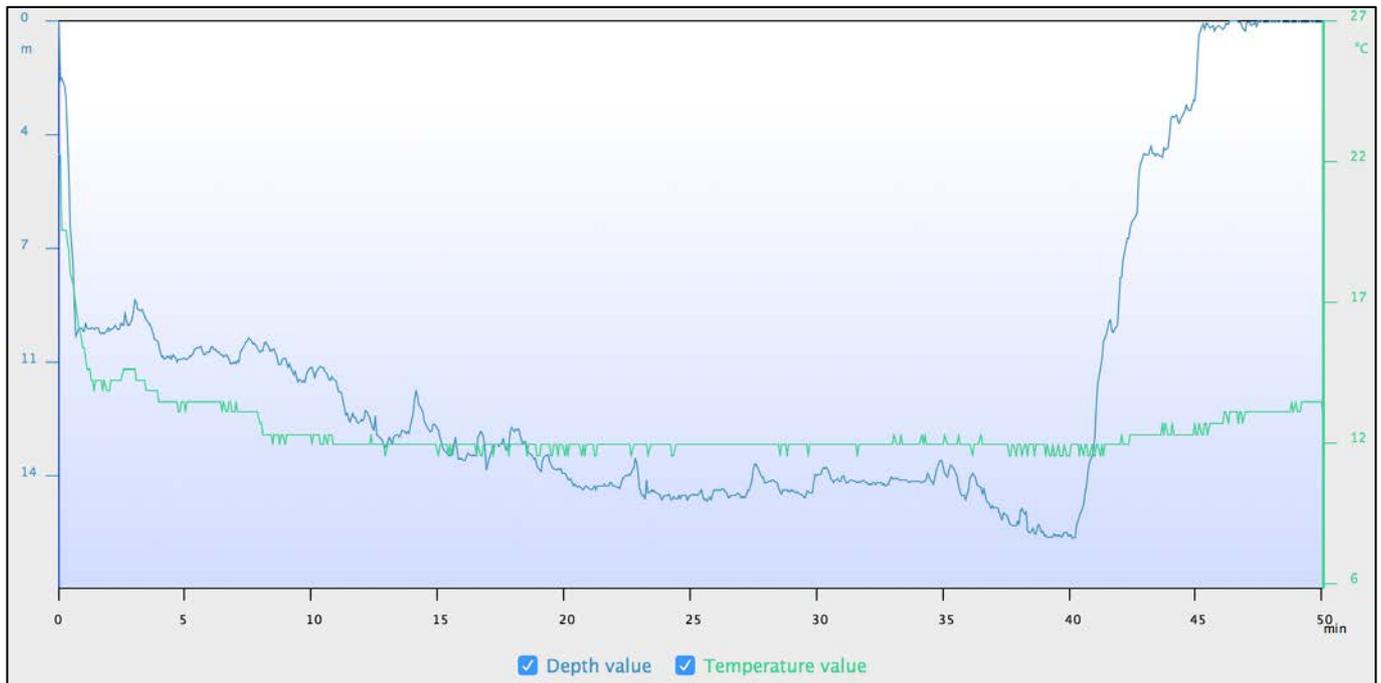


1119 (3.1m acd)

1144 (3.4m acd)

1210 (3.6m acd)

### Transect 3 (25.08.16)

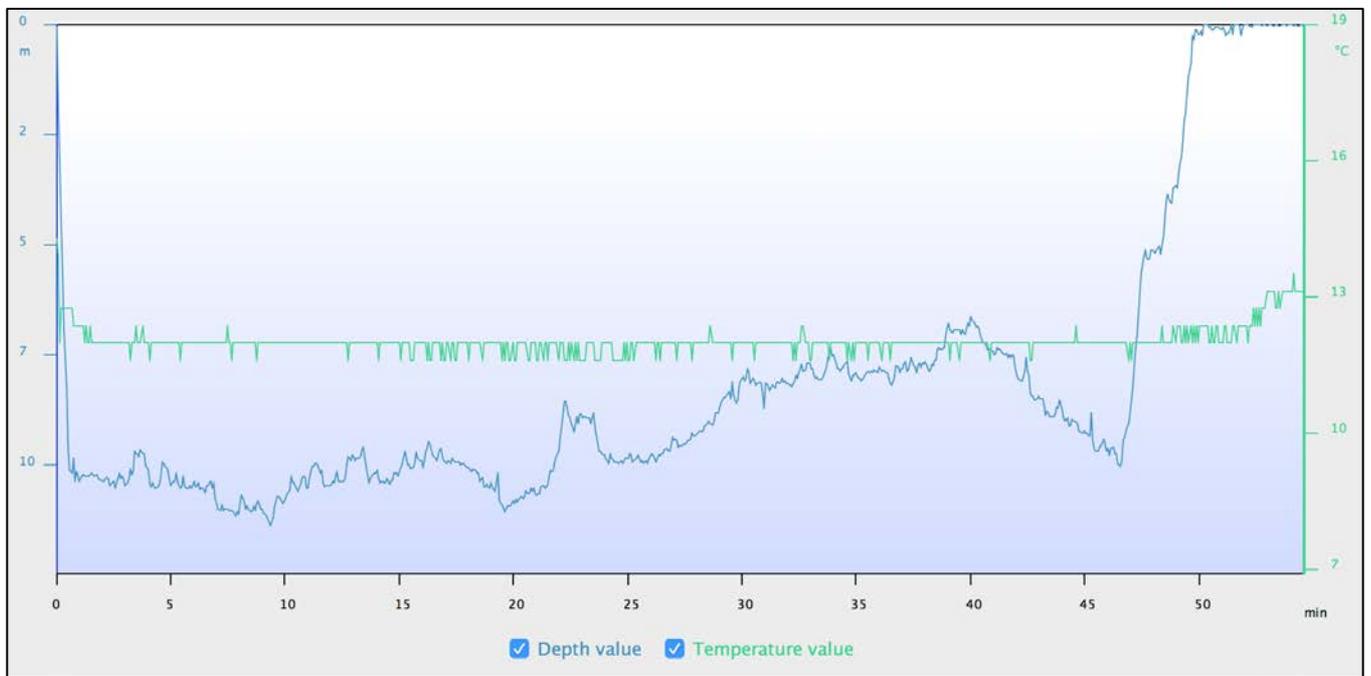


1316 (4.4m acd)

1338 (4.3m acd)

1401 (4.2m acd)

### Transect 4 (25.08.16)

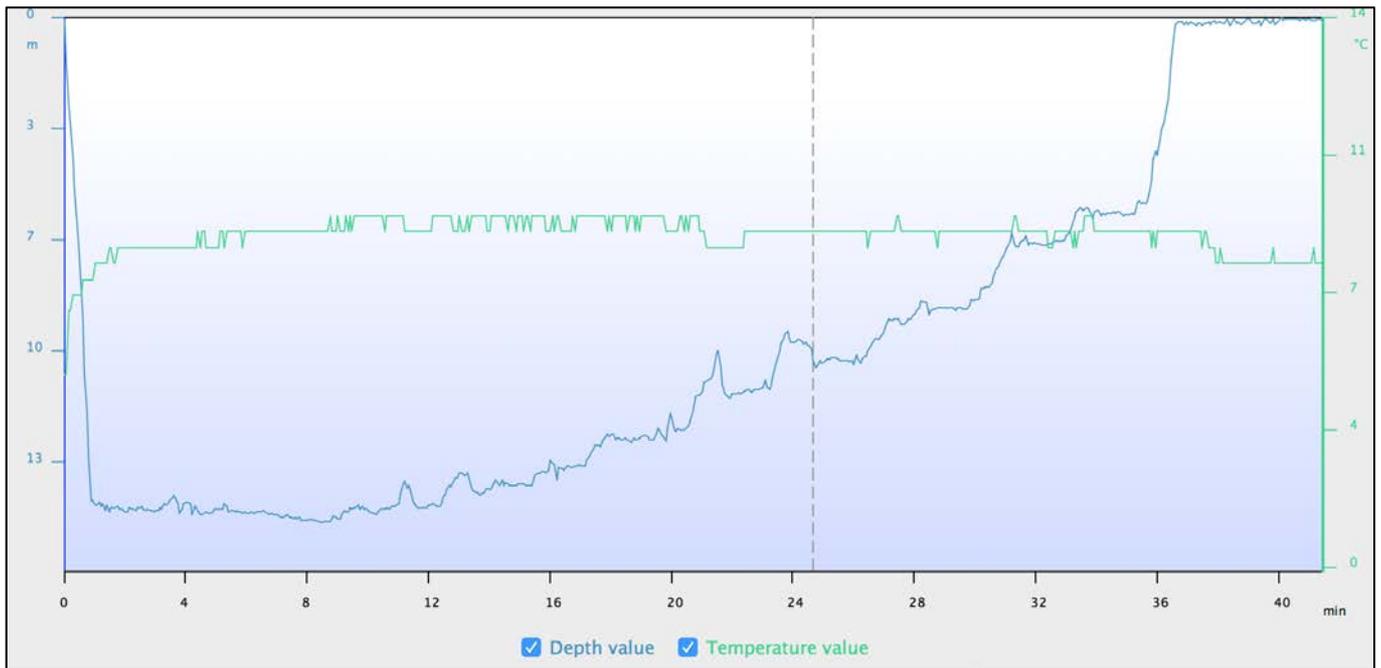


1420 (4.1m acd)

1445 (3.9m acd)

1509 (3.8m acd)

### Transect 5 (17.01.16)

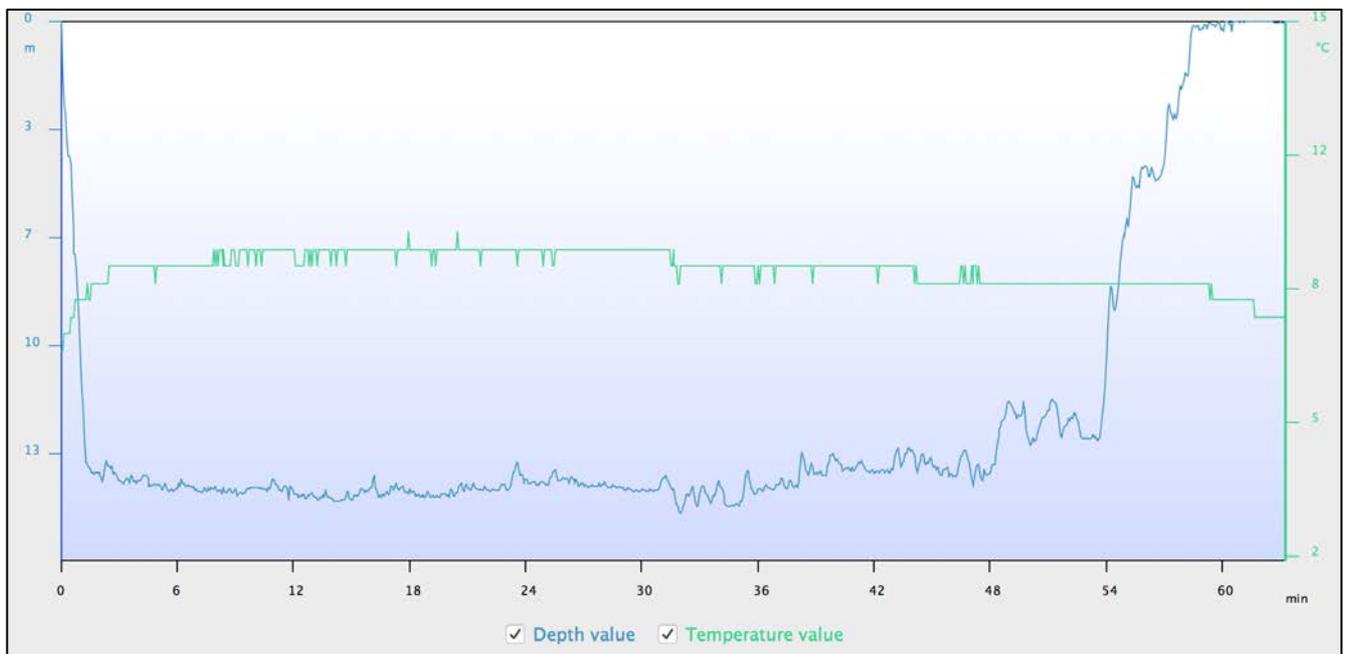


1007 (3.3m acd)

1027 (3.5m acd)

1043 (3.65m acd)

### Transect 6 (17.01.16)



1100 (4.2m acd)

1130 (4.4m acd)

1158 (4.5m acd)

## Appendix 2 – GPS data

### Transect 1

No.	Location	Date	Distance	Speed
391	57° 16.4880' N 5° 45.2173' W	3.5 m 26/08/2016 12:28:22	0.2660 nm	0.8 kt
392	57° 16.4909' N 5° 45.2167' W	5.4 m 26/08/2016 12:28:38	0.0030 nm	0.7 kt
393	57° 16.4954' N 5° 45.2198' W	5.4 m 26/08/2016 12:29:00	0.0048 nm	0.8 kt
394	57° 16.4978' N 5° 45.2262' W	3.0 m 26/08/2016 12:29:18	0.0042 nm	0.8 kt
395	57° 16.4992' N 5° 45.2301' W	3.5 m 26/08/2016 12:29:27	0.0025 nm	1.0 kt
396	57° 16.4993' N 5° 45.2378' W	4.0 m 26/08/2016 12:29:43	0.0042 nm	0.9 kt
397	57° 16.5005' N 5° 45.2427' W	4.5 m 26/08/2016 12:29:56	0.0029 nm	0.8 kt
398	57° 16.5002' N 5° 45.2467' W	4.5 m 26/08/2016 12:30:10	0.0022 nm	0.6 kt
399	57° 16.4998' N 5° 45.2495' W	4.9 m 26/08/2016 12:30:20	0.0016 nm	0.6 kt
400	57° 16.5003' N 5° 45.2514' W	4.9 m 26/08/2016 12:30:37	0.0011 nm	0.2 kt
401	57° 16.5002' N 5° 45.2506' W	5.4 m 26/08/2016 12:30:56	0.0004 nm	0.1 kt
402	57° 16.5005' N 5° 45.2512' W	5.4 m 26/08/2016 12:31:10	0.0004 nm	0.1 kt
403	57° 16.5003' N 5° 45.2512' W	5.9 m 26/08/2016 12:31:22	0.0002 nm	0.1 kt
404	57° 16.5002' N 5° 45.2519' W	5.9 m 26/08/2016 12:31:34	0.0004 nm	0.1 kt
405	57° 16.5002' N 5° 45.2548' W	5.4 m 26/08/2016 12:31:51	0.0016 nm	0.3 kt
406	57° 16.4998' N 5° 45.2577' W	5.4 m 26/08/2016 12:32:04	0.0016 nm	0.4 kt
407	57° 16.4997' N 5° 45.2590' W	5.9 m 26/08/2016 12:32:14	0.0008 nm	0.3 kt
408	57° 16.4996' N 5° 45.2619' W	5.4 m 26/08/2016 12:32:26	0.0016 nm	0.5 kt
409	57° 16.4989' N 5° 45.2629' W	5.4 m 26/08/2016 12:32:40	0.0008 nm	0.2 kt
410	57° 16.4997' N 5° 45.2643' W	4.9 m 26/08/2016 12:32:56	0.0011 nm	0.2 kt
411	57° 16.4989' N 5° 45.2666' W	4.5 m 26/08/2016 12:33:08	0.0014 nm	0.4 kt
412	57° 16.4989' N 5° 45.2690' W	4.5 m 26/08/2016 12:33:19	0.0013 nm	0.4 kt
413	57° 16.4995' N 5° 45.2716' W	4.5 m 26/08/2016 12:33:33	0.0015 nm	0.4 kt
414	57° 16.4986' N 5° 45.2752' W	4.5 m 26/08/2016 12:33:45	0.0022 nm	0.7 kt
415	57° 16.4994' N 5° 45.2788' W	4.9 m 26/08/2016 12:34:00	0.0021 nm	0.5 kt
416	57° 16.4995' N 5° 45.2805' W	4.9 m 26/08/2016 12:34:11	0.0010 nm	0.3 kt
417	57° 16.4998' N 5° 45.2833' W	4.5 m 26/08/2016 12:34:23	0.0016 nm	0.5 kt
418	57° 16.4991' N 5° 45.2859' W	4.5 m 26/08/2016 12:34:34	0.0016 nm	0.5 kt
419	57° 16.4992' N 5° 45.2870' W	4.9 m 26/08/2016 12:34:48	0.0006 nm	0.2 kt
420	57° 16.4992' N 5° 45.2874' W	5.4 m 26/08/2016 12:35:00	0.0002 nm	0.1 kt
421	57° 16.5002' N 5° 45.2895' W	5.4 m 26/08/2016 12:35:14	0.0015 nm	0.4 kt
422	57° 16.5003' N 5° 45.2910' W	5.9 m 26/08/2016 12:35:30	0.0009 nm	0.2 kt
423	57° 16.5004' N 5° 45.2948' W	5.4 m 26/08/2016 12:35:47	0.0020 nm	0.4 kt
424	57° 16.5001' N 5° 45.2974' W	4.9 m 26/08/2016 12:36:02	0.0015 nm	0.3 kt
425	57° 16.5002' N 5° 45.2990' W	5.4 m 26/08/2016 12:36:18	0.0009 nm	0.2 kt
426	57° 16.5003' N 5° 45.3026' W	5.4 m 26/08/2016 12:36:32	0.0019 nm	0.5 kt
427	57° 16.5005' N 5° 45.3074' W	4.9 m 26/08/2016 12:36:48	0.0026 nm	0.6 kt
428	57° 16.5007' N 5° 45.3092' W	4.5 m 26/08/2016 12:37:02	0.0010 nm	0.3 kt
429	57° 16.5010' N 5° 45.3100' W	4.5 m 26/08/2016 12:37:15	0.0005 nm	0.1 kt
430	57° 16.5010' N 5° 45.3106' W	5.4 m 26/08/2016 12:37:31	0.0004 nm	0.1 kt
431	57° 16.5014' N 5° 45.3127' W	5.9 m 26/08/2016 12:37:46	0.0012 nm	0.3 kt
432	57° 16.5016' N 5° 45.3172' W	5.9 m 26/08/2016 12:38:03	0.0024 nm	0.5 kt
433	57° 16.5014' N 5° 45.3181' W	6.4 m 26/08/2016 12:38:16	0.0005 nm	0.1 kt
434	57° 16.5016' N 5° 45.3182' W	6.9 m 26/08/2016 12:38:33	0.0002 nm	0.0 kt
435	57° 16.5019' N 5° 45.3176' W	6.4 m 26/08/2016 12:38:50	0.0004 nm	0.1 kt
436	57° 16.5017' N 5° 45.3171' W	5.9 m 26/08/2016 12:39:03	0.0003 nm	0.1 kt
437	57° 16.5016' N 5° 45.3175' W	5.4 m 26/08/2016 12:39:18	0.0002 nm	0.0 kt
438	57° 16.5017' N 5° 45.3172' W	6.4 m 26/08/2016 12:39:34	0.0002 nm	0.0 kt
439	57° 16.5013' N 5° 45.3173' W	5.9 m 26/08/2016 12:39:50	0.0004 nm	0.1 kt
440	57° 16.5014' N 5° 45.3177' W	5.9 m 26/08/2016 12:40:10	0.0003 nm	0.1 kt
441	57° 16.5017' N 5° 45.3180' W	5.4 m 26/08/2016 12:40:29	0.0003 nm	0.1 kt

No.	Location	Date	Distance	Speed
442	57° 16.5017' N 5° 45.3179' W	26/08/2016 12:40:47	5.9 m 0.0001 nm	0.0 kt
443	57° 16.5014' N 5° 45.3178' W	26/08/2016 12:41:02	6.4 m 0.0003 nm	0.1 kt
444	57° 16.5019' N 5° 45.3195' W	26/08/2016 12:41:15	5.4 m 0.0010 nm	0.3 kt
445	57° 16.5018' N 5° 45.3226' W	26/08/2016 12:41:31	5.9 m 0.0017 nm	0.4 kt
446	57° 16.5016' N 5° 45.3249' W	26/08/2016 12:41:49	5.9 m 0.0012 nm	0.2 kt
447	57° 16.5015' N 5° 45.3255' W	26/08/2016 12:42:07	5.4 m 0.0003 nm	0.1 kt
448	57° 16.5021' N 5° 45.3275' W	26/08/2016 12:42:23	5.4 m 0.0012 nm	0.3 kt
449	57° 16.5030' N 5° 45.3318' W	26/08/2016 12:42:44	5.9 m 0.0025 nm	0.4 kt
450	57° 16.5034' N 5° 45.3341' W	26/08/2016 12:42:56	5.4 m 0.0013 nm	0.4 kt
451	57° 16.5031' N 5° 45.3361' W	26/08/2016 12:43:09	5.9 m 0.0011 nm	0.3 kt
452	57° 16.5029' N 5° 45.3370' W	26/08/2016 12:43:22	6.4 m 0.0005 nm	0.1 kt
453	57° 16.5040' N 5° 45.3402' W	26/08/2016 12:43:39	5.9 m 0.0021 nm	0.4 kt
454	57° 16.5039' N 5° 45.3438' W	26/08/2016 12:43:52	5.9 m 0.0020 nm	0.5 kt
455	57° 16.5036' N 5° 45.3470' W	26/08/2016 12:44:05	5.9 m 0.0017 nm	0.5 kt
456	57° 16.5028' N 5° 45.3511' W	26/08/2016 12:44:19	5.9 m 0.0024 nm	0.6 kt
457	57° 16.5030' N 5° 45.3542' W	26/08/2016 12:44:34	5.4 m 0.0017 nm	0.4 kt
458	57° 16.5031' N 5° 45.3578' W	26/08/2016 12:44:49	6.4 m 0.0019 nm	0.5 kt
459	57° 16.5031' N 5° 45.3598' W	26/08/2016 12:45:04	6.9 m 0.0011 nm	0.3 kt
460	57° 16.5026' N 5° 45.3622' W	26/08/2016 12:45:21	6.9 m 0.0014 nm	0.3 kt
461	57° 16.5026' N 5° 45.3628' W	26/08/2016 12:45:38	6.4 m 0.0003 nm	0.1 kt
462	57° 16.5025' N 5° 45.3638' W	26/08/2016 12:45:52	6.4 m 0.0006 nm	0.1 kt
463	57° 16.5026' N 5° 45.3637' W	26/08/2016 12:46:04	6.4 m 0.0001 nm	0.0 kt
464	57° 16.5024' N 5° 45.3638' W	26/08/2016 12:46:19	6.4 m 0.0002 nm	0.1 kt
465	57° 16.5028' N 5° 45.3654' W	26/08/2016 12:46:37	6.9 m 0.0010 nm	0.2 kt
466	57° 16.5033' N 5° 45.3676' W	26/08/2016 12:46:52	6.4 m 0.0013 nm	0.3 kt
467	57° 16.5032' N 5° 45.3704' W	26/08/2016 12:47:08	6.4 m 0.0015 nm	0.3 kt
468	57° 16.5031' N 5° 45.3736' W	26/08/2016 12:47:28	6.9 m 0.0018 nm	0.3 kt
469	57° 16.5033' N 5° 45.3745' W	26/08/2016 12:47:45	6.9 m 0.0005 nm	0.1 kt
470	57° 16.5029' N 5° 45.3765' W	26/08/2016 12:48:03	6.9 m 0.0011 nm	0.2 kt
471	57° 16.5027' N 5° 45.3768' W	26/08/2016 12:48:16	6.9 m 0.0002 nm	0.1 kt
472	57° 16.5029' N 5° 45.3767' W	26/08/2016 12:48:30	6.9 m 0.0001 nm	0.0 kt
473	57° 16.5027' N 5° 45.3790' W	26/08/2016 12:48:45	6.9 m 0.0012 nm	0.3 kt
474	57° 16.5025' N 5° 45.3841' W	26/08/2016 12:49:03	6.4 m 0.0028 nm	0.6 kt
475	57° 16.5042' N 5° 45.3924' W	26/08/2016 12:49:20	6.4 m 0.0048 nm	1.0 kt
476	57° 16.5059' N 5° 45.3999' W	26/08/2016 12:49:38	5.9 m 0.0045 nm	0.9 kt
477	57° 16.5065' N 5° 45.4013' W	26/08/2016 12:49:53	5.4 m 0.0009 nm	0.2 kt
478	57° 16.5065' N 5° 45.4011' W	26/08/2016 12:50:10	5.9 m 0.0001 nm	0.0 kt
479	57° 16.5066' N 5° 45.4001' W	26/08/2016 12:50:28	5.9 m 0.0006 nm	0.1 kt
480	57° 16.5080' N 5° 45.4028' W	26/08/2016 12:50:47	5.9 m 0.0021 nm	0.4 kt
481	57° 16.5080' N 5° 45.4073' W	26/08/2016 12:51:04	5.4 m 0.0024 nm	0.5 kt
482	57° 16.5072' N 5° 45.4097' W	26/08/2016 12:51:19	5.4 m 0.0015 nm	0.4 kt
483	57° 16.5071' N 5° 45.4096' W	26/08/2016 12:51:38	5.9 m 0.0002 nm	0.0 kt
484	57° 16.5068' N 5° 45.4102' W	26/08/2016 12:51:57	5.9 m 0.0004 nm	0.1 kt
485	57° 16.5075' N 5° 45.4124' W	26/08/2016 12:52:12	6.4 m 0.0014 nm	0.3 kt
486	57° 16.5079' N 5° 45.4165' W	26/08/2016 12:52:28	5.9 m 0.0023 nm	0.5 kt
487	57° 16.5086' N 5° 45.4185' W	26/08/2016 12:52:40	5.4 m 0.0013 nm	0.4 kt
488	57° 16.5089' N 5° 45.4212' W	26/08/2016 12:52:52	5.4 m 0.0014 nm	0.4 kt
489	57° 16.5091' N 5° 45.4246' W	26/08/2016 12:53:04	5.9 m 0.0019 nm	0.6 kt
490	57° 16.5087' N 5° 45.4268' W	26/08/2016 12:53:19	6.4 m 0.0012 nm	0.3 kt
491	57° 16.5081' N 5° 45.4282' W	26/08/2016 12:53:31	6.4 m 0.0010 nm	0.3 kt
492	57° 16.5083' N 5° 45.4295' W	26/08/2016 12:53:46	7.3 m 0.0007 nm	0.2 kt

No.	Location	Date	Distance	Speed
493	57° 16.5084' N 5° 45.4298' W	26/08/2016 12:53:58	6.9 m 0.0002 nm	0.1 kt
494	57° 16.5085' N 5° 45.4311' W	26/08/2016 12:54:14	7.3 m 0.0007 nm	0.2 kt
495	57° 16.5088' N 5° 45.4335' W	26/08/2016 12:54:30	7.3 m 0.0014 nm	0.3 kt
496	57° 16.5083' N 5° 45.4366' W	26/08/2016 12:54:44	6.9 m 0.0018 nm	0.5 kt
497	57° 16.5079' N 5° 45.4390' W	26/08/2016 12:55:00	6.9 m 0.0013 nm	0.3 kt
498	57° 16.5080' N 5° 45.4396' W	26/08/2016 12:55:17	6.9 m 0.0004 nm	0.1 kt
499	57° 16.5082' N 5° 45.4420' W	26/08/2016 12:55:31	6.4 m 0.0013 nm	0.3 kt
500	57° 16.5084' N 5° 45.4427' W	26/08/2016 12:55:48	6.9 m 0.0004 nm	0.1 kt
501	57° 16.5082' N 5° 45.4435' W	26/08/2016 12:56:03	6.9 m 0.0004 nm	0.1 kt
502	57° 16.5082' N 5° 45.4443' W	26/08/2016 12:56:18	6.9 m 0.0005 nm	0.1 kt
503	57° 16.5082' N 5° 45.4461' W	26/08/2016 12:56:33	6.9 m 0.0010 nm	0.2 kt
504	57° 16.5079' N 5° 45.4479' W	26/08/2016 12:56:49	6.9 m 0.0010 nm	0.2 kt
505	57° 16.5077' N 5° 45.4508' W	26/08/2016 12:57:03	6.4 m 0.0016 nm	0.4 kt
506	57° 16.5077' N 5° 45.4531' W	26/08/2016 12:57:16	6.9 m 0.0013 nm	0.4 kt
507	57° 16.5076' N 5° 45.4558' W	26/08/2016 12:57:27	6.4 m 0.0015 nm	0.5 kt
508	57° 16.5073' N 5° 45.4576' W	26/08/2016 12:57:39	5.9 m 0.0010 nm	0.3 kt
509	57° 16.5071' N 5° 45.4601' W	26/08/2016 12:57:50	6.4 m 0.0014 nm	0.5 kt
510	57° 16.5068' N 5° 45.4620' W	26/08/2016 12:58:03	6.4 m 0.0011 nm	0.3 kt
511	57° 16.5075' N 5° 45.4624' W	26/08/2016 12:58:18	6.4 m 0.0008 nm	0.2 kt
512	57° 16.5074' N 5° 45.4643' W	26/08/2016 12:58:34	6.4 m 0.0010 nm	0.2 kt
513	57° 16.5076' N 5° 45.4665' W	26/08/2016 12:58:47	5.9 m 0.0012 nm	0.3 kt
514	57° 16.5075' N 5° 45.4705' W	26/08/2016 12:58:59	5.4 m 0.0021 nm	0.6 kt
515	57° 16.5077' N 5° 45.4738' W	26/08/2016 12:59:12	5.9 m 0.0018 nm	0.5 kt
516	57° 16.5077' N 5° 45.4768' W	26/08/2016 12:59:23	5.9 m 0.0017 nm	0.5 kt
517	57° 16.5076' N 5° 45.4823' W	26/08/2016 12:59:36	4.9 m 0.0030 nm	0.8 kt
518	57° 16.5068' N 5° 45.4875' W	26/08/2016 12:59:49	5.4 m 0.0029 nm	0.8 kt
519	57° 16.5071' N 5° 45.4912' W	26/08/2016 13:00:04	5.9 m 0.0021 nm	0.5 kt
520	57° 16.5070' N 5° 45.4959' W	26/08/2016 13:00:17	5.4 m 0.0025 nm	0.7 kt
521	57° 16.5066' N 5° 45.4978' W	26/08/2016 13:00:32	5.4 m 0.0011 nm	0.3 kt
522	57° 16.5074' N 5° 45.5007' W	26/08/2016 13:00:44	5.4 m 0.0018 nm	0.5 kt
523	57° 16.5069' N 5° 45.5042' W	26/08/2016 13:00:59	5.9 m 0.0019 nm	0.5 kt
524	57° 16.5064' N 5° 45.5044' W	26/08/2016 13:01:13	5.4 m 0.0005 nm	0.1 kt
525	57° 16.5064' N 5° 45.5079' W	26/08/2016 13:01:30	5.9 m 0.0019 nm	0.4 kt
526	57° 16.5068' N 5° 45.5109' W	26/08/2016 13:01:42	6.4 m 0.0017 nm	0.5 kt
527	57° 16.5064' N 5° 45.5129' W	26/08/2016 13:01:54	6.4 m 0.0012 nm	0.4 kt
528	57° 16.5062' N 5° 45.5158' W	26/08/2016 13:02:08	6.4 m 0.0016 nm	0.4 kt
529	57° 16.5060' N 5° 45.5194' W	26/08/2016 13:02:20	5.9 m 0.0020 nm	0.6 kt
530	57° 16.5060' N 5° 45.5223' W	26/08/2016 13:02:32	5.9 m 0.0015 nm	0.5 kt
531	57° 16.5057' N 5° 45.5241' W	26/08/2016 13:02:44	5.9 m 0.0010 nm	0.3 kt
532	57° 16.5050' N 5° 45.5275' W	26/08/2016 13:02:56	5.9 m 0.0020 nm	0.6 kt
533	57° 16.5036' N 5° 45.5313' W	26/08/2016 13:03:08	5.9 m 0.0025 nm	0.7 kt
534	57° 16.5031' N 5° 45.5339' W	26/08/2016 13:03:22	5.4 m 0.0015 nm	0.4 kt
535	57° 16.5035' N 5° 45.5373' W	26/08/2016 13:03:36	4.9 m 0.0019 nm	0.5 kt
536	57° 16.5038' N 5° 45.5388' W	26/08/2016 13:03:48	5.4 m 0.0009 nm	0.3 kt
537	57° 16.5040' N 5° 45.5404' W	26/08/2016 13:04:02	5.4 m 0.0009 nm	0.2 kt
538	57° 16.5039' N 5° 45.5432' W	26/08/2016 13:04:12	5.4 m 0.0015 nm	0.5 kt
539	57° 16.5035' N 5° 45.5470' W	26/08/2016 13:04:23	5.9 m 0.0021 nm	0.7 kt
540	57° 16.5037' N 5° 45.5508' W	26/08/2016 13:04:34	5.9 m 0.0021 nm	0.7 kt
541	57° 16.5040' N 5° 45.5555' W	26/08/2016 13:04:46	5.4 m 0.0026 nm	0.8 kt
542	57° 16.5042' N 5° 45.5585' W	26/08/2016 13:04:56	5.4 m 0.0017 nm	0.6 kt
543	57° 16.5043' N 5° 45.5622' W	26/08/2016 13:05:07	5.4 m 0.0020 nm	0.7 kt

No.	Location	Date	Distance	Speed
544	57° 16.5040' N 5° 45.5661' W	26/08/2016 13:05:18	5.4 m 0.0021 nm	0.7 kt
545	57° 16.5040' N 5° 45.5690' W	26/08/2016 13:05:27	5.9 m 0.0016 nm	0.6 kt
546	57° 16.5048' N 5° 45.5722' W	26/08/2016 13:05:37	5.9 m 0.0019 nm	0.7 kt
547	57° 16.5051' N 5° 45.5740' W	26/08/2016 13:05:48	6.4 m 0.0010 nm	0.3 kt
548	57° 16.5046' N 5° 45.5760' W	26/08/2016 13:06:01	5.9 m 0.0012 nm	0.3 kt
549	57° 16.5045' N 5° 45.5751' W	26/08/2016 13:06:15	5.9 m 0.0005 nm	0.1 kt
550	57° 16.5053' N 5° 45.5739' W	26/08/2016 13:06:26	6.9 m 0.0011 nm	0.3 kt
551	57° 16.5056' N 5° 45.5724' W	26/08/2016 13:06:38	6.9 m 0.0009 nm	0.3 kt
552	57° 16.5055' N 5° 45.5739' W	26/08/2016 13:06:51	6.4 m 0.0008 nm	0.2 kt
553	57° 16.5064' N 5° 45.5757' W	26/08/2016 13:07:00	6.4 m 0.0013 nm	0.5 kt
554	57° 16.5058' N 5° 45.5761' W	26/08/2016 13:07:12	6.9 m 0.0007 nm	0.2 kt
555	57° 16.5052' N 5° 45.5746' W	26/08/2016 13:07:25	7.3 m 0.0010 nm	0.3 kt
556	57° 16.5050' N 5° 45.5757' W	26/08/2016 13:07:38	7.8 m 0.0006 nm	0.2 kt
557	57° 16.5052' N 5° 45.5768' W	26/08/2016 13:07:53	7.3 m 0.0006 nm	0.1 kt
558	57° 16.5051' N 5° 45.5766' W	26/08/2016 13:08:05	6.9 m 0.0001 nm	0.0 kt
559	57° 16.5051' N 5° 45.5768' W	26/08/2016 13:08:17	7.3 m 0.0001 nm	0.0 kt
560	57° 16.5049' N 5° 45.5767' W	26/08/2016 13:08:28	7.3 m 0.0002 nm	0.1 kt
561	57° 16.5053' N 5° 45.5775' W	26/08/2016 13:08:39	7.3 m 0.0006 nm	0.2 kt
562	57° 16.5049' N 5° 45.5772' W	26/08/2016 13:08:51	7.3 m 0.0004 nm	0.1 kt
563	57° 16.5052' N 5° 45.5770' W	26/08/2016 13:09:02	6.9 m 0.0003 nm	0.1 kt
564	57° 16.5058' N 5° 45.5779' W	26/08/2016 13:09:13	6.9 m 0.0008 nm	0.2 kt
565	57° 16.5048' N 5° 45.5810' W	26/08/2016 13:09:27	6.9 m 0.0019 nm	0.5 kt
566	57° 16.5030' N 5° 45.5843' W	26/08/2016 13:09:39	6.9 m 0.0025 nm	0.8 kt
567	57° 16.5017' N 5° 45.5892' W	26/08/2016 13:09:51	6.4 m 0.0030 nm	0.9 kt
568	57° 16.5011' N 5° 45.5929' W	26/08/2016 13:10:03	5.9 m 0.0021 nm	0.6 kt
569	57° 16.5016' N 5° 45.5971' W	26/08/2016 13:10:13	6.4 m 0.0023 nm	0.8 kt
570	57° 16.5007' N 5° 45.6004' W	26/08/2016 13:10:22	6.4 m 0.0020 nm	0.8 kt
571	57° 16.4995' N 5° 45.6052' W	26/08/2016 13:10:33	6.4 m 0.0029 nm	0.9 kt
572	57° 16.4992' N 5° 45.6088' W	26/08/2016 13:10:43	6.4 m 0.0020 nm	0.7 kt
573	57° 16.5000' N 5° 45.6119' W	26/08/2016 13:10:53	6.4 m 0.0018 nm	0.7 kt
574	57° 16.5002' N 5° 45.6153' W	26/08/2016 13:11:02	6.9 m 0.0019 nm	0.7 kt
575	57° 16.4999' N 5° 45.6160' W	26/08/2016 13:11:04	6.9 m 0.0005 nm	0.8 kt
576	57° 16.4991' N 5° 45.6213' W	26/08/2016 13:11:14	6.9 m 0.0030 nm	1.1 kt
577	57° 16.4977' N 5° 45.6257' W	26/08/2016 13:11:23	6.9 m 0.0028 nm	1.1 kt
578	57° 16.4972' N 5° 45.6296' W	26/08/2016 13:11:32	6.9 m 0.0022 nm	0.9 kt
579	57° 16.4974' N 5° 45.6320' W	26/08/2016 13:11:41	6.9 m 0.0013 nm	0.5 kt
580	57° 16.4961' N 5° 45.6364' W	26/08/2016 13:11:50	6.9 m 0.0027 nm	1.1 kt
581	57° 16.4956' N 5° 45.6396' W	26/08/2016 13:11:59	6.4 m 0.0018 nm	0.7 kt
582	57° 16.4941' N 5° 45.6444' W	26/08/2016 13:12:09	6.4 m 0.0030 nm	1.1 kt
583	57° 16.4927' N 5° 45.6485' W	26/08/2016 13:12:21	5.9 m 0.0026 nm	0.8 kt
584	57° 16.4918' N 5° 45.6519' W	26/08/2016 13:12:31	6.4 m 0.0021 nm	0.7 kt
585	57° 16.4906' N 5° 45.6556' W	26/08/2016 13:12:42	6.4 m 0.0024 nm	0.8 kt
586	57° 16.4896' N 5° 45.6615' W	26/08/2016 13:12:56	5.9 m 0.0033 nm	0.9 kt
587	57° 16.4891' N 5° 45.6656' W	26/08/2016 13:13:06	5.9 m 0.0023 nm	0.8 kt
588	57° 16.4883' N 5° 45.6696' W	26/08/2016 13:13:18	6.4 m 0.0024 nm	0.7 kt
589	57° 16.4880' N 5° 45.6739' W	26/08/2016 13:13:29	5.9 m 0.0023 nm	0.8 kt
590	57° 16.4876' N 5° 45.6787' W	26/08/2016 13:13:43	5.4 m 0.0026 nm	0.7 kt
591	57° 16.4881' N 5° 45.6809' W	26/08/2016 13:13:53	4.5 m 0.0013 nm	0.5 kt
592	57° 16.4891' N 5° 45.6833' W	26/08/2016 13:14:13	4.5 m 0.0017 nm	0.3 kt

## Appendix 2 – GPS data

### Transect 2

No.	Location	Date	Distance	Speed
179	57° 16.4948' N 5° 45.2299' W	4.0 m 26/08/2016 11:20:01	0.2130 nm	0.0 kt
180	57° 16.4952' N 5° 45.2295' W	4.5 m 26/08/2016 11:20:18	0.0005 nm	0.1 kt
181	57° 16.4961' N 5° 45.2308' W	4.5 m 26/08/2016 11:20:32	0.0011 nm	0.3 kt
182	57° 16.4967' N 5° 45.2320' W	4.0 m 26/08/2016 11:20:48	0.0009 nm	0.2 kt
183	57° 16.4973' N 5° 45.2325' W	4.0 m 26/08/2016 11:21:06	0.0007 nm	0.1 kt
184	57° 16.4977' N 5° 45.2333' W	4.0 m 26/08/2016 11:21:23	0.0006 nm	0.1 kt
185	57° 16.4982' N 5° 45.2341' W	3.5 m 26/08/2016 11:21:37	0.0006 nm	0.2 kt
186	57° 16.4983' N 5° 45.2346' W	4.0 m 26/08/2016 11:21:54	0.0003 nm	0.1 kt
187	57° 16.4993' N 5° 45.2358' W	4.0 m 26/08/2016 11:22:15	0.0012 nm	0.2 kt
188	57° 16.5006' N 5° 45.2382' W	4.0 m 26/08/2016 11:22:32	0.0019 nm	0.4 kt
189	57° 16.5022' N 5° 45.2418' W	4.0 m 26/08/2016 11:22:44	0.0025 nm	0.8 kt
190	57° 16.5031' N 5° 45.2481' W	4.0 m 26/08/2016 11:23:02	0.0035 nm	0.7 kt
191	57° 16.5041' N 5° 45.2528' W	3.5 m 26/08/2016 11:23:17	0.0028 nm	0.7 kt
192	57° 16.5050' N 5° 45.2569' W	3.5 m 26/08/2016 11:23:33	0.0024 nm	0.5 kt
193	57° 16.5070' N 5° 45.2612' W	3.5 m 26/08/2016 11:23:48	0.0031 nm	0.7 kt
194	57° 16.5067' N 5° 45.2628' W	3.5 m 26/08/2016 11:23:58	0.0009 nm	0.3 kt
195	57° 16.5065' N 5° 45.2633' W	4.0 m 26/08/2016 11:24:15	0.0003 nm	0.1 kt
196	57° 16.5065' N 5° 45.2627' W	4.5 m 26/08/2016 11:24:30	0.0003 nm	0.1 kt
197	57° 16.5068' N 5° 45.2631' W	4.5 m 26/08/2016 11:24:46	0.0004 nm	0.1 kt
198	57° 16.5074' N 5° 45.2656' W	4.5 m 26/08/2016 11:24:58	0.0015 nm	0.4 kt
199	57° 16.5081' N 5° 45.2685' W	4.0 m 26/08/2016 11:25:13	0.0017 nm	0.4 kt
200	57° 16.5091' N 5° 45.2705' W	4.0 m 26/08/2016 11:25:26	0.0015 nm	0.4 kt
201	57° 16.5093' N 5° 45.2712' W	4.0 m 26/08/2016 11:25:37	0.0004 nm	0.1 kt
202	57° 16.5099' N 5° 45.2726' W	3.5 m 26/08/2016 11:25:52	0.0010 nm	0.2 kt
203	57° 16.5101' N 5° 45.2735' W	4.0 m 26/08/2016 11:26:06	0.0005 nm	0.1 kt
204	57° 16.5109' N 5° 45.2732' W	4.0 m 26/08/2016 11:26:22	0.0008 nm	0.2 kt
205	57° 16.5111' N 5° 45.2749' W	4.0 m 26/08/2016 11:26:31	0.0009 nm	0.4 kt
206	57° 16.5112' N 5° 45.2760' W	4.0 m 26/08/2016 11:26:43	0.0006 nm	0.2 kt
207	57° 16.5117' N 5° 45.2763' W	4.0 m 26/08/2016 11:26:59	0.0005 nm	0.1 kt
208	57° 16.5118' N 5° 45.2767' W	4.0 m 26/08/2016 11:27:11	0.0002 nm	0.1 kt
209	57° 16.5128' N 5° 45.2787' W	3.5 m 26/08/2016 11:27:23	0.0015 nm	0.4 kt
210	57° 16.5133' N 5° 45.2812' W	3.5 m 26/08/2016 11:27:34	0.0015 nm	0.5 kt
211	57° 16.5123' N 5° 45.2832' W	3.5 m 26/08/2016 11:27:48	0.0015 nm	0.4 kt
212	57° 16.5128' N 5° 45.2856' W	3.5 m 26/08/2016 11:28:02	0.0014 nm	0.4 kt
213	57° 16.5132' N 5° 45.2855' W	3.5 m 26/08/2016 11:28:19	0.0004 nm	0.1 kt
214	57° 16.5131' N 5° 45.2857' W	3.5 m 26/08/2016 11:28:29	0.0001 nm	0.0 kt
215	57° 16.5137' N 5° 45.2873' W	3.5 m 26/08/2016 11:28:42	0.0011 nm	0.3 kt
216	57° 16.5135' N 5° 45.2888' W	3.5 m 26/08/2016 11:28:56	0.0009 nm	0.2 kt
217	57° 16.5135' N 5° 45.2900' W	3.5 m 26/08/2016 11:29:09	0.0006 nm	0.2 kt
218	57° 16.5137' N 5° 45.2914' W	3.5 m 26/08/2016 11:29:21	0.0008 nm	0.2 kt
219	57° 16.5138' N 5° 45.2925' W	3.5 m 26/08/2016 11:29:34	0.0006 nm	0.2 kt
220	57° 16.5142' N 5° 45.2933' W	3.5 m 26/08/2016 11:29:47	0.0006 nm	0.2 kt
221	57° 16.5140' N 5° 45.2938' W	3.5 m 26/08/2016 11:30:03	0.0004 nm	0.1 kt
222	57° 16.5150' N 5° 45.2951' W	4.0 m 26/08/2016 11:30:15	0.0013 nm	0.4 kt
223	57° 16.5149' N 5° 45.2959' W	4.0 m 26/08/2016 11:30:25	0.0005 nm	0.2 kt
224	57° 16.5150' N 5° 45.2954' W	4.0 m 26/08/2016 11:30:38	0.0003 nm	0.1 kt
225	57° 16.5154' N 5° 45.2973' W	4.5 m 26/08/2016 11:30:52	0.0011 nm	0.3 kt
226	57° 16.5153' N 5° 45.2981' W	4.0 m 26/08/2016 11:31:06	0.0005 nm	0.1 kt
227	57° 16.5157' N 5° 45.2990' W	4.0 m 26/08/2016 11:31:19	0.0006 nm	0.2 kt
228	57° 16.5160' N 5° 45.2996' W	4.0 m 26/08/2016 11:31:33	0.0004 nm	0.1 kt
229	57° 16.5162' N 5° 45.2990' W	4.0 m 26/08/2016 11:31:45	0.0004 nm	0.1 kt

No.	Location	Date	Distance	Speed
230	57° 16.5160' N 5° 45.2989' W	4.0 m 26/08/2016 11:31:58	0.0002 nm	0.1 kt
231	57° 16.5168' N 5° 45.3013' W	4.5 m 26/08/2016 11:32:09	0.0015 nm	0.5 kt
232	57° 16.5170' N 5° 45.3029' W	4.5 m 26/08/2016 11:32:20	0.0008 nm	0.3 kt
233	57° 16.5179' N 5° 45.3054' W	4.9 m 26/08/2016 11:32:33	0.0017 nm	0.5 kt
234	57° 16.5188' N 5° 45.3060' W	4.5 m 26/08/2016 11:32:47	0.0010 nm	0.2 kt
235	57° 16.5196' N 5° 45.3077' W	4.5 m 26/08/2016 11:32:58	0.0012 nm	0.4 kt
236	57° 16.5197' N 5° 45.3096' W	4.9 m 26/08/2016 11:33:15	0.0010 nm	0.2 kt
237	57° 16.5205' N 5° 45.3113' W	4.5 m 26/08/2016 11:33:34	0.0012 nm	0.2 kt
238	57° 16.5219' N 5° 45.3158' W	4.9 m 26/08/2016 11:33:55	0.0028 nm	0.5 kt
239	57° 16.5220' N 5° 45.3180' W	4.9 m 26/08/2016 11:34:11	0.0012 nm	0.3 kt
240	57° 16.5223' N 5° 45.3188' W	4.9 m 26/08/2016 11:34:22	0.0005 nm	0.2 kt
241	57° 16.5224' N 5° 45.3203' W	5.4 m 26/08/2016 11:34:36	0.0009 nm	0.2 kt
242	57° 16.5222' N 5° 45.3221' W	5.4 m 26/08/2016 11:34:53	0.0010 nm	0.2 kt
243	57° 16.5222' N 5° 45.3232' W	5.4 m 26/08/2016 11:35:08	0.0006 nm	0.1 kt
244	57° 16.5227' N 5° 45.3240' W	5.4 m 26/08/2016 11:35:20	0.0007 nm	0.2 kt
245	57° 16.5230' N 5° 45.3255' W	5.4 m 26/08/2016 11:35:32	0.0009 nm	0.3 kt
246	57° 16.5239' N 5° 45.3280' W	5.4 m 26/08/2016 11:35:46	0.0016 nm	0.4 kt
247	57° 16.5249' N 5° 45.3300' W	5.4 m 26/08/2016 11:36:00	0.0015 nm	0.4 kt
248	57° 16.5254' N 5° 45.3305' W	4.5 m 26/08/2016 11:36:13	0.0006 nm	0.2 kt
249	57° 16.5260' N 5° 45.3323' W	4.9 m 26/08/2016 11:36:29	0.0012 nm	0.3 kt
250	57° 16.5267' N 5° 45.3354' W	4.5 m 26/08/2016 11:36:43	0.0018 nm	0.5 kt
251	57° 16.5266' N 5° 45.3369' W	4.5 m 26/08/2016 11:36:58	0.0008 nm	0.2 kt
252	57° 16.5268' N 5° 45.3388' W	4.9 m 26/08/2016 11:37:11	0.0011 nm	0.3 kt
253	57° 16.5275' N 5° 45.3417' W	4.5 m 26/08/2016 11:37:29	0.0017 nm	0.3 kt
254	57° 16.5283' N 5° 45.3439' W	4.5 m 26/08/2016 11:37:44	0.0015 nm	0.3 kt
255	57° 16.5287' N 5° 45.3464' W	4.9 m 26/08/2016 11:38:00	0.0014 nm	0.3 kt
256	57° 16.5288' N 5° 45.3470' W	4.5 m 26/08/2016 11:38:13	0.0004 nm	0.1 kt
257	57° 16.5290' N 5° 45.3485' W	4.9 m 26/08/2016 11:38:26	0.0008 nm	0.2 kt
258	57° 16.5293' N 5° 45.3510' W	4.5 m 26/08/2016 11:38:42	0.0014 nm	0.3 kt
259	57° 16.5297' N 5° 45.3528' W	4.0 m 26/08/2016 11:38:55	0.0010 nm	0.3 kt
260	57° 16.5301' N 5° 45.3542' W	4.0 m 26/08/2016 11:39:07	0.0009 nm	0.3 kt
261	57° 16.5309' N 5° 45.3555' W	4.0 m 26/08/2016 11:39:19	0.0011 nm	0.3 kt
262	57° 16.5318' N 5° 45.3585' W	4.0 m 26/08/2016 11:39:34	0.0018 nm	0.4 kt
263	57° 16.5327' N 5° 45.3624' W	4.0 m 26/08/2016 11:39:50	0.0023 nm	0.5 kt
264	57° 16.5328' N 5° 45.3651' W	4.0 m 26/08/2016 11:40:05	0.0015 nm	0.4 kt
265	57° 16.5332' N 5° 45.3678' W	4.5 m 26/08/2016 11:40:18	0.0015 nm	0.4 kt
266	57° 16.5332' N 5° 45.3690' W	4.9 m 26/08/2016 11:40:28	0.0007 nm	0.2 kt
267	57° 16.5332' N 5° 45.3706' W	4.9 m 26/08/2016 11:40:43	0.0009 nm	0.2 kt
268	57° 16.5331' N 5° 45.3718' W	4.9 m 26/08/2016 11:40:58	0.0006 nm	0.2 kt
269	57° 16.5328' N 5° 45.3729' W	4.9 m 26/08/2016 11:41:11	0.0007 nm	0.2 kt
270	57° 16.5326' N 5° 45.3738' W	5.4 m 26/08/2016 11:41:25	0.0005 nm	0.1 kt
271	57° 16.5337' N 5° 45.3769' W	5.4 m 26/08/2016 11:41:39	0.0020 nm	0.5 kt
272	57° 16.5342' N 5° 45.3792' W	5.4 m 26/08/2016 11:41:52	0.0014 nm	0.4 kt
273	57° 16.5346' N 5° 45.3809' W	5.4 m 26/08/2016 11:42:06	0.0010 nm	0.2 kt
274	57° 16.5346' N 5° 45.3821' W	5.9 m 26/08/2016 11:42:21	0.0007 nm	0.2 kt
275	57° 16.5352' N 5° 45.3843' W	5.4 m 26/08/2016 11:42:36	0.0013 nm	0.3 kt
276	57° 16.5354' N 5° 45.3850' W	5.4 m 26/08/2016 11:42:50	0.0004 nm	0.1 kt
277	57° 16.5365' N 5° 45.3867' W	5.4 m 26/08/2016 11:43:03	0.0014 nm	0.4 kt
278	57° 16.5370' N 5° 45.3896' W	5.4 m 26/08/2016 11:43:16	0.0016 nm	0.5 kt
279	57° 16.5369' N 5° 45.3916' W	5.4 m 26/08/2016 11:43:29	0.0011 nm	0.3 kt
280	57° 16.5373' N 5° 45.3930' W	5.4 m 26/08/2016 11:43:41	0.0009 nm	0.3 kt

No.	Location	Date	Distance	Speed
281	57° 16.5385' N 5° 45.3966' W	26/08/2016 11:43:56	0.0023 nm	0.5 kt
282	57° 16.5393' N 5° 45.3992' W	26/08/2016 11:44:07	0.0016 nm	0.5 kt
283	57° 16.5393' N 5° 45.4026' W	26/08/2016 11:44:23	0.0019 nm	0.4 kt
284	57° 16.5391' N 5° 45.4046' W	26/08/2016 11:44:35	0.0011 nm	0.3 kt
285	57° 16.5403' N 5° 45.4084' W	26/08/2016 11:44:49	0.0023 nm	0.6 kt
286	57° 16.5413' N 5° 45.4118' W	26/08/2016 11:45:08	0.0021 nm	0.4 kt
287	57° 16.5418' N 5° 45.4140' W	26/08/2016 11:45:22	0.0013 nm	0.3 kt
288	57° 16.5425' N 5° 45.4165' W	26/08/2016 11:45:36	0.0015 nm	0.4 kt
289	57° 16.5437' N 5° 45.4180' W	26/08/2016 11:45:55	0.0015 nm	0.3 kt
290	57° 16.5449' N 5° 45.4194' W	26/08/2016 11:46:12	0.0014 nm	0.3 kt
291	57° 16.5454' N 5° 45.4217' W	26/08/2016 11:46:23	0.0013 nm	0.4 kt
292	57° 16.5460' N 5° 45.4242' W	26/08/2016 11:46:38	0.0015 nm	0.4 kt
293	57° 16.5464' N 5° 45.4244' W	26/08/2016 11:46:47	0.0005 nm	0.2 kt
294	57° 16.5468' N 5° 45.4253' W	26/08/2016 11:46:59	0.0006 nm	0.2 kt
295	57° 16.5475' N 5° 45.4282' W	26/08/2016 11:47:12	0.0017 nm	0.5 kt
296	57° 16.5475' N 5° 45.4295' W	26/08/2016 11:47:23	0.0007 nm	0.2 kt
297	57° 16.5478' N 5° 45.4309' W	26/08/2016 11:47:35	0.0008 nm	0.2 kt
298	57° 16.5483' N 5° 45.4326' W	26/08/2016 11:47:46	0.0011 nm	0.3 kt
299	57° 16.5491' N 5° 45.4332' W	26/08/2016 11:47:59	0.0008 nm	0.2 kt
300	57° 16.5497' N 5° 45.4347' W	26/08/2016 11:48:09	0.0011 nm	0.4 kt
301	57° 16.5498' N 5° 45.4363' W	26/08/2016 11:48:20	0.0009 nm	0.3 kt
302	57° 16.5496' N 5° 45.4370' W	26/08/2016 11:48:33	0.0004 nm	0.1 kt
303	57° 16.5497' N 5° 45.4376' W	26/08/2016 11:48:46	0.0003 nm	0.1 kt
304	57° 16.5504' N 5° 45.4391' W	26/08/2016 11:49:01	0.0011 nm	0.3 kt
305	57° 16.5505' N 5° 45.4413' W	26/08/2016 11:49:13	0.0012 nm	0.4 kt
306	57° 16.5504' N 5° 45.4418' W	26/08/2016 11:49:26	0.0003 nm	0.1 kt
307	57° 16.5516' N 5° 45.4437' W	26/08/2016 11:49:41	0.0016 nm	0.4 kt
308	57° 16.5520' N 5° 45.4465' W	26/08/2016 11:49:53	0.0016 nm	0.5 kt
309	57° 16.5519' N 5° 45.4496' W	26/08/2016 11:50:04	0.0017 nm	0.5 kt
310	57° 16.5514' N 5° 45.4535' W	26/08/2016 11:50:20	0.0022 nm	0.5 kt
311	57° 16.5525' N 5° 45.4553' W	26/08/2016 11:50:32	0.0015 nm	0.4 kt
312	57° 16.5529' N 5° 45.4572' W	26/08/2016 11:50:46	0.0011 nm	0.3 kt
313	57° 16.5528' N 5° 45.4591' W	26/08/2016 11:50:59	0.0010 nm	0.3 kt
314	57° 16.5535' N 5° 45.4612' W	26/08/2016 11:51:12	0.0013 nm	0.4 kt
315	57° 16.5539' N 5° 45.4640' W	26/08/2016 11:51:25	0.0015 nm	0.4 kt
316	57° 16.5536' N 5° 45.4665' W	26/08/2016 11:51:38	0.0014 nm	0.4 kt
317	57° 16.5534' N 5° 45.4697' W	26/08/2016 11:51:52	0.0017 nm	0.4 kt
318	57° 16.5536' N 5° 45.4739' W	26/08/2016 11:52:09	0.0023 nm	0.5 kt
319	57° 16.5541' N 5° 45.4761' W	26/08/2016 11:52:20	0.0013 nm	0.4 kt
320	57° 16.5541' N 5° 45.4782' W	26/08/2016 11:52:32	0.0011 nm	0.3 kt
321	57° 16.5536' N 5° 45.4809' W	26/08/2016 11:52:45	0.0016 nm	0.4 kt
322	57° 16.5535' N 5° 45.4850' W	26/08/2016 11:53:00	0.0022 nm	0.5 kt
323	57° 16.5538' N 5° 45.4880' W	26/08/2016 11:53:14	0.0017 nm	0.4 kt
324	57° 16.5542' N 5° 45.4899' W	26/08/2016 11:53:25	0.0011 nm	0.4 kt
325	57° 16.5546' N 5° 45.4914' W	26/08/2016 11:53:36	0.0009 nm	0.3 kt
326	57° 16.5547' N 5° 45.4928' W	26/08/2016 11:53:50	0.0008 nm	0.2 kt
327	57° 16.5550' N 5° 45.4936' W	26/08/2016 11:54:04	0.0005 nm	0.1 kt
328	57° 16.5564' N 5° 45.4965' W	26/08/2016 11:54:19	0.0021 nm	0.5 kt
329	57° 16.5562' N 5° 45.4986' W	26/08/2016 11:54:34	0.0011 nm	0.3 kt
330	57° 16.5558' N 5° 45.4998' W	26/08/2016 11:54:47	0.0007 nm	0.2 kt
331	57° 16.5554' N 5° 45.5000' W	26/08/2016 11:54:58	0.0004 nm	0.1 kt

No.	Location	Date	Distance	Speed
332	57° 16.5559' N 5° 45.5002' W	26/08/2016 11:55:08	4.9 m 0.0005 nm	0.2 kt
333	57° 16.5562' N 5° 45.5001' W	26/08/2016 11:55:17	6.9 m 0.0003 nm	0.1 kt
334	57° 16.5563' N 5° 45.5032' W	26/08/2016 11:55:30	6.4 m 0.0017 nm	0.5 kt
335	57° 16.5568' N 5° 45.5065' W	26/08/2016 11:55:43	6.4 m 0.0018 nm	0.5 kt
336	57° 16.5574' N 5° 45.5085' W	26/08/2016 11:55:55	5.9 m 0.0012 nm	0.4 kt
337	57° 16.5572' N 5° 45.5104' W	26/08/2016 11:56:06	5.4 m 0.0011 nm	0.4 kt
338	57° 16.5568' N 5° 45.5115' W	26/08/2016 11:56:16	5.4 m 0.0007 nm	0.3 kt
339	57° 16.5570' N 5° 45.5119' W	26/08/2016 11:56:27	5.4 m 0.0003 nm	0.1 kt
340	57° 16.5580' N 5° 45.5135' W	26/08/2016 11:56:39	5.4 m 0.0013 nm	0.4 kt
341	57° 16.5585' N 5° 45.5177' W	26/08/2016 11:56:52	5.4 m 0.0023 nm	0.6 kt
342	57° 16.5592' N 5° 45.5224' W	26/08/2016 11:57:05	4.5 m 0.0027 nm	0.7 kt
343	57° 16.5598' N 5° 45.5276' W	26/08/2016 11:57:20	4.5 m 0.0029 nm	0.7 kt
344	57° 16.5605' N 5° 45.5312' W	26/08/2016 11:57:33	4.5 m 0.0021 nm	0.6 kt
345	57° 16.5613' N 5° 45.5333' W	26/08/2016 11:57:46	4.9 m 0.0015 nm	0.4 kt
346	57° 16.5620' N 5° 45.5348' W	26/08/2016 11:58:01	4.5 m 0.0010 nm	0.2 kt
347	57° 16.5624' N 5° 45.5375' W	26/08/2016 11:58:13	4.9 m 0.0016 nm	0.5 kt
348	57° 16.5626' N 5° 45.5402' W	26/08/2016 11:58:27	3.5 m 0.0014 nm	0.4 kt
349	57° 16.5628' N 5° 45.5428' W	26/08/2016 11:58:39	4.0 m 0.0014 nm	0.4 kt
350	57° 16.5636' N 5° 45.5473' W	26/08/2016 11:58:51	4.0 m 0.0026 nm	0.8 kt
351	57° 16.5644' N 5° 45.5502' W	26/08/2016 11:59:04	4.0 m 0.0017 nm	0.5 kt
352	57° 16.5653' N 5° 45.5528' W	26/08/2016 11:59:14	3.5 m 0.0017 nm	0.6 kt
353	57° 16.5677' N 5° 45.5583' W	26/08/2016 11:59:31	3.5 m 0.0039 nm	0.8 kt
354	57° 16.5682' N 5° 45.5614' W	26/08/2016 11:59:45	3.5 m 0.0017 nm	0.4 kt
355	57° 16.5689' N 5° 45.5629' W	26/08/2016 11:59:54	3.0 m 0.0011 nm	0.4 kt
356	57° 16.5706' N 5° 45.5657' W	26/08/2016 12:00:10	3.5 m 0.0022 nm	0.5 kt
357	57° 16.5722' N 5° 45.5682' W	26/08/2016 12:00:22	3.5 m 0.0021 nm	0.6 kt
358	57° 16.5733' N 5° 45.5709' W	26/08/2016 12:00:34	3.0 m 0.0018 nm	0.5 kt
359	57° 16.5755' N 5° 45.5743' W	26/08/2016 12:00:50	3.5 m 0.0029 nm	0.7 kt
360	57° 16.5766' N 5° 45.5764' W	26/08/2016 12:01:02	3.5 m 0.0016 nm	0.5 kt
361	57° 16.5780' N 5° 45.5780' W	26/08/2016 12:01:14	4.0 m 0.0016 nm	0.5 kt
362	57° 16.5806' N 5° 45.5799' W	26/08/2016 12:01:26	4.5 m 0.0028 nm	0.8 kt
363	57° 16.5817' N 5° 45.5832' W	26/08/2016 12:01:38	4.5 m 0.0021 nm	0.6 kt
364	57° 16.5838' N 5° 45.5851' W	26/08/2016 12:01:50	4.0 m 0.0024 nm	0.7 kt
365	57° 16.5861' N 5° 45.5869' W	26/08/2016 12:02:05	3.5 m 0.0025 nm	0.6 kt
366	57° 16.5871' N 5° 45.5881' W	26/08/2016 12:02:18	4.5 m 0.0012 nm	0.3 kt
367	57° 16.5879' N 5° 45.5908' W	26/08/2016 12:02:28	4.5 m 0.0016 nm	0.6 kt
368	57° 16.5893' N 5° 45.5912' W	26/08/2016 12:02:40	4.0 m 0.0014 nm	0.4 kt
369	57° 16.5904' N 5° 45.5919' W	26/08/2016 12:02:52	4.0 m 0.0012 nm	0.4 kt
370	57° 16.5907' N 5° 45.5933' W	26/08/2016 12:03:03	4.5 m 0.0008 nm	0.3 kt
371	57° 16.5913' N 5° 45.5951' W	26/08/2016 12:03:14	4.5 m 0.0011 nm	0.4 kt
372	57° 16.5913' N 5° 45.5952' W	26/08/2016 12:03:25	4.0 m 0.0001 nm	0.0 kt
373	57° 16.5912' N 5° 45.5956' W	26/08/2016 12:03:37	4.5 m 0.0002 nm	0.1 kt
374	57° 16.5913' N 5° 45.5965' W	26/08/2016 12:03:50	4.9 m 0.0005 nm	0.1 kt
375	57° 16.5915' N 5° 45.5979' W	26/08/2016 12:04:04	4.9 m 0.0008 nm	0.2 kt
376	57° 16.5922' N 5° 45.6007' W	26/08/2016 12:04:20	5.4 m 0.0017 nm	0.4 kt
377	57° 16.5920' N 5° 45.6033' W	26/08/2016 12:04:34	5.9 m 0.0014 nm	0.4 kt
378	57° 16.5908' N 5° 45.6088' W	26/08/2016 12:04:47	6.4 m 0.0032 nm	0.9 kt
379	57° 16.5931' N 5° 45.6111' W	26/08/2016 12:05:01	6.4 m 0.0026 nm	0.7 kt
380	57° 16.5946' N 5° 45.6134' W	26/08/2016 12:05:14	6.4 m 0.0020 nm	0.6 kt
381	57° 16.5962' N 5° 45.6165' W	26/08/2016 12:05:24	5.9 m 0.0023 nm	0.8 kt
382	57° 16.5974' N 5° 45.6218' W	26/08/2016 12:05:40	6.4 m 0.0031 nm	0.7 kt

<b>No.</b>	<b>Location</b>	<b>Date</b>	<b>Distance</b>	<b>Speed</b>
383	57° 16.5972' N 5° 45.6263' W	6.4 m 26/08/2016 12:05:55	0.0025 nm	0.6 kt
384	57° 16.5976' N 5° 45.6304' W	5.9 m 26/08/2016 12:06:07	0.0023 nm	0.7 kt
385	57° 16.5982' N 5° 45.6356' W	5.4 m 26/08/2016 12:06:22	0.0029 nm	0.7 kt
386	57° 16.5979' N 5° 45.6417' W	5.9 m 26/08/2016 12:06:42	0.0033 nm	0.6 kt
387	57° 16.5982' N 5° 45.6459' W	5.9 m 26/08/2016 12:06:53	0.0023 nm	0.7 kt
388	57° 16.5976' N 5° 45.6513' W	5.4 m 26/08/2016 12:07:06	0.0030 nm	0.8 kt
389	57° 16.5979' N 5° 45.6584' W	4.9 m 26/08/2016 12:07:20	0.0039 nm	1.0 kt
390	57° 16.5974' N 5° 45.6638' W	4.5 m 26/08/2016 12:07:30	0.0030 nm	1.1 kt

## Appendix 2 – GPS data

### Transect 3

No.	Location	Date	Distance	Speed
1	57° 16.5009' N 5° 45.1672' W	6.4 m 25/08/2016 13:15:36		
2	57° 16.5010' N 5° 45.1682' W	5.9 m 25/08/2016 13:16:17	0.0005 nm	0.0 kt
3	57° 16.5021' N 5° 45.1688' W	6.4 m 25/08/2016 13:16:44	0.0011 nm	0.2 kt
4	57° 16.5025' N 5° 45.1700' W	5.9 m 25/08/2016 13:17:33	0.0008 nm	0.1 kt
5	57° 16.5039' N 5° 45.1693' W	6.4 m 25/08/2016 13:18:02	0.0015 nm	0.2 kt
6	57° 16.5081' N 5° 45.1677' W	6.4 m 25/08/2016 13:18:30	0.0042 nm	0.5 kt
7	57° 16.5109' N 5° 45.1670' W	6.4 m 25/08/2016 13:18:53	0.0028 nm	0.4 kt
8	57° 16.5109' N 5° 45.1667' W	6.4 m 25/08/2016 13:19:24	0.0002 nm	0.0 kt
9	57° 16.5114' N 5° 45.1660' W	5.9 m 25/08/2016 13:20:03	0.0007 nm	0.1 kt
10	57° 16.5120' N 5° 45.1661' W	6.4 m 25/08/2016 13:20:57	0.0006 nm	0.0 kt
11	57° 16.5133' N 5° 45.1675' W	6.4 m 25/08/2016 13:21:34	0.0015 nm	0.1 kt
12	57° 16.5148' N 5° 45.1675' W	5.4 m 25/08/2016 13:22:04	0.0015 nm	0.2 kt
13	57° 16.5169' N 5° 45.1676' W	5.9 m 25/08/2016 13:22:28	0.0021 nm	0.3 kt
14	57° 16.5214' N 5° 45.1665' W	6.4 m 25/08/2016 13:22:51	0.0045 nm	0.7 kt
15	57° 16.5250' N 5° 45.1660' W	6.4 m 25/08/2016 13:23:16	0.0036 nm	0.5 kt
16	57° 16.5273' N 5° 45.1653' W	4.0 m 25/08/2016 13:23:39	0.0024 nm	0.4 kt
17	57° 16.5277' N 5° 45.1646' W	4.9 m 25/08/2016 13:24:04	0.0005 nm	0.1 kt
18	57° 16.5287' N 5° 45.1643' W	4.9 m 25/08/2016 13:24:24	0.0010 nm	0.2 kt
19	57° 16.5304' N 5° 45.1646' W	5.4 m 25/08/2016 13:25:07	0.0017 nm	0.1 kt
20	57° 16.5334' N 5° 45.1626' W	4.5 m 25/08/2016 13:25:34	0.0032 nm	0.4 kt
21	57° 16.5389' N 5° 45.1617' W	5.4 m 25/08/2016 13:26:04	0.0056 nm	0.7 kt
22	57° 16.5405' N 5° 45.1625' W	4.9 m 25/08/2016 13:26:38	0.0017 nm	0.2 kt
23	57° 16.5412' N 5° 45.1614' W	4.9 m 25/08/2016 13:27:06	0.0009 nm	0.1 kt
24	57° 16.5438' N 5° 45.1583' W	4.5 m 25/08/2016 13:27:29	0.0031 nm	0.5 kt
25	57° 16.5445' N 5° 45.1574' W	5.4 m 25/08/2016 13:27:52	0.0009 nm	0.1 kt
26	57° 16.5445' N 5° 45.1580' W	5.4 m 25/08/2016 13:28:26	0.0003 nm	0.0 kt
27	57° 16.5436' N 5° 45.1576' W	5.4 m 25/08/2016 13:28:48	0.0009 nm	0.1 kt
28	57° 16.5434' N 5° 45.1543' W	4.9 m 25/08/2016 13:29:16	0.0018 nm	0.2 kt
29	57° 16.5462' N 5° 45.1491' W	4.9 m 25/08/2016 13:29:39	0.0040 nm	0.6 kt
30	57° 16.5506' N 5° 45.1441' W	5.4 m 25/08/2016 13:30:06	0.0052 nm	0.7 kt
31	57° 16.5521' N 5° 45.1426' W	5.9 m 25/08/2016 13:30:26	0.0017 nm	0.3 kt
32	57° 16.5520' N 5° 45.1420' W	5.4 m 25/08/2016 13:30:58	0.0003 nm	0.0 kt
33	57° 16.5535' N 5° 45.1394' W	5.4 m 25/08/2016 13:31:58	0.0020 nm	0.1 kt
34	57° 16.5537' N 5° 45.1388' W	6.4 m 25/08/2016 13:32:40	0.0004 nm	0.0 kt
35	57° 16.5543' N 5° 45.1370' W	6.4 m 25/08/2016 13:33:07	0.0012 nm	0.2 kt
36	57° 16.5574' N 5° 45.1352' W	5.9 m 25/08/2016 13:33:28	0.0033 nm	0.6 kt
37	57° 16.5615' N 5° 45.1339' W	5.4 m 25/08/2016 13:33:58	0.0042 nm	0.5 kt
38	57° 16.5635' N 5° 45.1330' W	4.9 m 25/08/2016 13:34:31	0.0020 nm	0.2 kt
39	57° 16.5640' N 5° 45.1317' W	5.9 m 25/08/2016 13:34:58	0.0009 nm	0.1 kt
40	57° 16.5655' N 5° 45.1309' W	6.4 m 25/08/2016 13:35:32	0.0016 nm	0.2 kt
41	57° 16.5662' N 5° 45.1313' W	5.4 m 25/08/2016 13:35:59	0.0007 nm	0.1 kt
42	57° 16.5675' N 5° 45.1315' W	4.9 m 25/08/2016 13:37:09	0.0013 nm	0.1 kt
43	57° 16.5698' N 5° 45.1323' W	5.4 m 25/08/2016 13:38:00	0.0023 nm	0.2 kt
44	57° 16.5701' N 5° 45.1325' W	5.4 m 25/08/2016 13:38:29	0.0004 nm	0.0 kt
45	57° 16.5700' N 5° 45.1323' W	4.9 m 25/08/2016 13:40:09	0.0002 nm	0.0 kt
46	57° 16.5707' N 5° 45.1330' W	5.4 m 25/08/2016 13:41:29	0.0007 nm	0.0 kt
47	57° 16.5749' N 5° 45.1334' W	4.9 m 25/08/2016 13:42:57	0.0042 nm	0.2 kt
48	57° 16.5793' N 5° 45.1329' W	4.9 m 25/08/2016 13:43:30	0.0044 nm	0.5 kt
49	57° 16.5803' N 5° 45.1320' W	5.4 m 25/08/2016 13:44:14	0.0012 nm	0.1 kt
50	57° 16.5808' N 5° 45.1306' W	5.4 m 25/08/2016 13:44:51	0.0009 nm	0.1 kt

No.	Location	Date	Distance	Speed
51	57° 16.5848' N 5° 45.1296' W	25/08/2016 13:45:23	5.9 m 0.0041 nm	0.5 kt
52	57° 16.5871' N 5° 45.1287' W	25/08/2016 13:45:55	4.9 m 0.0024 nm	0.3 kt
53	57° 16.5877' N 5° 45.1293' W	25/08/2016 13:46:32	5.4 m 0.0007 nm	0.1 kt
54	57° 16.5897' N 5° 45.1274' W	25/08/2016 13:50:10	6.4 m 0.0022 nm	0.0 kt
55	57° 16.5938' N 5° 45.1284' W	25/08/2016 13:50:40	5.4 m 0.0042 nm	0.5 kt
56	57° 16.5940' N 5° 45.1266' W	25/08/2016 13:51:12	5.9 m 0.0010 nm	0.1 kt
57	57° 16.5981' N 5° 45.1258' W	25/08/2016 13:51:42	5.9 m 0.0042 nm	0.5 kt
58	57° 16.6011' N 5° 45.1243' W	25/08/2016 13:52:13	5.9 m 0.0031 nm	0.4 kt
59	57° 16.6034' N 5° 45.1233' W	25/08/2016 13:52:40	6.4 m 0.0024 nm	0.3 kt
60	57° 16.6054' N 5° 45.1221' W	25/08/2016 13:53:10	5.9 m 0.0021 nm	0.3 kt
61	57° 16.6067' N 5° 45.1210' W	25/08/2016 13:53:33	6.4 m 0.0015 nm	0.2 kt
62	57° 16.6083' N 5° 45.1211' W	25/08/2016 13:54:03	6.4 m 0.0016 nm	0.2 kt
63	57° 16.6099' N 5° 45.1160' W	25/08/2016 13:54:39	5.4 m 0.0032 nm	0.3 kt
64	57° 16.6104' N 5° 45.1137' W	25/08/2016 13:55:15	4.9 m 0.0014 nm	0.1 kt

## Appendix 2 – GPS data

### Transect 4

No.	Location	Date	Distance	Speed
65	57° 16.4929' N 5° 45.2018' W	8.3 m 25/08/2016 14:17:32	0.1271 nm	0.3 kt
66	57° 16.4963' N 5° 45.1979' W	8.3 m 25/08/2016 14:17:50	0.0040 nm	0.8 kt
67	57° 16.4983' N 5° 45.1951' W	7.8 m 25/08/2016 14:18:03	0.0025 nm	0.7 kt
68	57° 16.5002' N 5° 45.1912' W	7.3 m 25/08/2016 14:18:19	0.0029 nm	0.6 kt
69	57° 16.5013' N 5° 45.1848' W	6.9 m 25/08/2016 14:18:36	0.0036 nm	0.8 kt
70	57° 16.5039' N 5° 45.1755' W	5.9 m 25/08/2016 14:19:03	0.0057 nm	0.8 kt
71	57° 16.5063' N 5° 45.1708' W	5.9 m 25/08/2016 14:19:23	0.0036 nm	0.6 kt
72	57° 16.5073' N 5° 45.1673' W	6.9 m 25/08/2016 14:19:39	0.0021 nm	0.5 kt
73	57° 16.5064' N 5° 45.1634' W	6.9 m 25/08/2016 14:19:58	0.0024 nm	0.4 kt
74	57° 16.5061' N 5° 45.1630' W	6.4 m 25/08/2016 14:20:19	0.0004 nm	0.1 kt
75	57° 16.5064' N 5° 45.1631' W	6.4 m 25/08/2016 14:21:35	0.0003 nm	0.0 kt
76	57° 16.5064' N 5° 45.1634' W	6.4 m 25/08/2016 14:22:03	0.0002 nm	0.0 kt
77	57° 16.5069' N 5° 45.1620' W	6.4 m 25/08/2016 14:22:24	0.0009 nm	0.2 kt
78	57° 16.5072' N 5° 45.1569' W	6.4 m 25/08/2016 14:22:47	0.0028 nm	0.4 kt
79	57° 16.5071' N 5° 45.1526' W	6.4 m 25/08/2016 14:23:10	0.0023 nm	0.4 kt
80	57° 16.5065' N 5° 45.1495' W	6.4 m 25/08/2016 14:23:32	0.0018 nm	0.3 kt
81	57° 16.5069' N 5° 45.1464' W	6.9 m 25/08/2016 14:23:58	0.0017 nm	0.2 kt
82	57° 16.5071' N 5° 45.1411' W	6.4 m 25/08/2016 14:24:29	0.0029 nm	0.3 kt
83	57° 16.5067' N 5° 45.1361' W	6.4 m 25/08/2016 14:24:58	0.0027 nm	0.3 kt
84	57° 16.5063' N 5° 45.1310' W	5.9 m 25/08/2016 14:25:27	0.0028 nm	0.4 kt
85	57° 16.5060' N 5° 45.1271' W	5.9 m 25/08/2016 14:25:50	0.0021 nm	0.3 kt
86	57° 16.5053' N 5° 45.1254' W	5.9 m 25/08/2016 14:26:07	0.0011 nm	0.2 kt
87	57° 16.5049' N 5° 45.1243' W	5.9 m 25/08/2016 14:26:28	0.0007 nm	0.1 kt
88	57° 16.5048' N 5° 45.1247' W	6.4 m 25/08/2016 14:26:57	0.0003 nm	0.0 kt
89	57° 16.5051' N 5° 45.1205' W	5.4 m 25/08/2016 14:27:28	0.0023 nm	0.3 kt
90	57° 16.5053' N 5° 45.1196' W	5.9 m 25/08/2016 14:27:53	0.0005 nm	0.1 kt
91	57° 16.5052' N 5° 45.1137' W	5.4 m 25/08/2016 14:28:26	0.0032 nm	0.4 kt
92	57° 16.5031' N 5° 45.1098' W	5.9 m 25/08/2016 14:28:51	0.0030 nm	0.4 kt
93	57° 16.5012' N 5° 45.1073' W	5.9 m 25/08/2016 14:29:20	0.0023 nm	0.3 kt
94	57° 16.4994' N 5° 45.1044' W	5.9 m 25/08/2016 14:29:50	0.0023 nm	0.3 kt
95	57° 16.4984' N 5° 45.1002' W	5.9 m 25/08/2016 14:30:19	0.0025 nm	0.3 kt
96	57° 16.4956' N 5° 45.0954' W	5.4 m 25/08/2016 14:30:49	0.0038 nm	0.5 kt
97	57° 16.4940' N 5° 45.0959' W	5.4 m 25/08/2016 14:31:19	0.0017 nm	0.2 kt
98	57° 16.4935' N 5° 45.0951' W	5.9 m 25/08/2016 14:31:49	0.0006 nm	0.1 kt
99	57° 16.4928' N 5° 45.0926' W	6.4 m 25/08/2016 14:32:18	0.0015 nm	0.2 kt
100	57° 16.4916' N 5° 45.0886' W	6.4 m 25/08/2016 14:32:48	0.0025 nm	0.3 kt
101	57° 16.4895' N 5° 45.0859' W	6.4 m 25/08/2016 14:33:20	0.0026 nm	0.3 kt
102	57° 16.4887' N 5° 45.0854' W	5.9 m 25/08/2016 14:33:56	0.0009 nm	0.1 kt
103	57° 16.4869' N 5° 45.0832' W	5.9 m 25/08/2016 14:34:27	0.0021 nm	0.2 kt
104	57° 16.4859' N 5° 45.0778' W	5.9 m 25/08/2016 14:34:56	0.0031 nm	0.4 kt
105	57° 16.4853' N 5° 45.0785' W	5.4 m 25/08/2016 14:35:22	0.0007 nm	0.1 kt
106	57° 16.4844' N 5° 45.0737' W	5.4 m 25/08/2016 14:35:53	0.0028 nm	0.3 kt
107	57° 16.4857' N 5° 45.0712' W	5.9 m 25/08/2016 14:36:17	0.0019 nm	0.3 kt
108	57° 16.4864' N 5° 45.0687' W	5.4 m 25/08/2016 14:36:53	0.0015 nm	0.1 kt
109	57° 16.4884' N 5° 45.0674' W	5.9 m 25/08/2016 14:37:21	0.0021 nm	0.3 kt
110	57° 16.4896' N 5° 45.0665' W	5.4 m 25/08/2016 14:37:44	0.0013 nm	0.2 kt
111	57° 16.4902' N 5° 45.0580' W	5.9 m 25/08/2016 14:38:13	0.0046 nm	0.6 kt
112	57° 16.4902' N 5° 45.0530' W	5.4 m 25/08/2016 14:38:32	0.0028 nm	0.5 kt
113	57° 16.4903' N 5° 45.0462' W	4.9 m 25/08/2016 14:38:55	0.0036 nm	0.6 kt
114	57° 16.4891' N 5° 45.0414' W	5.4 m 25/08/2016 14:39:15	0.0029 nm	0.5 kt
115	57° 16.4881' N 5° 45.0388' W	5.4 m 25/08/2016 14:39:34	0.0017 nm	0.3 kt

No.	Location	Date	Distance	Speed
116	57° 16.4880' N 5° 45.0379' W	6.9 m 25/08/2016 14:39:53	0.0005 nm	0.1 kt
117	57° 16.4878' N 5° 45.0367' W	6.4 m 25/08/2016 14:40:18	0.0007 nm	0.1 kt
118	57° 16.4874' N 5° 45.0361' W	5.9 m 25/08/2016 14:40:32	0.0006 nm	0.1 kt
119	57° 16.4867' N 5° 45.0346' W	5.9 m 25/08/2016 14:40:47	0.0011 nm	0.3 kt
120	57° 16.4859' N 5° 45.0327' W	6.4 m 25/08/2016 14:41:05	0.0013 nm	0.3 kt
121	57° 16.4830' N 5° 45.0285' W	5.4 m 25/08/2016 14:41:25	0.0037 nm	0.7 kt
122	57° 16.4828' N 5° 45.0249' W	5.4 m 25/08/2016 14:41:44	0.0020 nm	0.4 kt
123	57° 16.4840' N 5° 45.0226' W	5.4 m 25/08/2016 14:42:00	0.0017 nm	0.4 kt
124	57° 16.4826' N 5° 45.0190' W	4.9 m 25/08/2016 14:42:24	0.0024 nm	0.4 kt
125	57° 16.4829' N 5° 45.0194' W	5.4 m 25/08/2016 14:42:41	0.0003 nm	0.1 kt
126	57° 16.4851' N 5° 45.0188' W	5.9 m 25/08/2016 14:43:06	0.0022 nm	0.3 kt
127	57° 16.4862' N 5° 45.0157' W	5.9 m 25/08/2016 14:43:30	0.0020 nm	0.3 kt
128	57° 16.4859' N 5° 45.0074' W	5.4 m 25/08/2016 14:44:03	0.0045 nm	0.5 kt
129	57° 16.4857' N 5° 45.0023' W	4.9 m 25/08/2016 14:44:32	0.0028 nm	0.3 kt
130	57° 16.4862' N 5° 44.9987' W	5.4 m 25/08/2016 14:45:01	0.0020 nm	0.3 kt
131	57° 16.4862' N 5° 44.9922' W	4.9 m 25/08/2016 14:45:37	0.0035 nm	0.4 kt
132	57° 16.4864' N 5° 44.9861' W	5.4 m 25/08/2016 14:46:06	0.0033 nm	0.4 kt
133	57° 16.4863' N 5° 44.9820' W	4.9 m 25/08/2016 14:46:33	0.0022 nm	0.3 kt
134	57° 16.4859' N 5° 44.9800' W	4.5 m 25/08/2016 14:46:56	0.0011 nm	0.2 kt
135	57° 16.4852' N 5° 44.9785' W	4.9 m 25/08/2016 14:47:21	0.0011 nm	0.2 kt
136	57° 16.4853' N 5° 44.9751' W	5.4 m 25/08/2016 14:47:54	0.0019 nm	0.2 kt
137	57° 16.4851' N 5° 44.9705' W	5.4 m 25/08/2016 14:48:21	0.0025 nm	0.3 kt
138	57° 16.4846' N 5° 44.9695' W	5.4 m 25/08/2016 14:48:47	0.0007 nm	0.1 kt
139	57° 16.4846' N 5° 44.9659' W	4.9 m 25/08/2016 14:49:11	0.0020 nm	0.3 kt
140	57° 16.4854' N 5° 44.9626' W	4.9 m 25/08/2016 14:49:32	0.0020 nm	0.3 kt
141	57° 16.4866' N 5° 44.9600' W	4.5 m 25/08/2016 14:49:53	0.0019 nm	0.3 kt
142	57° 16.4880' N 5° 44.9551' W	4.9 m 25/08/2016 14:50:22	0.0030 nm	0.4 kt
143	57° 16.4883' N 5° 44.9524' W	4.5 m 25/08/2016 14:50:52	0.0015 nm	0.2 kt
144	57° 16.4884' N 5° 44.9504' W	4.5 m 25/08/2016 14:51:20	0.0011 nm	0.1 kt
145	57° 16.4883' N 5° 44.9492' W	4.5 m 25/08/2016 14:51:53	0.0007 nm	0.1 kt
146	57° 16.4891' N 5° 44.9467' W	4.9 m 25/08/2016 14:52:23	0.0016 nm	0.2 kt
147	57° 16.4893' N 5° 44.9458' W	4.9 m 25/08/2016 14:52:49	0.0006 nm	0.1 kt
148	57° 16.4891' N 5° 44.9448' W	4.9 m 25/08/2016 14:53:19	0.0006 nm	0.1 kt
149	57° 16.4893' N 5° 44.9450' W	4.5 m 25/08/2016 14:54:01	0.0002 nm	0.0 kt
150	57° 16.4891' N 5° 44.9440' W	4.0 m 25/08/2016 14:54:44	0.0006 nm	0.0 kt
151	57° 16.4894' N 5° 44.9432' W	4.9 m 25/08/2016 14:55:19	0.0005 nm	0.1 kt
152	57° 16.4902' N 5° 44.9369' W	4.9 m 25/08/2016 14:55:50	0.0035 nm	0.4 kt
153	57° 16.4901' N 5° 44.9346' W	4.5 m 25/08/2016 14:56:11	0.0013 nm	0.2 kt
154	57° 16.4905' N 5° 44.9330' W	4.9 m 25/08/2016 14:56:35	0.0009 nm	0.1 kt
155	57° 16.4894' N 5° 44.9305' W	4.5 m 25/08/2016 14:57:49	0.0018 nm	0.1 kt
156	57° 16.4892' N 5° 44.9242' W	4.0 m 25/08/2016 14:58:15	0.0034 nm	0.5 kt
157	57° 16.4893' N 5° 44.9231' W	4.5 m 25/08/2016 14:58:42	0.0006 nm	0.1 kt
158	57° 16.4888' N 5° 44.9202' W	4.9 m 25/08/2016 14:59:14	0.0016 nm	0.2 kt
159	57° 16.4911' N 5° 44.9133' W	4.9 m 25/08/2016 14:59:42	0.0044 nm	0.6 kt
160	57° 16.4932' N 5° 44.9073' W	4.5 m 25/08/2016 15:00:03	0.0039 nm	0.7 kt
161	57° 16.4944' N 5° 44.9035' W	4.5 m 25/08/2016 15:00:28	0.0024 nm	0.3 kt
162	57° 16.4955' N 5° 44.9002' W	4.5 m 25/08/2016 15:00:53	0.0022 nm	0.3 kt
163	57° 16.4979' N 5° 44.8952' W	4.0 m 25/08/2016 15:01:18	0.0036 nm	0.5 kt
164	57° 16.4987' N 5° 44.8921' W	4.5 m 25/08/2016 15:01:36	0.0019 nm	0.4 kt
165	57° 16.5004' N 5° 44.8906' W	4.5 m 25/08/2016 15:01:55	0.0019 nm	0.4 kt
166	57° 16.5016' N 5° 44.8851' W	4.5 m 25/08/2016 15:02:22	0.0032 nm	0.4 kt

<b>No.</b>	<b>Location</b>	<b>Date</b>	<b>Distance</b>	<b>Speed</b>
167	57° 16.5021' N 5° 44.8840' W	4.9 m 25/08/2016 15:02:53	0.0008 nm	0.1 kt
168	57° 16.5033' N 5° 44.8786' W	5.4 m 25/08/2016 15:03:25	0.0032 nm	0.4 kt
169	57° 16.5045' N 5° 44.8721' W	5.4 m 25/08/2016 15:03:51	0.0037 nm	0.5 kt
170	57° 16.5045' N 5° 44.8706' W	5.4 m 25/08/2016 15:04:09	0.0008 nm	0.2 kt
171	57° 16.5046' N 5° 44.8682' W	5.9 m 25/08/2016 15:04:29	0.0013 nm	0.2 kt
172	57° 16.5048' N 5° 44.8655' W	5.9 m 25/08/2016 15:04:57	0.0015 nm	0.2 kt
173	57° 16.5054' N 5° 44.8637' W	6.4 m 25/08/2016 15:05:17	0.0012 nm	0.2 kt
174	57° 16.5059' N 5° 44.8637' W	6.4 m 25/08/2016 15:05:36	0.0005 nm	0.1 kt
175	57° 16.5062' N 5° 44.8591' W	6.4 m 25/08/2016 15:06:04	0.0025 nm	0.3 kt
176	57° 16.5071' N 5° 44.8552' W	5.9 m 25/08/2016 15:06:24	0.0023 nm	0.4 kt
177	57° 16.5083' N 5° 44.8479' W	5.4 m 25/08/2016 15:06:45	0.0041 nm	0.7 kt
178	57° 16.5086' N 5° 44.8384' W	5.4 m 25/08/2016 15:07:02	0.0052 nm	1.1 kt

## Appendix 2 – GPS data

### Transect 5

No.	Location	Date	Distance	Speed
1	57° 16.5986' N 5° 45.1811' W	4.0 m 17/01/2016 09:06:58		
2	57° 16.5982' N 5° 45.1815' W	3.5 m 17/01/2016 09:07:12	0.0005 nm	0.1 kt
3	57° 16.5970' N 5° 45.1823' W	4.0 m 17/01/2016 09:07:25	0.0012 nm	0.3 kt
4	57° 16.5964' N 5° 45.1831' W	4.0 m 17/01/2016 09:07:38	0.0008 nm	0.2 kt
5	57° 16.5960' N 5° 45.1826' W	4.5 m 17/01/2016 09:07:51	0.0004 nm	0.1 kt
6	57° 16.5962' N 5° 45.1830' W	4.5 m 17/01/2016 09:08:08	0.0003 nm	0.1 kt
7	57° 16.5966' N 5° 45.1829' W	4.5 m 17/01/2016 09:08:27	0.0004 nm	0.1 kt
8	57° 16.5962' N 5° 45.1825' W	4.0 m 17/01/2016 09:08:52	0.0004 nm	0.1 kt
9	57° 16.5963' N 5° 45.1833' W	4.0 m 17/01/2016 09:09:10	0.0004 nm	0.1 kt
10	57° 16.5964' N 5° 45.1833' W	4.0 m 17/01/2016 09:09:28	0.0001 nm	0.0 kt
11	57° 16.5961' N 5° 45.1823' W	4.0 m 17/01/2016 09:09:46	0.0006 nm	0.1 kt
12	57° 16.5959' N 5° 45.1821' W	4.0 m 17/01/2016 09:10:03	0.0002 nm	0.0 kt
13	57° 16.5960' N 5° 45.1833' W	4.0 m 17/01/2016 09:10:26	0.0007 nm	0.1 kt
14	57° 16.5948' N 5° 45.1828' W	4.0 m 17/01/2016 09:10:42	0.0013 nm	0.3 kt
15	57° 16.5942' N 5° 45.1845' W	4.0 m 17/01/2016 09:10:59	0.0010 nm	0.2 kt
16	57° 16.5929' N 5° 45.1849' W	4.0 m 17/01/2016 09:11:13	0.0013 nm	0.3 kt
17	57° 16.5925' N 5° 45.1846' W	3.5 m 17/01/2016 09:11:29	0.0005 nm	0.1 kt
18	57° 16.5927' N 5° 45.1843' W	3.5 m 17/01/2016 09:11:47	0.0003 nm	0.1 kt
19	57° 16.5928' N 5° 45.1850' W	3.5 m 17/01/2016 09:12:11	0.0004 nm	0.1 kt
20	57° 16.5921' N 5° 45.1850' W	3.5 m 17/01/2016 09:12:29	0.0007 nm	0.1 kt
21	57° 16.5917' N 5° 45.1847' W	4.0 m 17/01/2016 09:12:49	0.0004 nm	0.1 kt
22	57° 16.5914' N 5° 45.1847' W	4.0 m 17/01/2016 09:13:11	0.0002 nm	0.0 kt
23	57° 16.5908' N 5° 45.1853' W	3.5 m 17/01/2016 09:13:26	0.0007 nm	0.2 kt
24	57° 16.5897' N 5° 45.1850' W	3.5 m 17/01/2016 09:13:44	0.0012 nm	0.2 kt
25	57° 16.5893' N 5° 45.1844' W	3.5 m 17/01/2016 09:13:56	0.0005 nm	0.2 kt
26	57° 16.5888' N 5° 45.1843' W	3.5 m 17/01/2016 09:14:12	0.0005 nm	0.1 kt
27	57° 16.5879' N 5° 45.1836' W	4.0 m 17/01/2016 09:14:28	0.0010 nm	0.2 kt
28	57° 16.5876' N 5° 45.1831' W	4.0 m 17/01/2016 09:14:47	0.0004 nm	0.1 kt
29	57° 16.5874' N 5° 45.1829' W	3.5 m 17/01/2016 09:15:01	0.0002 nm	0.1 kt
30	57° 16.5875' N 5° 45.1828' W	3.5 m 17/01/2016 09:15:16	0.0001 nm	0.0 kt
31	57° 16.5874' N 5° 45.1827' W	3.5 m 17/01/2016 09:15:32	0.0001 nm	0.0 kt
32	57° 16.5874' N 5° 45.1828' W	3.5 m 17/01/2016 09:15:49	0.0001 nm	0.0 kt
33	57° 16.5861' N 5° 45.1839' W	4.0 m 17/01/2016 09:16:05	0.0013 nm	0.3 kt
34	57° 16.5846' N 5° 45.1853' W	4.0 m 17/01/2016 09:16:19	0.0018 nm	0.5 kt
35	57° 16.5829' N 5° 45.1873' W	3.5 m 17/01/2016 09:16:35	0.0020 nm	0.4 kt
36	57° 16.5817' N 5° 45.1891' W	4.0 m 17/01/2016 09:16:54	0.0015 nm	0.3 kt
37	57° 16.5812' N 5° 45.1896' W	4.0 m 17/01/2016 09:17:10	0.0006 nm	0.1 kt
38	57° 16.5811' N 5° 45.1910' W	3.5 m 17/01/2016 09:17:28	0.0008 nm	0.2 kt
39	57° 16.5806' N 5° 45.1930' W	3.5 m 17/01/2016 09:17:47	0.0012 nm	0.2 kt
40	57° 16.5797' N 5° 45.1942' W	4.0 m 17/01/2016 09:18:06	0.0012 nm	0.2 kt
41	57° 16.5778' N 5° 45.1929' W	4.0 m 17/01/2016 09:18:20	0.0020 nm	0.5 kt
42	57° 16.5773' N 5° 45.1917' W	4.0 m 17/01/2016 09:18:33	0.0008 nm	0.2 kt
43	57° 16.5772' N 5° 45.1906' W	3.5 m 17/01/2016 09:18:52	0.0006 nm	0.1 kt
44	57° 16.5771' N 5° 45.1888' W	3.5 m 17/01/2016 09:19:09	0.0010 nm	0.2 kt
45	57° 16.5770' N 5° 45.1879' W	3.5 m 17/01/2016 09:19:27	0.0005 nm	0.1 kt
46	57° 16.5763' N 5° 45.1874' W	3.5 m 17/01/2016 09:19:45	0.0008 nm	0.2 kt
47	57° 16.5744' N 5° 45.1877' W	4.0 m 17/01/2016 09:19:58	0.0018 nm	0.5 kt
48	57° 16.5725' N 5° 45.1888' W	3.5 m 17/01/2016 09:20:13	0.0021 nm	0.5 kt
49	57° 16.5711' N 5° 45.1901' W	3.5 m 17/01/2016 09:20:33	0.0015 nm	0.3 kt
50	57° 16.5705' N 5° 45.1903' W	3.5 m 17/01/2016 09:20:51	0.0006 nm	0.1 kt

No.	Location	Date	Distance	Speed
51	57° 16.5699' N 5° 45.1902' W	4.0 m 17/01/2016 09:21:10	0.0007 nm	0.1 kt
52	57° 16.5699' N 5° 45.1908' W	3.5 m 17/01/2016 09:21:27	0.0003 nm	0.1 kt
53	57° 16.5697' N 5° 45.1910' W	3.5 m 17/01/2016 09:21:46	0.0002 nm	0.0 kt
54	57° 16.5695' N 5° 45.1914' W	3.5 m 17/01/2016 09:22:10	0.0003 nm	0.0 kt
55	57° 16.5696' N 5° 45.1914' W	3.5 m 17/01/2016 09:22:28	0.0001 nm	0.0 kt
56	57° 16.5686' N 5° 45.1915' W	3.5 m 17/01/2016 09:22:50	0.0010 nm	0.2 kt
57	57° 16.5673' N 5° 45.1919' W	3.0 m 17/01/2016 09:23:04	0.0013 nm	0.3 kt
58	57° 16.5669' N 5° 45.1923' W	3.0 m 17/01/2016 09:23:19	0.0005 nm	0.1 kt
59	57° 16.5664' N 5° 45.1924' W	3.5 m 17/01/2016 09:23:36	0.0005 nm	0.1 kt
60	57° 16.5659' N 5° 45.1931' W	3.5 m 17/01/2016 09:23:56	0.0006 nm	0.1 kt
61	57° 16.5655' N 5° 45.1944' W	3.0 m 17/01/2016 09:24:17	0.0008 nm	0.1 kt
62	57° 16.5643' N 5° 45.1951' W	3.0 m 17/01/2016 09:24:29	0.0013 nm	0.4 kt
63	57° 16.5631' N 5° 45.1960' W	3.0 m 17/01/2016 09:24:44	0.0013 nm	0.3 kt
64	57° 16.5619' N 5° 45.1979' W	3.0 m 17/01/2016 09:25:02	0.0015 nm	0.3 kt
65	57° 16.5614' N 5° 45.1984' W	3.5 m 17/01/2016 09:25:19	0.0006 nm	0.1 kt
66	57° 16.5608' N 5° 45.1991' W	3.0 m 17/01/2016 09:25:36	0.0007 nm	0.2 kt
67	57° 16.5604' N 5° 45.2004' W	3.0 m 17/01/2016 09:25:57	0.0008 nm	0.1 kt
68	57° 16.5598' N 5° 45.2030' W	3.0 m 17/01/2016 09:26:19	0.0016 nm	0.3 kt
69	57° 16.5591' N 5° 45.2039' W	3.0 m 17/01/2016 09:26:35	0.0009 nm	0.2 kt
70	57° 16.5585' N 5° 45.2051' W	3.0 m 17/01/2016 09:26:53	0.0008 nm	0.2 kt
71	57° 16.5575' N 5° 45.2048' W	3.5 m 17/01/2016 09:27:12	0.0010 nm	0.2 kt
72	57° 16.5561' N 5° 45.2050' W	3.5 m 17/01/2016 09:27:25	0.0014 nm	0.4 kt
73	57° 16.5532' N 5° 45.2072' W	3.0 m 17/01/2016 09:27:41	0.0031 nm	0.7 kt
74	57° 16.5507' N 5° 45.2091' W	3.0 m 17/01/2016 09:27:54	0.0027 nm	0.7 kt
75	57° 16.5468' N 5° 45.2109' W	3.5 m 17/01/2016 09:28:10	0.0040 nm	0.9 kt
76	57° 16.5448' N 5° 45.2112' W	3.5 m 17/01/2016 09:28:23	0.0021 nm	0.6 kt
77	57° 16.5426' N 5° 45.2109' W	3.5 m 17/01/2016 09:28:40	0.0022 nm	0.5 kt
78	57° 16.5419' N 5° 45.2114' W	3.5 m 17/01/2016 09:28:56	0.0007 nm	0.2 kt
79	57° 16.5412' N 5° 45.2120' W	3.0 m 17/01/2016 09:29:18	0.0007 nm	0.1 kt
80	57° 16.5402' N 5° 45.2126' W	3.0 m 17/01/2016 09:29:40	0.0010 nm	0.2 kt
81	57° 16.5396' N 5° 45.2135' W	3.0 m 17/01/2016 09:30:00	0.0008 nm	0.2 kt
82	57° 16.5399' N 5° 45.2139' W	3.0 m 17/01/2016 09:30:20	0.0004 nm	0.1 kt
83	57° 16.5366' N 5° 45.2140' W	3.0 m 17/01/2016 09:30:38	0.0033 nm	0.7 kt
84	57° 16.5333' N 5° 45.2156' W	3.5 m 17/01/2016 09:30:55	0.0034 nm	0.7 kt
85	57° 16.5295' N 5° 45.2172' W	3.5 m 17/01/2016 09:31:12	0.0039 nm	0.8 kt
86	57° 16.5263' N 5° 45.2188' W	3.5 m 17/01/2016 09:31:27	0.0033 nm	0.8 kt
87	57° 16.5236' N 5° 45.2194' W	3.5 m 17/01/2016 09:31:42	0.0027 nm	0.7 kt
88	57° 16.5233' N 5° 45.2202' W	3.5 m 17/01/2016 09:31:57	0.0005 nm	0.1 kt
89	57° 16.5231' N 5° 45.2207' W	4.0 m 17/01/2016 09:32:12	0.0004 nm	0.1 kt
90	57° 16.5228' N 5° 45.2211' W	3.5 m 17/01/2016 09:32:40	0.0004 nm	0.0 kt
91	57° 16.5225' N 5° 45.2213' W	3.0 m 17/01/2016 09:33:00	0.0003 nm	0.1 kt
92	57° 16.5224' N 5° 45.2214' W	3.0 m 17/01/2016 09:33:18	0.0002 nm	0.0 kt
93	57° 16.5195' N 5° 45.2222' W	3.0 m 17/01/2016 09:33:38	0.0029 nm	0.5 kt
94	57° 16.5164' N 5° 45.2245' W	3.5 m 17/01/2016 09:33:57	0.0033 nm	0.6 kt
95	57° 16.5133' N 5° 45.2265' W	3.5 m 17/01/2016 09:34:14	0.0033 nm	0.7 kt
96	57° 16.5108' N 5° 45.2273' W	3.5 m 17/01/2016 09:34:27	0.0026 nm	0.7 kt
97	57° 16.5067' N 5° 45.2289' W	3.5 m 17/01/2016 09:34:46	0.0042 nm	0.8 kt
98	57° 16.5035' N 5° 45.2305' W	3.5 m 17/01/2016 09:35:02	0.0033 nm	0.7 kt
99	57° 16.4997' N 5° 45.2324' W	3.5 m 17/01/2016 09:35:19	0.0039 nm	0.8 kt
100	57° 16.4978' N 5° 45.2327' W	3.0 m 17/01/2016 09:35:32	0.0019 nm	0.5 kt

No.	Location	Date	Distance	Speed
101	57° 16.4973' N 5° 45.2328' W	3.5 m 17/01/2016 09:35:48	0.0006 nm	0.1 kt
102	57° 16.4970' N 5° 45.2322' W	3.5 m 17/01/2016 09:36:08	0.0004 nm	0.1 kt
103	57° 16.4970' N 5° 45.2320' W	3.0 m 17/01/2016 09:36:28	0.0001 nm	0.0 kt
104	57° 16.4970' N 5° 45.2326' W	3.5 m 17/01/2016 09:36:48	0.0003 nm	0.1 kt
105	57° 16.4953' N 5° 45.2316' W	4.0 m 17/01/2016 09:37:09	0.0018 nm	0.3 kt
106	57° 16.4923' N 5° 45.2327' W	3.5 m 17/01/2016 09:37:25	0.0031 nm	0.7 kt
107	57° 16.4896' N 5° 45.2338' W	4.0 m 17/01/2016 09:37:40	0.0028 nm	0.7 kt
108	57° 16.4865' N 5° 45.2348' W	4.0 m 17/01/2016 09:37:56	0.0031 nm	0.7 kt
109	57° 16.4836' N 5° 45.2347' W	4.0 m 17/01/2016 09:38:11	0.0030 nm	0.7 kt
110	57° 16.4821' N 5° 45.2347' W	4.0 m 17/01/2016 09:38:27	0.0015 nm	0.3 kt
111	57° 16.4813' N 5° 45.2316' W	4.0 m 17/01/2016 09:38:39	0.0019 nm	0.6 kt
112	57° 16.4804' N 5° 45.2308' W	3.5 m 17/01/2016 09:39:00	0.0010 nm	0.2 kt
113	57° 16.4794' N 5° 45.2306' W	3.5 m 17/01/2016 09:39:22	0.0010 nm	0.2 kt
114	57° 16.4785' N 5° 45.2302' W	3.5 m 17/01/2016 09:39:39	0.0009 nm	0.2 kt
115	57° 16.4779' N 5° 45.2301' W	3.5 m 17/01/2016 09:39:57	0.0007 nm	0.1 kt
116	57° 16.4753' N 5° 45.2317' W	3.0 m 17/01/2016 09:40:17	0.0027 nm	0.5 kt
117	57° 16.4720' N 5° 45.2320' W	3.0 m 17/01/2016 09:40:31	0.0033 nm	0.8 kt
118	57° 16.4698' N 5° 45.2307' W	3.0 m 17/01/2016 09:40:46	0.0023 nm	0.6 kt
119	57° 16.4686' N 5° 45.2306' W	3.5 m 17/01/2016 09:40:58	0.0012 nm	0.4 kt
120	57° 16.4680' N 5° 45.2296' W	4.0 m 17/01/2016 09:41:13	0.0008 nm	0.2 kt
121	57° 16.4676' N 5° 45.2292' W	4.0 m 17/01/2016 09:41:32	0.0005 nm	0.1 kt
122	57° 16.4667' N 5° 45.2293' W	3.5 m 17/01/2016 09:41:45	0.0008 nm	0.2 kt
123	57° 16.4660' N 5° 45.2290' W	3.5 m 17/01/2016 09:42:06	0.0008 nm	0.1 kt
124	57° 16.4665' N 5° 45.2300' W	3.5 m 17/01/2016 09:42:25	0.0008 nm	0.1 kt
125	57° 16.4671' N 5° 45.2291' W	3.0 m 17/01/2016 09:42:44	0.0008 nm	0.1 kt
126	57° 16.4668' N 5° 45.2300' W	3.5 m 17/01/2016 09:42:57	0.0006 nm	0.2 kt
127	57° 16.4659' N 5° 45.2295' W	4.0 m 17/01/2016 09:43:12	0.0009 nm	0.2 kt

## Appendix 2 – GPS data

### Transect 6

No.	Location	Date	Distance	Speed
128	57° 16.6025' N 5° 45.1561' W	17/01/2016 10:00:55	3.5 m	
129	57° 16.6025' N 5° 45.1565' W	17/01/2016 10:01:07	3.0 m	0.0002 nm 0.1 kt
130	57° 16.6025' N 5° 45.1569' W	17/01/2016 10:01:23	3.0 m	0.0002 nm 0.0 kt
131	57° 16.6029' N 5° 45.1572' W	17/01/2016 10:01:38	3.0 m	0.0005 nm 0.1 kt
132	57° 16.6028' N 5° 45.1572' W	17/01/2016 10:01:52	3.5 m	0.0001 nm 0.0 kt
133	57° 16.6032' N 5° 45.1573' W	17/01/2016 10:02:08	3.5 m	0.0004 nm 0.1 kt
134	57° 16.6034' N 5° 45.1575' W	17/01/2016 10:02:23	3.0 m	0.0002 nm 0.1 kt
135	57° 16.6035' N 5° 45.1578' W	17/01/2016 10:02:36	3.0 m	0.0002 nm 0.1 kt
136	57° 16.6039' N 5° 45.1575' W	17/01/2016 10:02:58	3.5 m	0.0005 nm 0.1 kt
137	57° 16.6038' N 5° 45.1571' W	17/01/2016 10:03:13	3.5 m	0.0002 nm 0.1 kt
138	57° 16.6037' N 5° 45.1563' W	17/01/2016 10:03:26	3.0 m	0.0005 nm 0.1 kt
139	57° 16.6036' N 5° 45.1562' W	17/01/2016 10:03:41	3.0 m	0.0001 nm 0.0 kt
140	57° 16.6040' N 5° 45.1565' W	17/01/2016 10:03:58	2.5 m	0.0004 nm 0.1 kt
141	57° 16.6036' N 5° 45.1563' W	17/01/2016 10:04:11	2.5 m	0.0004 nm 0.1 kt
142	57° 16.6031' N 5° 45.1564' W	17/01/2016 10:04:25	2.5 m	0.0005 nm 0.1 kt
143	57° 16.6030' N 5° 45.1564' W	17/01/2016 10:04:40	3.0 m	0.0001 nm 0.0 kt
144	57° 16.6030' N 5° 45.1566' W	17/01/2016 10:04:54	3.0 m	0.0001 nm 0.0 kt
145	57° 16.6025' N 5° 45.1555' W	17/01/2016 10:05:11	3.5 m	0.0008 nm 0.2 kt
146	57° 16.6021' N 5° 45.1556' W	17/01/2016 10:05:26	3.5 m	0.0004 nm 0.1 kt
147	57° 16.6022' N 5° 45.1561' W	17/01/2016 10:05:45	4.0 m	0.0003 nm 0.1 kt
148	57° 16.6010' N 5° 45.1554' W	17/01/2016 10:05:59	4.0 m	0.0012 nm 0.3 kt
149	57° 16.6005' N 5° 45.1556' W	17/01/2016 10:06:16	4.0 m	0.0005 nm 0.1 kt
150	57° 16.6005' N 5° 45.1556' W	17/01/2016 10:06:31	4.0 m	0.0001 nm 0.0 kt
151	57° 16.6004' N 5° 45.1553' W	17/01/2016 10:06:46	4.0 m	0.0002 nm 0.0 kt
152	57° 16.6006' N 5° 45.1559' W	17/01/2016 10:07:01	4.0 m	0.0003 nm 0.1 kt
153	57° 16.6004' N 5° 45.1559' W	17/01/2016 10:07:19	4.0 m	0.0002 nm 0.0 kt
154	57° 16.6001' N 5° 45.1563' W	17/01/2016 10:07:36	4.0 m	0.0003 nm 0.1 kt
155	57° 16.5998' N 5° 45.1558' W	17/01/2016 10:07:53	4.0 m	0.0004 nm 0.1 kt
156	57° 16.5993' N 5° 45.1553' W	17/01/2016 10:08:09	4.0 m	0.0006 nm 0.1 kt
157	57° 16.5990' N 5° 45.1559' W	17/01/2016 10:08:23	3.5 m	0.0004 nm 0.1 kt
158	57° 16.5983' N 5° 45.1560' W	17/01/2016 10:08:38	3.5 m	0.0007 nm 0.2 kt
159	57° 16.5975' N 5° 45.1559' W	17/01/2016 10:08:51	3.5 m	0.0008 nm 0.2 kt
160	57° 16.5975' N 5° 45.1560' W	17/01/2016 10:09:06	3.5 m	0.0001 nm 0.0 kt
161	57° 16.5976' N 5° 45.1561' W	17/01/2016 10:09:26	3.5 m	0.0001 nm 0.0 kt
162	57° 16.5975' N 5° 45.1561' W	17/01/2016 10:09:40	4.0 m	0.0001 nm 0.0 kt
163	57° 16.5976' N 5° 45.1560' W	17/01/2016 10:09:58	3.5 m	0.0001 nm 0.0 kt
164	57° 16.5976' N 5° 45.1561' W	17/01/2016 10:10:11	3.5 m	0.0001 nm 0.0 kt
165	57° 16.5978' N 5° 45.1562' W	17/01/2016 10:10:23	3.5 m	0.0002 nm 0.1 kt
166	57° 16.5979' N 5° 45.1569' W	17/01/2016 10:10:39	3.5 m	0.0004 nm 0.1 kt
167	57° 16.5978' N 5° 45.1564' W	17/01/2016 10:10:53	3.5 m	0.0003 nm 0.1 kt
168	57° 16.5975' N 5° 45.1561' W	17/01/2016 10:11:07	3.5 m	0.0003 nm 0.1 kt
169	57° 16.5974' N 5° 45.1558' W	17/01/2016 10:11:21	3.5 m	0.0002 nm 0.0 kt
170	57° 16.5965' N 5° 45.1536' W	17/01/2016 10:11:36	4.0 m	0.0015 nm 0.3 kt
171	57° 16.5961' N 5° 45.1530' W	17/01/2016 10:11:48	4.5 m	0.0005 nm 0.2 kt
172	57° 16.5955' N 5° 45.1520' W	17/01/2016 10:12:00	4.5 m	0.0008 nm 0.2 kt
173	57° 16.5951' N 5° 45.1518' W	17/01/2016 10:12:12	4.0 m	0.0004 nm 0.1 kt
174	57° 16.5946' N 5° 45.1525' W	17/01/2016 10:12:26	4.0 m	0.0007 nm 0.2 kt
175	57° 16.5946' N 5° 45.1524' W	17/01/2016 10:12:44	4.0 m	0.0001 nm 0.0 kt
176	57° 16.5946' N 5° 45.1524' W	17/01/2016 10:13:00	4.5 m	0.0000 nm 0.0 kt
177	57° 16.5947' N 5° 45.1525' W	17/01/2016 10:13:14	4.5 m	0.0001 nm 0.0 kt
178	57° 16.5945' N 5° 45.1533' W	17/01/2016 10:13:28	4.5 m	0.0005 nm 0.1 kt

No.	Location	Date	Distance	Speed
179	57° 16.5941' N 5° 45.1533' W	4.0 m 17/01/2016 10:13:44	0.0004 nm	0.1 kt
180	57° 16.5941' N 5° 45.1534' W	4.0 m 17/01/2016 10:13:59	0.0001 nm	0.0 kt
181	57° 16.5942' N 5° 45.1536' W	4.5 m 17/01/2016 10:14:15	0.0002 nm	0.0 kt
182	57° 16.5942' N 5° 45.1542' W	4.5 m 17/01/2016 10:14:32	0.0003 nm	0.1 kt
183	57° 16.5941' N 5° 45.1542' W	4.5 m 17/01/2016 10:14:46	0.0000 nm	0.0 kt
184	57° 16.5940' N 5° 45.1548' W	4.5 m 17/01/2016 10:14:58	0.0003 nm	0.1 kt
185	57° 16.5941' N 5° 45.1568' W	4.0 m 17/01/2016 10:15:12	0.0011 nm	0.3 kt
186	57° 16.5940' N 5° 45.1581' W	4.0 m 17/01/2016 10:15:28	0.0007 nm	0.2 kt
187	57° 16.5944' N 5° 45.1597' W	4.0 m 17/01/2016 10:15:42	0.0010 nm	0.2 kt
188	57° 16.5931' N 5° 45.1586' W	4.0 m 17/01/2016 10:15:57	0.0014 nm	0.3 kt
189	57° 16.5923' N 5° 45.1580' W	4.0 m 17/01/2016 10:16:10	0.0009 nm	0.2 kt
190	57° 16.5924' N 5° 45.1578' W	4.9 m 17/01/2016 10:16:24	0.0001 nm	0.0 kt
191	57° 16.5925' N 5° 45.1578' W	4.9 m 17/01/2016 10:16:39	0.0001 nm	0.0 kt
192	57° 16.5921' N 5° 45.1573' W	4.9 m 17/01/2016 10:16:55	0.0005 nm	0.1 kt
193	57° 16.5913' N 5° 45.1568' W	4.9 m 17/01/2016 10:17:09	0.0009 nm	0.2 kt
194	57° 16.5915' N 5° 45.1575' W	4.9 m 17/01/2016 10:17:23	0.0004 nm	0.1 kt
195	57° 16.5914' N 5° 45.1571' W	4.9 m 17/01/2016 10:17:42	0.0002 nm	0.0 kt
196	57° 16.5908' N 5° 45.1566' W	4.9 m 17/01/2016 10:17:56	0.0007 nm	0.2 kt
197	57° 16.5907' N 5° 45.1569' W	5.4 m 17/01/2016 10:18:08	0.0001 nm	0.0 kt
198	57° 16.5907' N 5° 45.1569' W	5.4 m 17/01/2016 10:18:19	0.0000 nm	0.0 kt
199	57° 16.5907' N 5° 45.1577' W	4.9 m 17/01/2016 10:18:38	0.0004 nm	0.1 kt
200	57° 16.5908' N 5° 45.1573' W	4.9 m 17/01/2016 10:18:52	0.0002 nm	0.1 kt
201	57° 16.5907' N 5° 45.1571' W	4.9 m 17/01/2016 10:19:08	0.0001 nm	0.0 kt
202	57° 16.5908' N 5° 45.1573' W	4.5 m 17/01/2016 10:19:23	0.0001 nm	0.0 kt
203	57° 16.5908' N 5° 45.1572' W	4.5 m 17/01/2016 10:19:35	0.0000 nm	0.0 kt
204	57° 16.5906' N 5° 45.1580' W	4.5 m 17/01/2016 10:19:53	0.0005 nm	0.1 kt
205	57° 16.5902' N 5° 45.1585' W	4.5 m 17/01/2016 10:20:06	0.0005 nm	0.1 kt
206	57° 16.5894' N 5° 45.1573' W	4.5 m 17/01/2016 10:20:21	0.0010 nm	0.2 kt
207	57° 16.5887' N 5° 45.1550' W	4.9 m 17/01/2016 10:20:37	0.0014 nm	0.3 kt
208	57° 16.5886' N 5° 45.1554' W	4.5 m 17/01/2016 10:20:49	0.0002 nm	0.1 kt
209	57° 16.5885' N 5° 45.1546' W	4.5 m 17/01/2016 10:21:06	0.0005 nm	0.1 kt
210	57° 16.5885' N 5° 45.1543' W	4.5 m 17/01/2016 10:21:19	0.0002 nm	0.0 kt
211	57° 16.5886' N 5° 45.1537' W	4.5 m 17/01/2016 10:21:36	0.0003 nm	0.1 kt
212	57° 16.5887' N 5° 45.1535' W	4.9 m 17/01/2016 10:21:53	0.0002 nm	0.0 kt
213	57° 16.5887' N 5° 45.1533' W	4.9 m 17/01/2016 10:22:11	0.0001 nm	0.0 kt
214	57° 16.5887' N 5° 45.1544' W	4.5 m 17/01/2016 10:22:26	0.0006 nm	0.1 kt
215	57° 16.5886' N 5° 45.1533' W	4.5 m 17/01/2016 10:22:40	0.0006 nm	0.2 kt
216	57° 16.5889' N 5° 45.1540' W	4.5 m 17/01/2016 10:22:58	0.0004 nm	0.1 kt
217	57° 16.5888' N 5° 45.1520' W	4.5 m 17/01/2016 10:23:11	0.0011 nm	0.3 kt
218	57° 16.5880' N 5° 45.1494' W	4.5 m 17/01/2016 10:23:28	0.0017 nm	0.4 kt
219	57° 16.5876' N 5° 45.1486' W	4.5 m 17/01/2016 10:23:44	0.0006 nm	0.1 kt
220	57° 16.5874' N 5° 45.1485' W	4.0 m 17/01/2016 10:24:02	0.0002 nm	0.0 kt
221	57° 16.5872' N 5° 45.1478' W	4.5 m 17/01/2016 10:24:18	0.0004 nm	0.1 kt
222	57° 16.5870' N 5° 45.1482' W	3.5 m 17/01/2016 10:24:37	0.0003 nm	0.1 kt
223	57° 16.5869' N 5° 45.1485' W	3.5 m 17/01/2016 10:24:54	0.0002 nm	0.0 kt
224	57° 16.5862' N 5° 45.1466' W	4.5 m 17/01/2016 10:25:11	0.0013 nm	0.3 kt
225	57° 16.5858' N 5° 45.1442' W	4.5 m 17/01/2016 10:25:24	0.0014 nm	0.4 kt
226	57° 16.5859' N 5° 45.1433' W	4.9 m 17/01/2016 10:25:39	0.0005 nm	0.1 kt
227	57° 16.5859' N 5° 45.1426' W	4.5 m 17/01/2016 10:25:55	0.0004 nm	0.1 kt
228	57° 16.5859' N 5° 45.1427' W	4.5 m 17/01/2016 10:26:08	0.0000 nm	0.0 kt

No.	Location	Date	Distance	Speed
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229	57° 16.5856' N 5° 45.1418' W	4.9 m	17/01/2016 10:26:24	0.0005 nm	0.1 kt
230	57° 16.5852' N 5° 45.1418' W	4.9 m	17/01/2016 10:26:40	0.0004 nm	0.1 kt
231	57° 16.5850' N 5° 45.1417' W	4.5 m	17/01/2016 10:26:53	0.0002 nm	0.1 kt
232	57° 16.5851' N 5° 45.1422' W	4.5 m	17/01/2016 10:27:06	0.0003 nm	0.1 kt
233	57° 16.5852' N 5° 45.1420' W	4.0 m	17/01/2016 10:27:22	0.0002 nm	0.0 kt
234	57° 16.5852' N 5° 45.1426' W	3.5 m	17/01/2016 10:27:46	0.0004 nm	0.1 kt
235	57° 16.5851' N 5° 45.1420' W	4.0 m	17/01/2016 10:28:01	0.0004 nm	0.1 kt
236	57° 16.5853' N 5° 45.1418' W	4.0 m	17/01/2016 10:28:20	0.0002 nm	0.0 kt
237	57° 16.5851' N 5° 45.1417' W	4.0 m	17/01/2016 10:28:37	0.0002 nm	0.0 kt
238	57° 16.5848' N 5° 45.1419' W	4.5 m	17/01/2016 10:28:51	0.0003 nm	0.1 kt
239	57° 16.5848' N 5° 45.1420' W	3.5 m	17/01/2016 10:29:05	0.0001 nm	0.0 kt
240	57° 16.5843' N 5° 45.1420' W	4.0 m	17/01/2016 10:29:23	0.0005 nm	0.1 kt
241	57° 16.5842' N 5° 45.1421' W	4.0 m	17/01/2016 10:29:38	0.0001 nm	0.0 kt
242	57° 16.5839' N 5° 45.1420' W	3.0 m	17/01/2016 10:30:00	0.0003 nm	0.1 kt
243	57° 16.5838' N 5° 45.1416' W	3.0 m	17/01/2016 10:30:18	0.0003 nm	0.1 kt
244	57° 16.5840' N 5° 45.1416' W	4.0 m	17/01/2016 10:30:33	0.0002 nm	0.1 kt
245	57° 16.5837' N 5° 45.1415' W	4.0 m	17/01/2016 10:30:46	0.0003 nm	0.1 kt
246	57° 16.5824' N 5° 45.1391' W	4.0 m	17/01/2016 10:30:59	0.0018 nm	0.5 kt
247	57° 16.5806' N 5° 45.1355' W	4.5 m	17/01/2016 10:31:16	0.0027 nm	0.6 kt
248	57° 16.5789' N 5° 45.1329' W	4.5 m	17/01/2016 10:31:34	0.0022 nm	0.4 kt
249	57° 16.5786' N 5° 45.1324' W	4.9 m	17/01/2016 10:31:52	0.0004 nm	0.1 kt
250	57° 16.5773' N 5° 45.1308' W	4.5 m	17/01/2016 10:32:08	0.0015 nm	0.3 kt
251	57° 16.5757' N 5° 45.1284' W	4.5 m	17/01/2016 10:32:25	0.0021 nm	0.4 kt
252	57° 16.5750' N 5° 45.1283' W	3.5 m	17/01/2016 10:32:40	0.0008 nm	0.2 kt
253	57° 16.5737' N 5° 45.1262' W	3.5 m	17/01/2016 10:32:57	0.0017 nm	0.4 kt
254	57° 16.5724' N 5° 45.1230' W	3.5 m	17/01/2016 10:33:13	0.0021 nm	0.5 kt
255	57° 16.5721' N 5° 45.1224' W	3.5 m	17/01/2016 10:33:29	0.0004 nm	0.1 kt
256	57° 16.5708' N 5° 45.1208' W	4.0 m	17/01/2016 10:33:43	0.0016 nm	0.4 kt
257	57° 16.5688' N 5° 45.1186' W	4.0 m	17/01/2016 10:34:03	0.0023 nm	0.4 kt
258	57° 16.5684' N 5° 45.1190' W	3.5 m	17/01/2016 10:34:33	0.0005 nm	0.1 kt
259	57° 16.5684' N 5° 45.1194' W	4.0 m	17/01/2016 10:34:54	0.0002 nm	0.0 kt
260	57° 16.5672' N 5° 45.1173' W	4.9 m	17/01/2016 10:35:11	0.0016 nm	0.3 kt
261	57° 16.5659' N 5° 45.1144' W	4.5 m	17/01/2016 10:35:28	0.0020 nm	0.4 kt
262	57° 16.5659' N 5° 45.1149' W	4.9 m	17/01/2016 10:35:45	0.0003 nm	0.1 kt
263	57° 16.5659' N 5° 45.1145' W	4.5 m	17/01/2016 10:36:01	0.0002 nm	0.0 kt
264	57° 16.5652' N 5° 45.1142' W	4.0 m	17/01/2016 10:36:16	0.0007 nm	0.2 kt
265	57° 16.5649' N 5° 45.1144' W	4.0 m	17/01/2016 10:36:29	0.0003 nm	0.1 kt
266	57° 16.5652' N 5° 45.1151' W	4.0 m	17/01/2016 10:36:44	0.0004 nm	0.1 kt
267	57° 16.5647' N 5° 45.1148' W	2.5 m	17/01/2016 10:37:10	0.0005 nm	0.1 kt
268	57° 16.5651' N 5° 45.1153' W	4.0 m	17/01/2016 10:37:28	0.0004 nm	0.1 kt
269	57° 16.5650' N 5° 45.1150' W	4.0 m	17/01/2016 10:37:45	0.0002 nm	0.0 kt
270	57° 16.5642' N 5° 45.1139' W	4.0 m	17/01/2016 10:38:00	0.0010 nm	0.2 kt
271	57° 16.5633' N 5° 45.1103' W	4.0 m	17/01/2016 10:38:16	0.0022 nm	0.5 kt
272	57° 16.5631' N 5° 45.1095' W	4.0 m	17/01/2016 10:38:29	0.0005 nm	0.1 kt
273	57° 16.5629' N 5° 45.1082' W	4.5 m	17/01/2016 10:38:44	0.0007 nm	0.2 kt
274	57° 16.5629' N 5° 45.1082' W	4.9 m	17/01/2016 10:39:00	0.0000 nm	0.0 kt
275	57° 16.5627' N 5° 45.1079' W	4.5 m	17/01/2016 10:39:25	0.0003 nm	0.0 kt
276	57° 16.5619' N 5° 45.1049' W	4.9 m	17/01/2016 10:39:37	0.0018 nm	0.5 kt
277	57° 16.5606' N 5° 45.1015' W	4.5 m	17/01/2016 10:39:54	0.0022 nm	0.5 kt
278	57° 16.5601' N 5° 45.0996' W	4.0 m	17/01/2016 10:40:09	0.0012 nm	0.3 kt

No.	Location	Date	Distance	Speed	
279	57° 16.5600' N 5° 45.0995' W	17/01/2016 10:40:23	4.0 m	0.0002 nm	0.0 kt
280	57° 16.5594' N 5° 45.0993' W	17/01/2016 10:40:43	4.0 m	0.0005 nm	0.1 kt
281	57° 16.5593' N 5° 45.0984' W	17/01/2016 10:41:00	4.9 m	0.0005 nm	0.1 kt
282	57° 16.5593' N 5° 45.0988' W	17/01/2016 10:41:15	4.9 m	0.0002 nm	0.1 kt
283	57° 16.5595' N 5° 45.0988' W	17/01/2016 10:41:31	4.5 m	0.0002 nm	0.0 kt
284	57° 16.5595' N 5° 45.0991' W	17/01/2016 10:41:47	3.5 m	0.0001 nm	0.0 kt
285	57° 16.5595' N 5° 45.0991' W	17/01/2016 10:42:04	4.0 m	0.0001 nm	0.0 kt
286	57° 16.5590' N 5° 45.0982' W	17/01/2016 10:42:27	3.5 m	0.0006 nm	0.1 kt
287	57° 16.5592' N 5° 45.0988' W	17/01/2016 10:42:43	4.0 m	0.0003 nm	0.1 kt
288	57° 16.5588' N 5° 45.0959' W	17/01/2016 10:42:59	3.5 m	0.0017 nm	0.4 kt
289	57° 16.5580' N 5° 45.0943' W	17/01/2016 10:43:17	3.5 m	0.0012 nm	0.2 kt
290	57° 16.5565' N 5° 45.0914' W	17/01/2016 10:43:33	4.0 m	0.0022 nm	0.5 kt
291	57° 16.5546' N 5° 45.0888' W	17/01/2016 10:43:51	3.5 m	0.0024 nm	0.5 kt
292	57° 16.5541' N 5° 45.0889' W	17/01/2016 10:44:04	4.0 m	0.0005 nm	0.1 kt
293	57° 16.5524' N 5° 45.0861' W	17/01/2016 10:44:18	3.0 m	0.0023 nm	0.6 kt
294	57° 16.5508' N 5° 45.0842' W	17/01/2016 10:44:34	3.0 m	0.0019 nm	0.4 kt
295	57° 16.5498' N 5° 45.0835' W	17/01/2016 10:44:52	4.0 m	0.0011 nm	0.2 kt
296	57° 16.5496' N 5° 45.0847' W	17/01/2016 10:45:07	4.9 m	0.0007 nm	0.2 kt
297	57° 16.5496' N 5° 45.0851' W	17/01/2016 10:45:22	4.0 m	0.0003 nm	0.1 kt
298	57° 16.5505' N 5° 45.0844' W	17/01/2016 10:45:40	4.0 m	0.0009 nm	0.2 kt
299	57° 16.5511' N 5° 45.0845' W	17/01/2016 10:46:01	3.5 m	0.0006 nm	0.1 kt
300	57° 16.5521' N 5° 45.0849' W	17/01/2016 10:46:18	3.5 m	0.0011 nm	0.2 kt
301	57° 16.5526' N 5° 45.0799' W	17/01/2016 10:46:37	3.5 m	0.0028 nm	0.5 kt
302	57° 16.5524' N 5° 45.0778' W	17/01/2016 10:46:52	3.5 m	0.0012 nm	0.3 kt
303	57° 16.5522' N 5° 45.0771' W	17/01/2016 10:47:09	3.5 m	0.0004 nm	0.1 kt
304	57° 16.5518' N 5° 45.0771' W	17/01/2016 10:47:24	4.0 m	0.0004 nm	0.1 kt
305	57° 16.5514' N 5° 45.0767' W	17/01/2016 10:47:39	4.0 m	0.0005 nm	0.1 kt
306	57° 16.5511' N 5° 45.0771' W	17/01/2016 10:47:54	3.5 m	0.0003 nm	0.1 kt
307	57° 16.5504' N 5° 45.0762' W	17/01/2016 10:48:14	4.5 m	0.0008 nm	0.1 kt
308	57° 16.5487' N 5° 45.0733' W	17/01/2016 10:48:32	4.0 m	0.0023 nm	0.5 kt
309	57° 16.5473' N 5° 45.0713' W	17/01/2016 10:48:47	2.5 m	0.0018 nm	0.4 kt
310	57° 16.5461' N 5° 45.0681' W	17/01/2016 10:49:02	3.5 m	0.0021 nm	0.5 kt
311	57° 16.5449' N 5° 45.0658' W	17/01/2016 10:49:15	3.5 m	0.0017 nm	0.5 kt
312	57° 16.5444' N 5° 45.0664' W	17/01/2016 10:49:30	3.5 m	0.0006 nm	0.1 kt
313	57° 16.5431' N 5° 45.0639' W	17/01/2016 10:49:46	3.5 m	0.0019 nm	0.4 kt
314	57° 16.5421' N 5° 45.0641' W	17/01/2016 10:49:59	3.5 m	0.0010 nm	0.3 kt
315	57° 16.5401' N 5° 45.0635' W	17/01/2016 10:50:17	2.5 m	0.0021 nm	0.4 kt
316	57° 16.5378' N 5° 45.0630' W	17/01/2016 10:50:35	1.6 m	0.0023 nm	0.5 kt
317	57° 16.5363' N 5° 45.0638' W	17/01/2016 10:50:49	1.6 m	0.0016 nm	0.4 kt
318	57° 16.5342' N 5° 45.0635' W	17/01/2016 10:51:05	1.6 m	0.0021 nm	0.5 kt
319	57° 16.5320' N 5° 45.0616' W	17/01/2016 10:51:23	1.1 m	0.0024 nm	0.5 kt
320	57° 16.5307' N 5° 45.0610' W	17/01/2016 10:51:39	2.1 m	0.0014 nm	0.3 kt
321	57° 16.5283' N 5° 45.0599' W	17/01/2016 10:51:55	2.5 m	0.0025 nm	0.6 kt
322	57° 16.5261' N 5° 45.0614' W	17/01/2016 10:52:12	1.6 m	0.0024 nm	0.5 kt
323	57° 16.5249' N 5° 45.0629' W	17/01/2016 10:52:27	2.1 m	0.0014 nm	0.3 kt
324	57° 16.5246' N 5° 45.0643' W	17/01/2016 10:52:41	3.0 m	0.0009 nm	0.2 kt
325	57° 16.5247' N 5° 45.0647' W	17/01/2016 10:52:54	4.0 m	0.0002 nm	0.1 kt
326	57° 16.5246' N 5° 45.0645' W	17/01/2016 10:53:15	4.5 m	0.0001 nm	0.0 kt