Expedition Report Loch Hourn 2016

Camping and Maerl bed survey dive expedition

Report for BEGS Grant made on behalf of Darwen Branch 0047

Tim of this expedition was to explore and document new dive sites discovered on a previous expedition in 2014 where the team had found maerl beds.

The diving was carried out from an isolated base camp without the normal facilities of civilisation that we are accustomed to.

Introduction

The 14-mile-long sea loch runs inland from the Sound of Sleat, opposite the Isle of Skye, to the head of the loch at Kinloch Hourn. Sometimes described as the most fjord-like of the sea lochs of northwest Scotland, it is steep-sided, with the slopes of Beinn Sgritheall to the north and Ladhar Bheinn rising from the southern shore.

There is no road access to most of the shoreline. Apart from a few isolated cottages, the only community is Arnisdale, with a population of approximately 30 people. Getting to Kinloch Hourn is 22 miles along a single track road from the A87 near Invergarry.

There were no facilities and accommodation was in tents. There was no mobile phone reception as expected.

The need to be totally self-sufficient was fulfilled by taking all our fuel, fire wood, food, shelter, oxygen and compressors with us.

NB Charts use data from a 1938 survey. (Loch Hourn Baeg 1848) So due caution was practised when navigating with GPS chart plotters.

Information regarding Maerl

Maerl, ***Phymatolithon calcareum***, is a red calcareous seaweed only found at Dive Site 1. Each "twiglet" is approximately 40 to 50 millimetres in length and 5 to 6 millimetres in diameter.

In the British Isles maerl is composed of three species of coralline algae growing loose in beds of fragmented nodules in the sub-littoral. The species generally involved are: Lithothamnion corallioides,[1] Lithothamnion glaciale and Phymatolithon calcareum.[8][2]

Maerl is dredged from the sea floor and crushed to form a powder. It is still harvested around the coasts of Brittany in France and Bantry Bay, Ireland, and is a popular fertilizer for organic gardening. It was also dredged off Falmouth, Cornwall, but this ceased in 2004. Scientists investigated Falmouth maerl and found that L. corallioides predominated down to 6 m and P. calcareum from 6–10 m (Blunden et al., 1981).[9][

Chemical analysis of maerl showed that it contained 32.1% CaCO3 and 3.1% MgCO3 (dry weight).

The ecology of maerl habitats has received very little attention in contrast to other marine ecosystems such as kelp forests or sea grass beds.[11] Maerl beds provide a complex habitat for a wide range of taxa[12] with a variety of niches that support high associated invertebrate and algal biodiversity[13]

Maerl beds act as nursery areas for the juvenile stages of commercial species such as juvenile cod Gadus morhua, saithePollachius virens, Pollack Pollachius pollachius[14] and juvenile scallops Aequipecten opercularis.[15] Maerl beds offer physical refuge and protection from predation as well as productive feeding grounds but are easily damaged by dredging and towed fishing gear.[16][17]Maerl has no tolerance for

desiccation.[18]Maerl has been extracted for centuries mainly for use as an agricultural fertilizer. The amount extracted increased in the late 20th century and in 2000, maerl was extracted at ~5,000 tonnes per year in Ireland and ~500,000 tonnes per year in France.[19] Large scale maerl extraction over the past 40 years has removed and degraded maerl beds.[20] In Cornwall, England, maerl has been extracted since 1970's, but was banned in 2005 by Falmouth Harbour Commissioners.[21]

An early reference to maerl was made by John Ray in 1690 who reported it from Falmouth. In Ireland, maerl is extracted from subfossil beds in Bantry Bay by Celtic Sea Minerals [3]. The maerl-forming species Lithothamion corallioides and Phymatolithon calcareum are listed in Annex V of the EC Habitats Directive [4].

Used as a soil conditioner, it is dredged from the sea floor and crushed to a powder.[22] The slow growth of individual nodules and their accumulation in beds over a millennial timescale means that there is no possibility of maerl keeping up with dredging for this purpose. Maerl should be considered as a non-renewable resource, and readily available alternative products (e.g., garden lime) make modern day exploitation questionable.

Main Dive Sites

The dive sites were in the areas closest to the maerl beds seen on the previous expedition. There was an opportunity to travel to dive the Port Napier wreck and a drift dive in the sound of Sleat The maerl beds discovered in 2014 at the northern side of a small island Eil Mhotgh-sgeir and also on the opposite shore formed the starting point for the search and survey dives . The approximate position is 57. 06. 55N. . 5. 27. 10W

Bad weather backup plan

Without doubt the weather was the best the diving group can remember in the near 30 year history of diving in Loch Hourn. However if we had experienced difficult weather conditions there were still sheltered sites within the loch to allow the group some diving and depending on the wind direction some of the survey areas might still have been accessible.

Strong winds would have limited the ability to carry out the passage to Kyle of Lochalsh.

Dates

1st October travelled north to Loch Horne

8th and 9th October Travelled south breaking journey in Fort William

On Saturday we travelled to Kinloch Hourn at the head of Loch Hourn and arrived at the launch site will at mid tide. The boats were loaded safely with camping and personal gear and taken on to the sand. Eventually they were floated and were walked to deeper water and the first trip to the camp site undertaken. After unloading the team were split to allow one group to start camp and the other to return to ferry the dive gear to our camp site. The boats were launched into Loch Baig (which is the eastern most part of Loch Hourn) and the journey to our camp site at Poll a Mhuineilte is 6NM

Overview of week

Sunday diving was a warm up dive firstly a wall near the camp site to approximately 22m.

By Sunday evening the team were working well and any minor problems dealt with

Monday and Tuesday were devoted to exploring recording and filming the maerl sites and estimating their extent.

Wednesday travelled to Kyle of Loch Alsh and Port Napier wreck

Thursday some further investigation of the maerl beds

Friday diving some other sites in the loch

Saturday break camp and return to Fort William

3rd October- 7th October: We did 2 dives per day

8th October Early Saturday morning, break camp and ferry equipment to Kinloch Hourn. Recover boats & pack up kit in preparation for the road journey. We travelled to Fort William and stayed in a Hotel overnight.

9th October Sunday. Travel home by road to Darwen and unload.

Dive Details

2nd October

Dive Site 1

Wall dive at site known as “Octopus wall”

Seven divers in two waves.

This is a dive site we have used in the past as a warm up dive.

It is in a sheltered part of the loch and has a slow drift running over it.

The wall is a mass of life and seasearch forms have been produced from a later visit to the wall.

The wall is vertical in places and then a series of very steep slopes to a sandy seabed at about 23m.

The wind was east approx force 2 with only a very slight swell on the surface strong sunlight enhanced the opportunity to use cameras and video.

Underwater viz was approx 3m Water temperature 13 degrees

The Imperial anemone, ***Capnea sanguinea***, is unique amongst anemones due to its stubby, wart-like tentacles. When disturbed, or having caught food, it can retract very quickly. Found at Dive Site 1 at a depth of 16 metres. The anemone grows to about 40 millimetres in diameter.

This beautiful, delicate octocoral, ***Sarcodictyon catenatum*** was found on a small pebble. Each polyp is about 10 millimetres tall. Its red base, or stolon, is a key identification feature. Found at Dive Site 1 at a depth of 16 metres.

The tide swept, tumbling bedrock cliffs, along the shore at Dive Site 1, are ideal ground for the Plumose anemone, ***Metridium senile***. Thanks to the nutrient rich waters of Loch Hourn the anemones grow to a height of 350 millimetres.

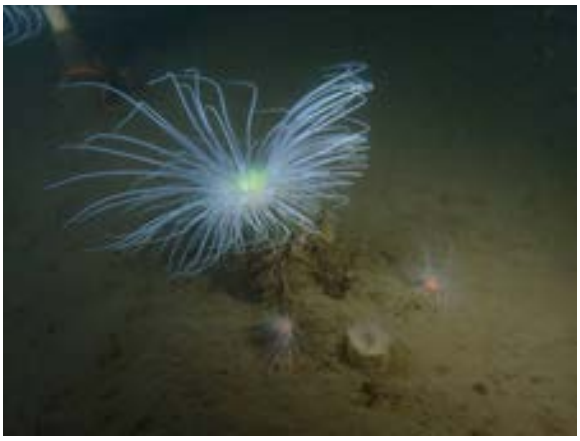
3rd October

Dive Site 2 off EN MHOGH SIGIR

This was the first of the survey dives where buddy pairs were allocated specific areas to investigate along the island. It was at this point that the maerl was discovered on the 2014 trip.

Site conditions were good with Force 2 easterly wind and only very slight surface swell

Underwater viz was approx 2-3m and the water temperature registered at 13 degrees.



The Fireworks anemone, ***Pachycerianthus multiplicatus***, was found in huge numbers at Dive Sites 2, 4 and 5. At Dive Site 5 we found a Fireworks anemone every two metres in all directions. Interestingly, the Fireworks anemone appears to have a relationship, not yet fully understood, with the annelid Eyelash worm, ***Myxicola infundibulum***. The worm is below and to the right of the anemone in the right hand photo. A couple of Sea loch anemones, ***Protanthea simplex***, are also in the photo. Water depth around 17 to 20 metres.

The Goose foot starfish, ***Anseropoda placenta***, is a scarce species nowadays. Found at Dive Site 2, the photo also shows ***Ophiura ophiura***, one of our biggest brittlestars. The Goose foot starfish is about 150 millimetres in diameter.

Dive Site 3

Further investigation of the survey area was carried out with buddy pairs continuing to cover a series of mini sites along the reef.

Similar site conditions to Dive 1 with slightly fresher breeze at Force 4 again from the east

We returned to cylinder filling and corn beef hash around a very welcoming camp fire which our fire guru eventually got to light - at this stage the comment was made the he needed more practice.

4th October

Dive Site 4

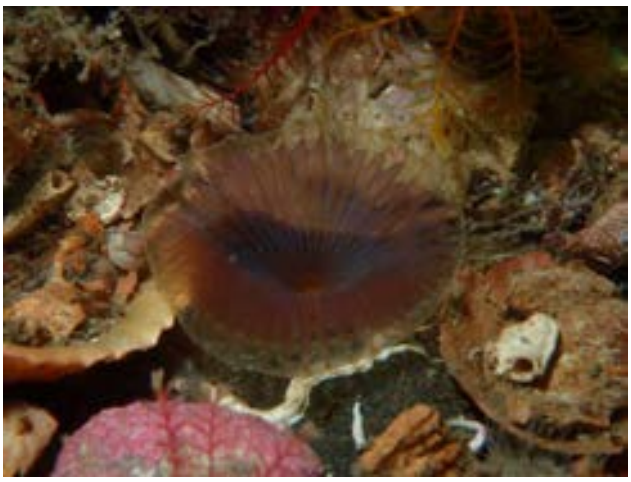
We continued our survey work gradually moving the site further up the loch in a similar manner to the previous day. Full compliment of ten divers were involved on this occasion.

A mixture of sun and cloud with very similar weather and diving conditions as before made access to the site easy.

After the difficult conditions experienced in 2014 we could hardly believe our luck. It certainly lifted the spirit of those that were on the previous trip!

The photograph shows the papery tubes of the Parchment worm, ***Chaetopterus variopedatus***. The worm is hardly ever seen outside its tube. The tubes are about 12 millimetres in diameter and about 500 millimetres in length. Also, many Sea loch anemones, ***Protanthia simplex***, and Fragile brittlestars, ***Ophiothrix fragilis*** were noted. The Parchment worm was found at Dive Sites 1,2,3,4,5 and 7.

Dive Site 5



The Eyelash worm, ***Myxicola infundibulum***, can grow to 200 millimetres in length and about 50 millimetres in diameter when fully expanded. ***Myxicola*** was found at Dive Sites 1, 4 and 5. At Dive Sites 4 and 5, it was found in association with the Fireworks anemone. This photograph was taken at Dive Site 1 amongst broken shell overlying coarse sand. If you are not quick, all you are left with is a blob of jelly.

After soup and sandwiches we filled the cylinders and returned to the survey area, we continued our process of gradually moving the site further up the loch in a similar manner to the previous day.

Spaghetti bolognaise awaited us for our evening meal and a greatly improved performance by the fire guru rounded off another successful and enjoyable day. It was noticed that the physical exertions and open air life of this type of rough camping ensured that the whole group were ready to retire to their tents in the evening ready for an early start on the morrow.

5th October

We woke early to a stronger wind from the NE F4-5 Still good surface viz and sun giving an air temperature of 17 degrees!!!

Today we planned to leave Loch Hourn and travel to Kyle of Lochalsh. This passage is stunning in good weather so the whole group of eleven of us set off early in the morning. The passage was very comfortable with the swell from astern and then we used the sheltered side of the sound of Sleat to head north.

Dive Site 6

We investigated the possibility of carrying out a north to south drift along the eastern side of the sound and found that the there was a reasonable tide running allowing four buddy pairs to make the dive. The sea bed was mostly flat with an array of crabs and DMF's over cobbles and small boulders. During the dive a warship passed going south and was seen to alter course to keep clear of our divers.

One buddy pair experienced a thrilling "fly dive" with 5-6knots of tide! Travelling over 1.3 miles.

Dive Site 7

After lunch at Kyle of Lochalsh we dived the wreck of the Port Napier which many of us had dived before but still excites our historical interest. The viz on the wreck was not as good as in the sound of in Loch Hourn. The site of the wreck is adjacent to a large fish farm however we all enjoyed exploring this interesting wreck and seeing how some of the metal work is now deteriorating.

Thursday 6th October

Today we were joined by another seasearch expert Chris Rikard from Macduff. He had a very early start and we collected him by boat from the small village of Arnisdale across the loch from our campsite.

We planned to continue our survey work with the extra help of another very experienced seasearch diver.

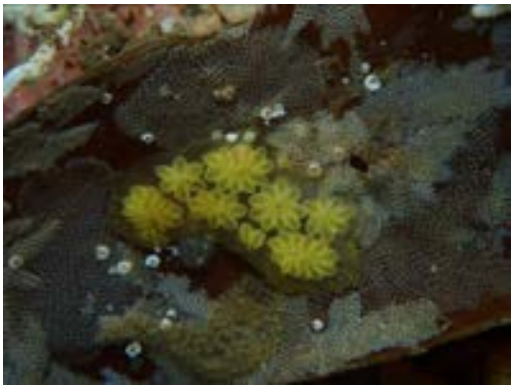
The two dives completed our survey diving. We experienced a return to the very pleasant weather conditions of full sunshine all day without a cloud which again enhanced the underwater photography. The wind was easterly F3 with only a slight swell on the loch and excellent surface viz. The sea temperature was recorded as 14 degrees which induced one of us to go for a swim in the bay at lunchtime. We also observed porpoises and an otter swimming across the bay near the campsite. We needed to collect some seafood for our evening meal so two buddy pairs were tasked with going scalloping on a nearby pinnacle while one of the boats discovered an abundant mussel bed nearby. We decided that one of our diving group must have had a secret supply of biscuits in his tent which attracted a mouse. Further investigation revealed a nest of mice located in a spare dry suit that one of our divers had brought with them! We prepared the scallops and mussels and enjoyed a wonderful meal that evening.

Friday 7th October

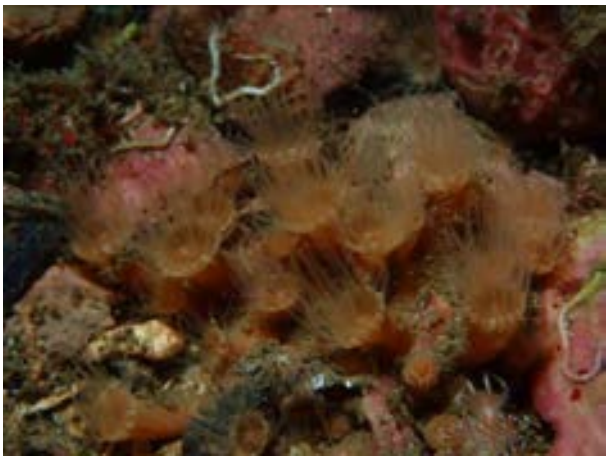
Our final day diving dawned with a spectacular sunrise followed by continued wonderful weather. Light winds again from the east Force 1 sunshine with slight swell and u/w viz for both dives of 3m.

Dive Site 10

We have named this site 39 steps. It is a series of ledges and vertical walls starting at about 50m and working up to near the surface giving a very satisfactory profile for a deeper dive. The site is teeming with crabs and squat lobsters with a number of deep crevices in which the fish shelter. We found a thornback ray on the sand. One of our group found an octopus to entertain him but as always is the case he had left his camera on the boat!



This yellow Star ascidian, ***Botryllus schlosseri***, is a colonial sea squirt with 8 to 12 individual zooids forming a star about 12 millimetres in diameter. The ascidian is growing on a Bryozoan sea mat consisting of two species. The rectangular structures on the right, left and top are ***Membranipora membranacea*** and the oval structures, along the bottom, are probably ***Electra pilosa***. ***Botryllus schlosseri*** was found at Dive Sites 1, 7, 10 and11.



The Sandy creeplet sea anemone, ***Epizoanthus couchii***, is relatively common in Loch Hourn where we found it at Dive Sites 1, 2, 3, 4, 10 and 11. We found it growing on shells and rock even in areas covered with a thin layer of silt. This tiny anemone grows to about 6 millimetres in diameter.

Dive Site 11

Another old favourite is the drift dive at the narrows. On this occasion we drifted on the ebb with the result that the second part of the dive is not as picturesque as when the dive is on the flood tide. However it is still an exhilarating experience especially on a strong spring tide.

Our evening meal was fillet steak and jacket potatoes cooked on the campfire.

Costs

Costs ended up around £240 per diver on the trip plus the cost of fuel getting there and back and cost of accommodation on the way back, this was paid for by the individuals in each vehicle apart from 1 tank of fuel for each of the vehicles towing the boats which was split amongst all on the trip.

What	Diver only costs	Cost all on trip
Fuel	£721	
Food		£717.56
Equipment (new + replacement)		£341.01
Boat fees to club	£250	
Misc		£9.00
Sub totals	£971.70	£1067.57
Total		£2039.27

For full breakdown of costs see appendix 1.

Participants.

Ian Dearden AD DSAC DIVING OFFICER

Jill Dean AD DSAC TREASURER

Martyn Dean AD DSAC BOAT OFFICER

Mike Holroyd FCD REGIONAL COACHING SCHEME DSAC SAFEGUARDING OFFICER

Duncan Read FCD

Pat Booth AD DSAC TRAINING OFFICER

Mike Coar DL

Paul Targett AD

Jan Grzywna DL

George Brown FCD NI

Accommodation

Campsite

We slept under canvas for 7 nights. Our campsite was at Poll a' Mhuineil . We were "wild camping" which is legal in Scotland since February 2005. See http://www.mcofs.org.uk for details of good practice for wild camping suggested by the Scottish Mountaineering Council to minimise impact on the environment.. A leaflet can be downloaded. http://www.mcofs.org.uk/assets/pdfs/wildcamping.pdf. On the Saturday night after camping for one week we stayed in a Fort William Hotel.

Food

Essentially this was self catering and we used the camp fire and a 2 burner stove to cook with. Cooking and washing up was shared between the group. All the food was purchased before we arrived in Kinloch Hourn excepting a small amount of shellfish we foraged for ourselves.


The Kitchen……complete with washing up facilities.

Breakfast: Porridge, dried fruit, honey. Bread & jam. Tea & coffee. Lunch: sandwiches (cheese, ham, tuna corned beef etc) soup, tea, coffee, juice. Chocolate/cake/cereal bars. Dinner: Chilli-con-carne, Spaghetti Bolognese, corned beef hash, steaks & baked potatoes, seafood night (mussels & scallops with rice), tinned fruit, cake, chocolate.

The last night, Saturday, we dined at The Cranog Restaurant in Fort William.

Transport

Car sharing was used to keep transport costs as low as possible. One member travelled from eastern Scotland and Chris joined us for one day driving to Arnisdale then we collected him by boat. Two members of the group planned to arrive on the Monday morning and were also collected by boat from Kinloch Hourn.

Training

The team had a number of experienced boat handlers but some do not have official BSAC Diver Cox'n Qualification. Boat handling practice was carried out on the expedition. Sea search training was carried out for those in the team not familiar with the method

Non Diving Partners

One diving partner was welcomed and the immense amount help they offered made the trip run smoothly and was very gratefully accepted.

Personal Equipment Needed

Tent (3 season, good wind resistance essential).

Sleeping Bag (3 season) Sleeping Mat (Thin Therm-a-rest type is good) Waterproof Jacket and Trousers (Essential, best you can afford, getting cold and wet is no fun) Thermals and thick socks for camping and diving. Cloths (walking/trekking cloths which wick away moisture and are easy to dry. Avoid cotton) Hat and Gloves(as above) Anti Midge equipment (repellent, hat etc) Camping Equipment. (Chair,plates, cutlery,cup/mug/plastic glass, thermos flask, bottle for water. Cloths for last night meal out. Shorts, sun cream, sunglasses (lets be optimistic!). Towels (microfiber sports towels dry easily are ideal). Head Torch (essential, also spare batteries). Personal Dive Kit Including: Usual dive kit and spares. Torch (remember we cant recharge batteries) Alternate source (Pony,twins) Enough air for 2 dive without refill on some days. DSMB ready to launch. (at least a second surface detection aid ie flag 2nd dsmb, whistle ect) O2 analyser

Equipment Provided by the expedition.

2 Fully equipped RHIBS. One with side scan sonar.

Shotlines, buoys weights. Oxygen (both therapeutic and for blending nitrox) O2 analiser, Blending equipment. 2 compressors. 24 large sacks of fire wood (approx 600kg) 3 sacks per night and some spare. 18 x 25 litre jerry cans for fuel. First Aid Kit including Automatic External Defibrilator Camping toilet. Toilet paper(one roll each!) Food. Large pan and gas stove for communal cooking. Survey quadrats, video and still cameras Seasearch guide books and recording forms.

One very important new piece of equipment purchased specifically for this year's expedition was a large volume water filter. On previous trips it had been necessary to carry sufficient bottled water for the whole group for eight days which with the larger group this time would have presented a considerable logistical problem. After the trip in 2014 despite us ordering the water as usual from the supermarket in Fort William they had not put in our order from their suppliers and we ended up buying a large quantity of 2l bottles of water rather than the usual 5l ones we had ordered, we later discovered that this bottled water had deposited a large crust of lime scale on the surface of the water heater which was in danger of damaging the valves and had taken hours of scrubbing to remove from the internals of the boiler. This could not happen again. We did however purchase 2 days' worth of water to give us a head start with the filtering but after that using the water filter we were able to generate ample drinking water from the relatively "clean" stream near the campsite.

Responsibilities

Ian Dearden (Branch DO, Instructor,AD) Overall responsibility Jill Dearden (Branch Sectrary AD) Food and Expedition Planning& Accounts Ian Dearden Mike Holroyd (FCD AI) FCD Mentor plan and report Diver Cox'n Assessments. Martyn Dean (Branch Boat Officer, AD) Equipment and Gas Manager, George Brown (FCD, NI) overall Seasearch responsibilites underwater photography - with others, Duncan Read (FCD, AI,) Pat Booth (AD, Instructor) Seasearch forms. Mike Holroyd first aid medical matters oxygen administration toilet facilities

The Expedition Leader had overall responsibility for safety The Dive manager was responsible each day for diving operations, record keeping, safety, oxygen and emergency equipment, weather forecasts and buddy pairings. He was able to delegate some of these functions to deputies.

It was the responsibility of each individual diver to analyse their gas mix before embarking on their dive.

The roles rotated on a daily basis so that all members of the team were involved. All members of the team including the leader were actively involved in making sure that help was offered to each other as and when required

Daily Time Table

07:00	Wake up call	12:30	Air Fills & Lunch
07:30	Breakfast	13:45	Brief on Afternoons Activities
08:00	Brief on Days Activities	13:55	Ropes Off
08:10	Prep Kit	14:55	Transit to/Locate/Shot Dive site
08:30	Ropes Off	15:10	1st Wave Divers
09:30	Transit to/Locate/Shot Dive site	16:20	2nd Wave Divers
09:45	1st Wave Divers	17:35	Return To Camp
10:45	2nd Wave Divers	18:20	Air Fills/Campfire lighting/prep evening meal.
11:45	Return To Camp	19:30	Evening meal/Debrief/Plan for next day's diving.

End of Expedition Time Table

Saturday	
06:45	Breakfast
07:15	Boats set off with dive kit to Kinloch Hourn
08:30	Boats return from Kinloch Hourn. Break Camp
09:30	Boats set off with rest of camp gear.
10:40	3rd trip may be needed
11:15	Recover Boats and Pack up kit
12:15	Set off for Fort William

14:45	Arrive Fort William
	Check in to West End Hotel possible from 14:00 . PH33 6ED · 56^{0}48'55"N 005 ^{0} 7 '2"W
19:00	Meal at Crannog Seafood Restaurant. At the Pier, 200m from Hotel.
Sunday	
10:00	Set off from Fort William for Darwen
17:00	Return Boats, Trailer, Pickup Truck to Storage.
Tuesday	
19:00	Clubnight: Clean and wash off Boats etc.

Dive Safety

All divers were expected to adhere to the practices outlined in the BSAC publication "Safe Diving Practices". A risk assessment is detailed in appendix 2.This is based on BSAC's generic open water risk assessment with additions as deemed appropriate for this expedition. The diver recall signal was briefed as continuous revving of dive boat engine and/or banging on a metal pipe underwater. This would be done in groups of 3 with a short space between them to help distinguish from incidental engine noise or banging. If an SMB is in use, by the diver to be recalled, a clip/karabiner could be dropped down the line. There were two compressors and the ability to mix nitrox for dive gas and to accelerate decompression The main sites were in the range of 25-35 m so ideal for nitrox no stop diving. We took therapeutic oxygen and a comprehensive first aid kit together with an AED. Four members of the team were qualified to use the AED

Dive Management

The dives were managed by Ian Dearden from his RHIB, Judy2. The RHIBs were always in radio contact with each other. Ch 6 was used during radio communications. A dual watch was kept on Ch 16 and Ch 6. An assistant dive manager (usually on the other RHIB) was active when the DM was diving

Survey techniques

The Seasearch format was used as the standard system for recording findings

All team members were instructed in how to use the system and some of the pre-expedition training focused on this skill.

The area to be surveyed was quite extensive so a representative sample of each underwater habitat was surveyed in detail after an overall inspection had been performed to decide which areas were most suitable.

Both still photography and video recording of the sites were undertaken to allow identification of less familiar species at a later date

Accurate position fixing for the survey sites was carried out using the GPS units.

Weather and Tidal Information

Tidal Streams within Loch Hourn were only significant in the narrows where drift dives of up to 3 knots were carried out.

The sound of Sleat and lochs on the mainland side, including Loch Hourn, are sheltered from the open sea, consequently swell was not a problem. The surrounding mountains are subject to severe squalls. The Base Camp at Poll a' Mhuineil has in the past been subjected to severe squalls from the south however on this occasion we were fortunate with the wind strength being sufficient to control the culicoides population but not worry the campers for fear of losing their tents .

Sea Temperatures 14/15. Min air temp 6. Max air temp 19

No rain was experienced throughout the week. Underwater visibility varied from 1 – 4m

Date	HIGH WATER	LOW WATER	HIGH WATER	
1ST OCT.	0730	1315	1930	
2ND OCT.	0745	1355	1945	
3RD OCT.	0815	1430	2015	
4TH OCT.	0845	1500	2045	
5TH OCT.	0915	1530	2115	
6TH OCT.	0945	1400	2145	
7TH OCT.	1030	1655	2225	
8TH OCT.	1100			

EMERGENCY PROCEDURES AND CONTACTS

For emergency and urgent situations at sea contact the coastguard (Clyde CG) on channel 16 using MAYDAY or PANPAN procedures after activating DSC red button on VHF set or on land by dialing 999 and asking for the coastguard.

If advice on DCI problems is required on land while still in Scotland contact Hyperbaric Medicine Unit at Aberdeen Royal Infirmary on 0845 408 6008.

The nearest chamber is at Oban at Dunstaffnage Marine Laboratory, Dunbeg which can be contacted through Aberdeen as above.

A list of emergency next of kin and contact numbers for the dive team was available from the expedition leader.

The VHF reception within Loch Horne is not reliable and there are many areas where mobile phone reception is not available The expedition leader contacted the local coast guard prior to the expedition to discuss an emergency action plan A next of kin list was established before the expedition.

Navigation

Both RHIBs were equipped with chart plotters and these were used to navigate under normal circumstances. In the event of a failure of these we had hand held GPS with pre prepared routes in them. There were also paper charts to refer to in a protective sleeve. Probably the most difficult navigation was from the launch site to the base camp. Chartlets were prepared for this and were referred to. The survey data for the head of the loch is very old (1800s) and so navigation using the chart plotter was done conservatively. The survey data for the rest of the loch is from 1938 so is better but care was taken as all hidden rocks may not be charted.

Safety

A comprehensive risk assessment for diving from the ribs in this location was produced which was enhanced by the dive manager for each dive. The expedition carried first aid and oxygen therapy equipment. Members of the diving team carry advanced rescue management, first aid and diver rescue qualifications

No incidents occurred requiring the skills

See Appendix 2 for risk assessment

Lessons learnt

In any dive but especially on survey dives if there is an option to take a camera with you underwater it is always worth doing.
We found marine life that was not recognised by the buddy pair but was later identified fron the photograph by one our seasearch experts.
Similarly always take a recording slate on all dives.
After our experience with the rodent problems we will consider erecting a drying line for the drysuits so they are not in contact with the grass.
Even in Scotland in October it is wise for those with sensitive skin to apply sun screen.

Acknowledgements

Information has been obtained from the following sources: Wrecksite EU Belfield Tide Plotter Reeds Nautical Almanac

The Yachtsman's Pilot to Sky & Northwest Scotland, Martin Lawrance. Cover Picture :pelhamplastics.com . Charts from

Polar Navy; www.polarnavy.com

Expedition Report Loch Hourn 2016
Appendix

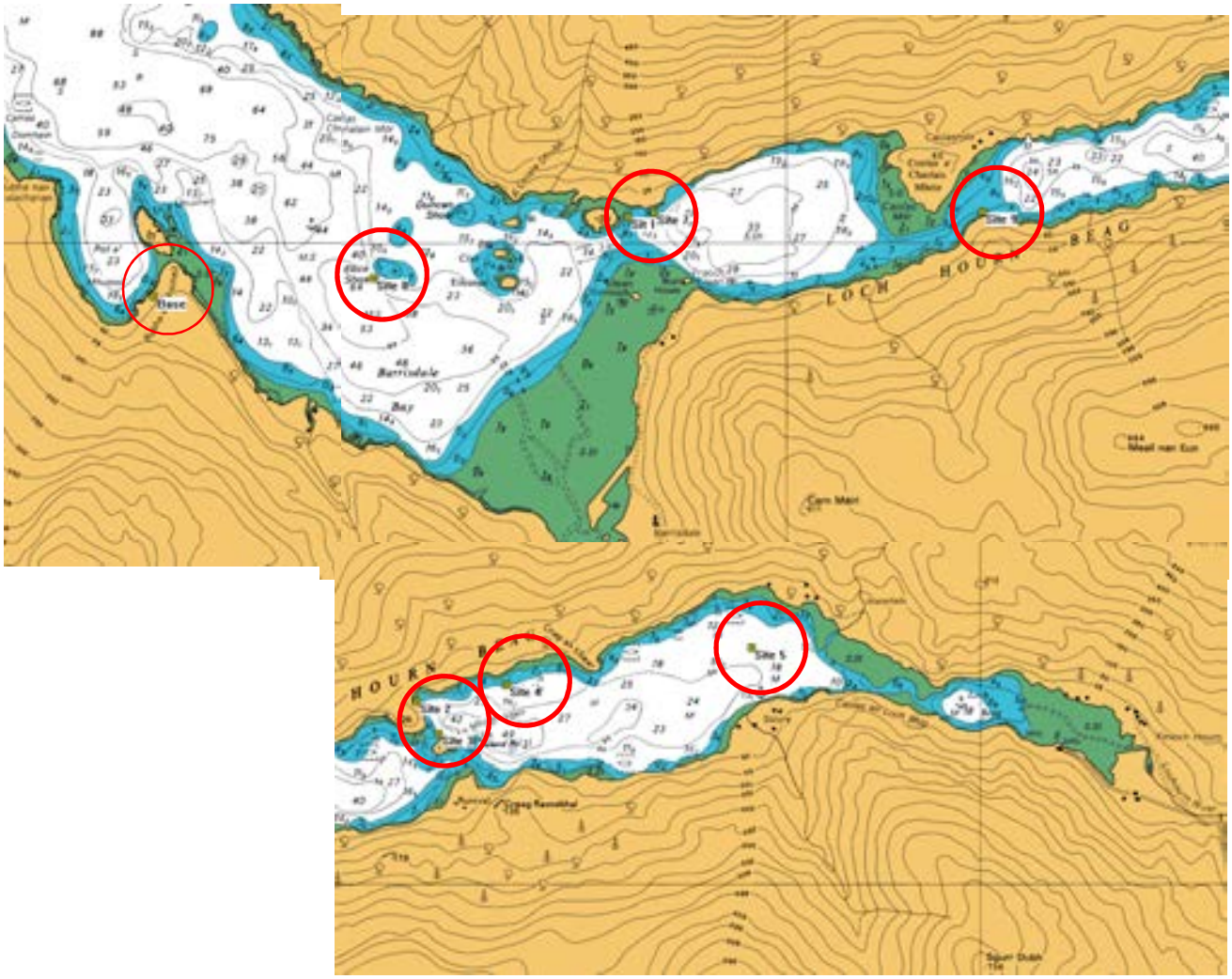
Index

Page

Appendix 1 Costing

	Cost diver only	Cost all on trip
Boat Fees	£250.00	
Spare water boiler tap		£28.99
Ma Bakers		£27.60
Spare water filters		£40.65
Spare water filter taps		£11.50
Water filter		£179.05
water cans		£38.97
Toilet fluid		£9.00
Clean water cans		£41.85
Asda food + wine		£174.82
Sainsburys food		£6.50
M Leeming Butchers		£9.00
Carlo's (receipt lost)		£9.00
Bookers food		£102.97
Sainsburys food		£40.75
Meat- Carrs scotch beef shop		£41.00
Meat- Carrs scotch beef shop		£117.00
Sainsburys bread		£20.00
Carlo's deli		£6.53
Cheese		£21.00
Petrol	£59.06	
Petrol	£114.05	
Petrol	£114.04	
Diesel	£74.89	
Diesel	£76.32	
Petrol	£114.00	
Petrol	£113.97	
Petrol	£55.37	
Morrisons		£85.87
Co-op		£38.40
Water from Morrisons (receipt lost)		£17.12
Sub totals	£971.70	£1,067.57
Total		£2,039.27

APPENDIX 2. CHART SHOWING LOCATIONS OF DIVES



Location	Latitude/Longitude (WGS84)
Base	57º 05.820'N 005º 33.694'W
Dive Site 1	57º 06.069'N 005º 30.968'W
Dive Site 2	57º 06.564'N 005º 27.365'W
Dive Site 3	57º 06.462'N 005º 27.235'W
Dive Site 4	57º 06.620'N 005º 26.842'W
Dive Site 5	57º 06.739'N 005º 25.405'W
Dive Site 6	Sound of Sleet
Dive Site 7	HMS Port Napier
Dive Site 8	57º 06.083'N 005º 30.822'W
Dive Site 9	57 º 06.023N 005 º 30.964W
Dive Site 10	57º 05.879'N 005º 32.431'W
Dive Site 11	57º 06.083'N 005º 28.940'W

N57 05.872 W5 32.418

APPENDIX 3. SEASEARCH SPECIES LIST.										
Phyla/Species	**Dive Site Number:**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Foraminifera										
Toxisarcon alba	Pepper pot				X					
Porifera										
Amphilectus fucorum	Shredded carrot sponge	X	X		X			X		
Cliona celata	Yellow boring sponge	X					X			
Clathrina lacunose	Tiny golf ball sponge								X	
Haliclona viscosa	Volcano sponge		X							
Hymedesmia paupertas	Blue crater sponge		X	X					X	
Leucosolenia sp.								X	X	
Myxilla incrustans		X					X			
Oscarella sp. “A”			X	X						
Pachymatisma johnstonia	Elephant hide sponge	X								
Polymastia boletiformis	Hedgehog sponge								X	
Stelligera stuposa							X		X	
Suberites carnosus		X	X		X		X		X	X
Cnidaria - Jellyfish										
Aurelia aurita (scyphistoma)	Moon jelly				X		X			
Cyanea capillata	Lions mane jellyfish				X					
Cnidaria - Hydroids										
Clytia hemisphaerica		X								
Halecium halecinum		X	X		X			X	X	
Hydractinia echinata			X		X	X				
Kirchenpaueria pinnata		X						X		X
Nemertesia antennina	Antenna hydroid	X			X			X	X	
Cnidaria – Soft Corals										
Alcyonium digitatum	Dead Men’s Fingers	X	X	X	X		X	X		X
Sarcodictyon catenatum		X								
Cnidaria – Sea Pens										
Funiculina quadrangularis	Tall Sea Pen				X					
Virgularia mirabilis	Slender Sea Pen									

Phyla/Species	**Dive Site Number:**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Cnidaria - Anemones										
Adamsia palliata	Cloak anemone						X			
Anemonia viridis	Snakelocks anemone							X		
Capnea sanguinea	Imperial anemone	X								
Caryophyllia smithii	Devonshire cup coral			X					X	
Cerianthus lloydii	Burrowing anemone	X	X		X			X		X
Corynactis viridis	Jewel anemone									
Epizoanthus couchii	Sandy creeplet	X	X	X	X				X	X
Hormathia coronata		X								
Metridium senile	Plumose anemone	X	X					X		X
Pachycerianthus multiplicatus	Fireworks anemone		X		X	X				
Protanthea simplex	Sea loch anemone	X	X	X	X	X			X	X
Sagartia elegans	Elegant anemone	X		X						X
Urticina eques	Horseman anemone			X						X
Urticina felina	Dahlia anemone	X								X
Nemertea										
Lineus longissimus	Bootlace worm									
Tubulanus annulatus	Football jersey worm							X		
Annelida										
Chaetopterus variopedatus	Parchment worm	X	X	X	X	X		X		
Chone sp.										
Eupolymnia sp.	Strawberry worm		X		X		X	X		X
Lanice conchilega	Sand mason worm	X						X		X
Myxicola infundibulum	Eyelash worm	X			X	X				
Polydora ciliata					X					
Spirobranchus sp.	Keel worm	X	X	X	X		X	X	X	
Protula tubularia		X	X	X			X	X	X	
Sabella pavonina	Peacock worm		X	X			X		X	
Serpula vermicularis			X	X	X				X	
Echiura										
Amalosoma eddystonense					X					
Crustacea (small)										
Balanus sp.	Barnacle	X					X	X	X	X
Caprellid sp.	Caprellid									
Iphimedia obesa	Sea flea	X								X
Jassa falcata		X								
Pandalus montagui	Humpback prawn	X								

Phyla/Species	**Dive Site Number:**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Crustacea (small) cont.										
Photis longicauda								X		X
Crustacea (large)										
Cancer pagurus	Edible crab	X		X				X	X	
Carcinus maenas	Shore crab		X		X	X				X
Galathea squamifera	Olive squat lobster									
Galathea strigosa	Spiny squat lobster	X								
Hyas araneus	Sea toad	X				X		X		
Inachus sp.	Small spider crabs	X	X		X	X		X		
Liocarcinus corrugatus	Wrinkled swimming crab									
Liocarcinus depurator	Harbour crab		X		X			X		X
Munida rugosa	Long clawed squat lobster	X						X	X	
Necora puber	Velvet swimming crab	X			X			X	X	
Nephrops norvegicus	Norway lobster									
Pagurus bernhardus	Common hermit crab		X		X	X	X			X
Pagurus prideaux	Anemone hermit crab						X			
Paguridae sp.	Hermit crab unknown	X	X							
Pisidia longicornis		X								
Mollusca (not nudibranchs)										
Aequipecten opercularis	Queen scallop	X	X		X	X	X			X
Arctica islandica	Ocean quahog									
Buccinum undatum	Common whelk	X			X		X			
Calliostoma zizyphinum	Painted top shell	X						X	X	X
Capulus ungaricus		X								
Circomphalus casina	Rough corrugated cockle	X						X		X
Gibbula cineraria	Grey top shell	X					X	X		X
Gibbula magus	Turban top shell		X		X			X		X
Helcion pellucidum	Blue-rayed limpet									X
Hinia incrassata	Thick-lipped dog whelk									
Lacuna vincta	Banded chink shell									X
Leptochiton asellus	Small limpet	X	X	X				X		
Lamellaria perspicua										X

Phyla/Species	**Dive Site Number:**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Mollusca (not nudibranchs) cont.										
Mimachlamys varia	Queen scallop		X							
Mytilus edulis	Edible mussel									
Pecten maximus	King scallop	X	X				X	X		X
Tectura virginea		X	X							
Trivia arctica	Arctic cowrie	X						X	X	X
Turritella communis	Tower shell									
Mollusca (Nudibranchs)										
Ancula gibbosa		X								
Cuthona rubescens										
Diaphorodoris luteocincta									X	
Doris pseudoargus	Sea lemon									X
Eubranchus pallidus		X								
Facelina auriculata							X			
Facelina bostoniensis		X				X		X		
Limacia clavigera	Yellow clubbed nudibranch									
Onchidoris bilamellata	Barnacle eating nudibranch	X								
Onchidoris muricata		X						X		X
Tritonia hombergii										
Brachiopoda										
Neocrania anomala	Button brachiopod			X					X	
Terebratulina retusa	Lamp shell brachiopod								X	
Bryozoa										
Alcyonidium diaphanum								X		
Bicellariella ciliata		X								
Cellaria sp.				X						
Disporella hispida				X			X			
Electra pilosa		X					X	X		X
Exidmonea atlantica				X					X	
Membranipora membranacea		X					X			X
Omalosecosa ramulosa									X	
Parasmittina trispinosa		X		X				X		
Plagioecia patina		X							X	
Scrupocellaria sp.					X			X		X

Phyla/Species	**Dive Site Number:**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Phoronida										
Phoronis hippocrepia	Horseshoe worm				X					
Echinoderms (starfish)										
Amphiura sp.	Mud burrowing starfish		X		X	X				
Anseropoda placenta	Goose foot starfish		X							
Antedon bifida	Few legged feather star	X		X	X			X	X	X
Antedon petasus	Many legged feather star	X			X		X	X	X	
Asterias rubens	Common starfish	X	X	X	X	X		X	X	X
Astropecten irregularis	Sand star							X		
Crossaster papposus	Common sunstar		X		X			X		X
Henricia sp.	Bloody Hendry	X			X					X
Luidia ciliaris	Seven legged starfish	X					X		X	X
Marthasterias glacialis	Spiny starfish	X			X			X		X
Ophiocomina nigra	Black brittle star	X	X		X					
Ophiopholis aculeata	Crevice brittle star		X							
Ophiothrix fragilis	Fragile brittle star	X	X	X	X	X				X
Ophiura albida	Two spot brittle star	X	X		X			X		
Ophiura ophiura	Sand brittle star		X		X	X		X		
Solaster endeca	Purple sunstar							X		
Echinoderms (Urchins &Cucs)										
Pawsonia saxicola										
Echinus esculentus	Edible sea urchin	X	X	X				X		X
Psammechinus miliaris	Purple tipped sea urchin		X	X	X	X				
Tunicates										
Ascidia mentula			X		X		X		X	X
Ascidia virginea			X				X			X
Ascidiella aspersa		X	X	X	X	X		X	X	X
Botryllus schlosseri	Star ascidian	X						X	X	X
Ciona intestinalis		X	X	X	X	X	X		X	X
Clavelina lepadiformis	Light bulb tunicate									X
Corella parallelogramma	Gas mantle sea squirt	X	X	X	X	X	X	X	X	
Lissoclinum perforatum					X				X	X
Polycarpa pomaria	Tea pot sea squirt								X	
Pyura microcosmus				X		X	X		X	

Phyla/Species	**Dive Site Number:**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Pisces										
Callionymus lyra	Common dragonet									
Callionymus reticulatus	Reticulated dragonet						X			
Crenilabrus melops	Corkwing wrasse									
Ctenolabrus rupestris	Goldsinny wrasse	X								
Diplecogaster bimaculata	Two-spot cling fish							X		
Gobius niger	Black goby		X							
Labrus bergylta	Ballan wrasse									
Lesueurigobius friesii	Fries goby									
Phrynorhombus norvegicus	Norwegian topknot								X	
Pollachius virens	Saithe									
Pomatoschistus microps	Common goby	X								
Pomatoschistus minutus	Sand goby		X		X					
Pomatoschistus pictus	Painted goby	X	X							X
Red algae										
Delesseria sanguinea	Sea beech	X								X
Dilsea carnosa	Red rags	X								X
Drachiella spectabilis	Iridescent weed	X								
Maerl indet	Maerl species	X								
Phycodrys rubens	Sea oak	X								
Phymatolithon calcareum	Loose maerl twigs	X								
Plocamium cartilagineum	Red comb weed	X								
Red encrusting algae		X	X	X	X		X	X	X	X
Brown algae										
Laminaria hyperborea	Cuvie		X					X		X
Laminaria saccharina	Sugar kelp		X					X		X
Green algae										
Ulva lactuca	Sea lettuce	X								

Appendix 4 Sample Seasearch report forms.

Thank you for completing this form

Please save the form, then email it to one of the following people:
- the Seasearch coordinator for the area where the dive took place
- the dive organiser
- the National Seasearch Coordinator at info@seasearch.org.uk

Your contact details will be included on the Seasearch database and those of partner organisations and will be used to send you information about Seasearch and associated projects. It will not be passed to third parties without your consent. The location, dive details, habitats and species information and the name of the recorder will be entered into a database and made available to the participating organisations and the general public. If you do not agree with this use of the data do not submit the form.

for Seasearch use only	validated by		date	
	entered by		date	
	Marlfac No			

Seasearch
Marine Conservation Society
Over Ross House, Ross Park
Ross- on- Wye
Herefordshire
HR9 7QQ

seasearch
www.seasearch.org.uk

Seasearch is a joint project co-ordinated by the Marine Conservation Society and supported by: The Wildlife Trusts, Natural England, Countryside Council for Wales, Scottish Natural Heritage, DOE Northern Ireland, Joint Nature Conservation Committee, Environment Agency, Marine Biological Association, British Sub-Aqua Club, Professional Association of Diving Instructors, Scottish Sub-Aqua Club, Sub-Aqua Association, Irish Underwater Council and the Nautical Archaeology Society

Record no

Seasearch
Observation Form

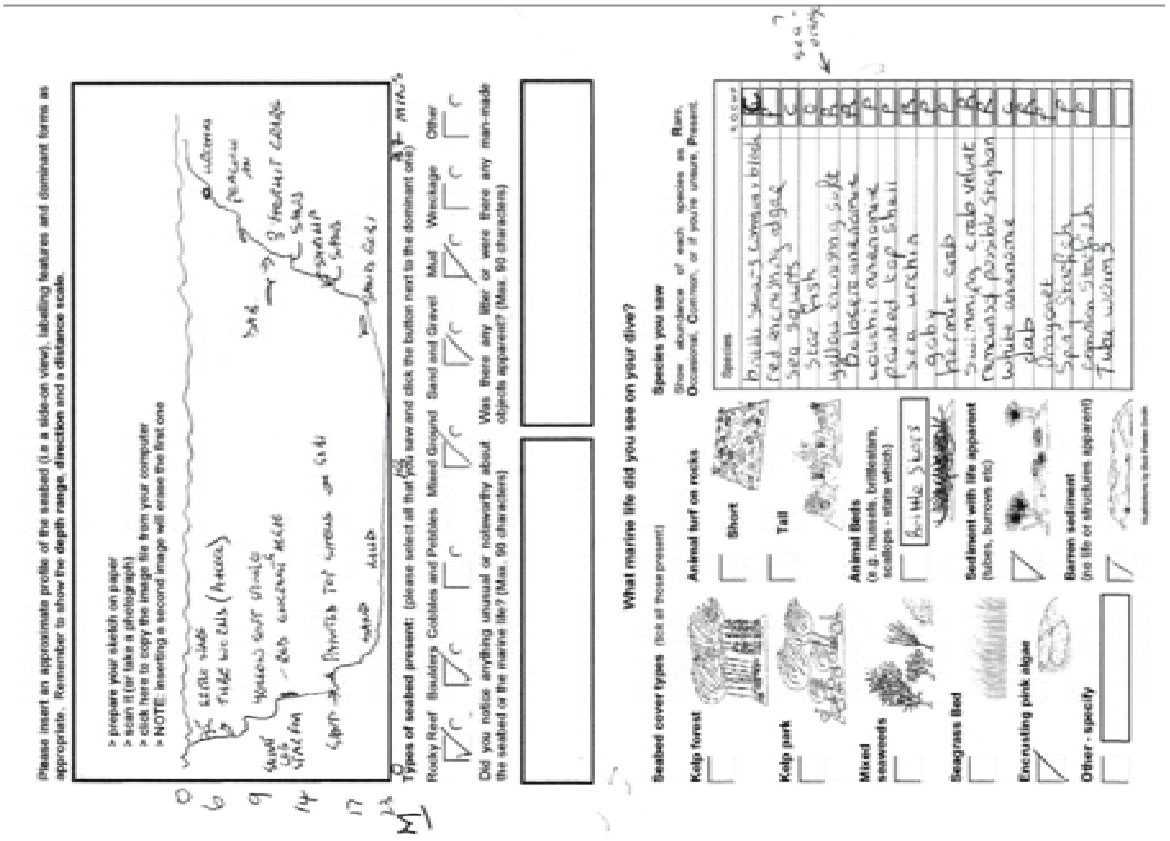
seasearch
www.seasearch.org.uk

This form asks for two types of information from your dive - **what the seabed was like** and **what marine life you saw**. Please read the guidance notes before completing the form. By completing this form you will be adding to our knowledge of the marine environment - helping it to remain fit for life!

Name [redacted]
Address [redacted]
Postcode [redacted]
Tel: Home [redacted] Mobile [redacted]
Email [redacted]
Buddy's Name [redacted]

Site Name off of Anglesey - Sylt
Date of Dive 4-10-12
Start of dive 10.25
Dive duration 57 (mins)
General Location (inc county) West Mainland Scotland
Max depth of survey 25 m
Sea Temperature 13 °C
UW visibility 4m m
Position at start of dive (degrees & decimal minutes only) 57 58.620 N 005 22.142 W
or OS Grid Reference
Position at end of dive (if different only) N W
Position derived from (select one) GPS ✓ Chart ○ OS Map ○ Web mapping site ○
Drift dive? ✗
Night dive? ✗
Did you take any photographs? ○ or video footage? ✓

SO digital v2 180120



Please insert an approximate profile of the seabed (i.e a side-on view), labelling features and dominant forms as appropriate. Remember to show the depth range, direction and a distance scale.

> prepare your sketch on paper
> scan it (or take a photograph)
> click here to copy the image file from your computer
> NOTE: inserting a second image will erase the first one

Types of seabed present: (please select all that apply and click the button next to the dominant one)

Rocky Reef	Boulders	Cobbles and Pebbles	Mixed Ground	Sand and Gravel	Mud	Wreckage	Other
○	○	○	○	○	○	○	○

Did you notice anything unusual or noteworthy about the seabed or the marine life? (Max. 90 characters)

Was there any litter or were there any man-made objects apparent? (Max. 90 characters)

What marine life did you see on your dive?

Species you saw
Show abundance of each species as Rare, Occasional, Common, or if you're unsure, Present.

Species	Abundance
Pebble Sponge	C
Common Kelp	C
Red Encrusting Algae	C
Sea Squirts	C
Star Fish	C
Yellow Encrusting Sponge	C
Bryozoan Mat	C
Common Anemone	C
Plumose Anemone	C
Dead Man's Fingers	C
Sea Urchin	C
Goby	C
Hermit Crab	C
Swimming Crab	C
Velvet Swimming Crab	C
Common Prawn	C
Possible Stephan	C
White Anemone	C
Crab	C
Pipefish	C
Spiny Starfish	C
Common Starfish	C
Tube Worms	C

Seabed cover types (tick all those present)

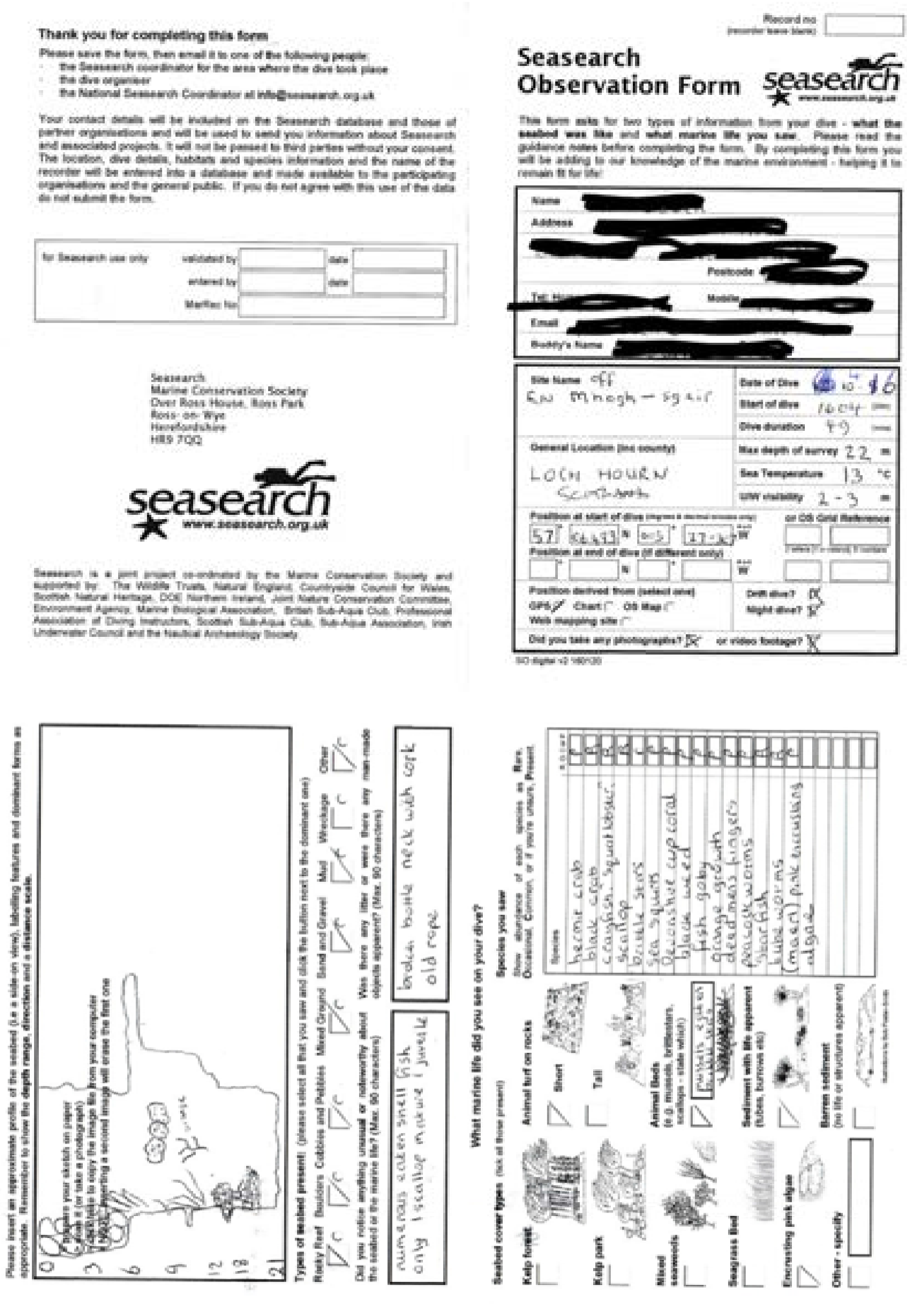
Kelp forest ○
Kelp park ○
Mixed seaweeds ○
Seagrass Bed ○
Encrusting pink algae ○
Other - specify ○

Animal turf on rocks
Short ○
Tall ○

Animal Beds (e.g. mussels, brittlestars, scallops - state which)

Sediment with life apparent (tubes, burrows etc) ○

Barren sediment (no life or structures apparent) ○



Thank you for completing this form

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- the National Seasearch Coordinator at info@seasearch.org.uk

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for Seasearch use only	validated by		date	
	entered by		date	
	Marlin No			

Seasearch
Marine Conservation Society
Over Ross House, Ross Park
Ross-on-Wye
Herefordshire
HR9 7QQ

seasearch www.seasearch.org.uk

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Record no (recorder leave blank)

Seasearch Observation Form

This form asks for two types of information from your dive - **what the seabed was like** and **what marine life you saw**. Please read the guidance notes before completing the form. By completing this form you will be adding to our knowledge of the marine environment - helping it to remain fit for life!

Name [redacted]
Address [redacted]
Postcode [redacted]
Tel. [redacted] Mobile [redacted]
Email [redacted]
Buddy's Name [redacted]

Site Name: off Eilean Mhogh-sgeir
Date of Dive: 6.10.16
Start of dive: 1604 (24hr)
Dive duration: 49 (mins)
General Location (inc county): LOCH HOURN Scotland
Max depth of survey: 22 m
Sea Temperature: 13 °C
U/W visibility: 2-3 m
Position at start of dive (degrees & decimal minutes only): 57° 06.493 N 005° 27.3 W
or OS Grid Reference
Position at end of dive (if different only)
Position derived from (select one): GPS ✓ Chart OS Map Web mapping site
Drift dive? ✗ Night dive? ✗
Did you take any photographs? ✗ or video footage? ✗

SO digital v2 160120

Please insert an approximate profile of the seabed (i.e. a side-on view), labelling features and dominant forms as appropriate. Remember to show the depth range, direction and a distance scale.

Types of seabed present: Rocky Reef, Boulders, Cobbles and Pebbles, Mixed Ground, Sand and Gravel, Mud, Wreckage, Other

Did you notice anything unusual or noteworthy about the seabed or the marine life? (Max. 90 characters): numerous eaten small fish only 1 scallop mature 1 juvenile

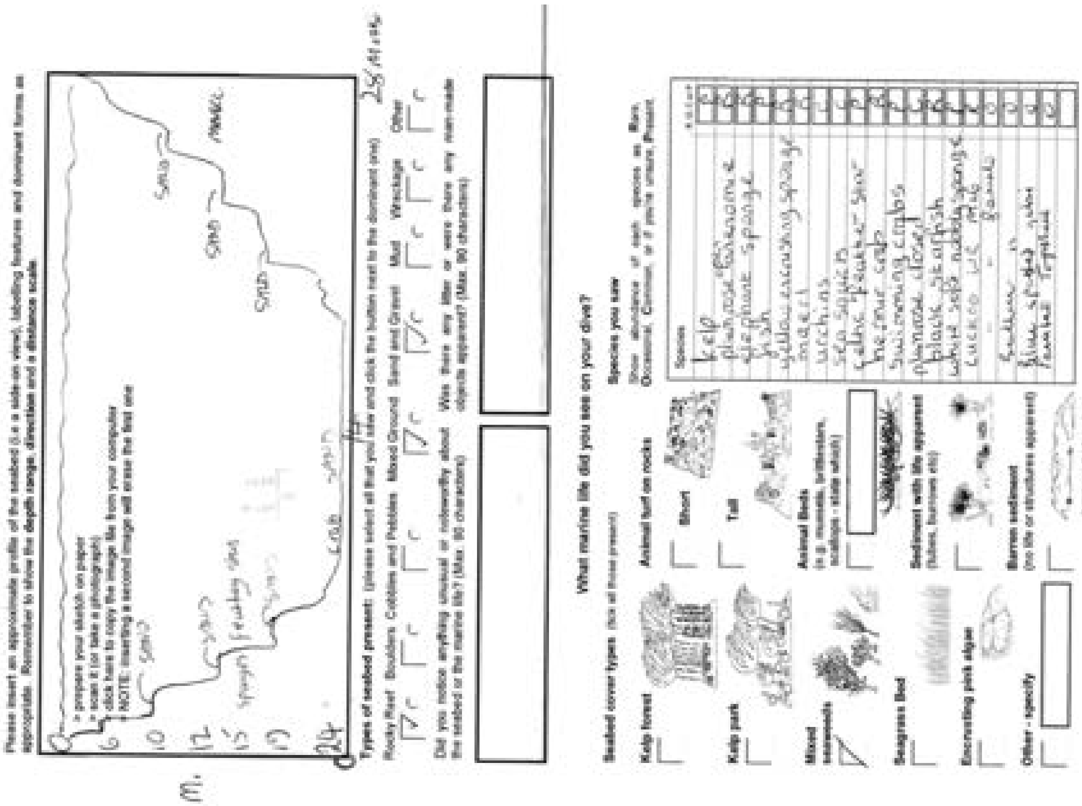
Was there any litter or were there any man-made objects apparent? (Max. 90 characters): broken bottle neck with cork, old rope

What marine life did you see on your dive?

Seabed cover types: Kelp forest, Kelp park, Mixed seaweeds, Seagrass bed, Encrusting pink algae, Other - specify; Animal turf on rocks (Short, Tall); Animal Beds (e.g. mussels, brittlestars, scallops - state which); Sediment with life apparent (tubes, burrows etc); Barren sediment (no life or structures apparent)

Species you saw — Show abundance of each species as Rare, Occasional, Common, or if you're unsure, Present.

Species
hermit crab
black crab
crayfish "squat lobster"
scallop
brittle stars
sea squirts
Devonshire cup coral
black weed
fish - goby
orange growth
dead men's fingers
peacock worms
starfish
tube worms
(maerl) pink encrusting algae



Thank you for completing this form

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for Seasearch use only	validated by		date	
	entered by		date	
	MarRec No			

Seasearch
Marine Conservation Society
Over Ross House, Ross Park
Ross-on-Wye
Herefordshire
HR9 7QQ

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Record no (recorder leave blank)

Seasearch Observation Form

www.seasearch.org.uk

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Name [redacted]
Address [redacted]
Postcode [redacted]
Tel: [redacted] Mobile [redacted]
Email [redacted]
Buddy's Name [redacted]

Site Name: WQ11 off Eilean A'Chaorach ...
Date of Dive: 6-10-2016
Start of dive: 16-11
Dive duration: 35 mins
General Location (inc county): Loch Hourn Scotland
Max depth of survey: 24 m
Sea Temperature: 13 °C
U/W visibility: 5-7 m

Position at start of dive: 56° 6-98' N 005° 30-85' W
Position at end of dive (if different only): 56° 6-90' N 005° 49-17' W
or OS Grid Reference

Position derived from (select one): GPS / Chart / OS Map / Web mapping site
Drift dive? Night dive?
Did you take any photographs? or video footage?

SG digital v2 160120

Appendix 5 Dive Log sheets

DATE	2/10	SITE	OCTOPUS WALL			DM	ID	ADM	JD	SUN EAST F2 GOOD	
Name	Qual.	OC	Cyl.1 MIX/MOD	Size	Cyl.2 MIX/MOD	Size	Cyl.3 MIX/MOD	Size	Time in	Max depth	Dive time
IAN	AD	OC	21 56	10	21 56	10	50 18	3	1735	20	50
GEORGE	FCD	OC	21 56	7	21 56	7	NA	NA	1735	16	63
PAT	AD	OC	21 56	7	21 56	7	NA	NA	1755	22	45
JILL	AD	OC	21 56	7	21 56	7	NA	NA	1740	19	40
MARTYN	AD	OC	21 56	7	21 56	7	NA	NA	1740	19	40
JAN	DL	OC	21 56	12	21 56	12	NA	NA	1841	29	39
MIKE C	DL	OC	21 56	12	21 56	12	NA	NA	1841	29	39
DUNCAN	FCD	OC	21 56	7	21 56	7	NA	NA	1755	22	45

DATE	3/10	SITE	Survey dive 1			DM	ID	ADM	DR	SUN EAST F2 GOOD	
Name	Qual.	OC	Cyl.1 MIX/MOD	Size	Cyl.2 MIX/MOD	Size	Cyl.3 MIX/MOD	Size	Time in	Max depth	Dive time
IAN	AD	OC	21 56	10	21 56	10	50 18	3	1003	24	64
GEORGE	FCD	OC	21 56	7	21 56	7	NA	NA	1003	24	64
PAT	AD	OC	21 56	7	21 56	7	NA	NA	1115	22	39
JILL	AD	OC	21 56	7	21 56	7	NA	NA	0958	19	48
MARTYN	AD	OC	21 56	7	21 56	7	NA	NA	0958	19	48
JAN	DL	OC	21 56	12	21 56	12	NA	NA	1030	23	49
MIKE C	DL	OC	21 56	12	21 56	12	NA	NA	1030	23	49
DUNCAN	FCD	OC	21 56	7	21 56	7	NA	NA	1115	22	39

DATE	3/10	SITE	SURVEY DIVE 2			DM	ID	ADM	DR	SUN E AST F4 GOOD	
Name	Qual.	OC	Cyl.1 MIX/MOD	Size	Cyl.2 MIX/MOD	Size	Cyl.3 MIX/MOD	Size	Time in	Max depth	Dive time
IAN	AD	OC	21 56	10	21 56	10	50 18	3	1630	31	72
GEORGE	FCD	OC	21 56	7	21 56	7	NA	NA	1630	31	72
PAT	AD	OC	21 56	7	21 56	7	NA	NA	NA	NA	NA
JILL	AD	OC	21 56	7	21 56	7	NA	NA	1635	27	40
MARTYN	AD	OC	21 56	7	21 56	7	NA	NA	1635	27	40
JAN	DL	OC	21 56	12	21 56	12	NA	NA	1655	30	35
MIKE C	DL	OC	21 56	12	21 56	12	NA	NA	1655	30	35
DUNCAN	FCD	OC	21 56	7	21 56	7	NA	NA	1748	17	49
MIKE H	FCD	OC	21 56	7	21 56	7	NA	NA	1727	27	32
PAUL	AD	OC	21 56	10	21 56	10	NA	NA	1727	27	32
DATE	4/10	SITE	SURVEY DIVE 3			DM	ID	ADM	DR	SUN /CLOUD EAST F3 GOOD	
Name	Qual.	OC	Cyl.1 MIX/MOD	Size	Cyl.2 MIX/MOD	Size	Cyl.3 MIX/MOD	Size	Time in	Max depth	Dive time
IAN	AD	OC	21 56	10	21 56	10	50 18	3	1003	22	63
GEORGE	FCD	OC	21 56	7	21 56	7	NA	NA	1003	22	62
PAT	AD	OC	21 56	7	21 56	7	NA	NA	1025	24	37
JILL	AD	OC	21 56	7	21 56	7	NA	NA	0956	25	50
MARTYN	AD	OC	21 56	7	21 56	7	NA	NA	0956	25	50
JAN	DL	OC	21 56	12	21 56	12	NA	NA	1016	30	42
MIKE C	DL	OC	21 56	12	21 56	12	NA	NA	1016	30	42
DUNCAN	FCD	OC	21 56	7	21 56	7	NA	NA	1114	17	51
MIKE H	FCD	OC	21 56	7	21 56	7	NA	NA	1025	24	37
PAUL	AD	OC	21 56	10	21 56	10	NA	NA	1114	17	51

DATE	4/10	SITE	SURVEY DIVE 4		DM		ID	ADM	DR	WEATHER SUN EAST F2 GOOD	
Name	Qual.	OC	Cyl.1 MIX/MOD	Size	Cyl.2 MIX/MOD	Size	Cyl.3 MIX/MOD	Size	Time in	Max depth	Dive time
IAN	AD	OC	21 56	10	21 56	10	50 18	3	1523	20	47
GEORGE	FCD	OC	21 56	7	21 56	7	NA	NA	1523	20	47
PAT	AD	OC	21 56	7	21 56	7	NA	NA	1523	15	24
JILL	AD	OC	21 56	7	21 56	7	NA	NA	1519	19	42
MARTYN	AD	OC	21 56	7	21 56	7	NA	NA	1519	19	42
JAN	DL	OC	21 56	12	21 56	12	NA	NA	1529	16	51
MIKE C	DL	OC	21 56	12	21 56	12	NA	NA	1529	16	51
DUNCAN	FCD	OC	21 56	7	21 56	7	NA	NA	1604	17	49
MIKE H	FCD	OC	21 56	7	21 56	7	NA	NA	1532	15	24
PAUL	AD	OC	21 56	10	21 56	10	NA	NA	1604	17	49
DATE	5/10	SITE	SOUND OF SLEAT		DM		ID	ADM	MD	SUN N/ E F4/5 GOOD	
Name	Qual.	OC	Cyl.1 MIX/MOD	Size	Cyl.2 MIX/MOD	Size	Cyl.3 MIX/MOD	Size	Time in	Max depth	Dive time
IAN	AD	OC	21 56	10	21 56	10	50 18	3	NA	NA	NA
GEORGE	FCD	OC	21 56	7	21 56	7	NA	NA	NA	NA	NA
PAT	AD	OC	21 56	7	21 56	7	NA	NA	NA	NA	NA
JILL	AD	OC	21 56	7	21 56	7	NA	NA	1100	18	35
MARTYN	AD	OC	21 56	7	21 56	7	NA	NA	NA	NA	NA
JAN	DL	OC	21 56	12	21 56	12	NA	NA	1030	16	56
MIKE C	DL	OC	21 56	12	21 56	12	NA	NA	1030	16	56
DUNCAN	FCD	OC	21 56	7	21 56	7	NA	NA	1058	17	13
MIKE H	FCD	OC	21 56	7	21 56	7	NA	NA	1058	17	13
PAUL	AD	OC	21 56	10	21 56	10	NA	NA	1042	12	34

DATE	5/10	SITE	PORT NAPIER		DM		ID	ADM	PT	SUN N/ E F4/5 GOOD		
Name	Qual.	OC	Cyl.1 MIX/MOD	Size	Cyl.2 MIX/MOD	Size	Cyl.3 MIX/MOD	Size	Time in	Max depth	Dive time	
IAN	AD	OC	21 56	10	21 56	10	50 18	3	1217	24	47	
GEORGE	FCD	OC	21 56	7	21 56	7	NA	NA	1217	24	47	
PAT	AD	OC	21 56	7	21 56	7	NA	NA	1258	17	37	
JILL	AD	OC	21 56	7	21 56	7	NA	NA	NA	NA	NA	
MARTYN	AD	OC	21 56	7	21 56	7	NA	NA	NA	NA	NA	
JAN	DL	OC	21 56	12	21 56	12	NA	NA	NA	NA	NA	
MIKE C	DL	OC	21 56	12	21 56	12	NA	NA	NA	NA	NA	
DUNCAN	FCD	OC	21 56	7	21 56	7	NA	NA	NA	NA	NA	
MIKE H	FCD	OC	21 56	7	21 56	7	NA	NA	1258	17	37	
PAUL	AD	OC	21 56	10	21 56	10	NA	NA	NA	NA	NA	

DATE	6/10	SITE	SURVEY DIVE 5		DM		ID	ADM	MD	SUN EAST F3 GOOD		
Name	Qual.	OC	Cyl.1 MIX/MOD	Size	Cyl.2 MIX/MOD	Size	Cyl.3 MIX/MOD	Size	Time in	Max depth	Dive time	
IAN	AD	OC	21 56	10	21 56	10	50 18	3	1032	22	60	
GEORGE	FCD	OC	21 56	7	21 56	7	NA	NA	1032	22	60	
PAT	AD	OC	21 56	7	21 56	7	NA	NA	NA	NA	NA	
JILL	AD	OC	21 56	7	21 56	7	NA	NA	1023	35	42	
MARTYN	AD	OC	21 56	7	21 56	7	NA	NA	NA	NA	NA	
JAN	DL	OC	21 56	12	21 56	12	NA	NA	1040	28	52	
MIKE C	DL	OC	21 56	12	21 56	12	NA	NA	1040	28	52	
DUNCAN	FCD	OC	21 56	7	21 56	7	NA	NA	1023	29	31	
MIKE H	FCD	OC	21 56	7	21 56	7	NA	NA	1059	25	32	
PAUL	AD	OC	21 56	10	21 56	10	NA	NA	1023	42	35	
CHRIS		OC	21 56	12	NA	NA	NA	NA	1059	25	32	

DATE	6/10	SITE	SURVEY DIVE 6 AND SCALLOP DIVE		DM		ID	ADM	MD	SUN_EAST F3 GOOD		
Name	Qual.	OC	Cyl.1 MIX/MOD	Size	Cyl.2 MIX/MOD	Size	Cyl.3 MIX/MOD	Size	Time in	Max depth	Dive time	
IAN	AD	OC	21 56	10	21 56	10	50 18	3	1514	22	45	
GEORGE	FCD	OC	21 56	7	21 56	7	NA	NA	1514	22	45	
PAT	AD	OC	21 56	7	21 56	7	NA	NA	1611	24	35	
JILL	AD	OC	21 56	7	21 56	7	NA	NA	NA	NA	NA	
MARTYN	AD	OC	21 56	7	21 56	7	NA	NA	NA	NA	NA	
JAN	DL	OC	21 56	12	21 56	12	NA	NA	1522	16	41	
MIKE C	DL	OC	21 56	12	21 56	12	NA	NA	1522	16	41	
DUNCAN	FCD	OC	21 56	7	21 56	7	NA	NA	1615	24	41	
MIKE H	FCD	OC	21 56	7	21 56	7	NA	NA	1611	24	35	
PAUL	AD	OC	21 56	10	21 56	10	NA	NA	1615	24	41	
CHRIS		OC	21 56	12	NA	NA	NA	NA	1514	22	45	

DATE	7/10	SITE	39 STEPS		DM		ID	ADM	MD	SUN_EAST F2 GOOD		
Name	Qual.	OC	Cyl.1 MIX/MOD	Size	Cyl.2 MIX/MOD	Size	Cyl.3 MIX/MOD	Size	Time in	Max depth	Dive time	
IAN	AD	OC	21 56	10	21 56	10	50 18	3	NA	NA	NA	
GEORGE	FCD	OC	21 56	7	21 56	7	NA	NA	1013	47	58	
PAT	AD	OC	21 56	7	21 56	7	NA	NA	NA	NA	NA	
JILL	AD	OC	21 56	7	21 56	7	NA	NA	1030	42	43	
MARTYN	AD	OC	21 56	7	21 56	7	NA	NA	NA	NA	NA	
JAN	DL	OC	21 56	12	21 56	12	NA	NA	1022	47	45	
MIKE C	DL	OC	21 56	12	21 56	12	NA	NA	1022	47	45	
DUNCAN	FCD	OC	21 56	7	21 56	7	NA	NA	1010	35	40	
MIKE H	FCD	OC	21 56	7	21 56	7	NA	NA	1010	37	30	
PAUL	AD	OC	21 56	10	21 56	10	NA	NA	1013	47	35	

DATE	7/10	SITE	NARROWS DRIFT		DM		MD	ADM	MC	SUN EAST F1 GOOD	
Name	Qual.	OC	Cyl.1 MIX/MOD	Size	Cyl.2 MIX/MOD	Size	Cyl.3 MIX/MOD	Size	Time in	Max depth	Dive time
IAN	AD	OC	21 56	10	21 56	10	50 18	3	1527	12	45
GEORGE	FCD	OC	21 56	7	21 56	7	NA	NA	NA	NA	NA
PAT	AD	OC	21 56	7	21 56	7	NA	NA	1514	12	34
JILL	AD	OC	21 56	7	21 56	7	NA	NA	1530	13	41
MARTYN	AD	OC	21 56	7	21 56	7	NA	NA	NA	NA	NA
JAN	DL	OC	21 56	12	21 56	12	NA	NA	1522	11	36
MIKE C	DL	OC	21 56	12	21 56	12	NA	NA	NA	NA	NA
DUNCAN	FCD	OC	21 56	7	21 56	7	NA	NA	1530	13	40
MIKE H	FCD	OC	21 56	7	21 56	7	NA	NA	1514	12	34
PAUL	AD	OC	21 56	10	21 56	10	NA	NA	1522	11	36

Appendix 6

Risk assessment

Risk Assessment Hazard	Who	Severity 1-3 (a)	Likelihood Risk 1-3 (b)	Evaluation (a * b)	Controls	Action to be taken in the event
DCI	all	3	2	6	Dive training and planning, approval. DM. Use of nitrox and computers. Extra safety stops over and above mandatory stops. Use of high % O2 for deco to 1.4 / 1.6 bar.	First aid Oxygen Contact CG
NARCOSIS	all	2	3	6	Use of mixed gas Buddy monitoring	Recognise problem Ascend
DARKNESS	all	1	3	3	Powerful torch and reserve	Use reserve Ascend
REPETITIVE DIVING	all	1	3	3	Conservative profiles Nitrox	Break Sequence
ENTANGLEMENT FISHING AND SURVEY LINES	all	1	3	3	Knives, cutters, buddy diving	Use. buddy to disengage
WRECK PENETRATION	all	2	2	4	Use distance lines, careful finning, finger walking, monitor gas. Avoid contact with silt.	Stop. Look for blue window. Follow line.
OXYGEN TOXICITY	all especially nitrox	3	2	6	Monitor depth. Planning, gas analysis, cylinder labelling, adhere to plan and MOD	Ascend. Buddy to assist to surface.
Hazard	Who	Severity 1-3 (a)	Likelihood Risk 1-3 (b)	Evaluation (a * b)	Controls	Action to be taken in the event
OUT OF GAS	all	3	2	6	Gas planning, reserve planning. Independent	Use buddy's AS

					supplies, drop cylinders	
EMERGENCY INCIDENT	all	2	2	4	Provide 1st aid and O2 Rescue management training. Rescue diver kitted up	Assess, Plan, Act. Contact CG
SURFACE TRAFFIC	all	2	2	4	Cox and DM to keep good look out. A Flag. Divers use Shot line/DSMB	Alert craft Flares, vhf A-Flag
SURFACE SEPARATION	all	2	3	6	Plan for tidal steams. Use SMB DSMB, flares, mirrors, whistles, strobes Flags, dyes, tagging system Use DSMB when unexpected tidal stream	Record time position Alert CG search down stream
SURFACE CONDITIONS & WEATHER	all	2	2	4	Constant monitoring. Use of weather forecasts obtain local knowledge Plan contingency site DM to inform CG of diving ops	Diver recall
HYPOTHERMIA	all	2	2	4	Correct thermal insulation in water and on boat. Monitor for incipient hypothermia over each day's diving	Assess degree1st aid, warm clothes,& drink Medical advice
Hazard	Who	Severity 1-3 (a)	Likelihood of Risk 1-3 (b)	Evaluation (a * b)	Controls	Action to be taken in the event
DEHYDRATION	all	2	2	4	Adequate fluid before and after diving. Limit alcohol in evenings.	Re-hydration Medical advice
SEA-SICKNESS	all	1	3	3	Medication well in advance of	Re-hydrate Don't dive

					passage. Look at horizon	
ALLERGIES	all	3	1	3	Pre-trip reporting; take medication	1st aid; medical advice
COMPRESSOR	all	1	3	3	Compressor itself only to be operated by trained team members. Cylinder filling by trained divers. Analyse gas mixes	Gas manager to supervise operations.
MAN OVER BOARD	all	3	1	3	Monitor sea state. Dry suits to be zipped up at all times	Inform cox, record position & time. Alert CG. Search pattern
FIRE	all	3	1	3	Action to be briefed at start of trip. Safety notices / position of extinguishers.	Sound alarm, tackle fire
TRIPS & FALLS INJURY FROM EQUIPMENT	all	1	3	3	All lines and gear correctly stowed especially cylinders. Extra care in rough seas	1st aid, seek medical help
Hazard	Who	Severity 1-3 (a)	Likelihood of Risk 1-3 (b)	Evaluation (a * b)	Controls	Action to be taken in the event
PROPELLER INJURY	all	3	1	3	Only enter water on command from cox. Care returning to boat esp. in tidal streams	Rescue diver
LAUNCH AND RECOVERY OF RIBS	all	2	2	4	To be briefed and supervised by cox. Dry run in sheltered conditions. Boat manager to organise team	DM to monitor performance