OUTER HEBRIDES EXPEDITION

PRELIMINARY REPORT

Contents

Team Members

Name	Degree	Year of Study	Age
Eleanor Barrie	Zoology	4	22
Elinor Grant	Zoology	3	20
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Mark Williamson (Leader)	Zoology	3	20
Rachel Faichnie	Zoology	2	19
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Sophie Zannetti (Leader)	Zoology	2	20

Expedition logistics

Pre Expedition Preparations

In November 2017 our expedition personnel were chosen, all team members were picked because they showed a keen interest in both the research proposed and the expedition. Throughout the year all team members worked extremely hard to raise the necessary money to fund the expedition. Team members gave personal contributions as well as organising whole team fundraising events which included; bucket shaking at public events, a Ceilidh and sponsored marathons, hill runs, hill climbs, hair shavings and beach cleans.

During the expedition

The 2018 expedition ran for 5 weeks between the 4th of june to the 6th of July. During the expedition our means of transportation was 3 team members cars, this was more cost effective than renting cars on the island. The team left Glasgow on the morning of the 4th and traveled to the ferry terminal at Uig. The ferry took us to the town of Tarbert on Harris and from there we drove to our accommodation at the Am Bothan Bunkhouse in Leverburgh. Due to the popularity of Harris as a summer holiday destination the availability of accomodation was limited, this meant we would have to wild camp for 4 nights between the 24th/27th during our expedition. We chose to camp at Scarista due to its central location and road access. Fieldwork would be carried out Monday to Friday and the weekends would be used for the write up of the data we collected or to conduct supplementary fieldwork if needed. When we had free time we would spend it exploring the islands hills, beaches, distillery and rare machair habitats that are a hotspot for Hebriden flora and fauna, this allowed us to encounter a wide variety of the islands animal life including golden eagles, otters and porpoises. On fieldwork days we would work from 9am till 5pm if the weather was permitting, the small mammal project and the bee project sometimes required earlier starts or longer days but these were expected and accounted for. The first week was used to scout out potential study sites and to conduct basic pilot studies, after this initial stage the main data collection began and continued up until the 4th of July. On the 6th of July we left the bunkhouse and drove to Tarbert to get the ferry back to Uig, from there we drove back to Glasgow.

Expedition Budget

Income

Personal Contributions	8 members X £200	£1600
Personal Fundraising	Goal of £300 per member plus any extra monies raised	£2,477.43
Group Fundraising	Ceilidh	£378.50
	Bucket shaking	£477.78
	Potluck	£202.56
Last year's funds		£73.42
Total		**£5209.69**

Expenditures

Ferries	£274.10
Food	£427.01
Fuel	£309.98
Accommodation	£3,710
Money refunded to team	£400
Remaining funds donated to RSPB	£88.60
Total	**£5209.69**

Research Projects

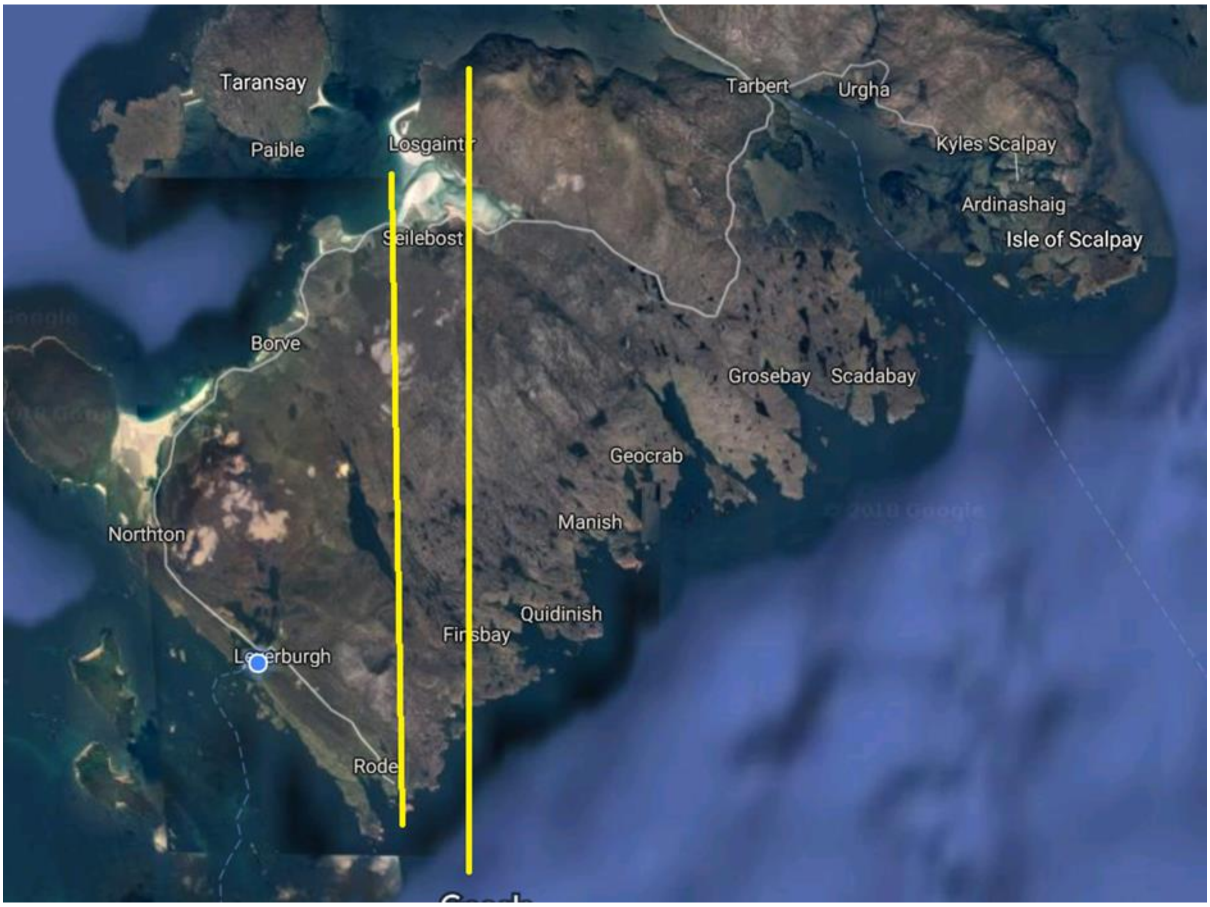
Assessment of the small mammal population distributions across south Harris.

Introduction

Small mammals are an essential component of many terrestrial ecosystems and as such it is essential to monitor their populations to both gain a better understanding of them and to be aware of the potential threats facing them (Sibbald, Carter and Poulton, 2006). Knowing the population of a small mammal species is necessary to make sure they have a healthy abundance and are not under threat or are not getting too large before a cull. Careful monitoring and management of small mammal populations can have carry over effects onto the populations of animals which use small mammals as a food source such as birds of prey. Similarly knowing the distribution of small mammal species is useful for reintroduction or eradication programs as it can inform us as to where we may need to focus our efforts for culling the remaining individuals (Sibbald, Carter and Poulton, 2006).The outer Hebrides are a group of islands off the coast of northwest Scotland which contain a diverse collection of small mammals. The area of South Harris in particular is inhabited by; wood mice (*Apodemus sylvaticus*), house mice (*Mus domesticus*), brown rats (*Rattus norvegicus*), pygmy shrews (*Sorex minutus*), rabbits (*Oryctolagus cuniculus*), hedgehogs (*Erinaceus europaeus*), the American mink (*Neovision vision*) and otters (*Lutra lutra*) (Reid). Of these only the otter is native to the islands, with all the others being introduced either accidentally or intentionally by humans. The American mink and the hedgehog are the most recent introductions to the Hebridean ecosystem. The wild mink population came from captive mink which either escaped or were released from fur farms on Lewis in the 1950's and made their way southwards to Harris (Roy, Chauvenet and Robertson, 2015) and the hedgehog population was intentionally released to control garden pests such as slugs and snails. Mink and hedgehogs have had a severe impact on the population of groundnesting birds, local fisheries and the Hebridean crofting lifestyle, because of this SNH began an eradication program throughout the Hebrides to remove these invasive species. The aim of investigation was to discover the distribution of these mammals across south Harris and to identify habitat preferences of small mammals. South Harris has a wide array of habitats ranging from sandy beaches and dunes on the west coast, Machair meadows with many species of flowering plants, large and small lochs scattered around the islands interior, heather moorlands, steep and bare mountains and a long rocky coast formed in the ice age stretching along the east coast of the island.

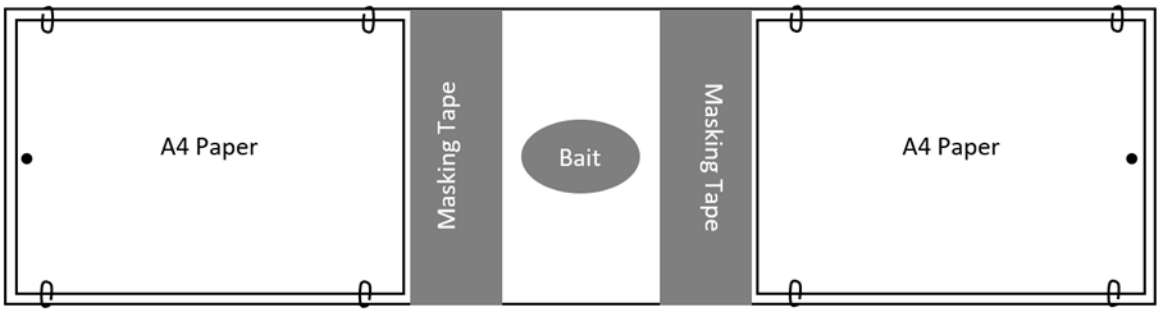
Methodology

The following types of habitat were examined across 6 different trapping sites; the west coast sand dunes and their associated shrubby grasslands at Luskentyre, a flat low lying grassy meadow at Shelibost, a heather moorland, a hilltop consisting of mostly bare rock and mosses, along the shores of loch Langabhat and a site near Rodel on the east coast of the island. All these sites were arranged in one continuous longitudinal line from the west coast to the east (Figure 1). This allowed us to better evaluate habitat changes as we trapped across the island and helped reduce any sampling bias that could arise if we selected sites based on their apparent ecological richness or sites which were easier to access.



(Figure 1, The sampling area between the east and west coast)

In order to find evidence that small mammals were present in a site both footprint traps and camera traps were set up. Footprint trapping provides a cheap and non-invasive method to reliably prove the presence of small mammals. The Footprint traps used were purchased from the NHBS online store. 8 footprint traps were placed in lines with a distance of 40m separating the traps. 3 of these lines were arranged 40m apart to create an area 280m X 80m containing 24 traps. 2 trapping grids were in use at the same time in different sites. The footprint traps were left for 5 days and nights in each site as this is enough time to accurately analyse the population of an area (Olsen, 1975). Traps were baited oats mixed with peanut butter and Nutella as well as with tuna flakes, it was hoped that these baits would attract both carnivores and herbivores. Mammals would enter the trap to eat the bait and walk over a line masking tape measuring 10cm (Figure 2) wide coated with a mix of vegetable oil and charcoal. This mixture adhered to the feet of the mammal and left a trail of footprints on a piece of A4 paper (Figure 3). This paper would be removed and the footprints were analysed to identify which species had entered the trap. Traps were secured to the ground by two tent pegs and paper was secured to the trap through the use of masking tape and paperclips



(Figure 2, The internal set up of a footprint trap (Nhbs.com, 2018).)

(Figure 3, Footprint of a Brown Rat (*Rattus norvegicus*)
(Figure 4, Picture taken by a camera trap showing a Brown Rat (*Rattus norvegicus*) exiting a footprint trap)

Traps were checked every 24 hours. Fresh bait was added and new paper was laid to ensure that the paper was not damaged by prolonged exposure to the weather or over saturated with prints to the point where identification to the species level became impossible. Paper with prints had a note taken of the date and location of the trap. Paper without prints was discarded. Any faeces which were found in the trap were photographed and analysed as these can also be used to identify small mammals to the species level.

Camera traps were selectively set up at footprint traps which were being visited the most frequency by small mammals in order to increase the chance that the camera traps would capture evidence of small mammals. The Camera traps were set to take one photo along with a ten second video of anything which triggered their sensor. Camera traps were checked daily along with the footprint traps to see if they had recorded any mammals. These recordings provide photographic evidence of the species which entered the traps and helps verify that our analysis of footprints was correct (Figure 4).

Habitat surveys were carried out in each of the different sites so that we could get an insight into the trapping environment. The transects were walked slowly and plants were collected to be identified.

The distribution of plants between sites will allow us to see the impact of floral differences can explain the presence of mammal populations. These transect walks were also used as an opportunity observe any target animals and to look for any signs of target animals including burrows, faeces, hair, cadavers and footprints outside of the traps.

Preliminary Results

As the findings of this investigation have not been fully processed and as such this results section does not represent a complete analysis of the data. The findings which can be stated without needing prior investigation will be presented.

Footprints traps did work to capture evidence of the presence of small mammals in the trapping site. The camera traps used in conjunction were also effective and managed to capture pictures of rats, mice, shrews and a cat which is a non-target mammal. No mink or hedgehogs were detected at any site but this is to be expected due to the ongoing success of the eradication programs.

The walking transects revealed otter spraints at Shelibost and Rodel which were two coastal sites, no otters were detected in the traps. Walking transects also revealed signs of rabbits at 5 out of the 6 sites excluding the hilltop site; this is understandable as the bait provided is not the preferred diet of rabbits. One sighting of a shrew was recorded at loch Langabhat but no shrews were ever detected by the footprint traps present.

Footprint traps did not record any signs of small mammals at loch Langabhat or on the hilltop. On the final trapping night at Luskentyre one mouse footprint was found in only one trap. The sites at Rodel, Shelibost and on the heather moorland above Shelibost detected footprints every trapping night. The heather moorland detected the most diverse selection of small mammals with shrews, mice and rats.

Breeding Wader Density and Habitat Preference

Introduction

Machair is abundant along the Western coast of North and South Uist. It is less widespread on Harris but could still be an important habitat for many different bird species. Machair is well known to be an important breeding habitat for a large range of breeding wader species including oystercatcher, lapwing and ringed plover. Although the most significant populations of machair nesting wader species are found on the Uists and Benbecula less is known about the populations on Harris (Fuller et al., 1986).

Harris does have a significantly smaller area of machair in comparison to the Uists and Benbecula but this has led to it being dismissed in studies. Fuller's study into the Breeding waders of the Outer Hebrides includes no data from Harris and Lewis as it is considered insignificant due to the smaller areas of machair present (Fuller et al., 1986). This does not however mean that Harris should be ignored as a habitat for waders.

The Lapwing *Vanellus vanellus* is a wader species that commonly breeds throughout Britain and is therefore one of the more well studied species. The main purpose of where a Lapwing nest is situated is usually to stay hidden from predators as opposed to having high densities of food

(Galbraith, 2008). Discovering more about the preferred nesting habitats of different species allows us to create a more habitable environment for them.

Aims:

-Comparing breeding wader densities within particular sites between Harris and the Uists

-Comparing the habitats in which waders within each species nest and raise their chicks

Methodology

Intensive observational studies were carried out on six fields in South Harris. 5 of these fields were in Northton within a Site of Special Scientific Interest (SSSI). One was in Scarista; this field was situated just outside the border of the SSSI. Northton is known to be an area of high density of breeding waders and the Scarista field was discovered whilst exploring the area for other sites.

Figure 1: Lapwing nest with 4 eggs in Northton field 5.

The first observation of each field involved noting any waders present and observing them for behaviours associated with nest or brood protection. The locations of potential breeding pairs were roughly marked out on a small map whilst in the field. When there were clear signs of any bird sitting on a nest, the nest would be approached slowly and carefully in order to cause as little disturbance as possible. The bird would move away from the nest and the eggs would quic
causing as little disturbance as possible. If the nest
observer would leave the area so the bird could re
nest would be made the same day.

This nest monitoring was carried out following the
Leech, 2011). The BTO guide was also used for spe
wader species. Each site was observed by 2 people with previous experience of identifying bird species and nest monitoring.

These observations were then repeated and each field was observed at least three times. This allowed confirmation of the location of breeding pairs and their nests or broods. The age and number of each brood observed was noted on every visit – again assisting in confirmation of the number of broods and nests per field.

The time spent observing each field was timed. However, the same amount of time was not spent observing every field as they were different areas with different densities of waders. All other birds in the fields were noted as casual observations. Any livestock present in the fields were also recorded.

The territory maps drawn in the field were then drawn out on a larger scale and all breeding waders were recorded on an excel sheet. After return visits to each field it was noted on the maps if the waders were still present and if any new pairs had been discovered.

After the wader observations had been carried out, the habitat around each brood or nest was examined. The rough coordinates of each nest and brood were found using the maps created from observations. Each nest and brood was located on the OS maps online and the grid references located. The map coordinates were then translated into GPS coordinates. The GPS Data App for iPhone was used to locate each of the previous nest and brood locations. In many cases the empty nests were found.

A 1m^2 quadrat was placed next to each nest site and the number of squares out of 100 in which each plant species was present was noted. For the broods, the quadrat was placed in an area in which the brood had been seen but due to brood movement these could be less representative than the nest locations. The height of the vegetation was taken using a 30cm ruler. The ruler was placed in each corner of the quadrat and in the centre and the height recorded at each point. The mean of the five heights was then calculated.

Due to limited experience in plant identification a set list of plant species was used based on a previous study (Calladine et al., 2014) and plants which were locally abundant. The Collins flower field guide book was used to familiarise the observers with these specific plant species before entering the field. Using a set list also decreased the time spent in the field in an attempt to reduce disturbance to any remaining birds.

Results

Table 1: Number of breeding wader pairs observed at each site. L=Lapwing, OC=Oystercatcher, RK=Redshank, DN=Dunlin, SN=Snipe, RP=Ringed plover.

Site	Area (Hectare)	L	OC	RK	DN	SN	RP	Total
Northton 1	8.6	5	4	7	5	3	0	24
Northton 2	1.36	3	1	1	2	0	0	7
Northton 3	4.92	4	2	5	6	2	0	19
Northton 4	4.53	4	6	6	4	2	0	22
Northton 5	9.9	9	3	4	3	0	2	21
Scarista	18.85	8	6	6	3	1	0	24
Total	48.16	33	22	29	23	8	2	117

The large number of breeding warders in such small fields indicates that there will be high densities of waders even when compared to other areas in the Outer Hebrides. Once the densities have been calculated they will then be comparable to those from other studies.

The results of the habitat study are yet to be analysed. These will show the percentage of each plant species in the areas in which the birds chose to nest. The plant species should be a good indication of the habitat as particular plant species prefer different types of soil and a variety of wetness.

Bumblebee Communities in South Harris Machair, with Focus on *B. distinguendus*.

Introduction

Machair is a unique form of grassland habitat that is only found in North West Europe. 70% of the world’s machair can be found in North West Scotland (Redpath-Downing et al, 2013), with the most found just South of Harris in the Uists. 80% of Scottish machair sites are recognised as SSSIs by the Scottish Government, and are also protected by the UK Biodiversity Action Plan (JNCC & DEFRA, 2012). The most recent threat to machair habitats includes anthropogenic factors - a departure from traditional crofting towards the usage of pesticides and herbicides in agriculture is thought to be adversely affecting machair in the Western Isles. Historically, the low intensity farming methods of the Outer Hebrides have resulted in particularly high invertebrate biodiversity (Love J, n.d.).

Machair is renowned for and defined by the variety of wildflowers that flourish there. Up to 45 different species of wildflower may be found in a metre square patch of machair (Love, 2003). Some particularly interesting species - such as the great yellow bumblebee *Bombus distinguendus* and the belted beauty moth Lycia zonaria - are uncommon in Scotland and machair is one of the key places that they can be found. The great yellow bumblebee has been a UK Biodiversity Action Plan (BAP) Priority Species since 2007, having undergone a decline of over 80% in the past 100 years (Bumblebee Conservation Trust, 2015). They are the rarest bumblebee in Britain. Other bumblebees, including *Bombus lucorum, Bombus muscorum and Bombus pascorum,* are also found in the machair habitat. In addition to the Great Yellow Bumblebee, *B. muscorum,* the Moss Carder, is also a recognised BAP species, with directives in regard to its conservation in place in England, Scotland, Wales and Northern Ireland (JNCC, 2007). Moss Carder’s have a distinct colour morph in the Western Isles, which are considered an important stronghold for the species after major declines in England since the 1970s (JNCC, 2007).

Bees, along with other pollinating insects, are known to exhibit colour preferences in regard to the flowers they visit. These preferences are thought to be originally innate and then learned in response to reward (Balamurali et al, 2018). Even within the same plant species, bees can learn to prefer a specific colour morph based on greater pollen availability (Russell et al, 2016). B. distinguendus is noted to have a preference for red clover (Bumblebee Conservation Trust, 2015) which is numerous within machair.

As machair is such a limited habitat, a preference of the rare Great Yellow Bumblebee for foraging there would emphasise the importance of conservation of the Harris machair. Harris’ machair was not included in the successful Machair Life project, making it more valuable to examine species composition within it. Finding a preferred flower species or colour of B. distinguendus could potentially aid the conservation of the species by enabling the encouragement to plant certain species to support the bees.

Previously, according to the RSPB, the Great Yellow Bumblebee had only been observed in Harris at the SSSI at Northton. However, an LBAP released in 2004 listed the aim “Expansion of its range from Northton in Harris (where it has been recorded) along the shoreline of Scarista and Horgabost to Luskentyre by 2008.” (Great Yellow Bumblebee Species Action Plan, 2004). This conservation goal was a key focus in this study, and transect sites were based on this, following machair along the West Coast to see if the range of *B, distinguendus* had in fact expanded.

Methods

Transect lines were run through machair at various sites along the west coast of South Harris where the majority of the islands machair can be found. There were 5 transects in total, ranging from 200-400m in length depending on the expanse of Machair present at each site. Locations of transects are shown in *figure 1.* Sites were chosen during a pilot study, and were preferentially picked for the machair quality/presence of flowering plants. Final transects were located at Northton, Scarista, Borve, Seilebost and Luskentyre (Losgaintir). Dependent on weather conditions, transects were walked with once or twice per viable day (days with heavy rain are not suitable for bumblebee transects). In total, each transect was repeated 14 times over the course of two weeks.

Figure 1. General locations of the five transects.

Flowers within 5m of the transect line were examined for foraging bees. Observations were recorded according to bee species. Using a system based on the Bumblebee Conservation Trust's Bee Walk record sheet (F2: Monthly Recording Form, 2017), the number of bees and the species of flower they were foraging on were also recorded, along with weather conditions, such as temperature, wind and cloud cover will be carefully recorded for each day of observations.

To measure floral abundance and diversity within the machair, a 1m^2 gridded quadrat was placed every 50m along each transect. Flowers were recorded according to how many squares of the grid they occupied. Only plants currently in flower were counted.

Results

The results of this study have not yet been analysed, but raw data indicates that the most common bumblebee species recorded on the machair were *B. lucorum* (white-tailed bumblebee) and *B. muscorum.* Across all 70 transect walks, six *B. distinguendus* individuals were observed. Four of these were seen at Northton, and two at Borve. All Great Yellow Bumblebees observed at Northton were foraging on White Clover (*Trifolium repens*) whilst at Borve both bees were foraging on Tufted Vetch (*Vicia cracca). B. distinguendus'* reported preference for red clover was unable to be investigated as the study took place before red clover had begun to flower.

Otter diet and feeding

Introduction:

The Eurasian otter (*Lutra lutra*) was once in rapid decline in the 20th century due to extensive water pollution, riparian habitat loss and hunting (Cho et al., 2009, Romanowski et al., 2013). The IUCN red list classed this species as vulnerable in 2000 but are now considered near threatened (Roos *et al*., 2015). It has been suggested that the major threat to otters in 2018 is limited resources (Kruuk, 2010). The species does not have a natural predator in Scotland, and mainly feeds on bottom-dwelling fishes, frogs, crayfish, crabs, birds and some mammals (Kruuk, 2010). To truly understand otters for their survival, we need to understand their ecology and behaviour.

The Eurasian otter's habitat is characterised by a secure holt/den carefully chosen in riparian habitats; mainly river banks, tree roots or among piles of rocks and debris (Roos et al., 2015). Holts have also been associated with reed beds, lochs, deciduous woodland, areas of scrub, and peat (Nature Conservation Committee, 2007). One reason for the otters decline in the past decades was due to riparian habitat loss. In Scotland, the National Forest Estate planted vast numbers of conifers on the water's edge. This caused excessive shade and acidification which altered the natural composition of the water. The Forestry Commission of Scotland has since worked to repair the natural structure and chemistry of riparian habitats to aid in the biodiversity of the area (Forestry Commission Scotland, 2018).

L. lutra exhibit a linear habitat preference, as their activity is mostly concentrated to the narrow strips at either side of their territory. Within this range, there must be sufficient vegetation, access to freshwater as to clean the salt out of their fur, low risk of flooding, access to food supply (within 100m of shore) and provide a safe play area for cubs (Nature Conservation Committee, 2007). Many females will use the same territory but have a particular area that they use more often than others. A single male territory may overlap with several female territories. Otters rarely come into contact with each other, and instead communicate their presence or reproductive stage by the use of spraints (Kruuk, 2010).

The Eurasian otter is highly abundant in Shetland and the Outer Hebrides of Scotland (Kruuk et al., 1989), however, they have not been extensively studied on the Isle of Harris. Otters are usually characterised by nocturnal activity, but the populations in Shetland and Outer Hebrides are diurnal. They become most active with the incoming tide as this disturbs their prey (Roos et al., 2015). These animals are solitary, and only come together to breed. Family groups, consisting of a female and her cubs, are the only instance that more than one otter will be sighted (Roos et al., 2015). Cubs will stay with their mother for 1.5 years to learn the valuable skills required to fish and hunt in their environment (Kruuk, 2010). The average life span of an otter is 4 years (Kruuk, 2010).

In general, otters have a high resting metabolic rate (BMR). A study by Pfeiffer and Culik (1998) measured the oxygen consumption of otters while diving. Due to the greater thermo-conduction of water, otters will lose heat 23x faster during a dive compared to on land (Pfeiffer and Culik, 1998). This study found that more energy is spent on thermo-regulation than on energy expenditure while swimming (Pfeiffer and Culik, 1998). To match their energy expenditure, otter need to consume large amount of food; between 0.8-1.8 kg a day (Kruuk, 2010). Therefore, an otter needs to hunt for around 6 hours a day, catching 200g of fish per hour. However, this means that even a 50% decrease in fish populations could be a disaster for otters (Kruuk, 2010).

There is a lack of data for otter distribution on the Isle of Harris compared to other Scottish islands. The geology of the Isle of Harris varies significantly depending on location. The west coast gets hit with Atlantic weather systems, but consists of long stretches of beaches and riparian habitats. The north of Harris consists of mountainous terrain. The east coast is the most isolated and consists of old rock formations carved from the ice age. Therefore, we propose to analyse otter distribution around the island depending on habitat. By analysing the differences between machair and rocky shore habitats, and also analysing any differences between marine and freshwater habitats.

Aims:

We had two aims for this study, first being otter distribution around the island. This will be determined based on spraint samples found at different points around the island. Our second aim is to investigate the diet of otters on Harris by collecting spraints and analysing the feeding remains. Diet has the potential to change at different areas of the island due to varying habitats. This could provide a better understanding as to whether certain areas of the island have less prey items, and generally provide insight into how successful the Eurasian otter is on the Isle of Harris.

Methodology:

A pilot study was performed within the first week to identify areas with spraint mounds. The coastline around the south of the Isle of Harris was searched for possible otter signs which included fresh spraints, feeding remains, and tracks. However, there were far more sites found on the east coast of the island. These marine locations included Leverburgh, Quidinish, Geocrab, Plocropol. Each site was required to be at least 1km away from each other (Chanin, 2003). A GPS location was recorded at each site. A minimum of 5 spraints was collected from each location. There were spraints found in other areas of the island but did not produce the 5 spraint minimum to be included in the study.

Freshwater spraints were also found in Leverburgh, Loch Langabhat, Loch na Moracha and Seilibost. These locations had to be at least 1km from the coastline to be classed as freshwater spraints. Due to the deficiency in available freshwater spraints, there was not a minimum number to obtain. All spraints were left out to dry for at least 24 hours to avoid moisture from rotting the contents of the spraint.

Figure 1. example of an otter spraint (marine) obtained from Leverburgh.

To further investigate otter diet around the coast of Harris, fish traps were set at 3 locations which had been identified as having otter presence. These locations included: Leverburgh, Geocrab and Plocropol. The traps were baited with bread and tuna and replenished every day, for 5 days. The catch from each trap was recorded each day and released away from the trap.

In a lab setting, the spraints were frozen until later analysis to further preserve the contents of the spraint. Analysis of the spraints include a filtration process to remove impurities and analysis of the fish bones, scales and remnants found in each sample. The results from each spraint can be tied to a location on the island and cross-examined with what was found in the fish traps.

Preliminary Results:

Preliminary results of otter diet around the Isle of Harris cannot be complete until further analysis of the spraints has been fulfilled. 44 marine spraints were collected around the island, however, 4 were discarded due to water damage which led to mould and rotting of the remains. The number of spraints found at each location is as follows:

Table 1. Location and number of marine spraints found around the Isle of Harris.

Leverburgh	8
Proclopol	8
Quidinish	5
Ardslave	4
Lingerbay	2
Finsbay	2
Rodel	2
Northton	1

From these results, it can be inferred that the otters in Harris prefer the east coast of the island. Freshwater spraints were less frequently found. Only 10 spraints were found that could be classed as freshwater (1km away from the coastline). This implies that there is plenty of food for otters around the coast and they are less likely to travel far inland to hunt. The number of spraints found in freshwater locations are as follows:

Table 2. Location and number of freshwater spraints found around the Isle of Harris.

Location	**Number of Spraints**
Leverburgh	5
Loch Langabhat	2
Loch na Moracha	1
Seilibost	2

The fish trapping was conducted over 5 days and caught crabs mostly, however some fish were found, including an eel. Identification of the fish has not yet been completed. The fish trapping produced the following results:

Table 3. Results of the catch found in the fish traps over a 5 day period in 3 locations. From this we can see that mostly crabs were caught, but some fish were also obtained.

Date	**Geocrab**	**Procropol**	**Leverburgh**
28/6	4 shore crabs	32 shore crabs	5 shore crabs
1/7	2 shore crabs, 1 big crab with no legs	0	2 shore crabs, 1 fish
2/7	1 fish	11 shore crabs	1 crab (not shore)
3/7	4 shore crabs	2 shore crabs	2 shore crabs, 1 eel
4/7	2 shore crabs, 1 fish, 1 shrimp	5 shore crabs	2 shore crabs, 1 fish

Acknowledgements

We would like to extend a final thank you to the following people who played a part in the success of our expedition.

A special thank you to our host Ruari Beaton, who always made us feel welcome with his great stories and warm humor even as we filled his bunkhouse with soaking equipment, otter spraints and all the other mess fieldwork creates. Ruari's local knowledge was invaluable for everything from selecting sites for data collection to finding the best beaches and bars on Harris.

We would also like to thank everyone from the University of Glasgow who helped with the planning and carrying out of our research projects including; Dr Victoria Paterson, Dr Dominic McCafferty and Professor Jason Matthiopoulos. We also need to thank those outwith the university who assisted us with our research such as Robin Reid-the RSPB conservation officer for the Western Isles and Bob Chaffer who works with SNH to control the invasive mink on Harris, their first experience with the Harris ecosystem provided us with plenty of amazing advice for our research.

The expedition would like to extend its gratitude to all the people of Harris we met during our stay, you made us feel welcome and were always eager to have a conversation or share some useful knowledge about the island and its history and ecology.

Lastly we would like to thank all our friends, families and all the generous strangers who donated to our fundraisers and supported us along the way, your encouragement and belief in us is what allowed us to make this expedition possible.

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