

Otter prey items on Ramsey Island and the associated Pembrokeshire coastline



Parry, G.S

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Author Contact details: Dr Gareth Parry, 37 St. John's Hill, Shrewsbury, Shropshire, SY1 1JQ.
Email: parrylutra@gmail.com

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1.1 History and current status of the Eurasian otter

The Eurasian otter (*Lutra lutra*) - hereafter referred to as the otter - is a semi-aquatic carnivore belonging to the Mustelid family. A comprehensive background to otter, taxonomy and conservation status has been provided in previous publications (Kruuk 2006; Parry, 2008; Parry, 2010). Otter populations underwent significant declines across much of their global range during the twentieth century (Mason and MacDonald, 1990). Despite the reported recovery of otter populations in areas of Western Europe it remains a species of conservation concern, classified as 'Near Threatened' by the International Union for the Conservation of Nature (IUCN, 2008). Otters are a European Protected Species, listed under the Conservation of Habitats and Species Regulations 2010 and schedule 5 of the Wildlife and Countryside Act (1981 – as amended). This legislation protects otters and their habitat against disturbance, damage or destruction.

In the UK, National Otter Surveys have been undertaken every seven years since the early 1980's. It is agreed that distribution across the UK has increased over the last two decades, with otters re-colonising much of their former range (Jones and Jones, 2004; Crawford, 2010). Caution should be exercised when using National Survey data to inform local conservation plans, as the standard National Survey methodology does not produce a reliable assessment of otter presence/absence at small spatial scales (Parry et al. 2013). It should also be noted that the standard Otter Survey Methodology cannot be used to estimate population size (Ruiz-Olmo et al. 2001). The fifth otter survey of Wales has not been made publically available by the Environment Agency. However, results indicate that 91 – 100% of sites in visited in Pembrokeshire were positive for otters.

In the late 1990's otters were increasingly being observed in the sea off the Pembrokeshire coast (Liles, 2003). A comprehensive survey of the Pembrokeshire coastline was carried out by Liles (2003), who found otter signs at 44.82% (13/29) of sites. This survey identified that caves and clefts in cliffs were providing secluded feeding and sprainting platforms for otters and evidence of breeding was found at four of the coastal sites.

1.2 Otter foraging and diet

Otter foraging behaviour has been described in detail by Kruuk (2006). Otters on Pembrokeshire are capable of foraging in freshwater, terrestrial and marine (Parry et al. 2011) environments. Otters have a very diverse fundamental (potential) trophic niche including fish, amphibians, crustaceans, birds, mammals, reptiles and insects (Parry, 2010), Otter diet predominantly consists of prey associated with aquatic habitats, but composition varies considerably between different habitats and geographical areas (*Op cit.*). A comprehensive study on the Pembrokeshire Coastline revealed a very diverse diet, with marine fish forming approximately two thirds of prey items. Freshwater fish and non-fish items were also regularly consumed (Parry et al. 2011). The most frequent prey items were Gobies (*Gobiidae* sp), Blennies (*Blennidae* sp), Eels (*Anguilla anguilla*) and Sticklebacks (*Gasterosteidae* sp). Birds were consumed infrequently, with Charadriiformes the dominant avian prey.

A small scale study of otter predation on avian prey was undertaken on Ramsey island, following concern for nesting seabirds from the Procellariidae order, in particular Manx Shearwaters (*Puffinus puffinus*) and Storm petrels (*Hydrobates pelagicus*). The results indicated that gulls (*Charadriiformes* sp) formed the vast majority of otter avian prey items. There were a small number of occurrences of Procellariidae remains; however, it was not possible to identify these to species level. The findings of this study were limited, as spraint collection was restricted to Ramsey Island. Otters can have very large ranges (Green et al. 1984), so prey items consumed on Ramsey may not be expelled at spraint sites on the Island. A follow up study was proposed to include spraint collections along the adjacent coastline of mainland Pembrokeshire.

1.3 Study aims

The aim of this study was to ascertain the extent of otter predation on the Procellariidae and identify if it is necessary to take measures to protect nesting sites.

Materials and Methods

2.1 Study area

Pembrokeshire is in south west Wales. It has a large number of riparian systems and a heterogeneous coastline. The Pembrokeshire coast is popular with walkers and adventure pursuits such as surfing, boat rides and coasteering. There are a large number of sea caves around the Pembrokeshire coast, which provide potential resting and breeding sites for otters (Liles, 2003).

2.2 Spraint collection

Otter spraint collections were undertaken by a team of volunteers co-ordinated by the Pembrokeshire Marine SAC officer. Spraints were collected from known spraint sites on Ramsey Island and four sites along the adjacent Pembrokeshire coastline; Porth Clais, Porth Lysgi, Caerbwdi and Carn Ar Wig. The objective was for all sites to be visited monthly between April and September 2011. During the monthly visits, volunteers were instructed to search each site for otter spraints and collect all spraints for analysis. Spraints were placed into individual sealed bags, labelled and stored in a freezer until analysis was undertaken. All spraint bags returned were checked by the author to confirm that they contained otter spraint. The other criterion required for samples to be included in the dietary analysis was that each bag must contain only one otter spraint.

2.3 Dietary analysis

All spraints were subjected to dietary analysis through the identification of hard prey remains. Prior to analysis spraints were soaked individually in 250ml beakers, containing a saturated solution of biological detergent, for a period of at least 24 hours. The spraints were then gently rinsed through a 420 μ m sieve to remove excess mucus and grit and turned out onto a sheet of blue roll (paper towel), with care taken to ensure all remains were removed from the sieve. The spraint remains were then wrapped up in the blue roll and left to dry for a period of at least 24 hours before analysis. All spraints were analysed using an Olympus SZ40© dissection microscope. Prey remains were identified using a published key (Day, 1966) and a reference collection containing vertebrae and mouth parts of 39 fish species, three amphibian species, two reptile species and feathers from Manx Shearwaters and two species of Charadriiforme.

The composition of otter diet was described using the Relative Frequency of Occurrence method described by Watson (1978). Relative Frequency of Occurrence (RFO %) = Number of occurrences of a prey type/Sum of occurrences of all prey types x 100 This method defines the presence of a prey category in a spraint as one occurrence regardless of the number of remains. Relative frequency of occurrence (RFO) is subject to the same major biases as frequency of occurrence (Carss and Parkinson, 1996). However, feeding studies on captive otters have found that this method gives a reasonably accurate interpretation of diet (Jacobsen and Hansen 1996).

Results

Survey sheets indicate that 52 spraints were collected, but only 37 spraints were submitted for dietary analysis. Five samples were rejected because it could not be certain that they were otter spraints. Two of the rejected samples were confirmed to contain badger (*Meles meles*) scat, whilst the other three did not display characteristics that could assign them to a species with sufficient confidence. Two further samples were rejected because the collection bags were not labelled. The total number of spraints analysed was 30.

In total, 49 prey occurrences were recorded covering fifteen different prey items. Non-fish formed a larger proportion of otter diet than fish prey (Table 1). A small number of prey remains could not be identified as the remains were extremely degraded. The most frequent prey items were Charadriiformes, Blennies and Four-bearded rocklings (*Enchelyopus cimbrius*). All of the Charadriiforme remains were from gulls, with no wader remains recovered. There were three occurrences of Procellariidae remains, all from spraints collected on Ramsey Island. Two of the spraints positive for Procellariidae were collected near to Ysgubor, whilst the third was collected by Y-Llech pond.

Table 1: Diet of the Eurasian otter on Ramsey Island and the adjacent Pembrokeshire coastline April – September 2011, expressed as percentage relative frequency of occurrence (RFO %).

Common name	Scientific name	RFO %
Fish prey		40.7
Blenny	Blennidae sp	10.2
Brown trout	<i>Salmo trutta</i>	2.0
Flatfish	Heterosomata sp	4.1
Goby	Gobiidae sp	2.0
Four-bearded rockling	<i>Enchelyopus cimbrius</i>	10.2
Unidentified Salmonidae	Salmonidae sp	2.0
Unidentified rockling	Gadidae sp	4.1
Wrasse	Labridae sp	2.0
Unidentified fish		4.1
Non-fish prey		61.2
Gulls	Charadriiforme sp	36.7
Beetles	Coleoptera sp	2.0
Crabs	Crustacean sp	4.1
Mollusc	Mytilus sp	2.0
Newt	Pleurodelinae sp	2.0
Shearwaters and petrels	Procellariidae sp	6.1
Unidentified avian		4.1
Unidentified Insect		2.0

Discussion

The current study indicates that Procellariidae are rarely predated by otters on Ramsey Island. This study collected spraints from a large geographic area than the previous investigation of avian predation by otters on Ramsey Island. A comprehensive study of otter diet on the Pembrokeshire coast undertaken by Parry et al. (2011) did not record Procellariidae in otter diet, despite analysing a larger number of spraints than the current study. Therefore, it can be concluded that otters rarely consume Procellariidae and this is likely to be due to opportunistic predation events. The evidence indicates that it is highly unlikely that otters have a significant impact on the populations of either Manx shearwaters or Storm petrels. Thus, measures to protect Procellariidae nesting sites, such as installing otter-proof fencing, are unlikely to be cost-effective considering the low impact of otter predation.

In a previous study of otter diet on Ramsey Island (Parry, 2009), the RFO of Charadriiformes was 54 %, consisting of 29% gulls and 25% waders. The current study only recorded gulls in otter diet, but the overall RFO % of charadriiformes remained high. The predominance of non-fish prey over fish prey in otter diet is unusual. This has been recorded in other areas where avian prey is abundant, such as Shapwick Heath National Nature Reserve in Somerset (De la Hey, 2008). Otters are thought to take prey roughly according to its availability (Heggberget, 1993; Lanszki et al. 2001). The abundance of gulls and marine fish around the Ramsey Island area, probably explains the composition of diet observed in this study. Due to the small sample size, there is a risk that the actual composition of otter diet may differ from that interpreted through the analysis, although the high occurrence of avian prey is still notable. Furthermore, it cannot be discounted that volunteers were more successful at locating spraints containing avian remains, than ones only containing fish remains. It is preferable that all spraints should be collected, as any bias in collection procedure would influence the interpretation of otter diet.

Two potential impacts are not considered by this study 1) consumption of eggs and 2) Impact of predator activity on breeding success. It has been demonstrated that Mustelids will take eggs from nests (Hammershøj, et al. 2004) although, to the author's knowledge, this behaviour has not been recorded in otters. Concern over egg predation could be investigated by installing remote camera traps at nest sites. This would reveal if any other mammalian or avian species are taking Procellariidae eggs. There is considerable evidence that disturbance, particularly by humans, has a detrimental impact on bird breeding success (Blackmer et al 2004; Beale and Monaghan, 2004). Otter appear to be actively foraging for sea birds on Ramsey. It is not clear whether the birds are predated whilst sitting on the water, or are taken from roost or nest sites. If otters are foraging at nest sites, this behaviour could potentially impact breeding success. However, the very low occurrence of Procellariidae suggests that otter are not foraging at nest sites of Manx Shearwaters or Storm petrels.

The findings of this study strengthen the previous conclusion that otters are not a major predator of Manx Shearwaters or Storm Petrels on Ramsey Island. The high occurrence of Charadriiformes in otter diet may provide some benefit to Shearwaters and petrel populations, due to the known impact of some gull species on the Procellariidae.

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