

Research Article

Estimating Otter Numbers Using Spraints: Is It Possible?

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Spraints have been used to survey otters in the UK since 1979 and a standard methodology has been set up which has been used in Britain and Europe for most survey work. At present data from these surveys is being used to give an estimation of actual population numbers. However, for this to be possible, there must be a correlation between sprainting numbers, active spraint sites, and otter numbers. This paper investigates whether such a correlation exists. There is evidence from previous work that there is seasonal variation in sprainting and this study confirms this. Therefore spraint surveys should be undertaken in the same months for each repeat survey.

1. Introduction

Recent reports have stated that otters are increasing in number all over the United Kingdom. However these reports must be treated with some caution because of the methodology of surveys. The standard methodology for otter surveys is to look for spraints (droppings) for a distance of up to 600 m from what is considered to be a suitable sprainting site, such as under a bridge or at the confluence of two streams/rivers. If spraint is found, then the 10 km grid square is marked as positive but this cannot give any idea of actual otter numbers—it simply confirms that an otter has passed that way [1, 2].

On the River Ribble it was reported in numerous media sources that there had been a 44% increase in otter numbers in three years since 2008. This was based on information from the Environment Agency website [3]. However otter populations cannot increase so quickly as they have a very slow rate of reproduction. Otters do not become sexually mature until 18–24 months and there will normally be 1–2 cubs, although occasionally there are three. The young stay with the female for 12–15 months, so she may only breed about every eighteen months. Furthermore, a report from Cardiff University highlighted the fact that out of 110 otters aged from England and Wales only 10 were aged 4 years or older and the maximum age found was only 8 years [4]. This means that

otters in England and Wales are dying much younger than in some other European countries. In Germany, for example, otters have been recorded living until 16 years old and the bulk of reproductively active females were 6–8 years old. In Cardiff only two females were older than 6 years. This therefore suggests that either otters in England and Wales reach peak breeding earlier than in Germany or they are dying before they reach this stage.

What the Environment Agency actually meant to say was that the number of spraints had increased by 44%. This has now been changed on the website but as it was so widely reported it is now believed by many to be fact.

However, it has also been stated that in Sussex otters are extremely rare. “We are starting to see them slowly move back into the county, but so far sightings are usually of lone individuals swimming in rivers near the borders of Kent and Hampshire” (J. Price, 2011 pers. comm.). This is an important issue as spraint surveys do not give any indication whether there is a breeding population or whether, as suggested here, the otters are largely lone individuals, possibly transients looking for a home range.

The only real estimates on numbers based on field work have come from two sources: Kruuk’s work in Shetland [5–7] and Yoxon’s work on the Isle of Skye [8]. In these two studies the authors correlated active otter holts with actual otter numbers determined by intensively studying areas and

working out a relationship. Kruuk et al. concluded that “there was no correlation between sprainting and the frequency of use of an area by otters. This casts doubt on the use of spraint surveys as a method to assess habitat utilisation by otters.” In a later paper Kruuk wrote “The implication is that not only does absence of spraints tell us little about otter activity but also when spraints are present numbers do not necessarily correlate with otters” [9].

DNA has also been used to estimate otter numbers. Jansman et al. [10] did work in Aberdeenshire, Scotland, and found that DNA obtained from spraint showed promise as a tool to monitor otter populations, but success rates on obtaining the DNA from spraints were low (20%) and it is also very expensive. This means that more extensive use of this method will only be possible with higher success rates and lower costs.

In Italy, Prigioni et al. [11] used DNA fingerprinting to estimate the Eurasian otter population in the Pollino National Park in Southern Italy. They collected 187 samples with 98.9% yielding otter DNA, but only 41.2% were accurately typed and accounted for 23 different genotypes. They concluded that DNA typing would be a good tool for estimating otter density over large areas.

In Kinmen, a small island off Taiwan, Hung et al. [12] used DNA sampling to estimate the Eurasian otter population and identified 38 different otters (19 females and 19 males). They also concluded that this method is expensive and this would make it difficult to do a large-scale survey, so more efficient and practical improvements are needed.

The method used by Kruuk et al. in Shetland was also used by Yoxon to estimate numbers on the Isle of Skye in 1999. From this the total population for the Isle of Skye was estimated to be between 300 and 400 [8] and on Shetland it was estimated to be 800–900 [13].

The problem remains today that otter surveys are still undertaken using spraints as the main indicator of the presence of otters and yet these bear no relationship to actual otter numbers, although they are often interpreted in this way.

The purpose of the current study was to test two hypotheses:

- (1) that actual spraint numbers can be correlated with otter numbers,
- (2) that the number of active sprainting sites can be used to estimate otter numbers.

2. The Study Area

Two coastlines were studied for over a year from October 2011 to October 2012. Both are rocky coastlines where spraints are more common than elsewhere [14]. The Ardnish Peninsula is 2.25 km long and consists of a gently sloping shoreline made up of Jurassic limestones and sandstones. The second coastline was Loch na Dal which is 2.1 km long and consists of Torridonian sandstone. The geology of the area is important as it is a determining factor on the presence or absence of freshwater pools and this in turn influences the distribution of coastal otters. Both areas are known to have good otter habitat. Paul Yoxon has been studying otters on

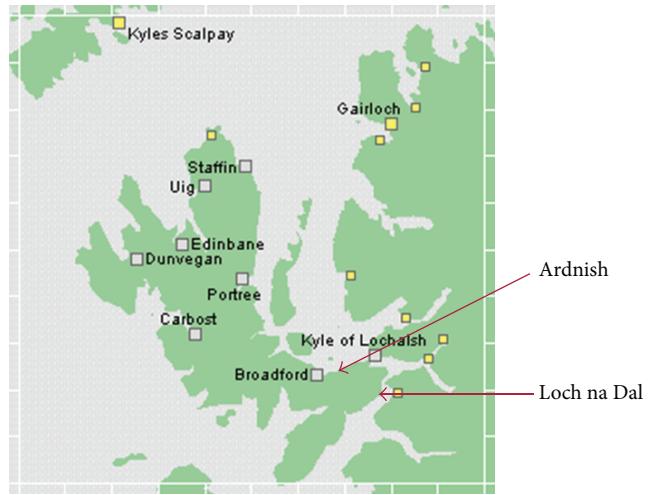


FIGURE 1: Coastal sections used on the Isle of Skye, Scotland.

both coastlines for over 20 years and have identified holts, natal holts, freshwater pools, regular sprainting points, and otter runs. The two coastlines are shown in Figure 1.

3. Methods

The field work was done by two surveyors, both with over 25 years of experience of undertaking otter surveys for both scientific purposes and as a consultant for the Scottish Government and private companies.

3.1. Spraint Numbers. Spraints are mostly deposited on green hummocks particularly near freshwater pools on the coast, streams, and otter runs. All sprainting points were identified in each coastal section and marked with a numbered plastic marker. Each month the number of individual spraints was counted at each sprainting point identified, and the number of active sprainting points was recorded. Sprainting activity is the number of sprainting points used in each section per month.

3.2. Otter Numbers. The actual number of otters was ascertained in three ways.

- (a) Each month two people spent four hours observing each coastline to record the number of individual otters seen. This provided a total number of 96 hours, observation on each coastline over the year's study.
- (b) Camera traps were placed at known holts and freshwater pools and images were checked twice a week.
- (c) Local people, who regularly look for wildlife, also contributed sightings on a regular basis.

Clearly, if more than one otter is observed, there is a possibility that the same animal has been recorded twice. However all the recorders are very experienced in otter observation and only recorded more than one animal when

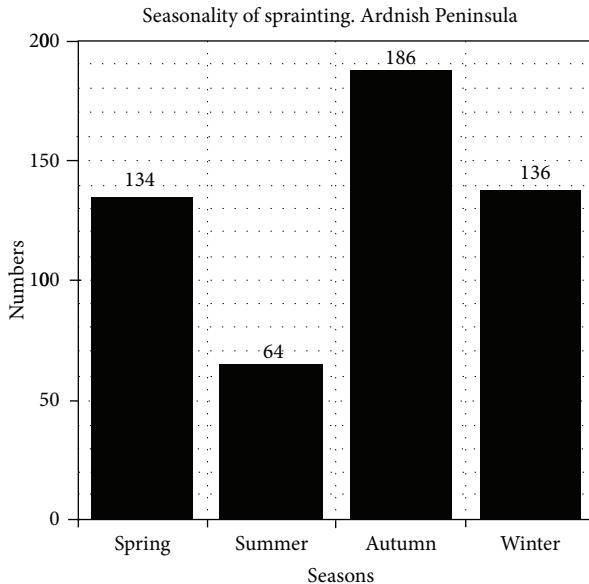


FIGURE 2: Seasonality of spraiting on the Ardnish peninsula.

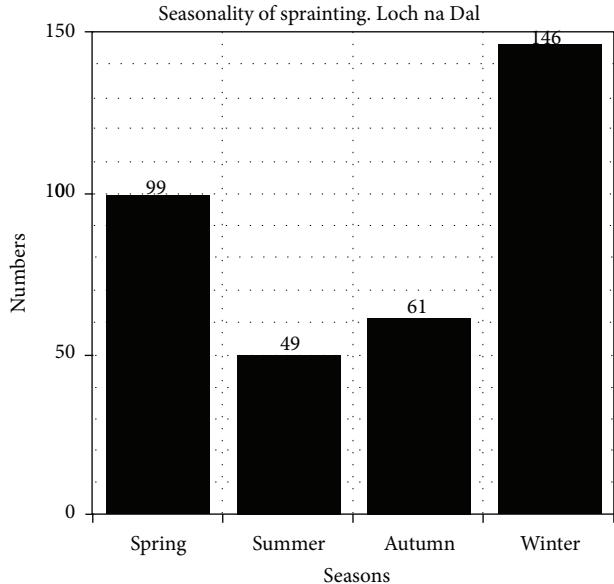


FIGURE 3: Seasonality of spraiting at Loch na Dal.

they were seen at the same time. The numbers recorded are the maximum seen by any of the three observational methods during the month.

4. Results

4.1. Loch Na Dal. In September 2011 a mother and large cub were observed on the coast. The cub stayed until December and then dispersed, leaving just a single otter on the coast. A male visited the area during the months of November and April. In Loch na Dal we have a mean of 17.5 spraints per otter and 4.42 spraints per active spraint site.

The results from Loch na Dal are shown in Tables 1 and 2.

4.2. Ardnish Peninsula. In September 2011 a mother and two cubs were seen on the coast until May 2012 when a dead cub was seen near the gate at the start of the peninsula. The mother and single cub continued to be observed until July when the cub dispersed. A male was observed periodically from February through to August 2012. In Ardnish we have a mean of 16.3 spraints per otter and 2.29 spraints per active spraint site.

The results from Ardnish are shown in Tables 3 and 4.

5. Seasonality of Spraiting

As in previous studies, a marked difference in spraint numbers was found throughout the seasons with more spraints on land in winter than summer.

In Ardnish there was an increase of 112% in the winter spraint numbers compared to the summer and at Loch na Dal it was even more marked at 198% (Figures 2 and 3).

6. Discussion and Conclusions

It is clear from this study that spraint numbers and spraint activity do not correlate with actual otter numbers. It is also not possible to relate it to the gender of the animals, particularly when the sex of a cub may not be known. It merely confirms that an otter has been present and spraint can also be analysed to give an indication of diet. However, if no spraints are found, it cannot be assumed that otters are definitely not present. In Wales, Parry et al. [15] found that in one visit to a site there were no spraints but the next week spraints were present. So absence could only be assumed if no spraint was found on repeated surveys. Therefore if spraint surveys are being used to give an indication of otter numbers, the area must be visited more than once. This is not done in the National Otter Surveys in the UK as each section of just 600 m of waterway is visited only once.

Spraiting can take place in the water and on land, but clearly spraints will only be found on land. Spraints in a coastal environment may also be lost on a rising tide and in times of flood in freshwater areas. If surveys are carried out after heavy rain, spraints may also have been washed away.

On coastal areas on the Isle of Skye Paul Yoxon found nearly three times the number of spraints in winter months compared to the summer [8]. Erlinge [16] in Sweden found intense spraint marking during the period from October to March with a decrease in spraint counts in the months of June and July. A similar pattern was found on the River Severn in Wales with a large increase in spraints and active spraiting sites in the winter months [17]. In Shetland huge seasonality in spraints has been found, with ten times more spraints found per visit in winter than in summer [6].

In studies in a freshwater area of Bulgaria, Georgiev [18] found that spraint numbers, although higher in winter months, were the lowest in spring and the most spraiting

TABLE 1: Spraint numbers and otter numbers by month at Loch na Dal.

Month	Spraint numbers	Otter numbers
October 2011	24	2
November 2011	22	3
December 2011	52	2
January 2012	72	2
February 2012	52	2
March 2012	38	2
April 2012	27	3
May 2012	34	1
June 2012	16	1
July 2012	18	1
August 2012	15	1
September 2012	15	2

No correlation was found to exist between spraint numbers and otter numbers during the 12-month survey ($r = 0.21$, $n = 12$, and $P < 0.05$). Using the Pearson Product Correlation Coefficient only 4.39% of spraint numbers could explain changes in otter numbers.

TABLE 2: Active spraining points and otter numbers at Loch na Dal.

Month	Active spraining points	Otter numbers
October 2011	6	2
November 2011	7	3
December 2011	9	2
January 2012	10	2
February 2012	11	2
March 2012	7	2
April 2012	8	3
May 2012	9	1
June 2012	5	1
July 2012	4	1
August 2012	4	1
September 2012	7	2

There was also no correlation between active spraining points and otter numbers ($r = 0.42$, $n = 12$, and $P < 0.05$). Using the Pearson Product Correlation Coefficient only 4.39% of spraint numbers could explain changes in otter numbers.

TABLE 3: Spraint numbers by month on Ardnish.

Month	Spraint numbers	Otter numbers
October 2011	75	3
November 2011	74	3
December 2011	57	3
January 2012	55	3
February 2012	24	3
March 2012	14	2
April 2012	33	3
May 2012	87	3
June 2012	32	3
July 2012	13	3
August 2012	20	2
September 2012	37	1

No correlation was found to exist between spraint numbers and otter activity ($r = 0.36$, $n = 12$, and $P < 0.05$). Using the Pearson Product Correlation Coefficient only 12.9% of spraint numbers could explain changes in otter numbers.

TABLE 4: Active sprainting points on Ardnish.

Month	Active sprainting points	Otter numbers
October 2011	25	3
November 2011	21	3
December 2011	11	3
January 2012	19	3
February 2012	10	3
March 2012	7	2
April 2012	12	3
May 2012	21	3
June 2012	32	3
July 2012	13	3
August 2012	20	2
September 2012	37	1

No correlation was found between active sprainting points and otter activity ($r = -0.38$, $n = 12$, and $P < 0.05$). Using the Pearson Product Correlation Coefficient only 12.9% of spraint numbers could explain changes in otter numbers.

activity occurred in the autumn. However, Parry et al. [15] found that in lowland rivers in South Wales there is no seasonal variation in spraint numbers. Parry et al. found that detecting otters using the standard survey methods was very low, at 26% probability of finding otter signs, and several visits to a site had to be undertaken to improve the detection methods.

Spraiting behaviour is therefore quite variable between coastal and freshwater areas and also within freshwater areas themselves. Clearly seasonality in spraiting does occur in many coastal and freshwater environments and it is therefore vital that spraint surveys are carried out at the same time of year; otherwise no comparison can be made between one survey and the next. Otherwise with all these inconsistencies regarding seasonality, it would make the use of spraints to monitor otter populations very tenuous.

In most freshwater areas otters are rarely seen and so population monitoring has to be done using other methods. So far this has been done mostly using spraint but given that spraint numbers and activity cannot be used to give an estimate of otter numbers it also cannot be used to indicate if a population is going up or down or is stable. It simply says that an otter has been there at some point in time. If populations are to be monitored accurately, another method must be used such as DNA or scent analysis and further work needs to be done on this.

If otter numbers cannot be estimated using spraints, it is important to have another reliable method. As Kruuk said “What is needed more than anything else is a method of surveying that quantifies otter numbers or density, rather than just numbers of spraints” (Kruuk, 2013, pers. comm.). DNA analysis of spraint can be used and it is becoming less of an expensive option. However, the spraint has to be very fresh for analysis and the number of spraints needed to give good results is high.

The Cardiff University Otter Project has been researching into the possibility of scent analysis of spraint as a means of identifying individuals. Older spraints can be used for this and it could therefore be a useful tool for detailed monitoring of otter populations. However, recently Cardiff University has

suffered considerable funding cuts and the project is under severe threat of closure.

Conflict of Interests

The authors declare that they have no conflict of interests.

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