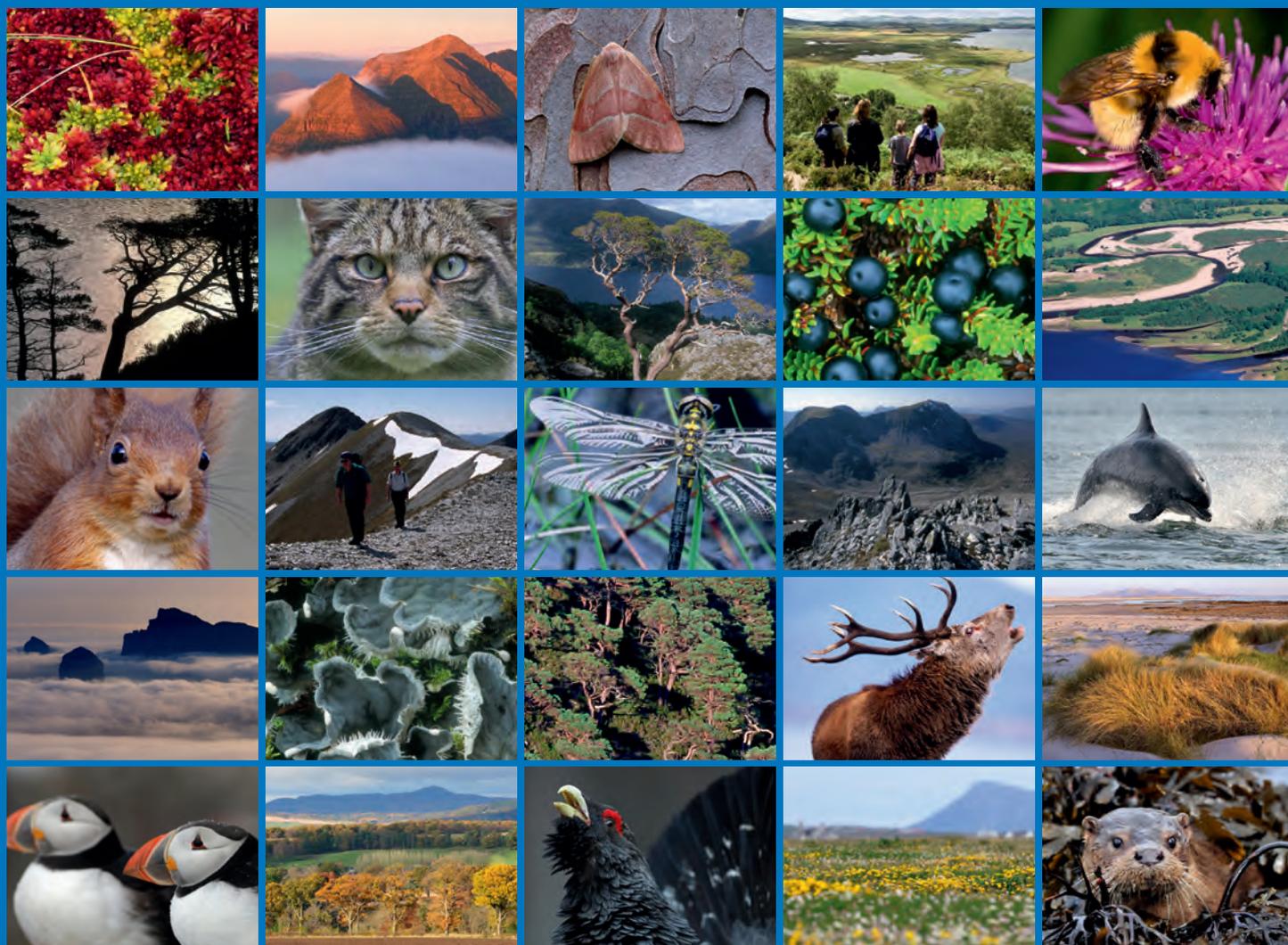


Site condition monitoring for otters (*Lutra lutra*) in 2011-12





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COMMISSIONED REPORT

Commissioned Report No. 521

Site condition monitoring for otters
(*Lutra lutra*) in 2011-12

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COMMISSIONED REPORT

Summary

Site condition monitoring for otters (*Lutra lutra*) in 2011-12

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Keywords

Otter; *Lutra lutra*; monitoring; Special Area of Conservation.

Background

44 Special Areas of Conservation (SACs) for which otter is a qualifying interest were surveyed during 2011 and 2012 to collect evidence to inform an assessment of the condition of each SAC. 73 sites outside the protected areas network were also surveyed. The combined data were used to look for trends in the recorded otter population in Scotland since the first survey of 1977-79.

Using new thresholds for levels of occupancy, and other targets agreed with SNH for the current report, the authors assessed 34 SACs as being in favourable condition, and 10 sites were assessed to be in unfavourable condition. These assessments form the basis of the authors' recommendations on site condition to SNH. They used modelled occupancy figures which included a spate indicator to at least partially account for detectability issues caused by the wet summers of 2011 and 2012.

Generalised Linear Models (GLMs) were used to compare surveys across all time periods. At a Scottish level, the recorded otter presence decreased between the 1977-79 and 1984-85 surveys, then increased to a peak in 2003-04, before declining slightly. Survey conditions during 2011 and 2012 were, however, extremely wet with frequent spells of heavy rainfall resulting in spates and local flooding. To investigate whether these conditions had resulted in false negatives, further analysis was commissioned. This found that elevated river flow above the median flow rate affected recorded otter presence and that a small difference in detection levels could render former differences insignificant. The recent reduction in recorded otter presence therefore may not represent a decline in actual otter presence.

Main findings

- There has been an apparent decline in recorded otter presence since 2003-04, but caution is needed in drawing firm conclusions from this, due to detectability issues associated with the current standard otter survey method. These are discussed in detail.
- The wet summers of 2011 and 2012 may have resulted in false absences. This potential effect on occupation in SACs has been corrected as far as possible and predicted occupancy has been used. This was considered the best approach given the survey methodology.

- Using the parameters set out in the report, at least 34 of 44 SACs were assessed as being in favourable condition.
- The wider countryside sites were assessed as having a lower level of occupancy than the SAC sites when analysed across all survey periods for all of Scotland.
- Available data for the assessment of prey availability and levels of toxic pollutants were inconsistent, and this needs to be addressed for future site condition monitoring.
- The results of this survey illustrate the importance of regular monitoring.

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1. INTRODUCTION

The UK Biodiversity Action Plan (BAP) and the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the EC Habitats Directive) place obligations on the UK Government to undertake surveillance of Eurasian otters (*Lutra lutra*). The species is listed as a BAP Priority Species and a UK Action Plan has been published. The Action Plan specifies a requirement to '*monitor populations and distribution of otters throughout the UK, including local survey to monitor the expansion of fringe populations.*' The EC Habitats Directive states that '*Member States shall undertake surveillance of the conservation status of ... species referred to in Article 2 with particular regard to ... priority species*' (Council of the European Communities, 1992). The last systematic survey of the distribution and status of the otter in Scotland was undertaken by Scottish Natural Heritage (SNH) during 2003-04 (Strachan, 2007), and was the fourth in a series of national surveys covering Scotland. The previous three were undertaken by the Vincent Wildlife Trust in 1977-79 (Green & Green, 1980), 1984-85, (Green & Green, 1987) and 1991-94 (Green & Green, 1997). (The first and third of these surveys provided almost complete coverage of Scotland at the 10 km square level). Similar surveys have also been conducted in England, (Crawford, 2010), Wales, (Jones & Jones, 2004), Northern Ireland, (Preston *et al.*, 2006) and Ireland, (Bailey & Rochford, 2006).

The Scottish surveys to 1994 clearly demonstrated that the species had strongholds in the Highlands, Hebrides and Shetland, but had undergone a decline during the 1970s in the Central Belt and parts of south east Scotland, although to a lesser extent than that observed in England or Wales. The 2003-04 survey covered all 44 otter Special Areas of Conservation (SACs) plus one Site of Special Scientific Interest (SSSI) and, in addition, included 58 x 10km squares referred to as the Focus Zone where previous national surveys had recorded less than 50% of sites positive for otters. (Some of these Focus Zone squares were also within SACs). The 2003-04 survey results showed that 92% of the 1376 sites surveyed had positive evidence of otter activity. Compared to 57% of positive sites in 1977-79, 65% in 1984-85 and 88% in 1991-94, the 2003-04 data indicated a steady increase in the range of the Scottish otter population since the 1970s and it was concluded in the report that the results of the survey showed evidence for the continued recovery of the otter in Scotland which was described as '*widespread and abundant*', (Strachan, 2007). The 2007 report recommended that future survey and monitoring effort need not be at the same level as previous surveys for sufficiently meaningful information on population trends to be provided. In addition it recommended that the focus of subsequent survey should be on the designated SACs for which otters are cited as a qualifying interest and for which full Site Condition Monitoring (SCM) is required on a 12 year cycle. This contract includes 44 SACs for which the otter is a qualifying feature and 36 x 10km squares in the wider countryside which were selected randomly. The results from the Muir of Dinnet SAC are included in the analysis but it was surveyed under a separate contract following the same survey protocol.

2. AIMS AND OBJECTIVES

The aim of this survey was to replicate the site SCM element of the 2003-04 national survey with the following three objectives:

- to undertake essential second cycle site condition monitoring on SACs where otters are identified as a qualifying feature;
- to provide data on the wider countryside as a broad comparison to SACs and,
- to use the extensive geographical coverage of the combined SAC and wider countryside data to provide an assessment of the overall conservation status of otters throughout Scotland¹.

The original brief included other aims but these were discussed with the project manager and deemed inappropriate. These were to calculate, for the largest SACs:

- an index of otter occupancy in each 10km square visited, as measured by the percentage of positive signs in each square and,
- an index of otter activity, as measured by the mean number of otter signs per positive site.

¹ When attempting to assess the overall conservation status of otters across the country in this way it must be recognised that otter SACs were positively selected for their noteworthy otter populations – see Section 3.2.

3. METHODS

3.1 Sampling strategy

All SACs that have the otter as a qualifying interest of the site were surveyed. The SACs are spread geographically throughout Scotland and were selected to represent as many habitat types as possible. Each SAC was sampled with survey lengths of 600m along riparian habitat. The sampling protocol within each SAC followed Brewer *et al.* (2002) in that two 600m sites per 10km square were sampled. The 2003-04 survey also followed this protocol. Where possible, the same 2003-04 sample points were used in the 2011-12 survey. The addition of Geographic Information System (GIS) planning in the 2011-12 survey enabled a more comprehensive approach to the selection of sample points. In some instances sites from earlier surveys were used in preference to the 2003-04 sites if a better distribution could be obtained relative to the SAC boundary and/or increasing distance between sites.

Each SAC was surveyed where possible in the same month as in the 2003-04 survey. Some adjustments had to be made to avoid the busiest period of the stalking season on some estates so complete parity in timing of each SAC between the survey period in 2003-04 and that of 2011-12 was not possible. Table 1 summarises the SACs included in the survey.

Table 1. Summary of SACs

	SAC	SNH Area	No. Sample sites	Survey period
1	Yell Sound Coast	Northern Isles and North Highland	10	June 2012
2	Hascosay	Northern Isles and North Highland	2	June 2012
3	Loch of Isbister	Northern Isles and North Highland	2	September 2011
4	Caithness & Sutherland Peatlands	Northern Isles and North Highland	68	September/ October 2011
5	River Borgie	Northern Isles and North Highland	4	October 2012
6	Durness	Northern Isles and North Highland	5	September 2011
7	Foinaven	Northern Isles and North Highland	8	June 2012
8	Ardvar and Loch a' Mhuilinn Woodlands	Northern Isles and North Highland	4	September 2012
9	Inverpolly	South Highland	7	September 2012
10	Dornoch Firth and Morrich More	Northern Isles and North Highland, South Highland	7	August 2011
11	Loch Maree Complex	South Highland	17	July 2012
12	Kinloch and Kyleakin Hills	South Highland	4	August 2011
13	Strathglass Complex	South Highland	12	August/September 2012
14	Ness Woods	South Highland	6	July 2011
15	Loch Ruthven	South Highland	2	July 2011

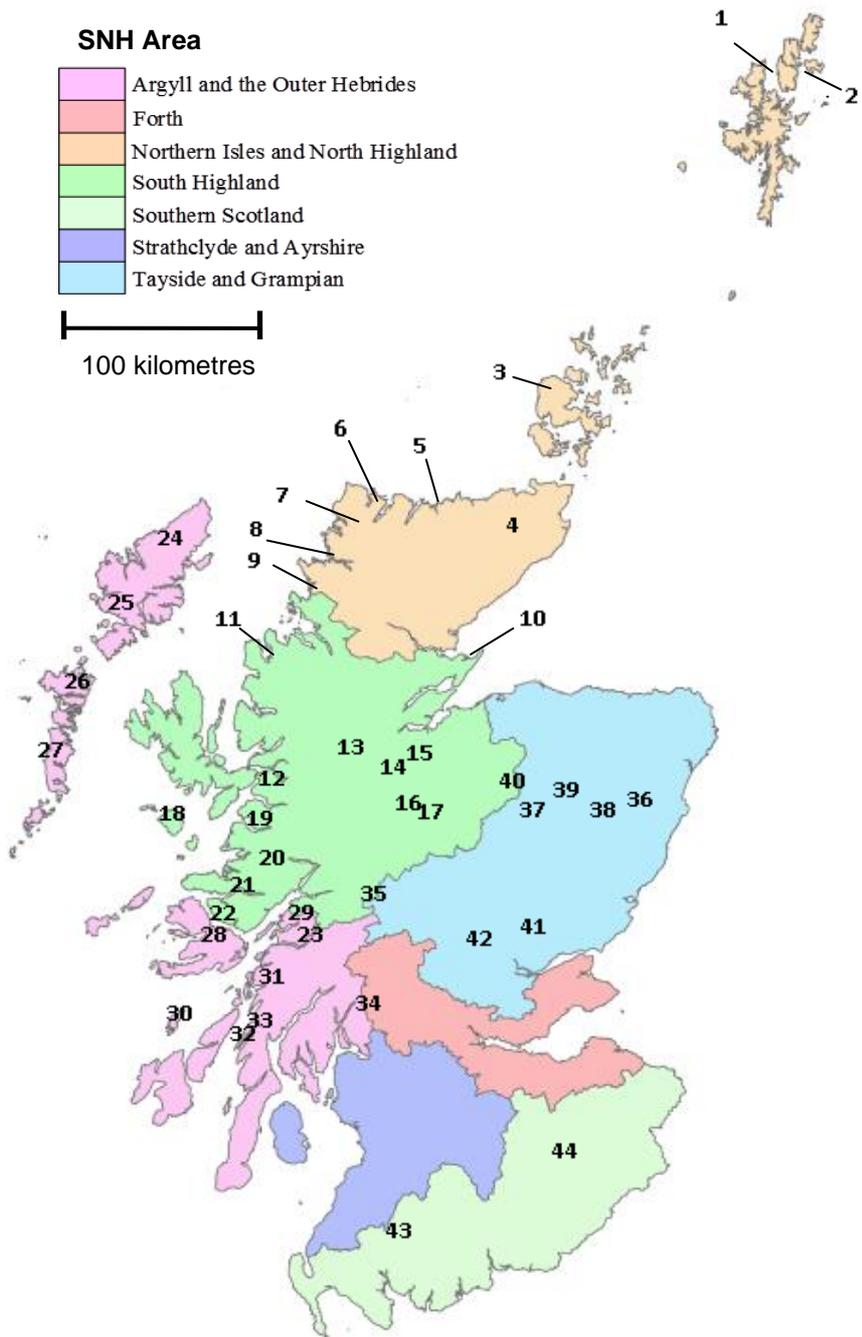
	SAC	SNH Area	No. Sample sites	Survey period
16	River Spey	South Highland, Tayside and Grampian	55	July/August 2011
17	Insh Marshes	South Highland	4	July/August 2011
18	Rum	South Highland	10	November 2011
19	Glen Beasdale	South Highland	2	September 2011
20	Loch Moidart and Loch Shiel Woods	South Highland	8	September 2011
21	Sunart	South Highland	12	September 2011
22	Morvern Woods	South Highland	10	September 2012
23	Loch Etive Woods	Argyll and the Outer Hebrides	9	July 2012
24	Lewis Peatlands	Argyll and the Outer Hebrides	19	April 2012
25	North Harris	Argyll and the Outer Hebrides	11	September 2011
26	Loch nam Madadh	Argyll and the Outer Hebrides	8	May 2012
27	South Uist Machair	Argyll and the Outer Hebrides	8	April/May 2012
28	Mull Oakwoods	Argyll and the Outer Hebrides	11	September/ November 2012
29	Glen Creran Woodlands	Argyll and the Outer Hebrides	5	July 2012
30	Loch Fada	Argyll and the Outer Hebrides	2	July 2012
31	Moine Mhor	Argyll and the Outer Hebrides	4	September 2012
32	Tayvallich Juniper and Coast	Argyll and the Outer Hebrides	4	September 2012
33	Taynish and Knapdale	Argyll and the Outer Hebrides	5	September 2011
34	Loch Lomond Woods	Argyll and the Outer Hebrides	11	August 2012
35	Rannoch Moor	Argyll and the Outer Hebrides, South Highland	10	May 2012
36	River Dee	Tayside and Grampian	48	July/September/ October 2012
37	Ballochbuie	Tayside and Grampian	4	November 2011
38	Glen Tanar	Tayside and Grampian	2	September 2012
39	Muir of Dinnet	Tayside and Grampian	2	July 2010
40	Cairngorms	Tayside and Grampian, South Highland	23	August 2011
41	Dunkeld-Blairgowrie Lochs	Tayside and Grampian	4	October 2011
42	River Tay	Tayside and Grampian	79	September/October/ November 2012
43	Merrick Kells	Southern Scotland	7	November 2011*
44	River Tweed	Southern Scotland	95	October 2011

**undertaken in March 2012 due to poor conditions through autumn and winter 2011 preventing access to site.*

A total of 291 sites were surveyed in 44 SACs. Overlap in designated areas led to some survey sites that were common to more than one SAC. In such cases, these 'shared' sites were surveyed once, but are included in the assessments of all the SACs in which they occur. They are counted as single sites in the overall analysis of trends in 10km squares.

3.2 Wider countryside

In view of the fact that the otter SACs were originally selected on the basis of their noteworthy otter populations, caution is needed in drawing conclusions on the status of otters in the wider countryside based solely on data collected from these designated sites. An initial comparative analysis of otter occupancy data from 10 km squares within the SACs *versus* those in the wider countryside demonstrated that the former tended to have higher occupancy levels than the latter. This analysis recommended that additional survey sites in as many 10 km squares as was possible within resource constraints should be included within the project. Thus, using GIS, 36 10km squares were randomly selected from the available suite of sites surveyed in the previous otter surveys to provide these comparative data. The vast majority of sites located both within and outside the SACs were surveyed in two or all three of the earlier Vincent Wildlife Trust "national" surveys and pre-date the SAC selection process. Their method of selection is described in Green & Green (1980), but essentially features likely to attract the attention of otters such as bridges were positively selected in order to maximise the chances of detecting otter presence in the area. In this survey, squares that did not contain part of an SAC designated for otters qualified for selection as a wider countryside square. Sites that had been surveyed in all the previous surveys were plotted within the 10 km squares, and from these two sites were then selected from each square. The choice of site followed the usual protocol of choosing sites that were at least 5km apart if possible and with no obvious access problems (e.g. a site within a shooting estate during the stag season).



Map 1. SACs included in 2011-12 survey within SNH Area boundaries (numbers relate to first column of Table 1). © Crown copyright and database rights 2014 Ordnance Survey 100017908.

3.3 Field protocol

3.3.1 Access

Landowners and farmers / land managers were initially contacted by local offices of SNH. At some sites there were restrictions on when access could be gained because of estate activities. This was especially prevalent in Caithness & Sutherland and Mull where most sites were used for deer stalking. Whilst it was possible to accommodate most of these requirements, a small number of sites in Caithness & Sutherland could not be surveyed. There was little opportunity to choose the most appropriate survey conditions for about a third of the sites that had to be completed before early September. Mull had to be delayed until the end of the stag season and the SAC survey was completed in November 2012.

3.3.2 Survey team

The survey was undertaken by a team of experienced surveyors. Most of the sites were surveyed by Leonie Alexander, Heather Beaton, Melanie Findlay, Roger Ingledew, Barry Nichols, Ro Scott, Lorna Slade, and Peter Stronach. Rachel Boden-Hall, Roger Cottis and Lorna Edey also assisted. The larger SACs were invariably surveyed by a group of surveyors.

3.3.3 Health and safety

The surveyors followed a strict health and safety protocol and no incidents were reported. The greatest risk identified was lone working in remote areas with sporadic mobile phone signal. This was offset by the use of GPS Spot (a remote satellite tracking system <http://www.findmespot.eu/en/>), field buddies and remote buddies.

3.3.4 Field survey

The current standard for otter SCM is to count spraints and other evidence along a 600m stretch of one river bank. Brewer *et al.* (2002) recommended that a fixed distance of 100m is searched for all signs of otter activity, and that if no spraints are found then a further search of up to 600m should be conducted in order to ascertain 'presence' over a longer stretch of watercourse. This protocol was followed, with the first 100m section recorded separately and nested within the 600m data to give greater potential for comparison with previous surveys.

At each site a standard form (based on Strachan, 2007) was filled in to record visible habitat parameters and noted impacts over 600m (see Appendix I). Both banks, channel morphology and adjacent land use and cover were considered in this assessment. Spraints were counted and other otter evidence was recorded over the first 100m then the subsequent 500m. The presence of mink² and water vole was also recorded.

Handheld GPS units were used to way-mark and label key locations at each site. Way-mark data were downloaded and converted to eastings and northings for use in the GIS to avoid errors in field notes. Way-marks were used to record the following:

- survey start point;
- end of 100m section;
- end of 600m section;
- locations of photographs; and,

² Based on field evidence only. Putative mink scats were not analysed for DNA (in common with previous otter surveys), so there is potential for some errors with identification.

- specific features such as resting sites, freshwater pools in coastal habitats and point source pollution or other impacts.

There were minor changes to the 2003-04 survey forms and approach, as follows:

- additional data boxes to describe the direction of survey (600m up or downstream, or sections that are split 300m up and down stream) and a requirement to record which bank was surveyed (left/right, when looking downstream). This will enable more accurate repetition in future surveys; and,
- addition of a GPS way-mark form to record start points and end points and features such as holts or resting site. These were way-marked on a handheld GPS in the field using the four figure code for the site and a feature number. The way-mark and descriptive information were recorded on the way-mark form. This form was also used to record photographs taken.

The survey conditions were also noted for each SAC. The full field methodology is detailed in Appendix II.

Negative sites were not resurveyed. On several occasions the survey was abandoned as conditions were deemed too extreme, and in two cases safety was an issue.

Counting spraints on Shetland SACs (Yell Sound Coast and Hascosay) was considered inappropriate due to the high number and historical accumulation of spraints. 'Spraint stations' (piles of accumulated spraint of different ages and often on a distinctive hummock) were therefore counted as opposed to estimating the number of spraints within these accumulations. This decision was taken early in the field survey once the difficulty of estimating spraint numbers was experienced. This issue was apparent in the 2003-04 survey data with 200 spraints recorded at most Shetland SAC sites, probably reflecting large quantities of spraints that were impossible to count or estimate with any accuracy.

Difficulty was also encountered in recording the number of active holts on Shetland. Many holts that were encountered occupied large areas. Continuity of the structure beneath the ground could not be assessed and these are described in the raw data as holt complexes. It should also be noted that distinguishing between above ground resting sites and spraint sites is often difficult. Otters will often spraint on ledges along undercut banks, or in tunnels formed at peat hags where the base of the peat cliff has been eroded and the top curls over to form a tunnel. The presence of spraint does not necessarily indicate a resting site; likewise the absence of spraint does not necessarily preclude the presence of a resting site, (Findlay, unpublished data). Green *et al.* (1984) found that less than 10% of resting sites could be found without telemetry. The identification of resting sites in general is therefore subjective.

3.3.4.1 Conditions of survey

The summers of 2011 and 2012 were particularly wet over most of Scotland with the exception of the NW of Scotland in the spring of 2012 when drought conditions prevailed. The rivers Spey, Dee and Tay, the west coast and the northern rivers received frequent bouts of heavy and persistent rain and experienced regular spate conditions. The Spey catchment had notably large spates in August 2011 and many river levels were generally higher than usual.

In the field, these conditions were frequently noted with comments on strandline vegetation several metres away from the tops of the low-lying rivers in the Caithness & Sutherland Peatlands. Many comments were made on the survey forms about recent heavy rain, elevated water levels and flattened vegetation from floods. Given these particularly difficult

conditions it was agreed with SNH that surveying would be avoided wherever possible in spate conditions, but complete avoidance of post-spate conditions was not possible in the allotted time-table. On several occasions field survey was abandoned and rescheduled on particular rivers to avoid the worst of the conditions. Conditions during and prior to the survey were noted for all SACs.



Figure 1. Strandline vegetation deposited during flooding prior to survey in Caithness & Sutherland Peatlands

3.4 Review of the methodology

3.4.1 Field methodology

The limitations of the field methodology used in sign-based otter surveys need to be borne in mind when interpreting site results. Inconsistencies that became apparent include:

- Estimation of distance. Tightly meandering upland rivers pose a considerable source of error in estimating distance. A handheld GPS helped to some extent in the field where the start point was way-marked and then the distance walked could be measured. However, this was a linear distance and best-guess adjustments and map work were also important. The 100m distances are likely to be more accurate than the 600m distances. A good example of how this can affect results is at Durness, where the 2003-04 surveyor walked as far as a stream, whilst the 2011-12 surveyor stopped short of this feature. With such small sample sizes on some SACs, this could significantly affect the results both in terms of spraint numbers and presence / absence. The difficulty of estimating 600m in the field only becomes significant if signs are only present towards the end of the 600m section, where this could make the difference between a positive and negative result. The 2011-12 survey recorded both the 100m cut-off point and the estimated 600m cut-off point, using GPS to aid repeatability in future surveys. GIS analysis of the 600m end points showed that there was a great deal of variation in the estimation of 600m.
- The survey of each SAC was scheduled, wherever possible, to eliminate any variation due to seasonal sprainting behaviour. This may have resulted in some false negative results, as some areas were surveyed shortly after spates and/or heavy

rainfall. It could be stated that ideal survey conditions rarely occur in some areas of Scotland, as frequent heavy rainfall is a feature of the local climate, but the timetable, coupled with restrictions on when access was possible due to shooting, may have exacerbated this at some SACs.

3.4.2 Detectability

The original assumption was that in a strong population of otters there was a 99% probability of finding evidence of otters in a 10km square if two 600m samples were surveyed, and at each sample site the probability of finding otter signs was at least 90% (Brewer *et al.*, 2002). As the 2011-12 survey progressed, the high level of rainfall and spate conditions in both summers were unavoidable, resulting in the likelihood of 'false negatives'. Statistical models are now available which can predict occupancy probability from 'presence/absence' data but the traditional single visit survey methodology does not facilitate use of such models. Given the poor survey conditions and concern over detectability issues, Biomathematics and Statistics Scotland (BioSS) were commissioned to examine any relationships between the survey conditions (i.e. rainfall, flow and spate) and probability of finding evidence of otters, so that the issue of detectability could be addressed as far as possible, given the field methodology.

The issue of detectability is illustrated well on one site where a surveyor returned to a section on the Borthwick Water in the upper River Tweed two weeks after the original survey to way-mark a resting site. Conditions on this second visit were poor. Seventeen spraints were found on the first survey and two resting sites, both of which were in bankside multi-stemmed willows where there was spraint, paths and pad marks. On the second visit there were nine spraints and, due to high water, only one resting site was still visible and identifiable. The surveyor and season were the same, but there was a substantial difference in the field evidence due to the high water level on the second visit. High water not only affects the longevity and visibility of field evidence, it can also affect how surveyors cover the ground.

3.5 Assessment of Condition

There are a total of 44 SACs designated for otters in Scotland, 12 of which are designated specifically for otters and 32 where otters are a qualifying feature. These are considered to be '*a representative sample of good otter habitat that are intended to support healthy, breeding and sustainable otter populations in Scotland*'. This survey assessed all 44 SACs in 2011/12.

In order to assess the condition of SACs for otters, four attributes are used as defined in the JNCC Common Standards Monitoring Guidance for Mammals, (Version: August 2004).

1. Food availability
2. Anthropogenic mortality (discretionary)
3. Toxic chemicals
4. Presence of otters

Targets for each attribute had not been set for otter in the 2003-04 SAC assessments, so a new approach of using thresholds as a guide for condition was agreed with SNH for the 2011-12 assessments. As per the JNCC Common Standards monitoring Guidance, if any target or attribute does not meet the threshold the feature may be considered to be in unfavourable condition. Additionally, if a feature is assessed to be in favourable condition, but there has been a notable deterioration in that feature whilst still remaining above the unfavourable threshold, then the SAC will be assessed as in favourable declining condition.

Use of these thresholds provides indicators of condition which form the basis of advice / recommendations to SNH but the final decision on Site Condition is for SNH to make.

3.5.1 Food availability

'Food availability' is presented in the assessment table as '*fish biomass stays within expected natural fluctuations*'. The SCM assessment of Atlantic salmon (*Salmo salar*) has been used as an indicator of prey availability on SACs designated for this species (North Harris, River Borgie, River Dee, River Spey, River Tay and River Tweed). The attributes to assess salmon include targets for adults, juveniles, water quality and in-stream habitat. Taken together, these are considered to be a reasonable proxy for the quality of aquatic habitats supporting salmon and more general prey items for otters. Therefore, if the salmon fishery was assessed in the most recent SCM cycle as favourable (maintained, recovered or declining) or unfavourable recovering, then the food availability attribute is considered to have passed. Any SACs with salmon assessments of unfavourable (no change or declining) are considered to have failed to meet the target for food availability.

In the absence of salmon assessments, published data from the local Fisheries Trusts was sought.

Published information on coastal prey species such as butterfish (*Pholis gunnellus*), eelpout (*Zoarces* sp.), wrasse (Labridae) and crustaceans are absent for all sites. There are unpublished data collected by J. Conroy on otter prey species for two SACs - Yell Sound Coast and Hascosay (Shetland).

If no evidence was available, then the assessment attribute was left blank but the SAC was not automatically deemed to fail due to lack of information.

3.5.2 Anthropogenic mortality

This is presented as 'otter population not significantly impacted by human induced kills', examples of which are road traffic accidents (RTA) and getting trapped in lobster creels and crab pots. This is a discretionary attribute and was only used in the assessments if data were available.

3.5.3 Levels of harmful toxic chemicals

'Toxic chemicals' is presented as 'no increase in pollutants potentially toxic to otters'. This attribute has been assessed through published data, primarily from SEPA. Trend data for arsenic, lead and mercury are published for most of Scotland's rivers (Anderson *et al.*, 2010) and this is taken to be an indication of the levels of heavy metals. This source does not, however, include small rivers and lochs in the west and north.

The west coast of Scotland and the Shetland Isles have a high concentration of designated shellfish waters which have to be monitored for a suite of pollutants including silver, arsenic, cadmium, chromium, copper, mercury, nickel, lead, zinc, polychlorinated biphenyls (PCBs) and selected pesticides. All 80 shellfish areas meet required European standards so these pollutants on the west coast are not deemed to be present at harmful levels. Toxic chemicals are not considered as an issue unless published information indicates specific problems.

3.5.4 Presence of otters

This is divided into 'Otters present on site' and 'Population maintained or increasing'.

The probability of finding otter signs in a 600m section within a good population was assumed to be at least 90% (based on Brewer *et al.*, 2002). In considering 'Otters present on site' the working assumption is that the SACs have been designated partially or wholly for otters so a high level of occupancy would be expected and a threshold of 80% or higher was assigned to meet this target. Chanin (2003a) proposed that a target of over 70% of positive sites should be met for an indicator of a healthy otter population. Scotland is, however, a stronghold for otter populations and the SACs are considered to be 'a representative sample of good otter habitat' so it was considered that a higher level of occupation was appropriate for an SAC to be assessed as in favourable condition in Scotland. In recognition that 80% is subjective, Table 49 provides an illustration of favourable or other status against a target of 70%, 80% and 90% occupancy and is presented in section [5.2 Special Areas of Conservation](#).

In considering this attribute, a regression model was used to predict otter presence using the presence/absence data and an indicator of spate conditions to account for detectability issues in the 2011-12 data. See section [3.6.4 Presence of otter field evidence and survey conditions](#).

3.5.5 *Population maintained or increasing*

Where there are observed reductions in occupancy³ between the 2003-04 and 2011-12 data, the threshold has been set at 20% or less in order to pass. This follows the same reasoning set out for the assessment of '*Otters present on site*'.

An additional attribute for coastal otters is included – '*no reduction in overall availability of freshwater*' in recognition of this being a potentially limiting factor. This is recorded in the field by counting freshwater pools and running water within the 600m survey section and is commented upon in SAC summaries where appropriate.

3.5.6 *Deviation from standard assessment*

The otter population on the Shetland Isles is recognised as being exceptional in terms of the high density of animals and their signs. Using standard targets to assess the status of the otter population is therefore not appropriate as a loss of 20% of positive sites may represent a more significant change in numbers. Density of holts has been established as a viable approach to monitoring the otter population on Shetland (Kruuk *et al.*, 1989). The two Shetland SACs, Yell Sound Coast and Hascosay, were surveyed using the standard protocol for consistency of approach but this was augmented with long-term studies by Shetland otter specialists based on holt counts. These data were used to inform the assessment of the attribute 'Population maintained or increasing'.

3.5.7 *Small sites*

Some SACs are too small to meaningfully apply percentage occupancy thresholds to assess presence or to compare occupancy between SCM monitoring cycles, because there may be a stochastic element to any changes in occupation. Such small SACs (defined here as comprising 10 or fewer sample sites) can only support part of an otter's home range, or possibly more than one individual, and cannot support a viable population in isolation from the surrounding habitat. In view of this, the assessment of small SACs thought to be in either unfavourable or favourable declining condition has referenced neighbouring SACs and/or the adjacent wider countryside habitat to consider the site within a broader context. The assessments of the following small SACs involved an element of expert opinion which has

³ Predicted otter percentage occupancy data derived from the BioSS analysis were used for the 2011-12 survey due to poor survey conditions.

taken account of other relevant information about the site and the wider context in which the site is located:

Yell Sound Coast
 Hascosay
 Loch of Isbister
 Ardvar & Loch a'Mhuilinn Woodlands
 Insh Marshes
 Rum
 South Uist Machair
 Muir of Dinnet

As a consequence of this process, the assessment tables for some of these sites denote a pass (✓) for certain attributes when these appear to fail against the targets set in Table 2. Expert judgement has been applied to arrive at recommendations in these cases.

3.5.8 Summary

Table 2. Summary of attributes and targets for SAC assessments

Attribute	Target/threshold
Otter presence	Presence must be 80% or greater (rounded up to nearest whole figure)
Population maintained/increasing	Any loss of occupancy between 2003-04 and 2011-12 surveys must be no greater than 20%
Food availability	For SACs also designated for Atlantic salmon, the assessment of salmon must be favourable or in recovery. For SACs not designated for Atlantic salmon the target will not be met if there is published evidence that there is a decline in prey populations
Toxic chemicals	Target not met if there is published evidence that there are levels of toxic chemicals in SAC that are potentially harmful to otters.
Human induced death (Discretionary)	Target not met if there are records of RTA or other mortality which may have an impact on the SAC population

It should be noted that national reporting on the Favourable Conservation Status (FCS) of a species is generally assessed against data from 1994, which is the year when the UK Government implemented the provisions of EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Fauna and Flora (“the Habitats Directive”). This date does not take into consideration the status of the target population at the time of the baseline. In this report we present trends since national surveys began in the 1970s.

3.6 Data analysis

3.6.1 Data processing

Before any statistical analysis was carried out, the data from the older, more extensive surveys were first processed by GIS. This identified those sites that fell within the SACs and the randomly-selected 10km grid cells from the wider countryside, and excluded all other previously surveyed sites that did not fall within these areas. This ensured that the spatial coverage of the data from the older surveys was matched to the spatial coverage of the 2011-12 data. Once the appropriate sites were identified, each site was assigned to its SNH Area and the SAC into which it fell. Next, weights were calculated for each sample site based on the relative size of the SNH Area that it was in relative to the total area of Scotland and the number of sites sampled in that region in a given year. This was then rescaled so

that the sum of the weights was equal to the total number of data points sampled across the whole study period (n=3415).

While this makes the historic data more comparable with the 2011-12 data, it may limit comparisons with previous analyses where data were collected and analysed in a different manner.

3.6.2 Investigating the relationship between otter presence and time

Presence or absence of otter signs was analysed at all sample sites in all survey periods. For the 2011-12 survey, recorded otter presence was defined using the data from the 600m survey rather than the 100m survey subset. The survey method used in the first three surveys did not record over a particular distance. The survey was stopped when the first spraint was found and searching continued to a maximum of 600m. For the purpose of presence/absence data, this difference in survey approach is not relevant as in all datasets a distance of 600m had to be surveyed before otter evidence was considered to be absent at a site.

In order to put the findings of the 2011-12 survey in a wider context, an assessment was carried out of how recorded otter presence in Scotland changed between the first systematic survey conducted in the late 1970s and the current survey. Across this time period, five surveys have been conducted: 1977 to 1979; 1984 to 1985; 1991 to 1994; 2003 to 2004 and 2011 to 2012. In the first four of these surveys, a more extensive range of sites were sampled. This last survey only sampled sites that fell within the 44 otter SACs as well as sites in 36 randomly-selected 10km squares that did not fall within these SACs.

Two questions were specifically investigated in this analysis. First, for Scotland as a whole, how has recorded otter presence changed between 1977 and 2012? Second, are any changes identified from sites that fall within the 44 SACs representative of changes in the wider countryside? After initial analysis, it was found that recorded otter presence in the most recent survey was less than in 2003-04. This was investigated in relation to conditions of survey and detectability.

3.6.3 All Scotland trend

Once the survey data had been processed, a statistical analysis was conducted using generalised linear models (GLM) with binomial errors and logit link function. The sampling unit for this analysis was the individual sampling site in a survey period and the presence or absence of signs of otters at each site in a survey was the dependent variable.

A range of GLM models were fitted in order to identify the best model that explained the relationship between the proportion of sites with otter presence and survey period. Other variables were considered that may also explain the proportion of sites with otter signs: month of survey, geographic location (presented as SNH Area), whether a site fell within an SAC or in the wider countryside (referred to here as SACs/non-SACs), the interaction between survey and SNH Area and the interaction between survey and SACs/non-SACs. Weights were calculated to account for the imbalance in survey effort between SNH Areas and between SACs and wider countryside areas, as preliminary analysis showed that these were potentially important explanatory variables. The imbalance in effort was necessary to focus resources on the site condition monitoring assessments for the SACs. To investigate which model best explained the proportion of sites with otter signs, a Chi-squared test was used where the significance of each variable is considered by comparing the model with it included against a model where it has been dropped.

All statistical analysis was conducted using the R statistical software, version 3.1.0.

3.6.4 *Presence of otter field evidence and survey conditions*

The trend analysis outlined above suggested that there has been a decline in otter presence between 2003-04 and 2011-13. Otter field evidence is, however, known to be influenced by factors such as whether a river is, or has recently been, in spate. The apparent decline in otter presence between 2003-04 and the 2011-12 identified as part of the overall trend analysis could be due to adverse conditions rather than a decline in occupancy. A more detailed analysis by Brewer & Spezia (2013) was therefore conducted to investigate whether rainfall and flow conditions might have influenced recorded otter presence between 2003-04 and 2011-02.

In this analysis, regression modelling was used to assess whether rain or flow affected otter presence and it was determined that neither exhibited a significant relationship with recorded otter presence. Flooding at a site was then considered; submergence of banks and riparian habitat would remove field evidence. A 'spate' indicator variable was therefore created to suggest when a site may be experiencing flood conditions. Two separate spate indicators were defined from the available hydrometric data. These were the Q50 (median flow) and Q10 (top 10% flow). For the Q50 indicator, a site was considered in spate if the flow at a survey site was greater than the Q50 value for the closest gauging station; the Q10 indicator was defined in a similar manner.

Based on this, four generalised linear regression analyses were conducted: two each for the Q10 and Q50 indicators (one unweighted and one weighted) using the same data set and weights as described in section 3.6.3 (Statistical analysis). The results of these models were used to assess whether poor surveying conditions could have been responsible for the apparent decline in recorded otter presence between 2003-04 and 2011-12. In addition, they were used to estimate a predicted percentage presence estimate for 2011-12 adjusted for the spate indicator. For this purpose, the individual SACs were included as a fixed factor into the 'best' weighted model (as defined by the Akaike Information Criterion (AIC)) to enable an assessment of adjusted presence for each SAC. There are, however, very high standard errors for some SACs as these estimates are being derived from very small numbers of observations and with binary responses (i.e. present or absent). This does not affect the estimates themselves, but the large standard errors render interval estimates unstable.

The results of this analysis suggested that the data for some areas (or even some specific sites) could have been unreliable for 2011-12 owing to the type of spate conditions present when they were surveyed. A further analysis was conducted to assess whether this could have resulted in a lower recorded otter presence in 2011-12 than 2003-04 rather than this reflecting an actual decline in otter occurrence across Scotland (as suggested by the all Scotland trend analysis). In this analysis, the spate indicator outlined above was used to focus on the part of the data set with low Q (flow) values. Two analyses were conducted, one based on a subset of data removing all sites where the flow at survey time was greater than Q10, and the other the same for Q50. These analyses used generalised linear models to specifically test whether there was a significant difference in recorded otter presence between the survey period 2003-04 and 2011-12 when the possible confounding effect of spate conditions on recorded otter presence was removed.

3.6.5 *Spraint count data*

Spraints were counted at each sample site within the first 100m and the complete 600m with the initial intention of undertaking the analysis on a regional basis through the survey periods. The approach to counting spraint has, however, varied through the historical surveys making comparisons difficult. Additionally, it has been demonstrated that there is no relationship between spraint numbers and otter numbers (Yoxon & Yoxon, 2014). For these

reasons, presence/absence of otter evidence at a site is used for the analysis, although spraint numbers are compared descriptively in some of the SAC accounts.

4. RESULTS AND ANALYSIS

The results for the survey as a whole are presented, followed by assessments of all SACs which are grouped within each SNH Area. Each SAC is presented within a summary table of the field survey and descriptive information. An assessment table is presented for each SAC which states the information used for the assessment of each attribute and the overall status of the SAC. At some coastal sites summary water quality information from nearby commercial shellfish areas (available from SEPA) is included in the assessment table, but only where this is considered meaningful in the context of the otter interest on the SAC.

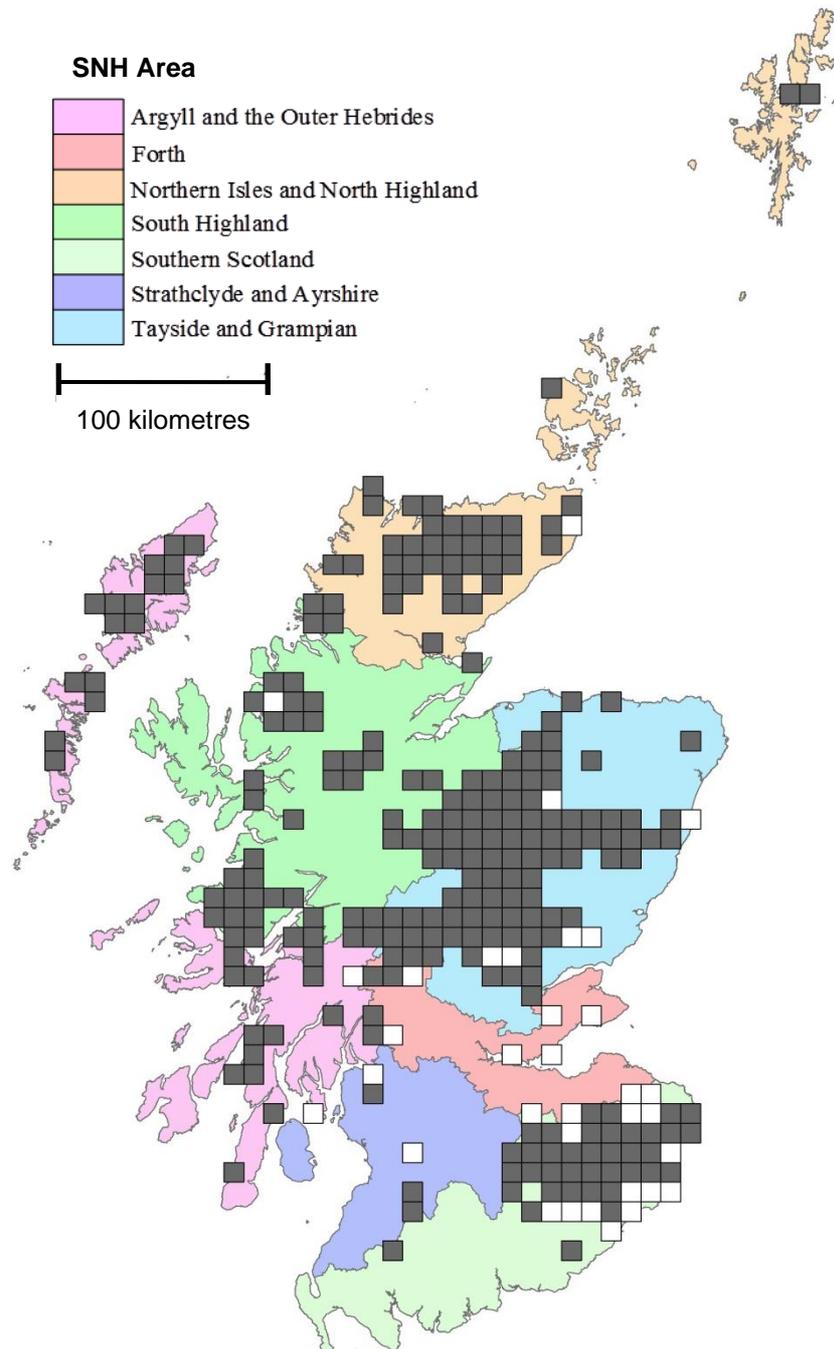
Several SACs fall into more than one SNH Area. In these cases the SAC is fully described in the SNH Area with the most sample points, with a reference to this description in the SNH Areas containing fewer sample points.

4.1 Changes in presence of otter evidence

The following otter distribution represents presence/absence of otter field evidence from sampled areas only and does not represent the overall otter distribution in Scotland. A general view of otter distribution can be accessed on the National Biodiversity Network Gateway website (<http://data.nbn.org.uk/>).

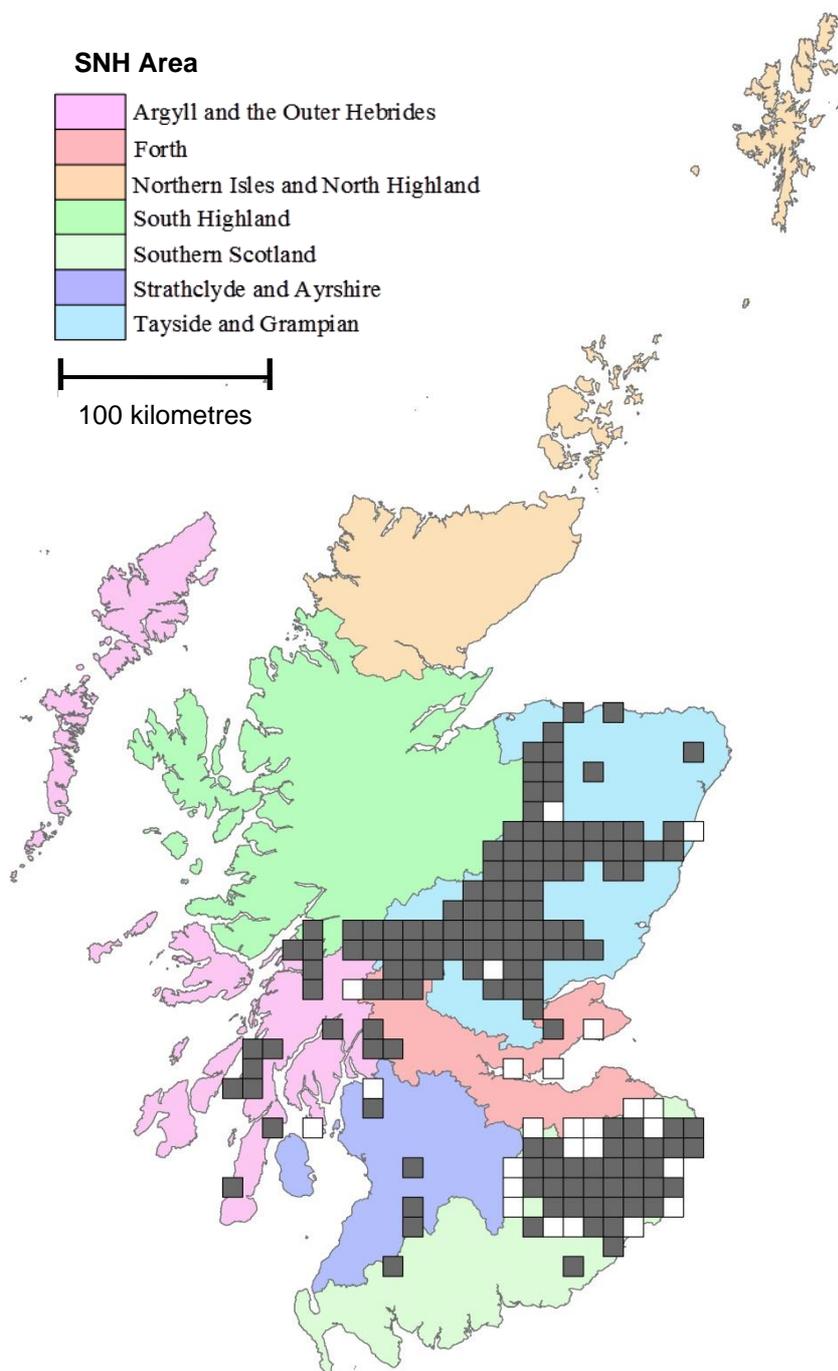
Maps 2 to 6 show the distribution of otter evidence using just the 10km squares that were surveyed in 2011-12 and which were included in the previous surveys, for direct comparison. In addition, Map 7 shows how recorded presence (i.e. where presence/absence has not been adjusted for conditions at time of survey) of otter evidence in specific grid cells changed between 2003-04 and 2011-12. This indicates that, while there has been a general expansion in the River Tweed SAC, there has been a reduction in the proportion of recorded positive sites in Caithness & Sutherland, the River Dee catchment and in the Cairngorms. Presence of otter evidence, based on 10km squares, has remained approximately similar in all other SACs sampled in 2011-12.

The sites in the Muir of Dinnet SAC were first surveyed in 2003-04 and so are not shown on Maps 2 to 4.



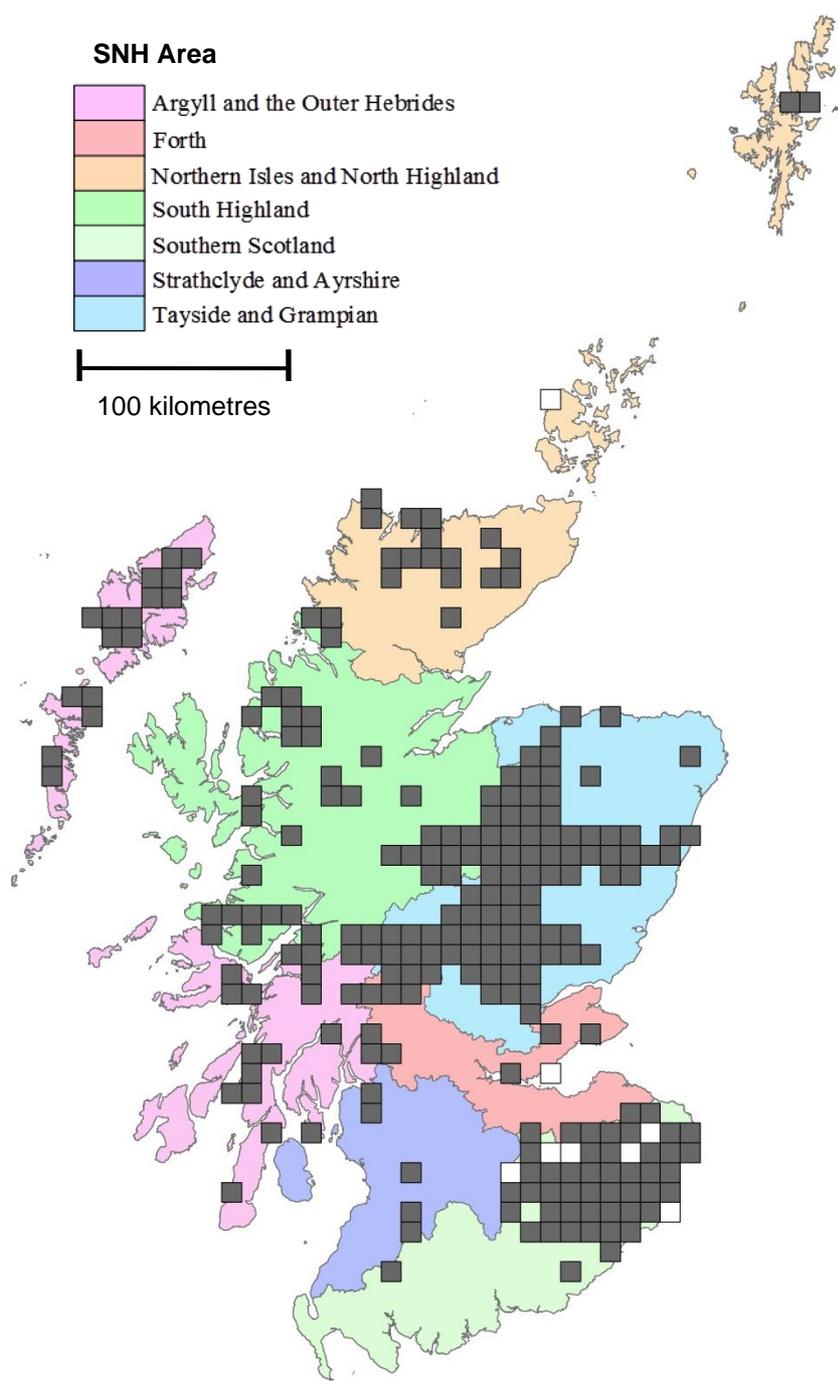
Map 2. Presence/absence of otter evidence 1977-79. White squares were sampled and were negative while grey squares were positive for signs of otter.

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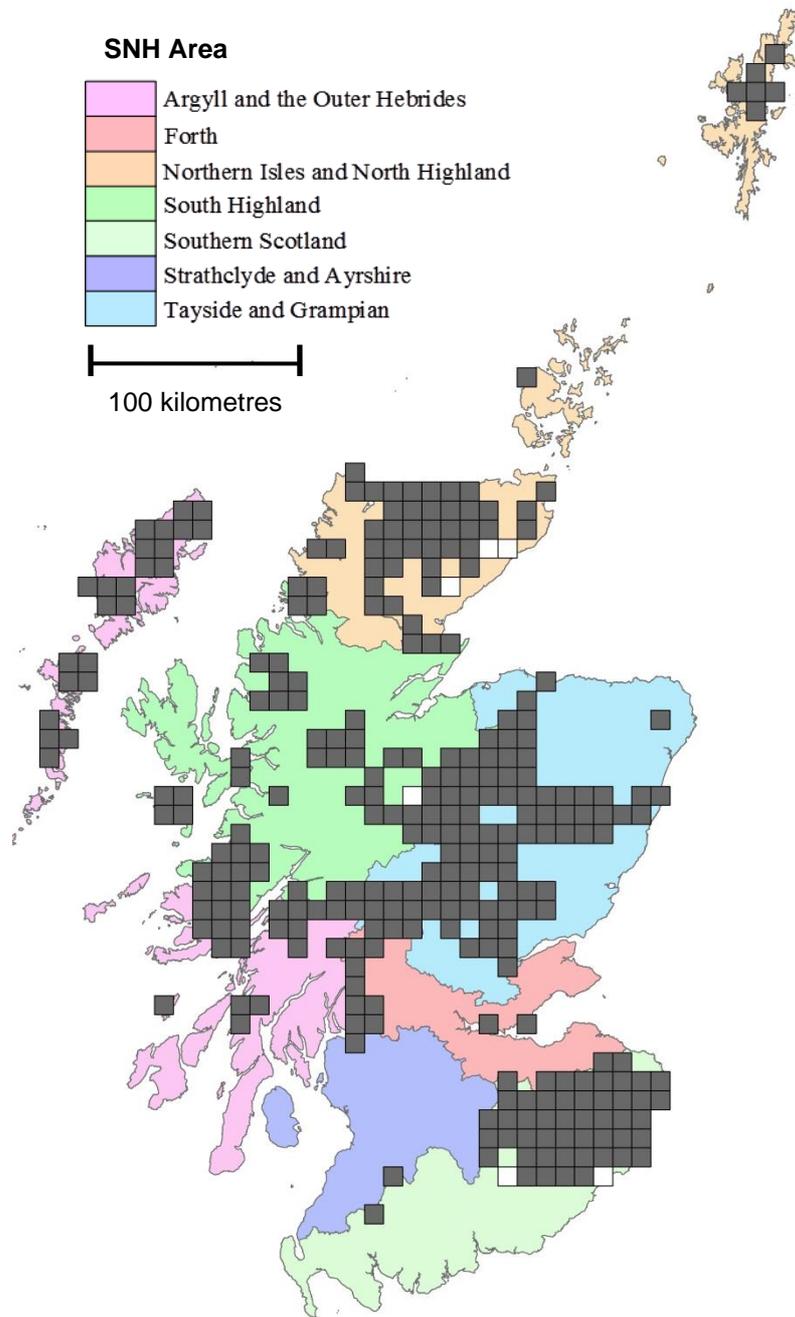
Map 3. Presence/absence of otter evidence 1984-85. White squares were sampled and were negative while grey squares were positive for signs of otter. The 1984-85 survey did not include the Western Isles, Northern Isles or Highland Regions.

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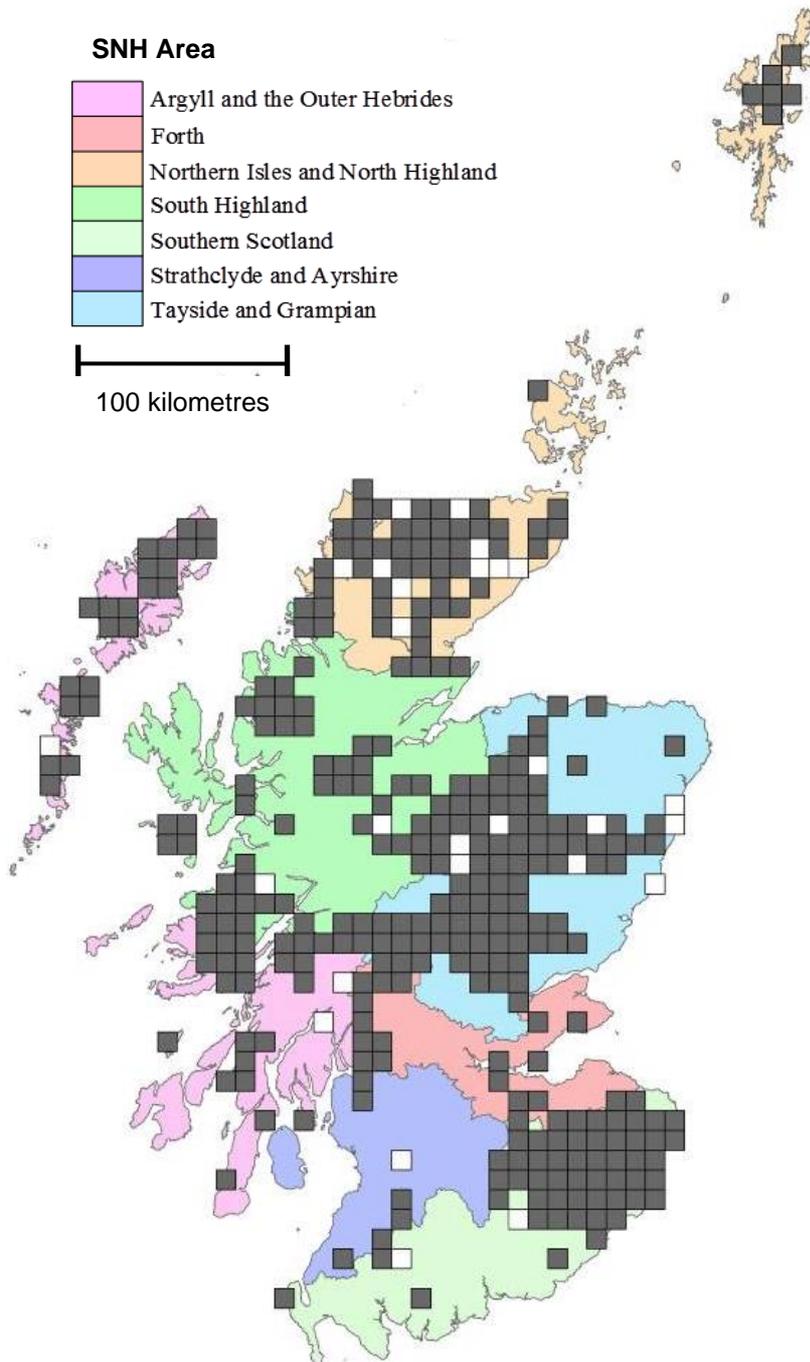
Map 4. Presence/absence of otter evidence 1991-1994. White squares were sampled and were negative while grey squares were positive for otter.

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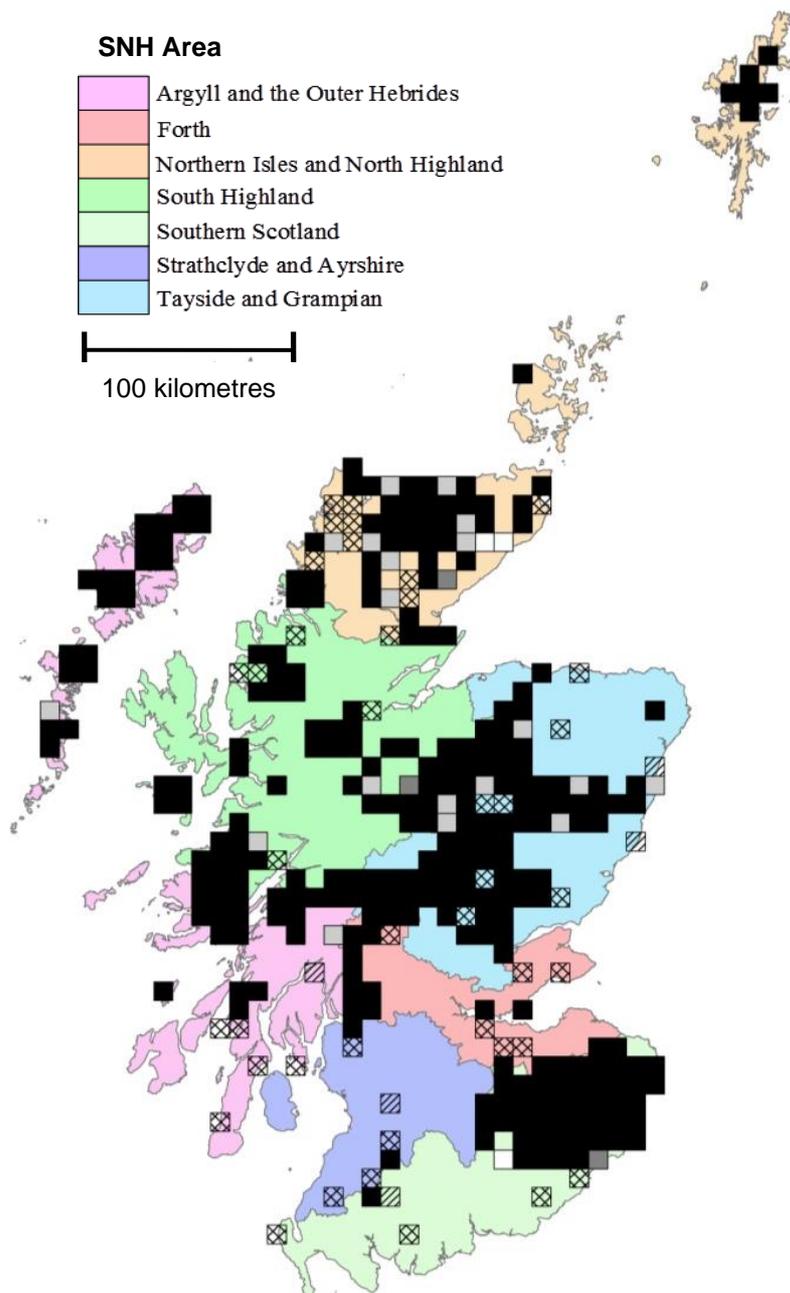
Map 5. Presence/absence of otter evidence 2003-04. White squares were sampled and were negative while grey squares were positive for otter.

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Map 6. Presence/absence of otter evidence 2011-12. White squares were sampled and were negative while grey squares were positive for otter.

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Map 7. Change in presence of otter evidence between 2003-04 and 2011-12. Black squares were positive in both surveys; dark grey squares were negative in 2003-04, positive in 2011-12; light grey squares were positive in 2003-04, negative 2011-12; white squares were negative in both and cross-hatched squares were not surveyed in 2003-04 and positive in 2011-12.

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4.2 Change in recorded otter presence through all surveys

The model that best explained the proportion of sites with signs of otters included survey, month, SNH Area, SAC/non-SAC and the interaction between survey and SNH Area. This represented an increase in presence of otter evidence between the first and fourth surveys (the apparent decrease between the first and second surveys was not significant) and a decline between the fourth and fifth survey (Figure 2). This suggests that across Scotland as a whole there has been a decline in the presence of otters in the sampled areas between the 2003-04 and 2011-12 sampling periods. This may, however, be due to the poor surveying conditions (i.e. spates) in the latter survey period (see section 3.6.4).

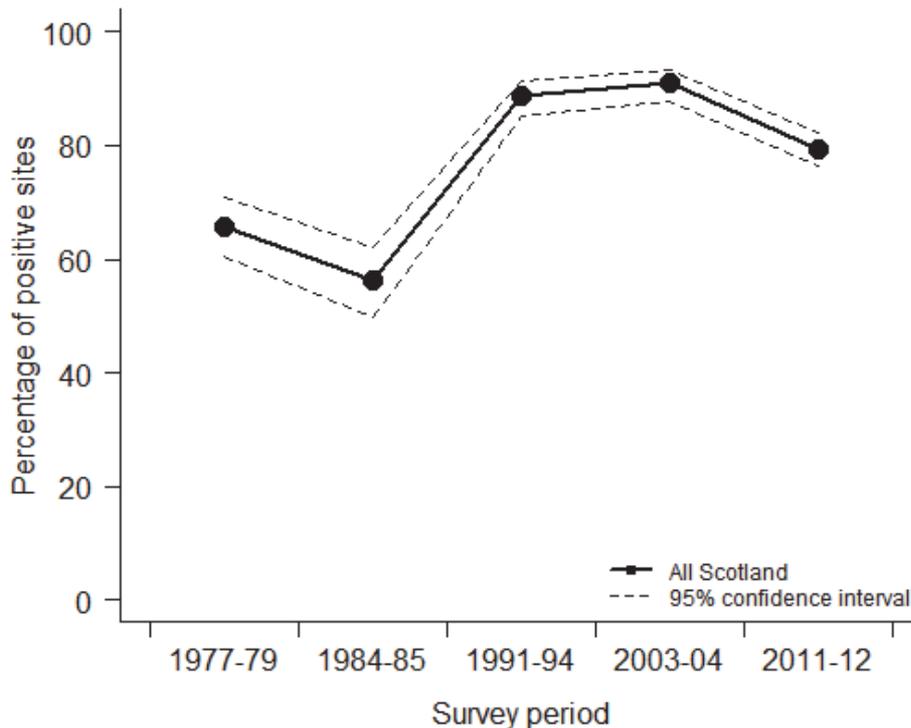


Figure 2. The relationship between proportion of sites with signs of otters and survey period for Scotland as a whole

The potential effect of spate conditions was investigated using the two spate indices described in section 3.6.4.

For the unweighted Q10 indicator, there was a significant decrease in the percentage of positive sites between the 2003-04 and 2011-12 surveys ($p < 0.001$). In the 2003-04 survey, sites in spate had a significantly lower proportion of positive sites than those not in spate ($p = 0.027$), but in the 2011-12 survey, there was no significant difference ($p = 0.496$).

For the weighted Q10 indicator, there was a significant decrease in the percentage of positive sites between the latest two surveys ($p < 0.001$). There was no significant difference between the proportion of positive sites for the sites in spate and those not ($p = 0.125$).

For the unweighted Q50 indicator, there was a significant decrease in the percentage of positive sites between the 2003-04 and 2011-12 surveys ($p < 0.001$). In the 2003-04 survey, the difference between the proportion of positive sites in spate and those not in spate was not significant ($p = 0.052$), but in the 2011-12 survey, the sites in spate had a significantly lower proportion of positive sites ($p < 0.001$).

For the weighted Q50 indicator, the significant decrease in the percentage of positive sites between the latest two surveys disappears ($p=0.094$). In the 2003-04 survey, there was no significant difference in the proportion of positive sites for the sites in spate and those not ($p=0.676$), but in the 2011-12 survey, sites in spate had a significantly lower proportion of positive sites ($p=0.016$).

Of these four models, only the weighted Q50 model did not have a significant difference between the surveys. Additionally, whether there is a significant difference between the sites in spate and those not in spate is mixed, with three out of the four models having a significant difference in one of the surveys, but not both.

An alternative approach is to remove the sites with flow greater than Q10 and then fit the model again. This was repeated for those sites with flow greater than Q50. Only the weighted data were used for this analysis. For the Q10 indicator, there was a significant decrease in the proportion of positive sites between the two surveys, but there was no significant difference for the Q50 indicator ($p=0.091$). It is notable that relatively few sites were removed when using the Q10 indicator.

Overall, the picture concerning whether there is a difference between the surveys after taking into account the effect of sites in spate is mixed.

A simulation study was carried out to test the effect of different detection probabilities. First, this was performed on a model with survey and month as the explanatory variables. This study showed that apparently small changes in the detection probability across the board could make the significant difference between the two surveys disappear. This study was repeated so that only the sites in spate had adjusted detection probabilities. The significant difference between the two surveys is lost when the detection probability drops to 0.8.

This more detailed analysis suggests that it is likely that the spate conditions may have influenced the recorded otter presence in 2011-12. As the picture is mixed, however, it is still possible that they were lower than in 2003-04 even when the effects of spate conditions are taken into account. It may also be that the approach to defining unsuitable conditions (i.e. the Q50 spate indicator) is too coarse, or that another confounding factor was present in 2011-12.

The month in which the survey was carried out was important for explaining the proportion of sites with signs of otters. Looking at this relationship in more detail, it appears that the proportion of sites with signs of otters is lower in January and December. It was only the first survey that had any sites surveyed in these months (apart from a single one in December in the fifth survey).

The proportion of sites with signs of otters varied between SNH Areas and also had different patterns of change between the surveys. These are detailed later in this report.

On average, otter presence was higher for SAC sites than wider countryside (non-SAC) sites (Figure 3). The difference between these tends to be greatest when otter presence is at its lowest: in the second survey within SACs, otter evidence was present at 82% of surveyed sites compared with 55% in non-SACs, whereas when otter presence is at its highest (fourth survey) otter evidence was present at 94% of sites in SACs and 91% of sites in non-SACs. This interaction term was not significant, however, so this may be a result of the data being binary. It is possible that SAC sampling sites are more likely to be representative of otter presence in the wider countryside when otter populations are doing well than when they are not. Additionally, the direction of change between successive sampling periods is consistent between SACs and the wider countryside sites. This means that SAC sites are likely to be representative of the direction of change in the wider countryside if not its extent.

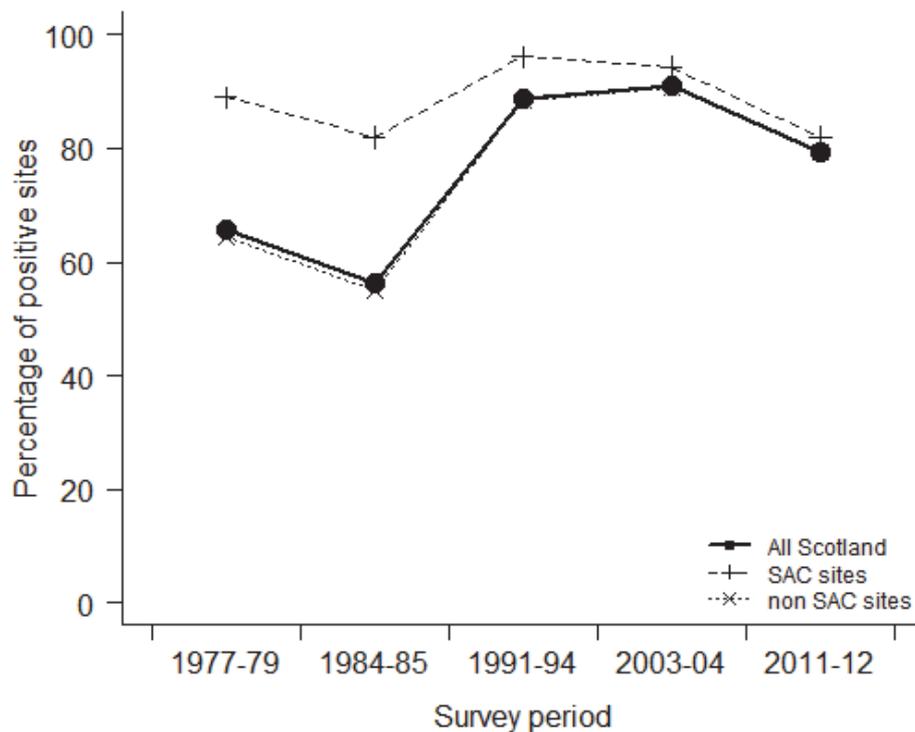


Figure 3. The relationship between proportion of sites with signs of otters and survey period for Scotland as a whole, the SAC sites and the non-SAC sites

4.2.1 A comparison of SACs and the wider countryside

Figure 4 shows the proportion of sites with signs of otters within SACs and also within the wider countryside (non-SAC sites) of Scotland for the weighted data. Figure 5 shows the same for the unweighted data. The effect of the weights on the All Scotland trend is obvious here as this line is much closer to the non-SAC areas when the data are weighted. Conversely, it is closer to the SAC line for the unweighted data, particularly in the fourth and fifth surveys where there was a higher proportion of SAC sites.

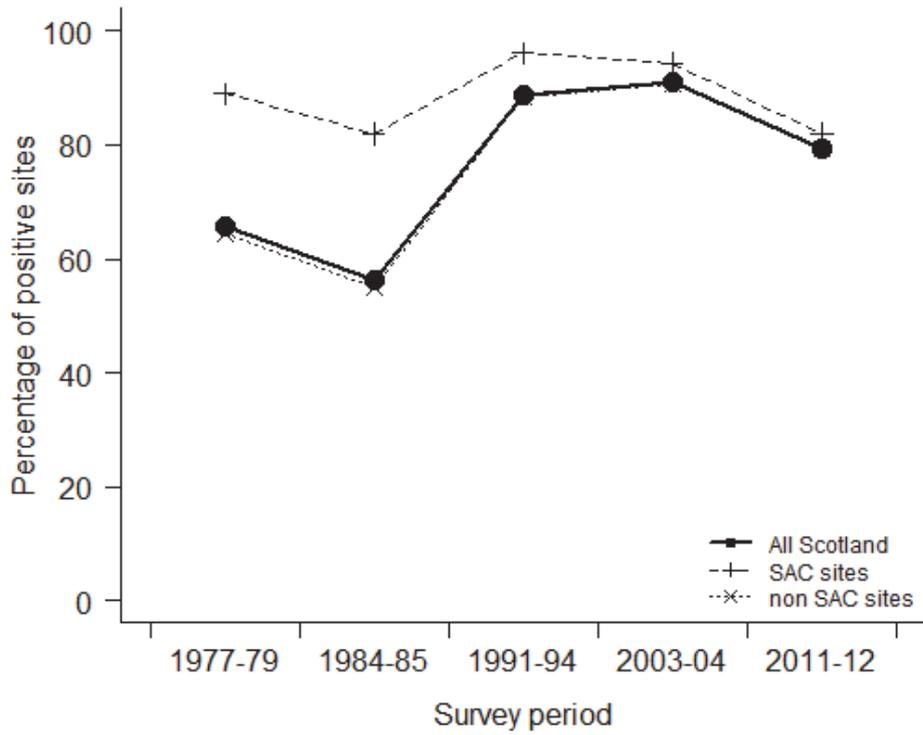


Figure 4. Weighted proportion of sites with signs of otters in the SAC and non-SAC areas

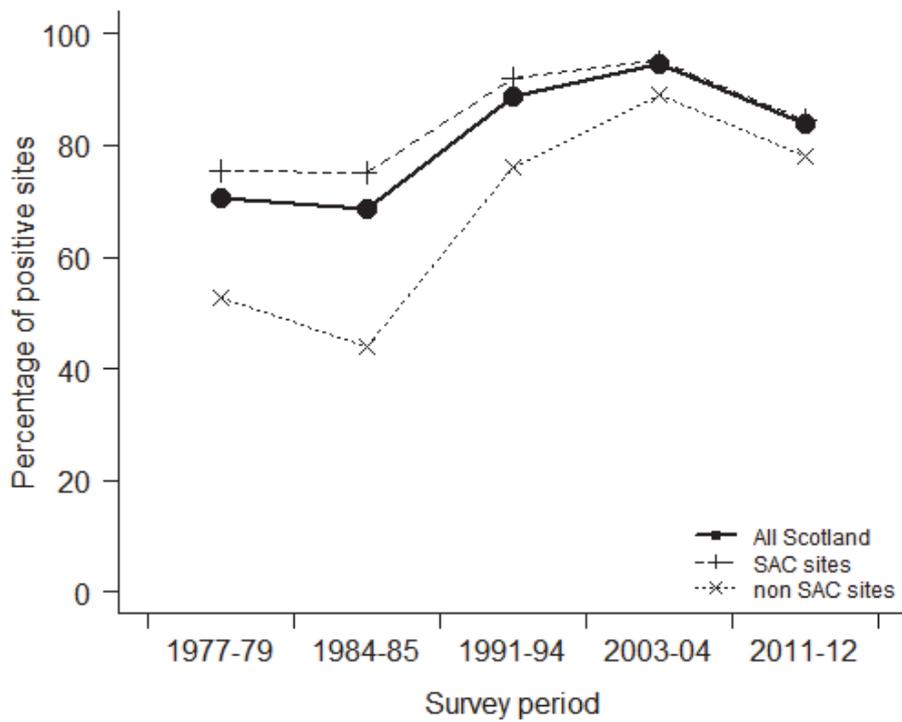


Figure 5. Unweighted proportion of signs of otters in the SAC and non-SAC areas

4.3 SNH Areas

4.3.1 Northern Isles and North Highland

Nine SACs were surveyed in this region. The most significant changes in this area are the assessment of the two Shetland SACs, Yell Sound Coast and Hascosay and also the Caithness & Sutherland Peatlands.

The two Shetland SACs are assessed as being in unfavourable condition in 2011/12 based upon a reduction in food resource and a likely reduction in otter abundance. The otter population on Shetland is the densest in the UK, with a population estimate in the late 1980s thought to represent up to 12% of the total British population at the time (Harris *et al.*, 1995). Given the smaller home-ranges on Shetland, and the greater density of animals, the standard assessment parameters were not considered appropriate as the sampling protocol assumes average home-range sizes (20km watercourse for a female and 32km for a male) whereas otters on Shetland have much smaller home-ranges (4-5km). In studies of otters on Shetland, it has been shown that there is a relationship between the number of holts and the number of otters (Kruuk *et al.*, 1989). Data from long term monitoring using holt counts in the Yell Sound Coast and Hascosay have also informed the assessments.

The Caithness & Sutherland Peatlands SAC was reported to be in favourable condition in 2003-04. The current assessment shows a continued decline in otter presence and the SAC is suggested in this report to be in unfavourable condition.

Of the remaining SAC sites, the River Borgie and Foinaven SACs retained full occupancy, as did Dornoch Firth and Morrich More which straddles the SNH area boundary with South Highland.

Durness and Ardvar & Loch a' Mhuilinn Woodlands SACs show a small reduction in positive sites, even after the correction for detectability (one of the outputs from the analysis described in Section 3.6.4). The former is suggested to be in favourable condition, whereas the status of the latter is suggested in this report as being Favourable Declining. Similarly, the Loch of Isbister is suggested in this report to be Favourable Declining, with one of its two sites being positive as in the 2003-04 survey. The small number of sites in this SAC has led to a greater reliance on recorded otter sightings in the assessment.

4.3.1.1 Yell Sound Coast SAC (Shetland)

Yell Sound Coast SAC		1,540.55ha															
Constituent SSSIs: Yell Sound Coast and islands including Gluss Isle, Brother Isle, Uynarey Isle, Samphrey Isle, Orfasay Island and Fora Ness.																	
10 survey sites in 2012. All positive.	36 resting sites	No evidence of mink															
Evidence of otter breeding: a significant level of activity was noted at all sites. Some holts were associated with a high level of otter activity (spraint piles and fresh deposits) suggesting breeding.																	
Conditions prior to and during survey: good																	
Changes identified since 2004: fewer holts were recorded and also no family groups were seen. Females with cubs were seen at 6 sites in the 2004 survey. Only single otters were seen in the 2012 survey.																	
<table border="1"> <caption>Yell Sound Coast: presence of otter through all survey periods</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> <th>Data type</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>1991-94</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>2003-04</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>2011-12</td> <td>100</td> <td>Predicted</td> </tr> </tbody> </table> <p><i>Yell Sound Coast: presence of otter through all survey periods</i> (2011-12: white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data)</p>			Survey period	Percentage of positive sites	Data type	1977-79	100	Actual	1991-94	100	Actual	2003-04	100	Actual	2011-12	100	Predicted
Survey period	Percentage of positive sites	Data type															
1977-79	100	Actual															
1991-94	100	Actual															
2003-04	100	Actual															
2011-12	100	Predicted															
Anecdotal evidence																	
Road mortality is highlighted as a cause of otter death in Shetland, as figures indicated a significant increase in 2009. There are some examples of mitigation e.g. the installation of an otter tunnel at the Tesco roundabout in Lerwick. The number of RTAs appears to be fairly consistent over time, (J. Brown, SNH, pers. comm.)																	
Potential issues																	
Lobster creels were identified in 2004 as a potential threat and it is likely that otters are drowned accidentally, but there is no evidence of how significant a threat this is.																	



Figure 6. Feor Wick forming part of the coastline of Lunna Ness with typical open, sheltered coastal habitat and frequent holts in peat.

Yell Sound Coast is specifically designated for otters and the SAC was selected to include the areas of highest otter density consisting of a complex of islands and coastline. The areas within the site are characterised by low-lying peaty coastlines with large numbers of otter holts and easy access to fresh water. The adjacent marine areas have extensive algal beds which are used for foraging.

Work undertaken by J. Conroy and J. Campbell indicates that the biomass of fish exploited by otters appears to have declined. Unpublished evidence comparing recent fish biomass data to results from the 1980s suggests that catches of target fish species for otter are now only 8% of those in the 1980s, i.e. what was previously caught in a month is now caught in a year (J. Campbell, pers. comm.).

The otter population in the Yell Sound Coast was monitored by J. Conroy for over a 20 year period. Holt counts were recorded almost annually from 1988 to 2008 in 10 study areas in the Yell Sound Coast. A further two study areas were additionally monitored from the late 1990s. The holt counts fluctuated until the early 2000s, but then all sites showed a consistent decrease in numbers. By 2007 and 2008 the holt counts suggest there had been a significant population decline of more than 50% from 2003 with no sign of a recovery since then. Conroy (unpublished) considered the most likely cause of this decline to be a significant reduction in the availability of the animals' main prey, small inshore fish. This is reflected in an increase in the amount of crab remains in the diet immediately before and during the decline periods; crabs are considered to be a secondary prey item.

Table 3. Assessment of Yell Sound Coast SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations	X	Unpublished studies by J. Conroy indicate a long term decline in prey species.
No increase in pollutants potentially toxic to otters	✓	In 2008 93% of Shetland water bodies are of good or high quality. All of the 16 shellfish areas met mandatory standards (SEPA, 2010)
Predicted presence of 80% of sample sites	✓	Spraint numbers and number of holts were lower in 2012 compared with 2004 but signs of otter activity were abundant at all sites with several individuals observed.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	X	Long term unpublished studies by J. Conroy indicate a reduction in population. Holt counts in all 12 areas studied show a decrease in holt counts since the early 2000s. Examples include Gluss Isle, which had a maximum holt count of 48 in 1995 and a minimum of 4 in 2006 and 2007. Brother Isle had a maximum count of 32 in 1996 and a minimum count of 3 in 2008. Data supplied courtesy of BP.
Otter population not significantly impacted by human induced kills		Deaths in crustacean traps are likely, but no evidence suggesting significant impact on population.
Recommended Condition Assessment	UNFAVOURABLE	

4.3.1.2 Hascosay SAC (Shetland)

Hascosay SAC		Total Area 164.9ha												
Constituent SSSIs: Hascosay														
2 survey sites in 2012. Both positive	13 resting sites	No evidence of mink												
Evidence of otter breeding: significant level of activity noted at all sites with some holts associated with high level of otter activity on the basis of spraint piles and fresh deposits														
Conditions prior to and during survey: good														
Changes identified since 2004: fewer holts recorded. Historic spraint areas noted with no fresh signs. No change in positive sites.														
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> </tr> <tr> <td>1984-85</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100 (Actual)</td> </tr> <tr> <td>2011-12</td> <td>100 (Predicted)</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	1977-79	100	1984-85	100	1991-94	100	2003-04	100 (Actual)	2011-12	100 (Predicted)
Survey period	Percentage of positive sites													
1977-79	100													
1984-85	100													
1991-94	100													
2003-04	100 (Actual)													
2011-12	100 (Predicted)													
<i>Hascosay: presence of otter through all survey periods</i>														
(2011-12: white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data)														
Anecdotal evidence														
J. Campbell, (pers. comm.) notes that work undertaken by J. Conroy in the 1980s on fish availability has recently been repeated using the same methodology and that the results indicate a dramatic decline with yearly fish counts of target species for otters being equivalent to monthly counts in the past. This work has yet to be published.														
Potential issues														
Lobster creels were identified in 2004 as a potential threat and it is likely that otters are drowned accidentally but there is no evidence of how significant a threat this is. Coastal peat erosion is apparent on Hascosay. Banks of deep peat containing holts are subject to erosion from high sea levels or storm events.														

Hascosay has one of the few remaining un-eroded pool systems in Shetland with intact blanket bog and a range of shallow mud-bottomed hollows. This peatland system is considered one of the best examples in the UK and has been subject to management agreements with crofters to ensure low grazing pressure. J. Conroy surveyed Hascosay in 2009 and compared annual holt counts from 2000 to 2004 to the 2009 count.

Table 4. The number of occupied holts on Hascosay counted between 2000 and 2004, and 2009 (data courtesy of BP)

Year	2000	2001	2002	2003	2004	2009
No of Holts	91	128	107	103	56	12

The decline in the otter population was attributed to a significant decline in inshore-living demersal fish (Conroy, 2009).

Otter RTAs are not an issue on Hascosay itself as there are no roads, but it is likely that some animals may also frequent Yell where RTAs are a risk.



Figure 7. One of several entrances to a large holt complex

Table 5. Assessment of Hascosay SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations	X	Unpublished studies by J. Conroy indicate a long term decline in prey species.
No increase in pollutants potentially toxic to otters	✓	In 2008, 93% of Shetland water bodies are of good or high quality. All of the 16 shellfish areas met mandatory standards (SEPA, 2010)
Predicted presence of 80% of sample sites	✓	Otters present at both sites with abundant signs
Population maintained or increasing (Loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	X	Fewer holts were found in 2011-12 than 2003-04 but given the small sample size it is difficult to draw firm conclusions. J. Conroy has, however, documented a decline in holt numbers since a peak in 2001 to the end of the study in 2009, see Table 4
Otter population not significantly impacted by human induced kills		Deaths in crustacean traps are likely, but no evidence suggesting significant impact on population. RTAs not relevant.
Recommended Condition Assessment	UNFAVOURABLE	

4.3.1.3 Loch of Isbister SAC (Orkney)

Loch of Isbister SAC		Total Area 105ha															
Constituent SSSIs: Loch of Isbister and the Loons																	
2 survey sites in 2011. One positive	No resting sites	No evidence of mink															
Evidence of otter breeding: see below																	
Conditions prior to and during survey: good																	
Changes identified since 2004: none																	
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> <th>Data type</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>1991-94</td> <td>0</td> <td>Actual</td> </tr> <tr> <td>2003-04</td> <td>50</td> <td>Actual</td> </tr> <tr> <td>2011-12</td> <td>50</td> <td>Predicted</td> </tr> </tbody> </table> <p><i>Loch of Isbister: presence of otter through all survey periods</i></p> <p>(2011-12: white dot and dotted line are the predicted values which have taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data)</p>			Survey period	Percentage of positive sites	Data type	1977-79	100	Actual	1991-94	0	Actual	2003-04	50	Actual	2011-12	50	Predicted
Survey period	Percentage of positive sites	Data type															
1977-79	100	Actual															
1991-94	0	Actual															
2003-04	50	Actual															
2011-12	50	Predicted															
Anecdotal evidence																	
<p>A group of three otters was recorded in the RSPB logbook on 12th April 2011 and the RSPB staff and local farmer had observed otters on the loch during 2011. Two otters were noted by SNH on a site visit on 27th September 2012, one of which was smaller than the other and likely to be a female and cub.</p>																	
Potential issues																	
Widespread heavy grazing and associated diffuse pollution																	



Figure 8. Loch of Isbister, open habitat

The Loch of Isbister SAC comprises a small naturally eutrophic loch and a cluster of small lochans with associated wetland habitats such as expanses of rushes, sedge beds, small reed beds, swamps, wet heath and grassland.

The 2011 results were very similar to the 2004 results with the same site being positive in both surveys. Heavy grazing was impacting on the marshy grassland with grazing and trampling significantly reducing the availability of tall vegetation suitable for couches. Vegetation and SCM vegetation surveys indicate that bare ground is very limited in extent (<1% of the site) and that grazing management is targeted at maintaining wetland vegetation. Cattle dung and associated diffuse pollution was also noted as likely to be adversely affecting water quality. Eutrophication issues were raised in the 2004 survey; the two sites surveyed in 2011 indicated that there had been no positive changes in management in the intervening time period. The sighting of three otters in April 2011 suggests a female with young used the site but whether as a natal (birthing) area or as a core area where the female concentrates rearing activities is unknown. There are some areas of wetter habitat which include five reed beds, four of which are more extensive now than in the early 1990s, and some areas of wetter swamps which are not so heavily grazed. These may offer suitable habitat for natal couches.

Table 6. Assessment of Loch of Isbister SAC, Orkney

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data.
No increase in pollutants potentially toxic to otters	✓	In 2008, 86% of Orkney water bodies are of good or high quality.
Predicted presence of 80% of sample sites	X	Only two sample sites, one of which was positive. Confidence limits are large with such a small sample of sites. Informal observations imply use of the loch by otters, including the use of the loch for breeding and these observations are the basis to consider this attribute a pass.
Population maintained or increasing	✓	Same result of 50% positive sites in 2011-12 as 2003-04, but with added informal evidence of use of the loch by otters.
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE DECLINING	

4.3.1.4 Caithness and Sutherland Peatlands SAC

Caithness and Sutherland Peatlands SAC		143,572.22ha										
<p>Constituent SSSIs: Stroupster Peatlands, Moss of Killimster, Oliclett, Shielton Peatlands, Blar nam Faileag, Coire na Beinne Mires, Strathmore Peatlands, Loch Caluim Flows, East Halladale, Sletill Peatlands, Rumsdale Peatlands, Knockfin Heights, Dunbeath Peatlands, West Halladale, Forsinard Bogs, Ben Griams, Lon a' Chuil, Skelpick Peatlands, Strathy Bogs, Lochan Buidhe Mires, West Strathnaver, Syre Peatlands, West Borgie, Ben Hutig, A' Mhoine, Druim na Coibe, Ben Loyal, Loch Meadie Peatlands, Druim nam Bad, Bad na Gallaig, Strath Duchally, Cnoc an Alaskie, Strath an Loin, Grudie Peatlands, Mallart, Truderscaig, Badanloch Bogs, Skinsdale Peatlands, Coir' an Eoin</p>												
68 survey sites in 2011. 46 positive	14 resting sites	Evidence of mink at two sites										
Evidence of otter breeding: cub/juvenile footprints found at Loch Caluim, Loch Akran and River Thurso.												
Conditions prior to and during survey: extremely wet with localised flooding and strandline vegetation noted several metres back from the tops of many burns.												
Changes identified since 2004: no major changes in terrestrial habitat. Reduction in positive sites.												
<table border="1"> <caption>Percentage of positive sites for otter presence</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>~95</td> </tr> <tr> <td>1991-94</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>~85</td> </tr> <tr> <td>2011-12</td> <td>~75</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	1977-79	~95	1991-94	100	2003-04	~85	2011-12	~75
Survey period	Percentage of positive sites											
1977-79	~95											
1991-94	100											
2003-04	~85											
2011-12	~75											
<p><i>Caithness & Sutherland Peatlands: presence of otter through all survey periods</i></p> <p>(2011-12: white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator, black dots represent actual data)</p>												
<p>Anecdotal evidence</p> <p>River Helmsdale bailiff (P. Clare) has noted that otters now eat rabbits (<i>Oryctolagus cuniculus</i>) as he has noted rabbit hair in spraint, rather than exclusively fish which was what he used to observe years ago. He used to see a lot of 'ottered fish' early in the season but hasn't seen so many recently. He has noticed a decline in eel numbers (not based upon formal monitoring). Voluntary catch returns are now at about 80%. Most sightings of otter are on the lower reaches and estuary.</p> <p>E. McCarthy, a bailiff on the Thurso River manages 40km of river from Loch More north to Thurso. He reported good fish numbers with salmon starting to run up river in January with numbers increasing until July when the grilse run starts. He notes that in 2009 and 2010 there had been the best salmon catches since records began in 1896. There is a voluntary catch return policy with a 90% uptake. He commented on excellent numbers of brown trout</p>												

and also that he had seen no evidence of a decline in eels. He and other bailiffs and fishermen see otters very regularly and know of three or four holts.

I. McMyn managed the salmon fishery on a number of rivers in Sutherland some of which are within the SAC (Oykel, Cassley, Carron, Shin). He stated that the previous two winters had been severe with surface water being frozen for three to four months. He stated that ploughing for forestry continues, resulting in silt input to rivers. Likewise, wind farm construction also deposits notable amounts of silt into the rivers.

Potential issues

Grazing and afforestation were noted as impacting otter habitat. The peatlands are generally grazed by sheep or cattle and red deer. In several areas poaching of river banks and erosion was noted from domestic grazing, but significant erosion and reduction of heather cover was also noted, resulting from high deer numbers. While this will impact on the quality of habitat, it is not clear whether it constitutes a real threat to otters.

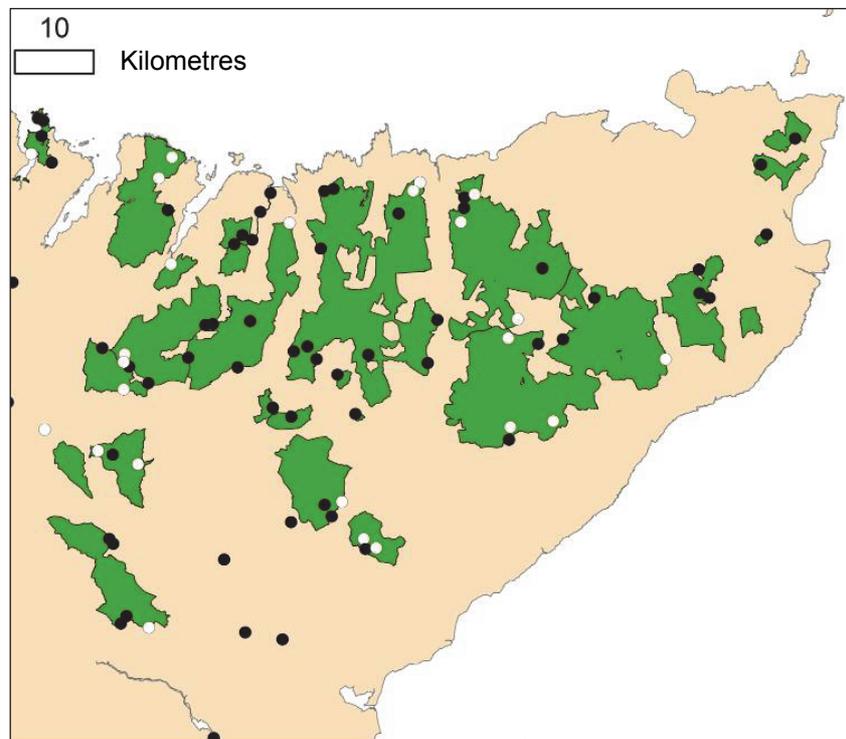


Figure 9. Distribution of positive sites (black) and negative sites (white) in the Caithness & Sutherland Peatlands SAC (green areas). © Crown copyright and database rights 2014 Ordnance Survey 100017908.

The Caithness & Sutherland Peatlands is a large SAC with scattered lochs, lochans, bog pools, burns and a number of significant rivers including the River Strathy, Halladale River, Forrs Water, River Thurso, Berriedale Water, River Helmsdale and River Brora. The SAC often includes parts of these main river stems and several tributaries including head waters, while generally excluding the lower reaches.



Figure 10. Typical burn in peatland landscape

The poor survey conditions were a repeated theme during the 2011 survey, but poor conditions were also noted for the Caithness & Sutherland Peatlands in the 2003-04 survey. The negative sites in 2003-04 were 'largely attributed to heavy rainfall and spate conditions' (Strachan, 2007). There is a notable increase in spraint numbers in the 2011 data compared with 2004 which implies that the poor conditions noted in 2011 cannot satisfactorily explain the negative 10km squares. It may also challenge the assumption of poor conditions adversely affecting the results in the 2004 survey. The comments on recent severe winters and lack of water for long periods of time may be extremely relevant in the interpretation of the downward trend.

Table 7. Assessment of the Caithness & Sutherland Peatlands SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	X	68% of sites had evidence of otter and there is a predicted occupancy of 73%.
Population maintained or increasing	X	Less than 80% of sites had evidence of otter, coupled with a reduction in positive sites for two consecutive cycles and an apparent contraction in range from peripheral areas.
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	UNFAVOURABLE	

4.3.1.5 River Borgie SAC

River Borgie SAC		34ha															
Constituent SSSIs: River Borgie and West Borgie. (Note: The mid and upper River Borgie runs through the Caithness & Sutherland Peatlands SAC)																	
4 survey sites in 2011/12. 4 positive	2 resting sites	No evidence of mink															
Evidence of otter breeding: none																	
Conditions prior to and during survey: periods of heavy rain																	
Changes identified since 2004: no changes in terrestrial or aquatic habitat. All sites with signs of otter.																	
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> <th>Data type</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>1991-94</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>2003-04</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>2011-12</td> <td>100</td> <td>Predicted</td> </tr> </tbody> </table> <p><i>River Borgie: presence of otter through all survey periods</i> (2011-12: white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data)</p>			Survey period	Percentage of positive sites	Data type	1977-79	100	Actual	1991-94	100	Actual	2003-04	100	Actual	2011-12	100	Predicted
Survey period	Percentage of positive sites	Data type															
1977-79	100	Actual															
1991-94	100	Actual															
2003-04	100	Actual															
2011-12	100	Predicted															
Anecdotal evidence: none																	
Potential issues: none identified																	

The River Borgie flows through woodland, scrub and banks of bracken in the lower reaches and through forestry, blanket bog and other moorland habitats in the mid to upper reaches. Throughout the length of the river the terrestrial habitat was considered good with plenty of scrub, bouldery areas or peaty banks suitable for resting. Large fish were observed and there is an active angling fraternity. Management for angling such as weirs and concrete stances were present downstream; the latter were not noted in the 2003-04 survey but are not thought to impact on otters.

The River Borgie Conservation Strategy (Birkeland, 2003) cites forestry operations as potentially impacting on salmonids and freshwater pearl mussels (*Margaritifera margaritifera*) as a result of increased siltation and reduced pH. It is acknowledged by all parties that there has been non-compliance with the Forests and Water Guidelines and with the UK Woodland

Assurance Standard (UKWAS) (Ratcliffe, 2012). However, almost all of the issues associated with forest management have now been resolved.

Table 8. Assessment of the River Borgie SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations	✓	The River Borgie SAC has been assessed as Unfavourable Recovering for Atlantic salmon in 2011.
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	All sites had evidence of otter.
Population maintained or increasing	✓	
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	

4.3.1.6 Durness SAC

Durness SAC		1,212.74ha										
Constituent SSSIs: Durness												
5 survey sites in 2011. 4 positive	1 resting site	No evidence of mink										
Evidence of otter breeding: none												
Conditions prior to and during survey: heavy rain preceded the survey. This area had experienced a particularly wet summer although three of the sites were coastal and therefore spates were not an issue.												
Changes identified since 2004: the 2004 survey identified freshwater pools on Faraid Head. These were not found in 2011. Military activity was noted at two of the 2004 sites but none was noted during 2011 although this does not mean that military activity is absent.												
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>80</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	1977-79	100	1991-94	100	2003-04	100	2011-12	80
Survey period	Percentage of positive sites											
1977-79	100											
1991-94	100											
2003-04	100											
2011-12	80											
<i>Durness: presence of otter through all survey periods</i>												
(2011-12: white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data)												
Anecdotal evidence												
Donald Mitchell, a countryside ranger, stated that otters are seen regularly and there was successful breeding in 2011 on Loch Borrallie and a dead cub was found on Loch Croispol. They are also regularly seen near the golf course at Balnakiel and from the ferry to Cape Wrath. Lobster pot/crab fishing occurs locally, but is very low key.												
Potential issues												
None identified, except for ponds on Faraid Head prone to seasonal drying out.												



Figure 11. Coastal habitat at Faraid Head

Durness SAC comprises a headland of limestone (Faraid Head) with dunes, cliffs, rocky shorelines and beaches and land to the south, adjacent to the Kyle of Durness, which includes lochs and small burns, coastal habitat and grazing land. Faraid Head yielded few otter signs, with one site recorded as positive just on the basis of tracks and an unmarked sign heap within a cave. Fresh water was noted as being sparse; various seepages were present running down cliffs but these were not associated with pools and an animal would have difficulty drinking and bathing. The 2003-04 survey commented on pools being dug out by otters but these features were not evident in 2011 despite a 'quality control' survey by a second surveyor which targeted this as well as corroborating a negative result for spraints. There is a small freshwater pond on the headland and another seasonal pond, but these were not included in the sites sampled. Spraint was found in the dunes and a single holt was found which comprised an excavated rabbit burrow. A small stream by the car park for visitors to the Durness headland was checked *ad hoc* where it flowed onto the coastal strip. No spraint was present. The car park was busy with visitors, several taking dogs for a walk along the sandy beaches, through occasional paths in the dunes and along the path network. The ranger did not think that visitor numbers had significantly increased since 2003-04.

The negative site was coastal with apparently good structural habitat including rocky shallows with seaweed backing onto low cliffs with plenty of elevated but accessible (to otters and the surveyor) level grassy ledges and shelves which would be a focus for otter activity. As noted at Faraid Head, however, fresh water was present as seepages down the cliff face but with no associated pools or areas suitable for bathing or drinking. Outwith the 2011 survey area, a freshwater stream flowed down to the beach. This was included in the 2003-04 survey, presumably due to a discrepancy in estimating the required 600m. This area is probably where the otter signs were found.

The two freshwater loch sites were both positive for otter and were considered good habitat.



Figure 12. Loch Croispol. Good loch habitat with signs of frequent use by otter

Table 9. Assessment of Durness SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	80% of sites had evidence of otter with predicted occupancy of 80%
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	Borderline pass, but the number of sample sites is low, and there is insufficient evidence to justify a failure.
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	Marginal pass with regard to the population being maintained or increasing, but the SAC has too few sample sites to assess whether condition is declining.

4.3.1.7 Foinaven SAC

Foinaven SAC		14,845.6 ha												
Constituent SSSIs: Foinaven														
8 survey sites in 2012. 8 positive	3 resting sites	No evidence of mink												
Evidence of otter breeding: none confirmed														
Conditions prior to and during survey: very low rainfall and streams and rivers with low flow														
Changes identified since 2004: no obvious changes since 2004. The 2012 survey followed very low spring and summer rainfall in NW Scotland with resultant very low flows in some streams and rivers at the time of survey. High algal content was noted in the Rhiconich River. Most sites are subject to sheep and deer grazing with little cover.														
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> <th>Data type</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> <td>Actual data</td> </tr> <tr> <td>2003-04</td> <td>100</td> <td>Actual data</td> </tr> <tr> <td>2011-12</td> <td>100</td> <td>Predicted value</td> </tr> </tbody> </table> <p><i>Foinaven: presence of otter through all survey periods</i> (2011-12: the white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data)</p>			Survey period	Percentage of positive sites	Data type	1977-79	100	Actual data	2003-04	100	Actual data	2011-12	100	Predicted value
Survey period	Percentage of positive sites	Data type												
1977-79	100	Actual data												
2003-04	100	Actual data												
2011-12	100	Predicted value												
Anecdotal evidence														
None														
Potential issues														
No information on use of fishing nets and lobster creels at Loch Inchard on the edge of the SAC														



Figure 13. Loch a' Garbh-bhaid Mor

The SAC includes the high ground of Foinaven and Arkle with the river valleys of the Dionard and the Rhiconich. There are extensive peatland areas and numerous lochans, mostly oligotrophic, but some are mesotrophic, offering richer feeding for otters. The SAC is bounded by the A838 on the NW boundary.

Table 10. Assessment of Foinaven SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	All sites positive for otter
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	Results similar to survey in 2004 and population likely to be stable.
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	

4.3.1.8 Ardvar and Loch a' Mhuilinn Woodlands

Ardvar and Loch a' Mhuilinn Woodlands SAC		805.99 ha								
Constituent SSSIs: Ardvar Woodlands and Loch a' Mhuilinn										
4 survey sites in 2012. 3 positive	No resting sites	No evidence of mink. Mink raft noted.								
Evidence of otter breeding: none confirmed. Crab shell was noted in spraint at one site which may be indicative of young animals being present, or a lack of higher quality prey.										
Conditions prior to and during survey: there had been high water levels immediately prior to survey. The negative site had typical sprainting rocks by the bridge but no spraint.										
Changes identified since 2004: drop in positive sites although the sample size is very small.										
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>~75</td> </tr> </tbody> </table> <p><i>Ardvar and Loch a' Mhuilinn Woodlands: presence of otter through all survey periods</i> (2011-12: the white dot and dotted lines are the predicted values which have taken the probability of missed detections using the Q50 spate indicator into account, black dots represent actual data)</p>			Survey period	Percentage of positive sites	1977-79	100	2003-04	100	2011-12	~75
Survey period	Percentage of positive sites									
1977-79	100									
2003-04	100									
2011-12	~75									
Anecdotal evidence: none										
Potential issues: none identified										

Ardvar and Loch a' Mhuilinn Woodlands SAC is a discontinuous area covering Loch a' Mhuilinn in the north. It comprises small areas of woodland which are dominated by sessile oak.

Table 11. Assessment of Ardvar and Loch a' Mhuilinn Woodlands SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	75% of sites had evidence of otter with a predicted occupancy of 77%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	All sites were positive for otter in 2003-04. Thus, there has been a loss of approximately 20% occupancy, but this needs to be considered in the context of the small number of sample sites.
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE DECLINING	The overall high quality of the habitat at this site and its surroundings coupled with the small sample size, have been taken into account in forming this assessment.

4.3.2 *South Highland*

Sixteen SACs were surveyed which at least partially fall within this SNH Area. Of these, the Cairngorms is presented in the Tayside & Grampian section and Rannoch Moor is presented in the Argyll and Outer Hebrides section as most of their area is within those respective SNH Areas. For the Cairngorms SAC account, see page 129, for Rannoch Moor SAC account, see page 115. In the South Highland SNH Area, two sites, Loch Moidart & Loch Shiel Woods SAC and Ness Woods SAC were assessed in this report as being in unfavourable condition. The level of confidence in the assessment of Ness Woods SAC is low due to difficult terrain and the loss of a bridge spraint site.

Rum SAC is suggested to be in favourable declining condition due to reduced occupancy. The remaining SACs are all in favourable condition.

4.3.2.1 Dornoch Firth and Morrich More SAC

Dornoch Firth and Morrich More SAC		8,700ha												
Constituent SSSIs: Dornoch Firth and Morrich More														
7 survey sites in 2011. 7 positive	3 resting sites	Evidence of mink at one site.												
Evidence of otter breeding: none														
Conditions prior to and during survey: recent spring tide														
Changes identified since 2004: none noted														
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> <th>Data type</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> <td>Actual data</td> </tr> <tr> <td>2003-04</td> <td>100</td> <td>Actual data</td> </tr> <tr> <td>2011-12</td> <td>100</td> <td>Predicted value</td> </tr> </tbody> </table> <p><i>Dornoch Firth and Morrich More: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data).</p>			Survey period	Percentage of positive sites	Data type	1977-79	100	Actual data	2003-04	100	Actual data	2011-12	100	Predicted value
Survey period	Percentage of positive sites	Data type												
1977-79	100	Actual data												
2003-04	100	Actual data												
2011-12	100	Predicted value												
Anecdotal evidence														
A local farmer saw otter tracks in the snow in 2010														
Potential issues														
<p>The site is bounded by busy trunk roads including the A9 crossing at the mouth of the firth. There are two RTA records on the bridge itself and two within 5km. Ten kilometres to the north, there is a cluster of five RTA records at the mound causeway at Loch Fleet with three of these RTAs being in 2007. Reflectors were installed in 2012 but a longer period of time is required to assess their efficacy.</p>														



Figure 14. The Dornoch Firth supports a diversity of structurally rich habitats and a varying foraging habitat

This SAC comprises saltmarsh, dunes, small watercourses and the firth itself. Generally the survey sites were undisturbed by recreation despite an adjacent golf course. The site offers a good combination of fresh and estuarine waters with dense gorse and juniper scrub, ungrazed saltmarsh and dune vegetation with associated rabbit burrows, providing good opportunities for holts and couches. Despite this, two of the resting sites found were in man-made structures; the first under an upturned boat and the second in bank reinforcement made of boulders. Extensive survey work was undertaken by local volunteer ecologists in 2005-07 (Wells & Patterson, 2008). This survey found otter signs, including bathing pools and holts to be numerous. Woodland and scrub were found to be the most favoured habitats for otter holts. Two previously used holts *may* have been abandoned due to a recent motorbike circuit being in close proximity, but another otter holt only 70m away showed signs of fresh use. Some of the main findings highlighted the importance of coastal woodland habitat for otter in proximity of the SAC, and also the retention of dense coastal scrub (i.e. gorse) along the shore as optimal otter resting habitat (Wells & Patterson, 2008).

Localised adverse impacts were noted during the 2011 survey, specifically sheep grazing, dumping from a farm and disturbance from the MoD firing range, although it is speculated that the otters would become habituated to activities on the MoD range. Generally the seven sites surveyed offered plenty of structural cover with the exception of one site where heavy sheep grazing had led to a grazed-off turf with no cover. A high amount of otter activity was associated with freshwater pools where strong paths indicated habitual use.

Table 12. Assessment of Dornoch Firth and Morrich More SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	The Dornoch Firth is a designated commercial shellfish area. Available water quality data (to 2010) indicate compliance with standards (excluding faecal coliforms).
Predicted presence of 80% of sample sites	✓	100% sites had evidence of otter.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	Full occupancy in 2003-04 and 2011-12. There is a well-documented and detailed survey covering the interval between the SCM surveys (Wells & Patterson, 2008).
Otter population not significantly impacted by human induced kills		There are some RTA records locally, but the full extent and impact on the otter population of the SAC is not clear.
Recommended Condition Assessment	FAVOURABLE	

4.3.2.2 Loch Maree Complex SAC

Loch Maree Complex SAC		15,735ha										
Constituent SSSIs: Torridon Forest, Coillie Dubh, Talladale Gorge, Beinn Eighe, Shildaig Woods, Loch Maree, Coulin Pinewood, Doire Damh, Ardlair–Letterewe												
17 survey sites in 2012. 15 positive	8 resting sites	Evidence of mink at one site.										
Evidence of otter breeding: none												
Conditions prior to and during survey: in the few weeks prior to survey, the conditions had been exceptionally dry and the level of the loch was considerably lower than normal for the season. During the week of the survey, the catchment received heavy downpours and river levels rose dramatically at the end of the week. This would have affected spraints in open areas.												
Changes identified since 2004: reduced the number of positive sites. The two negative sites were surveyed at the end of the week and comprised open sections through moorland, with little in the way of concealed structures which would have protected spraint from the heavy rain.												
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>88</td> </tr> <tr> <td>1991-94</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>90</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	1977-79	88	1991-94	100	2003-04	100	2011-12	90
Survey period	Percentage of positive sites											
1977-79	88											
1991-94	100											
2003-04	100											
2011-12	90											
<i>Loch Maree: presence of otter through all survey periods</i>												
(2011-12: the white dot and dotted line are the predicted values which have taken the probability of missed detections into account using the Q50 spate indicator, black dots represent actual data)												
Anecdotal evidence												
Derek Roxburghe, a ghillie, stated that in the last 15 years the fishery had declined. He also said that sightings of otter on the loch had always been extremely rare and that they are more associated with the coast.												
Potential issues												
Two RTA records on the A832 which runs parallel to much of the south shore of the loch.												

Loch Maree SAC includes Loch Maree, the Loch Maree Islands NNR, Beinn Eighe NNR, much of the northern valley of the River Torridon and parts of the southern valley. It also includes two small SSSIs which are not contiguous with the main part of the SAC (Doire Damh and Shildaig Woods). The terrestrial and aquatic habitats present in the SAC are very varied. Undisturbed boulder-strewn wooded shores surround much of the loch which has excellent potential for undisturbed resting sites and holts. The complex of islets is

undisturbed and has an abundance of structurally diverse terrestrial habitat as well as small, shallow lochans. These areas suggest suitability for natal holts with undisturbed habitat and calm safe waters for young otters emerging from the natal holt. Loch Maree lies on a fault line so is very deep (up to 110m). Otters prefer shallow waters for foraging which suggests that foraging conditions in the loch may be limited to any shallow shelves and the inflow and outflow burns rather than in the main water body itself. This is compounded by the naturally unproductive status of the loch.



Figure 15. The Loch Maree islands with boulders and Caledonian forest

The catchments around Loch Maree support Atlantic salmon, brown trout (*Salmo trutta*) and Arctic charr (*Salvelinus alpinus*). Sea trout are present but in much reduced numbers following the crash in the sea trout populations along the west coast. Minnows (*Phoxinus phoxinus*) became established in the early 1990s.

Table 13. Assessment of the Loch Maree Complex SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	88% of sites had evidence of otter and the predicted occupancy is 89%.
Population maintained or increasing (Loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		RTA data inconclusive.
Recommended Condition Assessment	FAVOURABLE	

4.3.2.3 Kinloch and Kyleakin Hills SAC

Kinloch and Kyleakin Hills SAC		5,266.9ha												
Constituent SSSIs: Bealach Udal, Loch na Dal														
4 survey sites in 2011. 4 positive	2 resting sites	Evidence of mink at one site.												
Evidence of otter breeding: none														
Conditions prior to and during survey: conditions in late summer were very wet, with frequent heavy rain.														
Changes identified since 2004: forestry operations and housing development														
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> </tr> <tr> <td>1984-85</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>100</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	1977-79	100	1984-85	100	1991-94	100	2003-04	100	2011-12	100
Survey period	Percentage of positive sites													
1977-79	100													
1984-85	100													
1991-94	100													
2003-04	100													
2011-12	100													
<p><i>Kinloch and Kyleakin Hills: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data).</p>														
Anecdotal evidence: none														
<p>Potential issues</p> <p>Two RTAs on A87 to the north of the SAC in 2008 are recorded. The A87 to the west of the site, however, has a high number of RTA records, particularly where it is closest to the coast. The local authority, Transport Scotland and Scotland Transerv are aware of this and are seeking to instigate measures where possible.</p>														

The Kinloch and Kyleakin Hills SAC on Skye is primarily designated for broadleaved semi-natural woodland plus associated heathland and mire habitats. The bulk of the site is owned and managed by the Forestry Commission under a woodland restoration management plan. Otters are regarded as being coastal at this site and it is the stated intention to manage the site positively for otters. Otter activity at one of the survey sites (known to the surveyor for 15 years) is noted as having declined dramatically and a holt has been directly impacted by forestry operations. Housing, litter and afforestation are noted as causing negative impacts on otters and otter habitat at this site.

Table 14. Assessment of Kinloch and Kyleakin Hills SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations No increase in pollutants potentially toxic to otters	✓	No data
Predicted presence of 80% of sample sites	✓	100% occupancy in 2003-04 and 2011-12 surveys.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		Regular RTAs are likely to impact on the island's population, but it is not possible to assess the significance of this in context with the SAC. Given the high level of activity found on the survey sites, it is not considered to be having a measurable adverse effect using the SCM survey method.
Recommended Condition Assessment	FAVOURABLE	

4.3.2.4 Strathglass Complex SAC

Strathglass Complex SAC		23,583.9ha										
Constituent SSSIs: Glen Affric, Glen Strathfarrar, Liatric Burn and Affric & Cannich Hills												
12 survey sites in 2012. 11 positive	12 resting sites	No evidence of mink										
Evidence of otter breeding: none, but there were encouraging signs on Loch Beinn a' Mheadhoin with prints from at least 2 animals and numerous resting sites												
Conditions prior to and during survey: dry summer in this part of Scotland although there was rain immediately prior to and during survey. Loch levels very low. The drawdown on Loch Mullardoch was approximately 20m from the permanent vegetation line.												
Changes identified since 2004: all sites had positive signs in 2004.												
<table border="1"> <caption>Percentage of positive sites over survey periods</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>80</td> </tr> <tr> <td>1991-94</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>92</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	1977-79	80	1991-94	100	2003-04	100	2011-12	92
Survey period	Percentage of positive sites											
1977-79	80											
1991-94	100											
2003-04	100											
2011-12	92											
<p><i>Strathglass Complex: presence of otter through all survey periods</i></p> <p>(2011-12: the white dots and dotted lines are the predicted values which have taken the probability of missed detections into account and are very similar to the actual value. Black dots represent actual data)</p>												
<p>Anecdotal evidence</p> <p>The keeper on the River Farrar reported having seen otters on several occasions and also dead salmon partially eaten by otter. Mink monitoring on the Farrar has not yielded evidence of mink for at least 2½ years (rafts in place in several locations – at least 5 on the Farrar and others on the Glass). Source: J. MacColl, Ness District Salmon Fishery Board.</p>												
<p>Potential impacts: see discussion below</p>												

The Strathglass Complex SAC comprises the three glens of the Rivers Farrar, Cannich and Affric and associated lochs. The Struy, Culligran and Braulen Estates manage the rivers primarily for salmon fishing. Deer stalking is also a major activity in the area. The Forestry Commission owns and manages the majority of Glen Affric both for forestry and recreation. The Ness District Salmon Fishery Board (DSFB) undertakes regular electrofishing. Migratory salmonids, brown trout and non-native rainbow trout (*Salmo gairdneri*) have previously been reported as the most numerous fish species. Eels (*Anguilla anguilla*), sticklebacks (*Gasterosteus aculeatus*) and lampreys (Petromyzontidae) also occur.



Figure 16. The River Affric above Dog Falls

Twelve of the previously surveyed 16 sites were surveyed in 2012 with 11 of these showing positive signs for otters. The Loch Beinn a' Mheadhoin site had clear suggestions of breeding with abundant signs of otter and frequent resting sites.

Keith Williams, the biologist for the Ness DSFB, considers that eel numbers (although down across Scotland) may not have been affected here as much as elsewhere. Electrofishing has not, however, been carried out for long enough to give reliable results. He advises that the early salmon run (February/March) is very small and has declined since the 1970s although any changes since 2004 are difficult to comment on. There is some concern that low flows exacerbated by hydro-electric schemes could affect salmon spawning but no reduction in otter presence since 2004 was detected.

Table 15. Assessment of the Strathglass Complex SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	92% of sites had evidence of otter and the predicted occupancy is 91%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	Slight reduction but well within limits set for this target.
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	

4.3.2.5 Ness Woods SAC

Ness Woods SAC		847.12ha																		
Constituent SSSIs: Easter Ness Forest, Glen Tarff, Inverfarigaig																				
6 survey sites in 2011. 4 positive	4 resting sites	No evidence of mink																		
Evidence of otter breeding: none																				
Conditions prior to and during survey: heavy rain prior to survey and consequent high water levels.																				
Changes identified since 2004: Glen Doe hydro scheme.																				
<table border="1"> <caption>Percentage of positive sites over survey periods</caption> <thead> <tr> <th>Survey period</th> <th>Actual (%)</th> <th>Predicted (%)</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> <td>100</td> </tr> <tr> <td>1984-85</td> <td>100</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>100</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>85</td> <td>85</td> </tr> <tr> <td>2011-12</td> <td>65</td> <td>68</td> </tr> </tbody> </table>			Survey period	Actual (%)	Predicted (%)	1977-79	100	100	1984-85	100	100	1991-94	100	100	2003-04	85	85	2011-12	65	68
Survey period	Actual (%)	Predicted (%)																		
1977-79	100	100																		
1984-85	100	100																		
1991-94	100	100																		
2003-04	85	85																		
2011-12	65	68																		
<p><i>Ness Woods: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data. The prediction is down on the actual data because one of the sites was removed from the prediction analysis as there were no flow data for this site.)</p>																				
Anecdotal evidence: none																				
Potential issues: no major issues identified. There is a reference in the SAC citation to disturbance by fishermen but this is considered negligible. There is potential for mortality on nearby roads.																				

Ness Woods comprises a series of predominantly semi-natural and coniferous plantation woodlands on the southern side of Loch Ness. The complex of sites includes, at Glen Tarff, one of the best and most extensive examples of ravine woodland in Scotland, with further examples occurring along the north-facing shores of Loch Ness. Parts of the site are owned by Forest Enterprise, whose staff have undertaken felling of non-native trees on and adjacent to the site and also undertake a culling regime to reduce deer numbers and eliminate feral goats. Available fish prey (as detailed in Shine *et al.*, 1993.) include Atlantic salmon, Arctic charr, eels, pike (*Esox lucius*), brown trout, sea trout, lamprey sp., sticklebacks, minnows and introduced coarse fish within burns and in Loch Ness. The site is steep and access difficult. At four of the six survey sites it is possible that otter activity was under-recorded due to the steep slopes. Additionally, there was no access to the bridge in 2011 where signs had been recorded in 2004 as the bridge had been cordoned off. No signs of activity were noted at two of the six survey sites. No specific threats to otters were

identified. It is not known whether there have been any changes as a result of the Glen Doe hydro scheme which intercepts 30% of the water in the Tarff catchment.

Table 16. Assessment of Ness Woods SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	X	67% of sites had evidence of otter and the predicted occupancy is 64%. (The prediction is lower than the actual due to one of the sites being removed from the prediction analysis as there were no flow data for this site.)
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	80% of sites had evidence of otter in 2003-04 survey compared to a predicted occupancy of 64% in 2011-12 (actual 67%).
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	UNFAVOURABLE	Although there are a small number of sites there are several negative indicators, including loss of occupancy, in two successive SCM cycles. The terrain is particularly difficult and both the 2003-04 survey and the 2011-12 survey could not survey the full 600m sections. The site has been assessed as unfavourable, but the level of confidence in this is low due to the particularly difficult survey conditions and the loss of a bridge sprainting site. It is recommended that the approach to sampling this SAC is modified.

4.3.2.6 Loch Ruthven SAC

Loch Ruthven SAC		201.2ha																		
Constituent SSSIs: Loch Ruthven																				
2 survey sites in 2011. 2 positive	1 resting site	No evidence of mink during the survey, but mink prints have been noted on mink rafts by RSPB staff																		
Evidence of otter breeding: none																				
Conditions prior to and during survey: elevated water levels immediately prior to survey																				
Changes identified since 2004: none noted																				
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> <th>Data Type</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>1984-85</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>1991-94</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>2003-04</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>2011-12</td> <td>100</td> <td>Predicted</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	Data Type	1977-79	100	Actual	1984-85	100	Actual	1991-94	100	Actual	2003-04	100	Actual	2011-12	100	Predicted
Survey period	Percentage of positive sites	Data Type																		
1977-79	100	Actual																		
1984-85	100	Actual																		
1991-94	100	Actual																		
2003-04	100	Actual																		
2011-12	100	Predicted																		
<p><i>Loch Ruthven: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data).</p>																				
<p>Anecdotal evidence</p> <p>An otter was caught on a webcam installed by RSPB at Slavonian grebe (<i>Podiceps auritus</i>) nests during 2011 on three occasions in June and July. On one occasion eggs were knocked into the water and possible predation noted at another nest. Cameras installed in 2010 did not detect any otter activity. Mink presence was noted on rafts installed with otter guards to prevent otter access. There were sightings of a female otter with cubs reported in the 2003-04 survey. No actual sightings were recorded by RSPB staff in 2010-11. Otters on camera were recorded at night only. A local angling association with SNH representation manages a brown trout fishery, but this is not considered to result in significant disturbance.</p>																				
<p>Potential issues</p> <p>No major threats were identified. There is a reference in the SAC citation to disturbance by fishermen but this is considered negligible. There is the potential for mortality on nearby roads.</p>																				



Figure 17. The wooded shores of Loch Ruthven

The Loch Ruthven SAC comprises an oligotrophic loch with associated sedge-dominated fen vegetation and semi-natural birch woodland along part of the shoreline. The site is linked to Loch Ness via the Farigaig River. The SAC is part-owned and managed by the RSPB, primarily for breeding birds including Slavonian grebe. A management agreement is in place to regenerate native woodland. The survey in 2011 identified lack of terrestrial cover as a possible limiting factor where woodland on the north shore has no undergrowth offering cover for otters. The woodland structure comprises a birch canopy with grass beneath. Heavy poaching by cattle was noted on one survey section.

Table 17. Assessment of Loch Ruthven SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	

4.3.2.7 River Spey SAC

River Spey SAC		5,729 ha												
Constituent SSSIs: River Spey														
55 survey sites in 2011. 45 positive	24 resting sites	Mink evidence was noted at 4 sites. Mink rafts noted at several sites												
Evidence of otter breeding: anecdotal sightings of more than one otter at 3 sites, 2 of which were recent.														
Conditions prior to and during survey: exceptionally heavy rain resulted in delays to and abandonment of survey work at times. Heavy rain and torrential flow undoubtedly washed away evidence of otter activity and it is therefore likely that sites have been under-recorded.														
Changes identified since 2004: none noted														
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>90</td> </tr> <tr> <td>1984-85</td> <td>90</td> </tr> <tr> <td>1991-94</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>95</td> </tr> <tr> <td>2011-12</td> <td>90</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	1977-79	90	1984-85	90	1991-94	100	2003-04	95	2011-12	90
Survey period	Percentage of positive sites													
1977-79	90													
1984-85	90													
1991-94	100													
2003-04	95													
2011-12	90													
<i>River Spey: presence of otter through all survey periods</i>														
(2011-12: the white dot and dotted line are the predicted values which have taken the probability of missed detections into account using the Q50 spate indicator, black dots represent actual data)														
Anecdotal evidence														
Regular signs of otter activity are noted by Spey Fishery Board staff throughout the catchment, including upland areas. Otters are reported to follow spawning fish upstream and dead fish are regularly observed which are partially predated by otters with a bite out of the back of the neck. Eel numbers are observed to have declined but other fish populations fluctuate over the years. There is considered to have been an increase in otter activity over the last 22 years and a more recent decline in mink activity, (D. Ferguson, Spey Fishery Board, pers. comm.). D. Ferguson also notes road casualties during spate conditions when otters cross roads as opposed to following their usual routes through culverts.														
Potential issues														
No major threats identified. There is a reference in the SAC citation to disturbance by fishermen but this is considered negligible. There is potential for mortality on nearby major roads, e.g. the A9 and A95.														



Figure 18. Upland habitat on the Spey

The River Spey SAC encompasses the main river and its tributaries and the associated wetland and terrestrial habitats. The SAC citation states: *“The Spey represents an important otter Lutra lutra site in Scotland, with good quality freshwater habitat. Surveys have identified high levels of otter presence throughout the Spey catchment. Riverine habitat features which are known to be important to otters are present, such as reedbeds and islands, and populations of important prey species are relatively healthy. The persistence of a strong population of otter on this river indicates that habitat conditions are particularly favourable for the survival of the species”*.

Despite the unfavourable survey conditions, there was a statistically significant increase in spraints found at each positive site on the Spey. The reason for this is unclear.

The 2003-04 survey highlighted the intensive management of banks for fly fishing and this was also noted in the 2011 survey where a number of survey sites were impacted by a complete lack of cover over significant lengths of river bank. D. Ferguson and R. Laughton of the Spey Fishery Board note, however, that fishermen regularly see otters while fishing. In terms of fish availability R. Laughton notes that salmon numbers have been *“reasonable to good”* over the last five or six years corresponding to long term averages, but that numbers are lower in the early part of the year – a period when otters can suffer food shortages. Sea trout numbers have been well down and brown trout, although not intensively monitored, are considered to sustain reasonable numbers in many areas. Eels appear to be down in numbers when compared to 20 years ago when they were regularly encountered. R. Laughton also notes that there is a sizeable pike population in the Spey catchment. No comprehensive information exists regarding Arctic charr populations. Anglers voluntarily returning fish to the river will increase the food available to otters with a much higher voluntary return rate in recent years (currently around 81%).

The Spey Fishery Board continues to be concerned by high levels of water abstraction, particularly in the upper catchment. These are historic developments, however, which have been established for many decades. The level of compensation flows being released are considered to be insufficient to allow adult salmon to migrate up to, and above, Spey Dam to spawn, or to allow smolts to migrate down-river to sea. The Spey Fishery Board is also concerned about further proposed reductions in flow down the Rivers Tromie and Truim into the Tay catchment. These two rivers are important spring salmon spawning tributaries

(ASFB & RAFTS, 2012). Detrimental changes to flow regimes which impact on fish biomass could potentially impact on the carrying capacity for otters.

The Spey Fishery Board in their Annual Report for 2010 refer to the issue of water transfer in the Upper Spey and state that: *“Much time and resource has been spent by the Board on the issues surrounding Water Transfer in the Upper Spey.... It seems extraordinary that there is a serious proposal to achieve “Good Ecological Status” under the Water Framework Directive through the increased transfer of water from one Special Area of Conservation Salmon River system to another... As the Board has stated before, there is no issue that it views with more gravity than the current and proposed “use” of water and its consequent effect on fish populations in the Upper Spey”.*

Three otter RTAs were noted between October and December 2011 near culverts with no ledges, (D. Ferguson, pers. comm.). Transport Scotland and the local operating company recognise that the A9 has frequent otter RTAs. As part of ongoing works to dual the A9, there is a commitment to otter mitigation measures, including underpasses to reduce RTAs.

Table 18. Assessment of the River Spey SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		The most recent SCM assessment of Atlantic salmon was in 2005. No recent comprehensive data are available for assessment
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	82% of sites had evidence of otter and the predicted occupancy is 89%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		Insufficient data
Recommended Condition Assessment	FAVOURABLE	

4.3.2.8 Insh Marshes SAC

Insh Marshes SAC		1,158.78ha												
Constituent SSSIs: River Spey-Insh Marshes														
4 survey sites in 2011. 3 positive	No resting sites	Mink noted at 1 site.												
Evidence of otter breeding: none														
Conditions prior to and during survey: there was a very high spate just prior to the survey. Water levels on the marshes were extremely high. All signs found were very recent indicating no build-up of signs over time, or that the spate had cleared the river of signs.														
Changes identified since 2004: the terrestrial habitat remains much the same but possible localised disturbance from canoeing was noted through an otherwise quiet reach of river. Management of terrestrial vegetation to facilitate angling was also noted. New/recent housing near the river was present at one site, with an increase in informal riverside access/recreation.														
<table border="1"> <caption>Percentage of positive sites for otter presence</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> </tr> <tr> <td>1984-85</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>75</td> </tr> </tbody> </table> <p><i>Insh Marshes: presence of otter through all survey periods</i> (2011-12: no predictions are possible as no sites in 2011-12 had flow data. Black dots represent actual data)</p>			Survey period	Percentage of positive sites	1977-79	100	1984-85	100	1991-94	100	2003-04	100	2011-12	75
Survey period	Percentage of positive sites													
1977-79	100													
1984-85	100													
1991-94	100													
2003-04	100													
2011-12	75													
Anecdotal evidence: none														
Potential issues: mortality on roads.														



Figure 19. Habitat along the River Spey at the Insh Marshes

The Insh Marshes lie on the River Spey floodplain and comprise an extensive area of marshland habitat, ditches, riparian woodland and freshwater pools. Most of the SAC is managed by the RSPB with controlled grazing and winter flooding. Structural habitat was considered good with abundant coarse vegetation, scrub and woodland. Numerous small ponds and interconnecting ditches provide a very broad swathe of continuous semi-natural habitat with good foraging conditions.

Whilst there is localised recreational disturbance, the wet and marshy conditions on the site indicate that it is likely to be seasonal and large areas receive minimal disturbance. Away from the RSPB reserve recent housing was noted with an associated increase in access adjacent to the river. Canoeists use the river and there was localised vegetation management for angling. Whilst these may impact locally, no major adverse issues were identified associated with recreational use.

The adjacent A9 and B9152 pose a risk of road kills. The River Spey, as well as some of its minor tributaries and ditches likely to be regularly used by otters, run close to, or pass beneath these roads.

Table 19. Assessment of Insh Marshes SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		The most recent SCM assessment for Atlantic salmon on the River Spey was in 2005. No recent information is available.
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	75% of sites had evidence of otter (but see comments below). No prediction is possible due to the lack of flow data, but spate conditions were likely to be a factor given the conditions prior to the survey.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	Based upon the spate conditions having a likely impact on detectability.
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE DECLINING	This site is within the River Spey catchment which was assessed as being in favourable condition. This and the overall high quality of the habitat at this site, coupled with the small sample size, have been taken into account in forming this assessment.

4.3.2.9 Rum SAC

Rum SAC		10,835.3ha									
Constituent SSSIs: Isle of Rum											
10 survey sites in 2011. 7 positive	No resting sites	No mink recorded									
Evidence of otter breeding: none											
Conditions prior to and during survey: recent rain with a high flow in the Kinloch River											
<p>Changes identified since 2004: Loch Coire nan Grund was found to have considerable otter activity in the 2003-04 survey and where they were found to be predated Manx shearwater (<i>Puffinus puffinus</i>). The 2011 survey was undertaken in November and was too late for this seasonal activity. A single fresh spraint was noted at this upland loch location. There were a reduced number of positive sites.</p> <p>The SAC has only been surveyed twice so there are no long-term data to contextualise the current level of occupancy. SNH local staff have not noted any change in the overall population.</p>											
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Actual data (black dots)</th> <th>Predicted values (white dot)</th> </tr> </thead> <tbody> <tr> <td>2003-04</td> <td>100</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>70</td> <td>78</td> </tr> </tbody> </table>			Survey period	Actual data (black dots)	Predicted values (white dot)	2003-04	100	100	2011-12	70	78
Survey period	Actual data (black dots)	Predicted values (white dot)									
2003-04	100	100									
2011-12	70	78									
<p><i>Rum: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot and dotted lines are the predicted values which have taken the probability of missed detections into account using the Q50 spate indicator, black dots represent actual data)</p>											
Anecdotal evidence											
Residents and SNH staff occasionally see otters in Loch Scresort and regular signs of otter activity were reported on the lower section of the Kinloch River.											
Potential issues: none identified											



Figure 20. Habitat at Loch Scresort, Rum

The SAC comprises the whole island of Rum dominated by rugged terrain with the Rum Cuillins reaching altitudes of over 800m. There are sheltered, heavily grazed bays at Kilmory and Harris while much of the coastline is relatively inaccessible except along narrow deer paths. Management of the island is focussed on achieving a balance between open ground and encouraging the development of native woodland where appropriate. Where grazing animals are excluded there is dramatic evidence of tree and shrub thickets becoming established as above Harris bay. Heavy grazing was identified at two locations in the 2003-04 survey as potentially impacting on otters and this is reiterated in 2011 where lack of cover may be impacting on available shelter for otters along exposed coasts and around upland lochans and burns. Grazing levels are controlled, however, to ensure positive management of key habitats on Rum which are currently considered appropriate, for example, at Harris. Recent tree and shrub establishment may offer new opportunities for otters. Little information was available regarding fish prey availability on the island. Due to the later survey in 2011 (November) it was not possible to assess whether Manx shearwaters were still being predated, as was noted in the 2004 survey. Manx shearwater predation by otters has also been observed at Copeland Bird Observatory in Northern Ireland (K. Leonard, pers. comm.). Two of the Rum survey sites (5130 and 5129) are immediately adjacent to one another and it is recommended that 5129 is moved so that the island is sampled more effectively.

Table 20. Assessment of Rum SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	Otter evidence was found at 70% of sites (predicted occupancy is 76%). However, the sample size is small with only two survey periods. The assessment has also been confounded by a discrepancy between the surveyed area of one (negative) survey site in 2011 and the surveyed area of the same site in 2003/4. The less suitable habitat encountered in the 2011 survey may have accounted for the negative result at this site. It has therefore been removed from the assessment.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	A loss of >20% of occupancy but only 10 survey sites and two survey periods completed.
Otter population not significantly impacted by human induced kills	✓	
Recommended Condition Assessment	FAVOURABLE DECLINING	The apparent downward trend is based on just two surveys and a small sample size. In view of this and the fact that the overall habitat is very good, the site has been assessed as Favourable Declining rather than Unfavourable.

4.3.2.10 Glen Beasdale SAC

Glen Beasdale SAC		507.3ha															
Constituent SSSIs: Glen Beasdale																	
2 survey sites in 2011. 2 positive	1 resting sites	No mink recorded															
Evidence of otter breeding: none																	
Conditions prior to and during survey: good with average water levels in the river, recent rain but not an exceptional amount																	
Changes identified since 2004: road re-alignment works on the A830 have resulted in the creation of a regular sprainting site under the road bridge																	
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> <th>Data type</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>1991-94</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>2003-04</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>2011-12</td> <td>100</td> <td>Predicted</td> </tr> </tbody> </table> <p><i>Glen Beasdale: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data).</p>			Survey period	Percentage of positive sites	Data type	1977-79	100	Actual	1991-94	100	Actual	2003-04	100	Actual	2011-12	100	Predicted
Survey period	Percentage of positive sites	Data type															
1977-79	100	Actual															
1991-94	100	Actual															
2003-04	100	Actual															
2011-12	100	Predicted															
Anecdotal evidence: none																	
Potential issues: none identified																	



Figure 21. Wooded habitat of Glen Beasdale

Glen Beasdale is primarily designated for its sessile oak woodland plus open heathland and coastal habitats with burns flowing into Loch nan Uamh. The A830 road bridge allows free passage for otters and large quantities of spraint were found at this location. There appears to be reduced grazing on river banks to the east of the bridge where natural regeneration is developing. This will offer good cover for otters in future. Localised effects from eutrophication were noted.

Table 21. Assessment of Glen Beasdale SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	Both sites had evidence of otter.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	No change from 2003-04 assessment

4.3.2.11 Loch Moidart and Loch Shiel Woods SAC

Loch Moidart and Loch Shiel Woods SAC		1,756.8ha												
Constituent SSSIs: Loch Moidart, Loch Shiel Woods														
8 survey sites in 2011. 4 positive	2 resting sites	No mink recorded												
Evidence of otter breeding: none														
Conditions prior to and during survey: water levels on Loch Shiel had been very high due to heavy rain. Terrestrial vegetation was still inundated.														
Changes identified since 2004: there is now better security of fish cages on Loch Shiel and resulting exclusion of otters which formerly had access to farmed fish in cages														
<table border="1"> <caption>Percentage of positive sites for otter presence</caption> <thead> <tr> <th>Survey period</th> <th>Actual data (%)</th> <th>Predicted values (%)</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>50</td> <td>55</td> </tr> </tbody> </table>			Survey period	Actual data (%)	Predicted values (%)	1977-79	100	100	2003-04	100	100	2011-12	50	55
Survey period	Actual data (%)	Predicted values (%)												
1977-79	100	100												
2003-04	100	100												
2011-12	50	55												
<p><i>Loch Moidart and Loch Shiel Woods: presence of otter through all survey periods</i></p> <p>(2011-12: the white dots and dotted lines are the predicted values which have taken the probability of missed detections into account using the Q50 spate indicator, black dots represent actual data)</p>														
<p>Anecdotal evidence</p> <p>G. Shankland of Glen Shiel Estate notes that he has never seen otters in the loch in 30 years but does see very regular activity in the upper reaches of the River Shiel. A. MacMaster of Marine Harvest, who manages the fish farms, has worked at Loch Shiel since early 2011 and has not seen otters in the loch during this time.</p>														
<p>Potential issues</p> <p>Road mortality is possible where the road runs close to Loch Moidart and where there is abundant otter activity.</p>														

The Loch Moidart and Loch Shiel Woods SAC comprises a wide range of marine and freshwater habitats from tidal rivers and associated habitats to broadleaved woodland associated with the shores of Loch Moidart and Loch Shiel. Undisturbed habitat exists on the north shore of Loch Shiel where there is no access except by boat.

The Loch Shiel survey sites in 2003-04 all had evidence of otter but in 2011 no evidence of activity was found at three sites on the north shore. Previous national surveys did not

include this 10km square so no longer term comparison is possible. The apparent decline in local otter range may potentially be attributed to fires on the north shore of the loch in 2011 starting on the north shore and burning up the hill and then back to the shore and encompassing the area where the three negative sites were located. Evidence of otter activity was found at the west end of Loch Shiel. This area is linked to the coast by the River Shiel and is likely to offer better foraging than the deep oligotrophic loch.

Approximately 5km south over the watershed lies Sunart SAC where there was considerable otter activity noted. One negative site was recorded in what would appear to be ideal otter habitat with abundant coastal and freshwater feeding and excellent terrestrial habitat. With such close proximity, there is likely to be movement of otters between these SACs.

The history of fish farming in the loch may have some bearing on the distribution of otter activity. Fish farms have been present in Loch Shiel since 1978 and continued to operate in south Loch Shiel until spring 2011 and are still present at the Glenfinnan end of the loch producing salmon smolts to supply sea cages. Historically, it is possible that fish were more available to predators such as otters from the fish farm cages when they were less secure, whereas now they are secured with stronger netting making it much more difficult for predators to access. Studies have demonstrated that local fish farms have had effects on the local brown trout population by causing increased residency and better condition of individual fish, as a result of eating excess food from around the fish cages. It is only possible to speculate on what impacts these relatively recent changes in fish populations may have on local otter activity and distribution. There is clearly excellent and undisturbed habitat for holts and breeding holts on the loch shores but Loch Shiel is a deep oligotrophic loch with less than ideal foraging conditions. Canoeing has become increasingly popular on the loch in recent years with associated camping on shore and this constitutes a potential new source of disturbance, the effects of which are unknown.

Table 22. Assessment of Loch Moidart and Loch Shiel Woods SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	X	50% of sites had evidence of otter. The predicted occupancy is 53%.
Population maintained or increasing (Loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	X	Reduction of nearly 50% in positive sites (based on predicted occupancy). Some uncertainty as the north shore was not surveyed in 2003-04 but had three sample points in 2011-12.
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	UNFAVOURABLE	

4.3.2.12 Sunart

Sunart SAC		1,027.43ha										
Constituent SSSIs: Sunart												
12 survey sites in 2011. 11 positive	Total of 17 resting sites	No mink recorded										
Evidence of otter breeding: a group of three otters was seen on the southern shore, likely to be female and two juveniles. A single animal was also seen.												
Conditions prior to and during survey: heavy spells of rain but most of the sites were tidal and would therefore not suffer from spate conditions. The negative site had recently experienced very high water level which had flattened vegetation.												
Changes identified since 2004: the number of active fish farms (shellfish and salmon farms) on the loch has fluctuated over time. Farmed halibut (<i>Hippoglossus</i> sp.) has also been tried.												
<table border="1"> <caption>Percentage of positive sites over survey periods</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>~92</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	1977-79	100	1991-94	100	2003-04	100	2011-12	~92
Survey period	Percentage of positive sites											
1977-79	100											
1991-94	100											
2003-04	100											
2011-12	~92											
<p><i>Sunart: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot and dotted line are the predicted values which have taken the probability of missed detections into account using the Q50 spate indicator, black dots represent actual data)</p>												
<p>Anecdotal evidence</p> <p>Anecdotal evidence is contradictory at this site. Forestry Commission staff are monitoring holts and have recorded high levels of otter activity. The campsite owners at Resipole on the north shore take a great interest in otter sightings in front of the campsite where otters are seen regularly and family groups have been seen. Contrary to this, an experienced naturalist (P. Dale, pers. comm.) considered that former otter strongholds that he has regularly watched for many years now yield far fewer sightings. Sunart was the only site in the 2011 survey where otters were observed.</p>												
<p>Potential issues</p> <p>Lobster creels and crab pots in shallow waters.</p>												



Figure 22. Extensive seaweed-covered shores, rocky islets and dense heathy woodland offering excellent habitat at Loch Teacuis

Sunart offers all the terrestrial components of good otter habitat. There are inaccessible areas with excellent structural cover from boulder-strewn mature broadleaved woodlands, tussocky *Molinia* and shrubby heather in adjacent wet heath, and frequent islands varying from small rocky knolls to larger islets such as Oronsay Island. Freshwater sources are regular with numerous feeder burns and marshes. Disturbance from walkers and dogs is generally very limited and natal and breeding habitat is abundant. The expansive sea loch is very sheltered; Loch Teacuis in particular has extensive rocky shallows with abundant seaweed offering excellent foraging conditions.



Figure 23. Large holt in rocky outcrop with numerous runs and dense otter signs

The 2011 survey found extensive otter activity at Sunart with numerous holts and couches, abundant spraints, rolling pitches, extremely well-worn otter paths and bathing pools. There

were no recorded changes to the terrestrial habitat. Inappropriately placed lobster creels and crab pots in shallow waters were identified as a threat to otters from drowning in the 2003-04 survey and this threat remains. There are several small fish farming operations in the loch. Road traffic mortality also remains a threat, but at Sunart the south shore and some of the north shore are distant from busy roads.

Table 23. Assessment of Sunart SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	Evidence of otter at 92% of sites with predicted occupancy of 93%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	

4.3.2.13 Morvern Woods SAC

Morvern Woods SAC		1,927ha										
Constituent SSSIs: Drimnin to Killundine Woods, Beinn Iadain and Beinn na h'Uamha, Loch Aline, Ininmore Bay, Garbh Shlios												
10 survey sites in 2012. 9 positive	12 resting sites	No evidence of mink										
Evidence of otter breeding: none recorded												
Conditions prior to and during survey: elevated water levels prior to survey												
Changes identified since 2004: none noted												
<table border="1"> <caption>Percentage of positive sites over survey periods</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>90</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	1977-79	100	1991-94	100	2003-04	100	2011-12	90
Survey period	Percentage of positive sites											
1977-79	100											
1991-94	100											
2003-04	100											
2011-12	90											
<p><i>Morvern Woods: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data).</p>												
Anecdotal evidence: none												
Potential issues: lobster creels and crab pots in shallow waters												

Morvern Woods SAC is a composite site comprising five SSSIs which are not all contiguous. These include blocks of native deciduous woodland hugging the north shore of the Sound of Mull with the largest area at the junction of the Sound of Mull and Loch Linnhe as well as the eastern shore of and slopes above Loch Aline, woodland and other habitats adjoining the Abhain a' Ghlinne Ghil and the north shore and wooded hill above Loch Arienas.

Boulder slopes coupled with woodland, tall herbaceous vegetation and areas of scrub offer superb terrestrial habitat with numerous sheltered nooks and crannies suitable for resting otters. Coastal habitat provides good foraging conditions through a good portion of the SAC and intervening non SAC areas. Fresh water is abundant along the coastal habitats with small feeder burns and frequent freshwater pools, many of which exhibited signs of use by otter. Spraint numbers were notably higher on coastal sections than river sections. A single otter was watched along a coastal section for 30 minutes.

Low levels of disturbance from general recreation and boating were noted at two sites, but generally the level of disturbance is considered unlikely to cause adverse effects and some

sections are free from disturbance. A fish-farm net cleaning area was noted together with containers of chemicals.

Table 24. Assessment of Morvern Woods SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	Evidence of otter at 90% of sites with predicted occupancy of 90%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	

4.3.2.14 Inverpolly SAC

Inverpolly SAC		11,877.3ha																		
Constituent SSSIs: Inverpolly																				
7 survey sites in 2012. 6 positive	Total of 3 resting sites	No evidence of mink. Mink raft present.																		
Evidence of otter breeding: crab shell in the majority of spraint found on Loch Bad a' Ghail.																				
Conditions prior to and during survey: there had been torrential rain with high flows in rivers. One site was not accessible to survey due to torrential flow in the river (Allt Liathdoire)																				
Changes identified since 2004: results generally similar to 2004 findings.																				
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> <th>Data Type</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> <td>Actual data</td> </tr> <tr> <td>1984-85</td> <td>100</td> <td>Actual data</td> </tr> <tr> <td>1991-94</td> <td>100</td> <td>Actual data</td> </tr> <tr> <td>2003-04</td> <td>100</td> <td>Actual data</td> </tr> <tr> <td>2011-12</td> <td>87</td> <td>Predicted values</td> </tr> </tbody> </table> <p><i>Inverpolly: presence of otter through all survey periods</i> (2011-12: the white dots and dotted lines are the predicted values which have taken the probability of missed detections into account using the Q50 spate indicator, black dots represent actual data)</p>			Survey period	Percentage of positive sites	Data Type	1977-79	100	Actual data	1984-85	100	Actual data	1991-94	100	Actual data	2003-04	100	Actual data	2011-12	87	Predicted values
Survey period	Percentage of positive sites	Data Type																		
1977-79	100	Actual data																		
1984-85	100	Actual data																		
1991-94	100	Actual data																		
2003-04	100	Actual data																		
2011-12	87	Predicted values																		
Anecdotal evidence: none																				
Potential issues: none identified																				



Figure 24. Loch Bad a' Ghail with an otter resting site in the willow scrub at the edge of the loch

Inverpolly supports a large number of high-quality freshwater loch habitats, the majority of which are oligotrophic standing waters. There are several large lochs including Loch Sionasgaig, together with many other smaller water bodies. The remote location and lack of environmental pressures means that the majority of the lochs are undisturbed. High ground includes Cul Mor, Cul Beag and Stac Pollaidh. The SAC includes extensive peatland habitat and is bounded to the SE by the A835 Ullapool to Ledmore road and in the NW by a complex indented coastline.

Table 25. Assessment of Inverpolly SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	Evidence of otter found at 86% of sites, predicted occupancy is 85%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	

4.3.3 *Argyll and the Outer Hebrides*

There were 13 SACs sampled in 2011-12 which at least partially fall within this SNH Area.

Several SACs within this area have shown small but notable reductions in sites with otter evidence. The Lewis Peatlands SAC was surveyed in good conditions of low rainfall and low loch levels, but still showed a reduction in positive sites. Rannoch Moor was also surveyed in good conditions and had reduced positive sites.

One site, Loch Etive Woods, has been assessed in this report as being in unfavourable condition due to reduced occupancy. As the actual and predicted occupancy values were both just below the 80% threshold, however, this conclusion should be treated with caution.

4.3.3.1 Loch Etive Woods SAC

Loch Etive Woods SAC		2,639.5ha												
Constituent SSSIs: Clais Dhearg, Airds Park and Coille Nathais, Glen Nant, Coille Leitire, Barran Dubh, Kennacraig and Esragan Burn, Bonawe to Cadderlie, Ard Trilleachan														
9 survey sites in 2012. 7 positive	3 resting sites	Evidence of mink at one site on the north shore at Bonawe												
Evidence of otter breeding: crab shell was present in spraint at one site which may be indicative of a younger and less experienced animal or lack of availability of higher energy food.														
Conditions prior to and during survey: good														
Changes identified since 2004: full occupancy was recorded during the 2003-04 survey but two sites were negative in 2012 including one site in Glen Nant and one at Bonawe. Mink noted at four sites in 2003-04 survey and at one in 2012														
<table border="1"> <caption>Percentage of positive sites over survey periods</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> </tr> <tr> <td>1984-85</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>78</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	1977-79	100	1984-85	100	1991-94	100	2003-04	100	2011-12	78
Survey period	Percentage of positive sites													
1977-79	100													
1984-85	100													
1991-94	100													
2003-04	100													
2011-12	78													
<i>Loch Etive Woods: presence of otter through all survey periods</i>														
(2011-12: the white dots and dotted lines are the predicted values which have taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data)														
Anecdotal evidence: none														
Potential issues: none identified														



Figure 25. A large, well-used holt under a combined oak and birch root plate in the slope above the loch beach, with a large spraint pile

The Loch Etive SAC comprises a complex of primarily broadleaf deciduous woodland with sites sampled on the north and south shore of Glen Etive, on the north shore of Loch Awe and along Glen Nant including freshwater and sea loch habitat and rivers. Individual areas are owned by a number of private landowners and the Forestry Commission with conversion to broadleaf woodland from coniferous plantation being actively implemented. Two sites were found to be negative in 2012, one in Glen Nant to the south and one near Bonawe on the north shore.

The *Argyll and the Islands Strategic Fishery Management Plan 2009-15* describes the fish resource and highlights the issues affecting the area including aquaculture, water temperature, coniferous forestry and acidification, diffuse pollution, sedimentation, pesticides and morphological impacts. Much work is being done to address these issues and a concerted investigation of the Loch Etive catchment is planned for 2013 to gather habitat and fish data. In addition, the Argyll Fisheries Trust (AFT) is gaining expertise in the issues affecting the marine phase of their key species of interest – salmon, sea trout and eel, (A. Kettle-White, pers. comm.).

Table 26. Assessment of Loch Etive Woods SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	Loch Etive is a designated commercial shellfish area. Available water quality data (2007-2010) indicate compliance with standards (excluding faecal coliforms).
Predicted presence of 80% of sample sites	X	Evidence of otter found at 78% of sites, predicted occupancy is also 78%, but this needs to be considered in the context of the small number of sample sites.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	X	There has been a loss of 22% occupancy, but this needs to be considered in the context of the small number of sample sites
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	UNFAVOURABLE	As the actual and predicted occupancy values were just below the 80% threshold, this conclusion should be treated with caution.

4.3.3.2 Lewis Peatlands SAC

Lewis Peatlands SAC		27,945.59ha																		
Constituent SSSIs: Loch Scarrasdale, Achmore Bog, Loch nan Eilean valley bog																				
19 survey sites in 2012. 17 positive	11 resting sites	Evidence of mink at 2 sites																		
Evidence of otter breeding: a peat holt at one site had extensive spraint piles associated with it, suggesting a female with young.																				
Conditions prior to and during survey: in the few weeks prior to the survey, conditions had been dry and water levels were notably low.																				
Changes identified since 2004: there was 100% occupancy in 2004 so there has been a reduction in positive sites, but no loss of positive 10km squares. The number of positive mink sites has reduced from 13 sites in 2004 to just two in 2012, as a result of the Hebridean Mink Project eradication programme.																				
<table border="1"> <caption>Percentage of positive sites for otter presence</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> <th>Data Type</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>1984-85</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>1991-94</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>2003-04</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>2011-12</td> <td>90</td> <td>Predicted</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	Data Type	1977-79	100	Actual	1984-85	100	Actual	1991-94	100	Actual	2003-04	100	Actual	2011-12	90	Predicted
Survey period	Percentage of positive sites	Data Type																		
1977-79	100	Actual																		
1984-85	100	Actual																		
1991-94	100	Actual																		
2003-04	100	Actual																		
2011-12	90	Predicted																		
<i>Lewis Peatlands: presence of otter through all survey periods</i>																				
(2011-12: the white dots and dotted lines are the predicted values which have taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data)																				
Anecdotal evidence: none																				
Potential issues: intensive grazing and associated diffuse pollution was noted with algal growth likely to be the result of increased nitrate input.																				



Figure 26. Old shieling used by otters as a resting site

The terrestrial habitat generally offers an abundance of peaty banks and overhangs, and cover from heather and tussocky vegetation. Holt and couch habitat was therefore abundant and a resting site was also found within one of the old shielings which are an occasional feature.



Figure 27. Otter route across blanket bog

Otter signs were readily found on most sections with some very active holts. Well-used cross-country routes between burns and lochs were found on a few occasions, marked by spraint on large moss (*Racomitrium lanuginosum*) hummocks, and with worn paths with prints indicating free movement of otters over the moorland. The 2003-04 survey noted dragonfly larvae remains in spraints and this was also frequently observed in the 2011-12 survey. Both surveys were undertaken in April, so it is unclear if this is a seasonal food item.

Table 27. Assessment of Lewis Peatlands SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	Evidence of otter found at 89% of sites, predicted occupancy is 90%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	

4.3.3.3 North Harris SAC

North Harris SAC		13,131.73ha										
Constituent SSSIs: North Harris												
11 survey sites in 2011. 10 positive	4 resting sites	No evidence of mink										
Evidence of otter breeding: a peat holt at one site had extensive spraint piles associated with it, suggesting a female with young.												
Conditions prior to and during survey: local people stated that the summer had been exceptionally wet with frequent heavy rain and very few dry days.												
Changes identified since 2004: full occupancy of otter in 2004 and with one negative site in 2011												
<table border="1"> <caption>Percentage of positive sites for otter presence</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>90</td> </tr> <tr> <td>2003-04</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>90</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	1977-79	100	1991-94	90	2003-04	100	2011-12	90
Survey period	Percentage of positive sites											
1977-79	100											
1991-94	90											
2003-04	100											
2011-12	90											
<p><i>North Harris: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data).</p>												
<p>Anecdotal evidence</p> <p>Various local people provided records of single otters seen by road sides within the last two years.</p>												
<p>Potential issues</p> <p>Significant localised eutrophication on the Abhainn Eadarra from year-round cattle presence. (The cattle are supplemented with food during the winter). A layer of bright green, thick filamentous algae is now growing in the burn, even in fast-flowing sections. Heavy grazing was noted on blanket bog and wet heath adjacent to many sites resulting in loss of heather cover. Vegetation features (blanket bog and dry heath) were in unfavourable recovering condition in 2007. Measures to improve vegetation targets may increase the cover from heather for otters and reduce input into rivers.</p>												



Figure 28. Upland river habitat on Harris

The North Harris SAC is a large expanse of blanket bog, wet heath and montane habitats including lochs, lochans, frequent small mountain burns and larger rivers running through the mountainous areas. Harris does not naturally support common frog (*Rana temporaria*) populations although there are a few areas where frogs have been introduced. Despite the general absence of frogs, otter signs have been found high in the hills on lochans at considerable altitude in winter (Robin Reid, pers. comm.). Otters commuting across catchments may account for this. The 2004 survey described abundant otter signs at all sites but this was not found to be the case in the 2011 survey. Otter evidence was absent at one site and at a further four sites only low numbers of spraints (fewer than 5) were found.

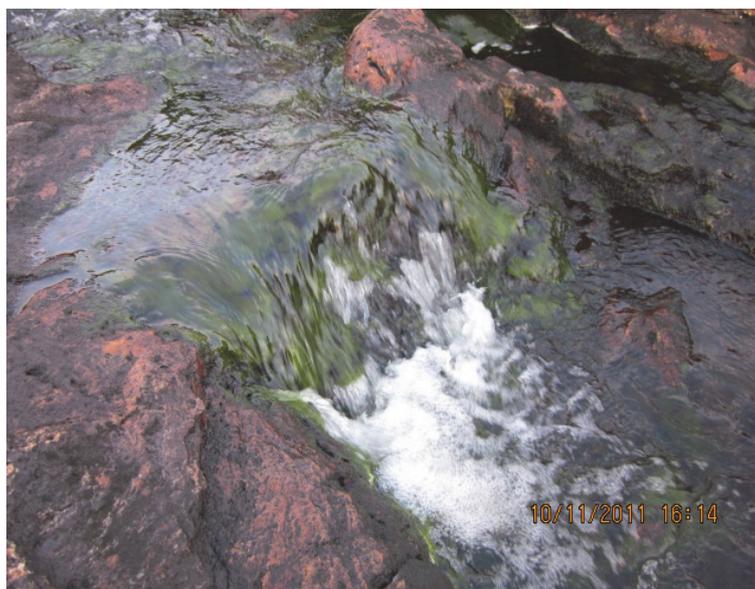


Figure 29. Algal growth, likely to be due to year round stocking of cattle, causing eutrophication

The terrestrial habitat has remained largely unchanged, although heavy grazing was noted on several sites and thought to be impacting on the cover available from the heather. Additionally, there was obvious eutrophication at one site where the rocks in a fast, upland burn were coated in a thick layer of filamentous algae. The lower reaches of the rivers are not pristine, with a fish hatchery and hydro-electric schemes, but these were not considered to be adversely impacting otters on Harris. The impacts from grazing are thought to be limited to the lower reaches of the rivers, which are far more accessible from the B887 than the upper reaches.

The number of positive sites remains high despite the reduced number of spraints at several of these sites, which may well be attributable to the particularly wet summer of 2011. At Loch Chliostair, a very exposed loch, only four spraints were found, but the peaty substrate of the loch margins had numerous footprints indicating recent activity. This may indicate that the continual wet weather did not facilitate the accumulation of spraints through the summer.

Table 28. Assessment of North Harris SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	Evidence of otter found at 91% of sites, predicted occupancy also is 91%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	

4.3.3.4 Loch nam Madadh SAC

Loch nam Madadh SAC		2,319.8ha										
Constituent SSSIs: Loch nam Madadh & Loch an Duin												
8 survey sites in 2012. 8 positive	6 resting sites	No evidence of mink										
Evidence of otter breeding: holt sites with remains of crab shell and shellfish indicative of young animals coupled with excellent undisturbed breeding habitat on the islands												
Conditions prior to and during survey: very dry conditions prior to and during survey which may have resulted in otters withdrawing from areas where fresh water not currently available												
Changes identified since 2004: results similar to 2004 with evidence of otter activity at all sites. Early spring and summer drought lasted for 10 weeks and may have altered availability of freshwater resources.												
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>100 (predicted)</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	1977-79	100	1991-94	100	2003-04	100	2011-12	100 (predicted)
Survey period	Percentage of positive sites											
1977-79	100											
1991-94	100											
2003-04	100											
2011-12	100 (predicted)											
<i>Loch nam Madadh: presence of otter through all survey periods</i>												
(2011-12: the white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data).												
Anecdotal evidence: none												
Potential issues Otter road kills have been seen by the Hebridean Mink Project staff and members of the public. Otters are known to be drowned in lobster creels, but this is not considered to be a significant number of animals compared to the overall otter population (I. MacLeod, Hebridean Mink Project, pers. comm.).												



Figure 30. Peat burrow at Leiravay Bay

Excellent freshwater and coastal otter habitat with a complex and extensive shoreline of coastal lagoons, inlets and bays. Numerous undisturbed islands offer excellent breeding habitat, and there are extensive holts in peat burrows and large sign heaps with old and fresh spraint. Underground water channels below the peat appeared to be significant with extensive sprainting in these areas. The SAC includes the area around one of the key Hebridean ferry ports. Creel fishing and fish farming are all carried out within the SAC.

Table 29. Assessment of Loch nam Madadh SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	Evidence of otter found at all sites, predicted occupancy is 100%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	

4.3.3.5 South Uist Machair SAC

South Uist Machair SAC		3,432.6ha												
Constituent SSSIs: Loch Hallan, Bornish and Ormiclate Machairs, Loch Bee Machair, Howmore Estuary, Lochs Roag and Fada, Loch Druidibeg														
8 survey sites in 2012. 6 positive	2 resting sites	No evidence of mink												
Evidence of otter breeding: family groups were reported by a local gamekeeper at Tobha Lochan														
Conditions prior to and during survey: drought conditions persisted for around 10 weeks in the Western Isles and the change in freshwater availability may have influenced the local distribution of otters.														
Changes identified since 2004: all sites were positive in 2004 but there were two negative sites in 2012, one of which was a sandy beach with little potential for otters and the other at Loch Druidibeg.														
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> </tr> <tr> <td>1984-85</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>75</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	1977-79	100	1984-85	100	1991-94	100	2003-04	100	2011-12	75
Survey period	Percentage of positive sites													
1977-79	100													
1984-85	100													
1991-94	100													
2003-04	100													
2011-12	75													
<p><i>South Uist Machair: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data).</p>														
<p>Anecdotal evidence</p> <p>The local gamekeeper has noted family groups of otters at Tobha Lochan and Bun na Feathlach. He has seen otter mortality (possibly around one animal a year) in this area, where roads are running close to water bodies and channels. He commented on the continued presence of feral ferrets (<i>Mustela furo</i>) which were also noted in 2004.</p>														
<p>Potential issues</p> <p>Otter road kills have been seen by the Hebridean Mink Project staff and members of the public. Otters are known to be drowned in lobster creels but this is not considered to be a significant number of animals compared to the overall otter population, (I. MacLeod, Hebridean Mink Project, pers. comm.).</p>														

The South Uist machair supports a complex mix of terrestrial and coastal habitats with extensive freshwater lochans, rivers, marsh, bog and machair in an intimate mix with coastal areas. Much of the habitat is very undisturbed with ideal locations for otter holts including peat burrows and rocky islands in lochans. Loch nam Madadh SAC lies approximately 40km to the north on North Uist. This SAC had full occupancy in 2012 indicating that in general the populations of the Uists are not experiencing an overall decline.

Table 30. Assessment of South Uist Machair SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations	✓	There have been good salmon fishery catches in recent years in the Outer Hebrides, e. g. South Uist Estate fishery. Recent catches are at the high levels seen in the 1950s and 1960s. The brown trout population also appears to be healthy in the more fertile (machair) lochs of South Uist, which continue to give good catch rates.
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	Evidence of otter found at 75% of the eight surveyed sites, predicted occupancy is 75%. However, as one of these sites was deemed unsuitable due to the habitat present, occupancy at the remaining seven sites would have been 86%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	Based on the seven suitable survey sites.
Otter population not significantly impacted by human induced kills		Road kills and informal reports of entrapment in creels do occur, but it is not known if this has any significant effect on the local or wider population.
Recommended Condition Assessment	FAVOURABLE	This is based on seven sites and excludes the open beach site south of Ardivachar Point. It is recommended that this survey site is re-located to a more diverse section of coastline in future surveys.

4.3.3.6 Mull Oakwoods SAC

Mull Oakwoods SAC		1,401ha										
Constituent SSSIs: Loch Ba Woodland, Ben More-Scarisdale, Ardura-Auchnacraig												
11 survey sites in 2012. 11 positive	6 resting sites	Evidence of mink at 2 sites										
Evidence of otter breeding: no definite evidence although crab remains were found in spraint which may indicate a young animal or lack of availability of higher energy food.												
Conditions prior to and during survey: there was heavy rain prior to both survey visits.												
Changes identified since 2004: a fish hatchery is present on Loch Ba which was not mentioned in the 2004 survey. The hatchery is associated with a short section of engineered shore which has been reinforced with boulders and a new access track.												
<table border="1"> <caption>Percentage of positive sites for otter presence</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>92</td> </tr> <tr> <td>2011-12</td> <td>100</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	1977-79	100	1991-94	100	2003-04	92	2011-12	100
Survey period	Percentage of positive sites											
1977-79	100											
1991-94	100											
2003-04	92											
2011-12	100											
<i>Mull Oakwoods: presence of otter through all survey periods</i>												
(2011-12: the white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data).												
Anecdotal evidence												
An experienced wildlife photographer stated that otters are becoming more difficult to see and attributed this to organised groups of photographers now targeting Mull for otter photography.												
Potential issues												
Severe overgrazing was noted on some sites. Fencing is improving the structural diversity of some sites, although the enclosed woodland excludes the shore which is heavily grazed (Loch Ba, southern shore). Scarisdale Wood was also structurally poor due to grazing, however the boulder areas probably compensated to some extent. Scarisdale Wood is separated from the coastal habitats by a road. Otters would have to cross the road frequently to access resting sites in the boulder areas. This issue was also highlighted in Strachan (2007). Signs of otter in Scarisdale Wood were far sparser than expected given the combination of good coastal habitat, bouldery woodland and frequent freshwater streams. It is recommended that this road is routinely monitored for RTAs.												

Mull Oakwoods SAC comprises three separate SSSIs, two on the shores and slopes above Loch Ba and two further areas at Loch Spelve to the east. The woodlands generally offer good cover with some boulder areas and plenty of suitable locations for resting sites. Coastal habitat varies from rocky shorelines to areas of saltmarsh and mudflats. All sites were positive with good numbers of spraints found and plenty of other field signs were evident, such as well demarcated otter paths and feeding signs. Crab remains were found in some spraints possibly indicating young animals or lack of availability of higher energy food.

Table 31. Assessment of Mull Oakwoods SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	Loch Spelve is a designated commercial shellfish area. Available water quality data (up to 2010) indicate compliance with standards (excluding faecal coliforms).
Predicted presence of 80% of sample sites	✓	Evidence of otter found at 100% of sites, predicted occupancy is 100%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	

4.3.3.7 Glen Creran Woodlands SAC

Glen Creran Woodlands SAC		703.9ha																		
Constituent SSSIs: Creran Oakwoods																				
5 survey sites in 2012. 5 positive	2 resting sites	No evidence of mink																		
Evidence of otter breeding: crab shell was found in spraint at three sites, including by a holt, which may indicate young or lack of availability of higher energy food. Cub prints were noted at one site.																				
Conditions prior to and during survey: good																				
Changes identified since 2004: it was difficult to compare the 2004 survey with the 2012 survey due to reporting inconsistencies. One 2004 site was reported as positive based on a potential holt. A second site was identified as positive based upon resting sites with no corroborating evidence (i.e. no spraints). The reported full occupancy of sites stated in Strachan (2007) has therefore been revised to 80% in line with the raw data. There has, therefore, been an overall increase in positive sites.																				
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> <th>Data Type</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>1984-85</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>1991-94</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>2003-04</td> <td>80</td> <td>Actual</td> </tr> <tr> <td>2011-12</td> <td>100</td> <td>Predicted</td> </tr> </tbody> </table> <p><i>Glen Creran Woods: presence of otter through all survey periods</i> (2011-12: white dot and dotted line are the predicted values which have taken the probability of missed detections into account using the Q50 spate indicator, black dots represent actual data)</p>			Survey period	Percentage of positive sites	Data Type	1977-79	100	Actual	1984-85	100	Actual	1991-94	100	Actual	2003-04	80	Actual	2011-12	100	Predicted
Survey period	Percentage of positive sites	Data Type																		
1977-79	100	Actual																		
1984-85	100	Actual																		
1991-94	100	Actual																		
2003-04	80	Actual																		
2011-12	100	Predicted																		
Anecdotal evidence: none																				
Potential issues Major forestry operations at one site (the River Creran) may have resulted in temporary disturbance.																				



Figure 31. Spraint with crab shell found at a number of locations within the SAC

The SAC includes a range of habitats, but mainly comprises broad leaved deciduous woodland, extending from Loch Creran (west of the A828 road crossing) up Glen Creran, with a length of around 11km covering coastal and freshwater habitat. This is a small SAC relative to the size of an otter's home range. Otters were found to be present throughout the SAC on the north side of the loch, with a very well-used holt under a rock outcrop with massive spraint piles.

Table 32. Assessment of Glen Creran Woodlands SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	Loch Creran is a designated commercial shellfish area. Available water quality data (up to 2010) indicate compliance with standards (excluding faecal coliforms).
Predicted presence of 80% of sample sites	✓	Evidence of otter was found at 100% of sites, predicted occupancy of 100%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	

4.3.3.8 Loch Fada SAC

Loch Fada SAC		80.34ha																		
Constituent SSSIs: Loch Fada																				
2 survey sites in 2012. 2 positive	No resting sites	Evidence of mink at one site																		
Evidence of otter breeding: none																				
Conditions prior to and during survey: there was very heavy rain submerging the loch edge vegetation. The water level was 20cm above normal and had been even higher in the preceding days.																				
Changes identified since 2004: rhododendron control has been carried out.																				
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> <th>Data Type</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>0</td> <td>Actual</td> </tr> <tr> <td>1984-85</td> <td>0</td> <td>Actual</td> </tr> <tr> <td>1991-94</td> <td>0</td> <td>Actual</td> </tr> <tr> <td>2003-04</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>2011-12</td> <td>100</td> <td>Predicted</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	Data Type	1977-79	0	Actual	1984-85	0	Actual	1991-94	0	Actual	2003-04	100	Actual	2011-12	100	Predicted
Survey period	Percentage of positive sites	Data Type																		
1977-79	0	Actual																		
1984-85	0	Actual																		
1991-94	0	Actual																		
2003-04	100	Actual																		
2011-12	100	Predicted																		
<p><i>Loch Fada: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data).</p>																				
<p>Anecdotal evidence</p> <p>There were no recent signs of mink according to the estate farmer and the RSPB warden, Mike Peacock. The RSPB has a permanent presence on Oronsay and has estimated 10-15 otter holts on Oronsay itself with more on Colonsay. Otters are sighted regularly and were seen on lower Loch Fada earlier in 2012. The warden considers the otter population on Colonsay to be in good health. Alan Kettle-White of the Argyll Fisheries Trust carried out electro-fishing surveys on Colonsay. The only place fish were caught was Loch Fada, as it is the only place on the island with suitable habitat for brown trout. The rest of the island's fresh water is in the form of straightened ditches.</p>																				
<p>Potential issues</p> <p>Strachan (2007) raised concerns over sheep dip and its effect on fish populations. Otters have access to coastal and loch habitats and thus are not dependent solely on fish found in the lochs. Few if any threats were evident. There is limited structural cover around the loch shores for secure resting sites but suitable coastal habitat is abundant nearby.</p> <p>The lochs are not stocked with brown trout but are used for angling, although use does not appear to be intensive.</p>																				

Loch Fada is located on the island of Colonsay and is made up of three small, contiguous inland lochs running east-west across the northern part of the island. The majority of the loch banks are comprised of sheep and cattle pasture with varying amounts of scrub although the easternmost section of the area is bordered by woodland and extensive reed fringe. The central loch also has some reed fringe on the southern banks. Potential for holts and other resting sites is not high, particularly on the middle loch. There has been rhododendron control on the loch banks with large stretches being cleared in the woodlands.

The lochs are fished for brown trout by the Colonsay Estate but are not stocked. There had been heavy rain for several weeks before the survey and water levels were at least 20cm higher than usual and had recently been higher. This is likely to have masked some signs, with rocks and vegetation banks being submerged.

Previous concern was expressed over the potential effect of sheep-dip on fish abundance, but there is no evidence for this. Being in close proximity to the coast, these lochs form a small part of an otter territory and do not present notable potential for breeding. Despite this, continued otter presence and anecdotal evidence suggests that the loch is in favourable condition for otters.

Table 33. Assessment of Loch Fada SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	Evidence of otter found at 100% of sites, predicted occupancy is 100%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	

4.3.3.9 Moine Mhor SAC

Moine Mhor SAC		1,150ha												
Constituent SSSIs: Moine Mhor														
4 survey sites in 2012. 4 positive	1 resting sites	No evidence of mink												
Evidence of otter breeding: none														
Conditions prior to and during survey: heavy rain and elevated river levels														
Changes identified since 2004: all positive sites in both surveys														
<table border="1"> <caption>Percentage of positive sites over survey periods</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>68</td> </tr> <tr> <td>1984-85</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>100</td> </tr> </tbody> </table> <p><i>Moine Mhor: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data).</p>			Survey period	Percentage of positive sites	1977-79	68	1984-85	100	1991-94	100	2003-04	100	2011-12	100
Survey period	Percentage of positive sites													
1977-79	68													
1984-85	100													
1991-94	100													
2003-04	100													
2011-12	100													
Anecdotal evidence: none														
<p>Potential issues</p> <p>The B842 road runs parallel to the Crinan Canal and is likely to be frequently crossed by otters. No RTAs were returned from local records centres.</p>														



Figure 32. Estuarine habitats at Moine Mhor

Four sites were surveyed in 2011-12, one of which was in common with the 2003-04 survey. All four sites were positive. The estuary itself may not provide good feeding habitat, as there are large mudflats with minimal rocky and weedy edges. Ditch habitat on the SAC is frequent, however, and is likely to support small fish, amphibians and invertebrates. Adjacent to the SAC are a range of good feeding habitats such as the Crinan Canal and the streams and lochs to the south of the canal. These neighbouring habitats are likely to be important in supporting the otter population of the Moine Mhor SAC. The survey sites sampled rivers, mudflat habitat, ditches and the estuary adjacent to the canal. Signs were present in all areas, but evidence of otter was most prolific adjacent to the artificial embankment of the Crinan Canal where pine marten evidence was also notably abundant. Along this steep rubbly embankment, otter paths were present linking the shore to the canal. The holt found here was surprisingly close (less than 10m) to the canal tow path.

Table 34. Assessment of Moine Mhor SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	Loch Crinan was de-designated as a commercial shellfish area in 2012 but the available data (to 2010) indicate compliance with quality standards (excluding faecal coliforms).
Predicted presence of 80% of sample sites	✓	Evidence of otter found at 100% of sites, predicted occupancy is 100%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	

Otter population not significantly impacted by human induced kills

No data

Recommended Condition Assessment

FAVOURABLE

4.3.3.10 Tayvallich Juniper and Coast SAC

Tayvallich Juniper and Coast SAC		1,212ha												
Constituent SSSIs: Tayvallich Juniper and Fen, West Tayvallich Peninsula, Ulva, Danna & the McCormaig Isles, Linne Mhuirich														
4 survey sites in 2012. 4 positive	8 resting sites	No evidence of mink												
Evidence of otter breeding: none														
Conditions prior to and during survey: periods of heavy rain preceding survey but not very significant to this SAC which comprised all coastal sample sites														
Changes identified since 2004: all positive sites in both surveys														
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>~75</td> </tr> <tr> <td>1984-85</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>100</td> </tr> </tbody> </table> <p><i>Tayvallich Juniper and Coast: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data).</p>			Survey period	Percentage of positive sites	1977-79	~75	1984-85	100	1991-94	100	2003-04	100	2011-12	100
Survey period	Percentage of positive sites													
1977-79	~75													
1984-85	100													
1991-94	100													
2003-04	100													
2011-12	100													
Anecdotal evidence: none														
Potential issues														
There is the threat of road kill as a minor road separates the grazed coastal strip from good scrubby habitat inland. Lobster creels and crab pots may also be an issue.														



Figure 33. Grooming area and holt at the base of a cliff 80m inland.

Both the terrestrial and marine habitats in this SAC are of superb quality. Sheltered shores with shallow, rocky and weedy feeding areas, bouldery areas and scrubby areas, as well as fresh water pools and streams are present on all sections. Grazing intensity was high along one of the coastal sections, but ungrazed scrubby habitat was present further inland, across a quiet road. Holts and other resting sites were common in the bouldery habitat and a substantial pine marten den was also found immediately adjacent to an otter resting site in boulders. Often the holts were found inland, as far as 80m. Almost the complete range of otter signs were present, including rolling pitches, runs to freshwater pools and across promontories, spraints and feeding remains. A single otter was seen and heard calling on one site, but no cubs were apparent.

Table 35. Assessment of Tayvallich Juniper and Coast SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	Evidence of otter found at 100% of sites and a predicted occupancy is 100%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	

4.3.3.11 Taynish and Knapdale SAC

Taynish and Knapdale SAC		966.11ha																		
Constituent SSSIs: Taynish Woods, Knapdale Woods																				
5 survey sites in 2011. 4 positive	5 resting sites	No evidence of mink. A mink monitoring raft was found at one site.																		
Evidence of otter breeding: no indication of breeding was recorded during the survey but a probable breeding holt was found in 2011 near the north end of Loch Sween.																				
Conditions prior to and during survey: heavy spells of rain prior to, and during the survey.																				
Changes identified since 2004: all four sites were positive in 2004. Four out of five sites in 2011.																				
No changes to the terrestrial habitat in the survey sections. Reintroduced beavers (<i>Castor fiber</i>) are now using Lochs Linne, Coille Bharr and Creag Mhor. Localised changes in habitat have occurred since 2008, as a result of the Scottish Beaver Trial, notably near Loch Coille Bharr.																				
<table border="1"> <caption>Percentage of positive sites for otter presence</caption> <thead> <tr> <th>Survey period</th> <th>Actual data (%)</th> <th>Predicted values (%)</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> <td>100</td> </tr> <tr> <td>1984-85</td> <td>100</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>100</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>80</td> <td>80</td> </tr> </tbody> </table>			Survey period	Actual data (%)	Predicted values (%)	1977-79	100	100	1984-85	100	100	1991-94	100	100	2003-04	100	100	2011-12	80	80
Survey period	Actual data (%)	Predicted values (%)																		
1977-79	100	100																		
1984-85	100	100																		
1991-94	100	100																		
2003-04	100	100																		
2011-12	80	80																		
<p><i>Taynish and Knapdale: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot and the dotted line are the predicted values which have taken the probability of missed detections into account using the Q50 spate indicator, black dots represent actual data)</p>																				
Anecdotal evidence: none																				
<p>Potential issues</p> <p>Rhododendron was noted on four sites but not in any great density. Otters are likely to exploit areas of rhododendron for shelter so clearance of rhododendron thickets is potentially damaging. Early control is more desirable. Other potential issues include lobster creels and crab pots in shallow waters.</p>																				

Taynish and Knapdale SAC comprises Atlantic oak woodland with small stands of coniferous plantation that lie on the northern shore of Loch Sween, a sea loch. Of the five sites surveyed, two were on the shore of Loch Sween and this site held an abundance of otter signs with copious amounts of spraint, freshwater pools, rolling pitches, food remains and runs. The remaining sites were on freshwater lochs or tiny burns. The terrestrial habitat is

rich in structural habitat, predominantly woodland with bouldery areas, stands of bracken, stick piles and areas of scrub and tall vegetation.



Figure 34. Point source pollution from sediment run-off at Barnluasgan

There is a network of walks through the Forestry Commission areas but, in general, only short sections of the shoreline receive many walkers. The visitor centre at Barnluasgan was observed in a torrential downpour of rain, and it was noted that surface water pooled in the car park and the heavily discoloured sediment-laden water drained directly into the linkage burn between Coille Bharr and Loch Barnluasgan. This was a sporadic point source of pollution.

It is considered that the site with no otter evidence (Lochan Taynish, site 5023) does not represent the typically good habitat which is abundant through the SAC. It is a very narrow burn through rank vegetation and difficult to follow as it often disappeared into marsh. The lack of signs in this poorer habitat is not of major concern.

Table 36. Assessment of Taynish and Knapdale SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations	✓	No data Loch Crinan was de-designated as a commercial shellfish area in 2012 but the available data (to 2010) indicate compliance with quality standards (excluding faecal coliforms).
No increase in pollutants potentially toxic to otters	✓	Evidence of otter found at 80% of sites, predicted occupancy is 83%.
Predicted presence of 80% of sample sites	✓	
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)		
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	One of the sample sites should be replaced by a more suitable location in future surveys as it comprises very poor habitat.

4.3.3.12 Loch Lomond Woods SAC

Loch Lomond Woods SAC		1,454.33ha												
Constituent SSSIs: Glen Falloch Woods, Pollochro Woods, Rowardennan Woods, West Loch Lomondside Woods, Inchtavannach and Inchconnachan, Inchlonaig, Endrick Mouth & Islands, Endrick Water														
11 survey sites in 2012. 10 positive	5 resting sites	No evidence of mink												
Evidence of otter breeding: none														
Conditions prior to and during survey: not exceptional, although periods of heavy rain preceded survey work.														
Changes identified since 2004: 10 of the 11 sites in 2004 were positive, as in 2012. It was noted that there was more otter evidence in loch-side habitats in 2012 contrasting with less activity on the islands.														
Considerably more mink activity was noted in 2004														
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>60</td> </tr> <tr> <td>1984-85</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>90</td> </tr> <tr> <td>2011-12</td> <td>90 (actual), 90 (predicted)</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	1977-79	60	1984-85	100	1991-94	100	2003-04	90	2011-12	90 (actual), 90 (predicted)
Survey period	Percentage of positive sites													
1977-79	60													
1984-85	100													
1991-94	100													
2003-04	90													
2011-12	90 (actual), 90 (predicted)													
<i>Loch Lomond Woods: presence of otter through all survey periods</i>														
(2011-12: the white dot and the dotted line are the predicted values which have taken the probability of missed detections into account using the Q50 spate indicator, black dots represent actual data)														
Anecdotal evidence: none														
<p>Potential issues</p> <p>Changing weather patterns in the last 20 years have resulted in a 20% increase in rainfall in Loch Lomond resulting in an increased frequency of flood events and “flashiness” of river regimes. This, together with prolonged low flows and the increasing severity of summer spates, may impact on juvenile fish survival. Evidence from studies undertaken at the University of Glasgow suggests that the temperature of the loch has risen by 1.8°C in the last 20 years. This has potentially major implications.</p>														



Figure 35. An undisturbed section of the eastern shore where the profile is steep and there are abundant rocky ledges and exposed tree roots amongst the boulders, showing signs of frequent use by otter.

The Loch Lomond Woods SAC has a complex and fragmented boundary comprising a number of woodland SSSIs along the loch shore, loch islands (the Inchtavannach & Inchconnachan SSSI, Inchlonaig SSSI and Endrick Mouth & Islands SSSI) and the Endrick Water SSSI. The woodlands and islands of Loch Lomond fall within two SNH Areas, the northern half is in Argyll & Stirling and the southern half in Strathclyde & Ayrshire. In addition to searches along the wooded shores of the loch, surveys were also carried out on the islands of Inchconnachan, Creinch, and Clairinish. In total 11 survey sites were examined and all but one (Arrochymore Point) showed signs of otters.

There was a substantial increase in otter evidence along the loch shore with several well used and heavily sprainted resting sites. Evidence of otters along the eastern shore may be impacted by the proximity of the West Highland Way. Disturbance is particularly high in areas where the shore profile is gentle allowing walkers to camp along the cobbled shore. Similarly, there is a high level of disturbance along the south east of the loch where there is easy access to the loch shore and an abundance of water sports. The level of disturbance from visitors may explain why no evidence of otters was identified at Arrochymore Point despite good survey conditions and excellent habitat for otters. These areas are, however, localised. Where the West Highland Way is not immediately adjacent to the loch shore, there are long stretches where the habitat (rocky shore, exposed tree roots and undisturbed cover) provides excellent habitat for otters, including suitable refuge for natal holts. The islands appear to indicate a reduction in the evidence of activity, possibly due to increased landings by visitors. Local disturbance is very likely to deter breeding and may also deter otters from resting in these areas.

The Loch Lomond Fisheries Trust (2009) states in its management plan for 2009–2013 that: *'The varied fish assemblages of lochs and rivers within the Lomond catchment area contribute a significant biological and economic resource. Local populations of powan, brook, river, sea lampreys and Atlantic salmon have attracted both national and European conservation priority status with designations implemented to attempt to protect them. Loch Lomond is famed for its sea trout and salmon angling opportunities and in more recent years a growing number of specialist coarse anglers have targeted the large pike and shoals of other coarse fish that abound'*. Eels are native and are regarded as widespread in the

catchment and very abundant in the main loch where there has been a commercial fishery in the past. Little is known about the current status of this important species in the Lomond catchment but it is possible that they are in decline as elsewhere. Dietary studies by McCafferty (2005) in the Loch Lomond & the Trossachs National Park show that the diet of otters is similar to other freshwater areas of Britain, with fish dominating the diet and amphibians being particularly common during late winter and spring. Spraints included ruffe (*Gymnocephalus cernua*) (52%), cyprinids (51%), eel (26%), *Salmo spp.* (14%), powan (*Coregonus clupeoides*) (4%), pike (1.5%) perch (*Perca fluviatilis*) (1.5%) and changes in the diet were associated with the migration and spawning habits of a number of species. The value of different prey for otters is not only dependent on their availability but also on their energy content. Introduced ruffe are now found throughout Loch Lomond, the lower Endrick and other slow flowing tributaries, but not the fast-flowing tributaries (Adams & Maitland, 1998). They have the lowest energy content amongst the fish prey taken by otters, whereas eels are the most energy-rich.

Table 37. Assessment of Loch Lomond Woods SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations	✓	A wide variety of native and non-native species.
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	Evidence of otter found at 91% of sites, predicted occupancy is 94%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		No data, but the density of busy roads in the vicinity of the SAC imply that road kills may be exerting pressure on the population.
Recommended Condition Assessment	FAVOURABLE	

4.3.3.13 Rannoch Moor SAC

Rannoch Moor SAC		10,102ha												
Constituent SSSIs: Rannoch Moor														
10 survey sites in 2012. 8 positive	3 resting sites	No evidence of mink												
Evidence of otter breeding: juvenile footprints were found at Loch Laidon														
Conditions prior to and during survey: very good. The survey followed a dry period. Loch levels were notably low; some sections had frequent sandy areas suitable for registering prints.														
Changes identified since 2004: there was reduced occupancy of sites compared with 2004 when all sites were occupied; this reflects the occupancy levels found in the 1977-79 and 1984-85 surveys.														
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>88</td> </tr> <tr> <td>1984-85</td> <td>72</td> </tr> <tr> <td>1991-94</td> <td>88</td> </tr> <tr> <td>2003-04</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>88</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	1977-79	88	1984-85	72	1991-94	88	2003-04	100	2011-12	88
Survey period	Percentage of positive sites													
1977-79	88													
1984-85	72													
1991-94	88													
2003-04	100													
2011-12	88													
<p><i>Rannoch Moor: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot and the dotted line is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator, which is very similar to the actual data. Black dots represent actual data)</p>														
<p>Anecdotal evidence</p> <p>Salmon and trout website forums, for example (www.flyforums.co.uk and http://troutandsalmonforum.proboards.com) have advocated Loch Laidon and Loch Ba as good reliable trout fisheries.</p>														
Potential issues: see below														



Figure 36. Small rocky islands in Loch Ba offering potential refuge sites

The Rannoch Moor SAC lies in the upper River Tay catchment and comprises an open, rugged landscape of blanket bog punctuated by frequent burns and lochans with the larger Loch Laidon in the east of the SAC. The terrestrial habitat is varied but generally good with structural heterogeneity, small islands and peaty hags and banks suitable for holts. Otter signs were generally sparse in both the 2003-04 and 2011-12 surveys with the greatest amount of spraints in 2003-04 at the eastern end of Loch Laidon. The 2011-12 survey found a notable reduction in signs at the three sites in this area, with one of these sites not having any signs. Abundant sandy and peaty beaches were exposed by the low water levels offering good tracking conditions but only one set of juvenile prints was found. The other negative site was adjacent to the A82. On the return route from this site across the moorland, a disused holt was found.

The sample site adjacent to the A82 was very disturbed. Evidence of campfires, beer cans and bottles was present on islands and it is likely that this area is a hotspot for canoeing and wild camping. Dog and human footprints were common around the loch shores. Paths created by visitors were present in the moorland and litter was prolific around the loch shores bordering the A82. Human latrines were present under the Ba Bridge preventing access to one of the shelves under the bridge and only one spraint was found on the side with less human activity. The evidence suggests that certain areas in the SAC are under considerable pressure from visitor access. Disturbance potentially continues into the night. It is not clear how otters respond to such recreational disturbance but this is potentially breeding habitat and it is likely to deter breeding in these areas. No comment was made in the 2003-04 survey concerning disturbance, so this is being interpreted as a change in the last 10 years.

At two sample sites, filamentous algae were recorded in the water. These sites are naturally oligotrophic rivers and so algal growth is likely to represent a significant input of nutrient.

Grazing pressure was noted in the 2003-04 survey and was also noted in the 2011-12 survey. Acidification of Loch Laidon has been identified as an issue in the Tay Foundation fisheries management plan (Tay District Salmon Fisheries Board, 2009).

Table 38. Assessment of Rannoch Moor SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations	✓	Good numbers of brown trout are regularly caught in Loch Ba and Loch Laidon and the area has a reputation as a reliable brown trout fishery.
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	Evidence of otter found at 80% of sites, predicted occupancy is also 80%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		No evidence is available. No RTAs in the available data, but RTAs are likely along the A82. Recent works along A82 included provision of an artificial holt and otter passes.
Recommended Condition Assessment	FAVOURABLE	

4.3.4 Tayside and Grampian

There were eight SACs sampled in 2011-12 which at least partially fall within this SNH Area. Note that the River Spey assessment is presented in the South Highland Area.

The River Dee SAC and three of the four other SACs associated with this river system, namely the Cairngorms, Ballochbuie and Muir of Dinnet, were assessed in this report as being in unfavourable condition. (Muir of Dinnet has been re-assessed as unfavourable based on new data that were unavailable at the time of the original (2010) assessment). The remaining SACs, including the extensive River Tay are suggested to be in favourable condition.

4.3.4.1 River Dee SAC

River Dee SAC		2,445.6ha (570.5km in length)																		
Constituent SSSIs: River Dee																				
48 survey sites in 2011-12. 36 sites positive	3 resting sites	Evidence of mink at 2 sites.																		
Evidence of otter breeding: none																				
Conditions prior to and during survey: the 2011 sites (Cairngorms SAC), experienced heavy rain and resulting high water levels at time of survey. In 2012, this area of Scotland also received high levels of rainfall, but poor conditions were only noted at one site.																				
Changes identified since 2004: the number of negative sites has increased from one out of 54 sites in 2004 to 12 out of 48 in 2011-12. Very few resting sites were found in the 2011-12 survey.																				
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Actual data (%)</th> <th>Predicted values (%)</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>87</td> <td>87</td> </tr> <tr> <td>1984-85</td> <td>88</td> <td>88</td> </tr> <tr> <td>1991-94</td> <td>97</td> <td>97</td> </tr> <tr> <td>2003-04</td> <td>100</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>75</td> <td>78</td> </tr> </tbody> </table>			Survey period	Actual data (%)	Predicted values (%)	1977-79	87	87	1984-85	88	88	1991-94	97	97	2003-04	100	100	2011-12	75	78
Survey period	Actual data (%)	Predicted values (%)																		
1977-79	87	87																		
1984-85	88	88																		
1991-94	97	97																		
2003-04	100	100																		
2011-12	75	78																		
<i>River Dee: presence of otter through all survey periods</i>																				
(2011-12: the white dots and the dotted line are the predicted values which have taken the probability of missed detections into account using the Q50 spate indicator, black dots represent actual data)																				
Anecdotal evidence																				
Members of the fisheries staff of the River Dee Trust note regular sightings of otters and of fish predated by otters and have not observed any changes in the local otter population.																				
Potential issues																				
Rhododendron was noted on four sites but not at great density. Otters are likely to exploit areas of rhododendron for shelter and clearance of rhododendron thickets is therefore potentially damaging. Early control is more desirable.																				

The River Dee SAC is designated for freshwater pearl mussels, Atlantic salmon and otter. Draining the southern Cairngorms and northern Grampians, the Dee runs 130km to the East Coast, with a total catchment area of 2083km². Along its length, 25 tributaries join the main stem, the largest of which are the waters of Feugh, Tanar, Clunie and the River Gairn. The western half of the catchment is upland in character, with the main land uses being moorland and forestry. Towards the east the land becomes more suited to arable and improved pasture. Water systems are oligotrophic supporting salmonid fish and eels.

Otter signs were far less frequent in the 2011-12 survey compared to the 2003-04 results. Other SACs which lie at least partially in the River Dee catchment include the Cairngorms, Ballochbuie and Glen Tanar. The Cairngorms recorded 13 out of 23 positive sites, Ballochbuie had two out of five positive sites and at Glen Tanar both survey sites were found to be positive.

Prospects for the Dee catchment in terms of riparian management appear good. The *Pearls in Peril* project aims to re-establish riparian woodland and it is hoped that this will improve nutrient input and water temperature regimes, benefiting the target species: freshwater pearl mussels, salmonids and otters if prey availability increases. Overall grazing levels are lower and sheep numbers are falling. This, coupled with the control of deer numbers, is enabling the development of bankside vegetation. Work is also starting on the diversification of in-stream habitat. Previously, the build-up of woody material in river systems would have been cleared, but it is now regarded more positively. All the other work undertaken by the Dee Fisheries Trust also contributes to a healthy river system including identifying blockages to migratory fish species, addressing agricultural run-off and pollution and assessing impacts of current and future abstraction. This is likely to be of benefit to otters.

Eels are absent from many upper catchment tributaries but are present in the lower parts of some larger ones and throughout the Clunie Water. They are absent from areas of intensive agricultural land use with high sediment loads and/or poor water quality. In recent years there has been a marked decrease in eel distribution, even in tributaries with good in-stream habitat and no change in land use practices. They are no longer found in the upper reaches of many tributaries or in the side streams of large tributaries.

Water quality is generally good in the River Dee and its tributaries but issues including diffuse pollution, sediment, faecal contamination, pesticides and morphological changes to watercourses have all been identified. The River Dee is one of SEPA's 14 'priority catchments'. These are river and coastal catchments that are currently failing to meet water quality standards and which will not achieve improved water quality without a focused management approach. The issues identified lie mainly in the lower catchment.

Table 39. Assessment of the River Dee SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations	✓	SCM of salmon in 2011, favourable maintained.
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	X	Evidence of otter found at 75% of sites, predicted occupancy is 79%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	X	
Otter population not significantly impacted by human induced kills		There is no evidence of persecution. Evidence of road mortality on the A93 which follows and crosses the River Dee and a number of tributaries
Recommended Condition Assessment	UNFAVOURABLE	Although this is a borderline fail, it is based on a good sample size and is consistent with the assessments of three of the four other SACs that are associated with the Dee SAC.

4.3.4.2 Ballochbuie SAC

Ballochbuie SAC		1,881.7ha																		
Constituent SSSIs: Ballochbuie																				
4 survey sites in 2011. 1 site positive	No resting sites	No evidence of mink																		
Evidence of otter breeding: none																				
Conditions prior to and during survey: heavy rain prior to survey																				
Changes identified since 2004: large reduction in positive signs																				
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Actual data (%)</th> <th>Predicted values (%)</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> <td>100</td> </tr> <tr> <td>1984-85</td> <td>100</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>100</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>25</td> <td>35</td> </tr> </tbody> </table>			Survey period	Actual data (%)	Predicted values (%)	1977-79	100	100	1984-85	100	100	1991-94	100	100	2003-04	100	100	2011-12	25	35
Survey period	Actual data (%)	Predicted values (%)																		
1977-79	100	100																		
1984-85	100	100																		
1991-94	100	100																		
2003-04	100	100																		
2011-12	25	35																		
<p><i>Ballochbuie: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot and the dotted line are the predicted values which have taken the probability of missed detections into account using the Q50 spate indicator, black dots represent actual data)</p>																				
<p>Anecdotal evidence</p> <p>Otters are reported to be widespread throughout the Balmoral Estate as reported by the ranger, G. Jones. He notes activity at regular sprainting sites throughout the estate across watersheds up to 450m, and evidence of otters eating frogs at Lochnagar. G. Jones also reports being challenged at night by an (assumed) female otter with a cub which was whistling from a mid-stream island on the Dee near Balmoral Castle.</p>																				
<p>Potential issues: none identified</p>																				

The Ballochbuie SAC comprises Caledonian pine forest on the slopes of the Dee valley with associated open habitats and forest mire. Broadleaf and coniferous woodlands are being actively managed to encourage regeneration. Three tributary burns of the River Dee were surveyed for evidence of otter activity. Evidence of otter activity was extremely low or absent along all 600m survey sections of the Ballochbuie SAC. Heavy rainfall preceding the survey, in conjunction with the steep morphology of the tributaries within the SAC, could have led to their presence being under-recorded within the sample sites.

Table 40. Assessment of Ballochbuie SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations	✓	Ballochbuie is part of the River Dee catchment. The Dee was most recently assessed for Atlantic salmon in 2011 when it was found to be Favourable Maintained.
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	X	Evidence of otter found at 25% of sites, predicted occupancy is 32%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	X	Loss of 75%
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	UNFAVOURABLE	There are a small number of sites within the SAC, but two attributes fail to reach their targets by a wide margin.

4.3.4.3 Glen Tanar SAC

Glen Tanar SAC		4,180.1ha												
Constituent SSSIs: Glen Tanar														
2 survey sites in 2012. 2 sites positive	No resting sites	Evidence of mink at one site												
Evidence of otter breeding: none														
Conditions prior to and during survey: good														
Changes identified since 2004: both sites positive in both surveys.														
<table border="1"> <caption>Percentage of positive sites for otter presence</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> </tr> <tr> <td>1984-85</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>100</td> </tr> </tbody> </table> <p><i>Glen Tanar: presence of otter through all survey periods</i> (2011-12: no predictions are possible as there were no flow data for any of the sites. Black dots represent actual data).</p>			Survey period	Percentage of positive sites	1977-79	100	1984-85	100	1991-94	100	2003-04	100	2011-12	100
Survey period	Percentage of positive sites													
1977-79	100													
1984-85	100													
1991-94	100													
2003-04	100													
2011-12	100													
Anecdotal evidence														
<p>The estate ranger notes that otters have a permanent presence at the trout-stocked loch by Glen Tanar House and otter tracks have been seen in snow throughout the catchment, including the upper catchment where otters have been caught on webcams scavenging deer carcasses (C. McLean, pers. comm.). C. McLean considers otters to be present throughout the Tanar catchment.</p>														
Potential issues: none identified														



Figure 37. The Water of Allachy, a tributary of the Water of Tanar on Glen Tanar Estate

Glen Tanar SAC supports a combination of dry and wet heathland and blanket bog vegetation and the largest area of remnant Caledonian pine forest in the region. It includes the valley of the Water of Tanar and its tributaries. The estate has a major focus on conservation management particularly to secure the population of capercaillie (*Tetrao urogallus*).

Data from the River Dee Trust indicate that fish numbers are good, including salmonids.

Table 41. Assessment of Glen Tanar SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations	✓	Glen Tanar is part of the River Dee catchment. The River Dee was most recently assessed for Atlantic salmon in 2011 when it was found to be Favourable Maintained.
No increase in pollutants potentially toxic to otters	✓	Evidence of otter found at 100% of sites. No predictions are possible as there were no flow data for any of the sites.
Predicted presence of 80% of sample sites	✓	Evidence of otter found at 100% of sites. No predictions are possible as there were no flow data for any of the sites.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	Although the assessment of this site is favourable, Glen Tanar is part of the Dee catchment and cannot meaningfully be viewed in isolation from it. Caution is therefore needed, given the variance in condition between Glen Tanar and the other Deeside SACs.

4.3.4.4 Muir of Dinnet SAC

The Muir of Dinnet was surveyed under a separate contract and the following is a summary of the contract report (Bacon & Watt, 2010).

Muir of Dinnet SAC		415.8ha												
Constituent SSSIs: Muir of Dinnet is a large SSSI (2308ha) of which a smaller area is designated as the SAC														
2 survey sites in 2010. 2 sites positive	1 resting site	No evidence of mink												
Evidence of otter breeding: recent observations by Kruuk (in Bacon & Watt, 2010) indicate less breeding in recent years and it is suggested that the population may now comprise itinerant males rather than breeding females.														
Conditions prior to and during survey: good, considering the habitat. Low water levels. Some areas could not be accessed due to the quaking surface.														
Changes identified since 2004: both sites were positive in both surveys. There have been no changes to the terrestrial/riparian habitat. The importance of reedbed habitat is recognised at this site and there has been no reduction in the size of this since the 2003/04 survey.														
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>0</td> </tr> <tr> <td>1984-85</td> <td>0</td> </tr> <tr> <td>1991-94</td> <td>0</td> </tr> <tr> <td>2003-04</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>100</td> </tr> </tbody> </table> <p><i>Muir of Dinnet: presence of otter through all survey periods(not surveyed prior to 2003-04)</i> (2011-12: no predictions are possible as there were no flow data for either site. Black dots represent actual data).</p>			Survey period	Percentage of positive sites	1977-79	0	1984-85	0	1991-94	0	2003-04	100	2011-12	100
Survey period	Percentage of positive sites													
1977-79	0													
1984-85	0													
1991-94	0													
2003-04	100													
2011-12	100													
Anecdotal evidence: J. Conroy noted fewer breeding females in recent years and numbers of local RTAs had also declined.														
Potential issues: none identified														

The Muir of Dinnet was surveyed in the summer of 2010. It comprises Lochs Davan and Kinord and adjacent wetland including reed beds, and forms part of the Muir of Dinnet National Nature Reserve. The site is linked by the Monandavan and Dinnet Burns to the River Dee.

The 2010 survey found a good level of otter activity on both survey sites with abundant spraints, paths and slides into the water. A resting site was found in the survey area and a rabbit burrow holt was found outwith the survey area. It was noted that many of the spraints contained abundant feathers.

The Muir of Dinnet was last assessed as Favourable Declining (Bacon & Watt, 2010) which used data from unpublished studies by Kruuk on otter numbers and dietary changes. These studies have since been published (Kruuk, 2014) and provide evidence of population change at this SAC and also evidence indicating a change in diet. If the site were to be re-assessed using this published information, and using the assessment method which has been used for all of the other sites, the Muir of Dinnet would be in unfavourable condition. A re-assessment is presented below.

Table 42. Re-assessment of the Muir of Dinnet SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations	X	A study of prey composition in spraints on the site has been ongoing since the mid 1970s (Kruuk, 2014). It was found that there had been a significant decrease in the number of spraints containing eel remains and an increase in bird and mammal remains.
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	Evidence of otter was found at 100% of sites.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	X	There were no losses of positive sites, however a long-term study found that prior to 1994 there were one to three litters per year, but since 1994 breeding has not been confirmed on the lochs. There were also fewer otters in 2000-2003 compared with visual observation surveys in 1993-2000 (expressed as different otters recorded per hour) (Kruuk, 2014).
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	UNFAVOURABLE	

4.3.4.5 Cairngorms SAC

Cairngorms SAC		56,785ha																		
Constituent SSSIs: Cairngorms																				
23 survey sites in 2011. 13 sites positive	5 resting sites	No evidence of mink																		
Evidence of otter breeding: a female and cubs were seen regularly on the River Cluny at Braemar in the town centre as reported by local residents.																				
Conditions prior to and during survey: the effects of heavy rain and torrential flow had just subsided at some sites, particularly on the River Feshie. No signs of otter activity were found on the Feshie and a return trip also proved negative despite an abundance of likely sprainting features.																				
Changes identified since 2004: a large reduction in positive sites																				
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Actual data (%)</th> <th>Predicted values (%)</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>68</td> <td>68</td> </tr> <tr> <td>1984-85</td> <td>90</td> <td>90</td> </tr> <tr> <td>1991-94</td> <td>100</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>90</td> <td>90</td> </tr> <tr> <td>2011-12</td> <td>58</td> <td>72</td> </tr> </tbody> </table>			Survey period	Actual data (%)	Predicted values (%)	1977-79	68	68	1984-85	90	90	1991-94	100	100	2003-04	90	90	2011-12	58	72
Survey period	Actual data (%)	Predicted values (%)																		
1977-79	68	68																		
1984-85	90	90																		
1991-94	100	100																		
2003-04	90	90																		
2011-12	58	72																		
<p><i>Cairngorms: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot and the dotted line are the predicted values which have taken the probability of missed detections into account using the Q50 spate indicator, black dots represent actual data)</p>																				
<p>Anecdotal evidence</p> <p>T. MacDonnell, the Factor of Glenfeshie, Braeroy & Tulloch Estates, reports seeing otters at all three survey locations on the River Feshie “albeit occasionally, but about this time of year”, i.e. August. He also supplied photos of salmon predated by otters taken on the 16th September 2011 (Figure 39).</p>																				
Potential issues: none identified																				



Figure 38. Upland habitat in the upper reaches of the River Feshie

The Cairngorms SAC includes the most extensive area of upland in the UK and is designated for a range of habitat types including a complex of oligotrophic lochs, wet, dry, alpine and boreal heaths, montane grassland, blanket bog and bog woodland, Caledonian pine forest and associated specialist upland habitats. The Cairngorms SAC overlaps with the River Spey and the River Dee SACs. The rivers Feshie, Avon, Lui, Derry, Quoich, Am Beanaidh and Dee were all sampled, plus Loch Mallachie, Loch Builg and Loch Avon.

There has been a considerable increase in negative sites compared with the 2003-04 survey. Strachan (2007) notes that in 2003-04 many of the sites had few signs of activity and it may be that weather conditions in 2011 washed these out in very exposed upland areas with little cover. T. MacDonnell reports regular activity on the Feshie and otters were clearly present in September 2011 when otter-predated fish were photographed.



Figure 39. Salmon predated by otter in Glen Feshie, September 2011 Photo: T. MacDonnell

Table 43. Assessment of the Cairngorms SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations	✓	The Cairngorms SAC forms part of the Dee and Spey catchment. The River Dee was most recently assessed for Atlantic salmon in 2011 when it was found to be Favourable Maintained. The River Spey has not been assessed since 2005. This assessment is based on SCM of the Dee.
No increase in pollutants potentially toxic to otters	✓	Evidence of otter found at 57% of sites, predicted occupancy is 71%.
Predicted presence of 80% of sample sites	X	A loss of approximately 20% since the 2003-04 survey. A continued downward trend since full occupancy in 1991-94.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	X	No data
Otter population not significantly impacted by human induced kills		
Recommended Condition Assessment	UNFAVOURABLE	

4.3.4.6 Dunkeld-Blairgowrie Lochs SAC

Dunkeld-Blairgowrie Lochs SAC		428.1ha																		
Constituent SSSIs: Lochs of Butterstone, Craiglush and Lowes, Lochs Clunie and Marlee																				
4 survey sites in 2011. 3 sites positive	No resting sites	No evidence of mink																		
Evidence of otter breeding: occasional sightings by Scottish Wildlife Trust (SWT) staff of a female with young.																				
Conditions prior to and during survey: not noted																				
Changes identified since 2004: evidence of mink was recorded at all four sites in 2003-04, whereas there was no such evidence in 2011.																				
<table border="1"> <caption>Percentage of positive sites for otter presence</caption> <thead> <tr> <th>Survey period</th> <th>Actual data (%)</th> <th>Predicted values (%)</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> <td>100</td> </tr> <tr> <td>1984-85</td> <td>100</td> <td>100</td> </tr> <tr> <td>1991-94</td> <td>100</td> <td>100</td> </tr> <tr> <td>2003-04</td> <td>100</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>~75</td> <td>~82</td> </tr> </tbody> </table>			Survey period	Actual data (%)	Predicted values (%)	1977-79	100	100	1984-85	100	100	1991-94	100	100	2003-04	100	100	2011-12	~75	~82
Survey period	Actual data (%)	Predicted values (%)																		
1977-79	100	100																		
1984-85	100	100																		
1991-94	100	100																		
2003-04	100	100																		
2011-12	~75	~82																		
<p><i>Dunkeld-Blairgowrie Lochs: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot and the dotted line are the predicted values which have taken the probability of missed detections into account using the Q50 spate indicator, black dots represent actual data)</p>																				
<p>Anecdotal evidence</p> <p>SWT staff record sightings of otters at Loch of the Lowes. This included a dog otter seen around six times a year, and a known holt which he occupies. There is no evidence of any of the three artificial holts being used, or evidence of breeding on the Loch of the Lowes reserve, which forms part of the SAC.</p>																				
<p>Potential issues</p> <p>The potential local water quality issue was raised in the 2007 report and again in 2011, where water quality was identified as a potential issue at two locations.</p>																				

The SAC comprises a series of five lochs along the Lunan Burn which form a transition from oligotrophic to mesotrophic conditions with the upper three lochs in more upland catchments and the two lower lochs (Clunie and Marlee) in more enriched lowland catchments. Agricultural enrichment is identified as a potential threat to the qualifying interests in the SAC citation and was also identified as a potential issue at two of the four survey sites. This is a recognised issue and nutrient levels are monitored by SEPA in all the lochs. No point source has been identified for the elevated levels of phosphate and nitrate, but heavy rain events and snow melt appear to exacerbate nutrient levels. This resulted in three small algal blooms at Loch of the Lowes in 2011, (E. Rawling, SWT Ranger, pers. comm.). A new

sewage treatment plant was installed at Loch of the Lowes in 2012 which should reduce the nutrient input to the system. Remedial measures have been instigated recently such as agricultural buffer zones. High rainfall over the last two years has overwhelmed these and levels of phosphate have increased again. Efforts to address these issues are ongoing (N. McIntyre, SNH, pers. comm.).

Mink rafts have been installed at Loch of the Lowes and Butterstone Loch as part of the mink eradication programme.

Table 44. Assessment of Dunkeld-Blairgowrie Lochs SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	There are ongoing problems with water quality but there is no evidence suggesting toxicity of pollutants to otters.
Predicted presence of 80% of sample sites	✓	Evidence of otter found at 75% of sites, predicted occupancy is 81%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	

4.3.4.7 River Tay SAC

River Tay SAC		9,496ha												
Constituent SSSIs: 37 SSSIs are associated with this large complex SAC														
79 survey sites in 2012. 73 sites positive	20 resting sites	Evidence of mink at 4 sites												
Evidence of otter breeding: none														
Conditions prior to and during survey: the poorest conditions were avoided, so in general the conditions were average.														
Changes identified since 2003: the wet summer of 2012 is likely to be the cause of the slight downward trend. The number of resting sites between the two surveys is broadly comparable.														
Beavers are now established on the Tay catchment. Beaver signs were found on the River Isla at two sites. Signs included feeding evidence and a lodge.														
<table border="1"> <caption>Percentage of positive sites over survey periods</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>72</td> </tr> <tr> <td>1984-85</td> <td>88</td> </tr> <tr> <td>1991-94</td> <td>98</td> </tr> <tr> <td>2003-04</td> <td>100</td> </tr> <tr> <td>2011-12</td> <td>92</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	1977-79	72	1984-85	88	1991-94	98	2003-04	100	2011-12	92
Survey period	Percentage of positive sites													
1977-79	72													
1984-85	88													
1991-94	98													
2003-04	100													
2011-12	92													
<p><i>River Tay: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot and the dotted line are the predicted values which have taken the probability of missed detections into account using the Q50 spate indicator, which is very similar to the actual data. Black dots represent actual data)</p>														
Anecdotal evidence: none														
<p>Potential issues</p> <p>The local records centre data include a small cluster of four RTAs within a 100m stretch of the A9 at Pitlochry during 2008 and 2009. The loss of four otters in two years is of note given the naturally low density of otters. The true RTA toll here is not known, but is likely to be higher. Transport Scotland in conjunction with Scotland Transerv have installed ramps, ledges, reflectors and fencing as retrospective mitigation. These measures are recent and are being monitored for efficacy.</p> <p>Grazing may also be an issue.</p>														

The Tay SAC includes the rivers Tay, Tummel, Garry and Isla and their associated tributaries, as well as a high number of associated clear water lochs (i.e. with a low sediment load), such as Loch Tay and Loch Rannoch in the west and Loch Beanie in the east. Land

use and adjacent habitats on the Tay change through the catchment. The upper tributaries run through moorland with large tracts of heath, acid grassland, blanket bog and areas of forestry. The mid to lower reaches support more intensive agricultural land use, with the river flowing through Perth before becoming an estuary with its associated tracts of reed bed.

Water quality is better in the upper catchment although sheep dipping and diffuse input has been raised by SEPA in the past as a concern. The upper catchment is also highly influenced by several hydro-electric schemes. Here, impoundments and water transfers impact on natural flow regimes, sediment transfer and river channel morphology. Diffuse input and discharges cause more problems in the lower catchment.

Evidence of otters was found throughout the catchment and the slight reduction in positive sites is not deemed significant, given the wet summer.

Table 45. Assessment of the River Tay SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations	✓	SCM for salmon in 2011, Favourable Maintained.
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	Evidence of otter found at 92% of sites, predicted occupancy is 93%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		There are local RTA issues but it cannot be determined whether these impact the SAC population.
Recommended Condition Assessment	FAVOURABLE	

4.3.5 *Southern Scotland*

In 2011-12 two SACs were sampled within this SNH Area; the River Tweed and Merrick Kells. The River Tweed was one of a small number of SACs showing a positive increase in otter occupancy. Merrick Kells was surveyed in good conditions but one of the seven sites was negative (100% occupancy was recorded in the 2003-04 survey). Both SACs are suggested to be in favourable condition.

4.3.5.1 Merrick Kells SAC

Merrick Kells SAC		8,698ha																					
Constituent SSSIs: Merrick Kells																							
7 survey sites in 2012. 6 sites positive	1 resting sites	No evidence of mink																					
Evidence of otter breeding: none																							
Conditions prior to and during survey: gale force winds, high rainfall followed by snow prevented survey in the autumn of 2011 as scheduled, so this site was postponed until March 2012 when conditions were deemed suitable. Dry conditions preceded the 2012 survey and loch levels were considered lower than average.																							
Changes identified since 2004: generally the level of otter activity at each site in the 2012 survey was low. Previous surveys record a widely fluctuating level of occupancy. Probable breeding holts were found in the 2003-04 survey but no breeding evidence was found in 2012.																							
<table border="1"> <caption>Percentage of positive sites by survey period</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> <th>Data Type</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>1984-85</td> <td>68</td> <td>Actual</td> </tr> <tr> <td>1991-94</td> <td>35</td> <td>Actual</td> </tr> <tr> <td>2003-04</td> <td>100</td> <td>Actual</td> </tr> <tr> <td>2011-12</td> <td>87</td> <td>Actual</td> </tr> <tr> <td>2011-12</td> <td>95</td> <td>Predicted</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	Data Type	1977-79	100	Actual	1984-85	68	Actual	1991-94	35	Actual	2003-04	100	Actual	2011-12	87	Actual	2011-12	95	Predicted
Survey period	Percentage of positive sites	Data Type																					
1977-79	100	Actual																					
1984-85	68	Actual																					
1991-94	35	Actual																					
2003-04	100	Actual																					
2011-12	87	Actual																					
2011-12	95	Predicted																					
<p><i>Merrick Kells: presence of otter through all survey periods</i></p> <p>(2011-12: the white dot and the dotted line are the predicted values which have taken the probability of missed detections into account using the Q50 spate indicator, black dots represent actual data)</p>																							
Anecdotal evidence: none																							
<p>Potential issues</p> <p>Acidification of watercourses from forestry was noted in Strachan (2007), and there has been no reduction of forestry since. Filamentous algae were noted in streams at two sample points.</p>																							



Figure 40. Loch Dungeon

Merrick Kells comprises Silver Flowe, a large area of blanket bog, wet heath and other montane habitats and a number of remote oligotrophic lochans and rivers surrounded by large blocks of coniferous plantation. Much of the site is remote and undisturbed with peaty, treeless moorland but shrubby heather and tussocky *Molinia* offer couch habitat, while boulders, peat hags and slumps offer the potential for holts. Amphibian bones were present in many of the spraints.

The negative site at Loch Dungeon included exposed bare peat and small areas of sand, but no footprints were found. Old fish remains were found at a rocky knoll by the loch edge where cormorants (*Phalacrocorax carbo*) were loafing, but there was no corroborating evidence indicating otter. Equally, a flattened area in the heather strongly suggesting a rolling pitch or heather couch was found in the vicinity of a couch recorded in the 2003-04 survey. Again, there was no evidence suggesting recent use, so it was recorded as a negative site. The return walk included intermittent checks along an additional 250m of shore, but no signs were found.

Table 46. Assessment of Merrick Kells SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No data
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	Evidence of otter found at 86% of sites. Predicted occupancy is 95%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		No data
Recommended Condition Assessment	FAVOURABLE	

4.3.5.2 River Tweed SAC

River Tweed SAC		3,380ha												
Constituent SSSIs: River Tweed														
95 survey sites in 2011. 89 sites positive	23 resting sites	Evidence of mink at 6 sites												
Evidence of otter breeding: there are many reports of cubs throughout the catchment, see anecdotal evidence below. Cubs were heard in holts/structures on two sites.														
Conditions prior to and during survey: variable but generally not extreme. Variable water levels and rainfall but the survey period also included drier spells.														
Changes identified since 2004: there have been no major changes to the terrestrial habitat.														
<table border="1"> <caption>Percentage of positive sites over survey periods</caption> <thead> <tr> <th>Survey period</th> <th>Percentage of positive sites</th> </tr> </thead> <tbody> <tr> <td>1977-79</td> <td>44</td> </tr> <tr> <td>1984-85</td> <td>55</td> </tr> <tr> <td>1991-94</td> <td>81</td> </tr> <tr> <td>2003-04</td> <td>93</td> </tr> <tr> <td>2011-12</td> <td>95 (predicted), 95 (actual)</td> </tr> </tbody> </table>			Survey period	Percentage of positive sites	1977-79	44	1984-85	55	1991-94	81	2003-04	93	2011-12	95 (predicted), 95 (actual)
Survey period	Percentage of positive sites													
1977-79	44													
1984-85	55													
1991-94	81													
2003-04	93													
2011-12	95 (predicted), 95 (actual)													
<i>River Tweed: presence of otter through all survey periods</i>														
(2011-12: the white dot is the predicted value which has taken the probability of missed detections into account using the Q50 spate indicator and which is the same as the actual (uncorrected) value. Black dots represent actual data).														
Anecdotal evidence														
<p>The Kale Water and the Bowmont Water comprise the local study area of M. Findlay. Breeding has been confirmed on both rivers. One road casualty (an adult male) was recorded on the watershed between the Kale and the Bowmont. The animal had crossed the watershed using ponds and commuted along tiny ditches through arable fields. Otters have also been observed several times running along the roadside (the B6352), which is part of this cross-catchment route.</p> <p>Laurie Campbell has been photographing otters on the lower Tweed for 15 years. He has noted that otters on the river are becoming more diurnal. Even females with young have been observed during daytime at Berwick upon Tweed, and generally otters are becoming easier to see. He has observed two breeding females using holts less than 400m apart. He has seen many emergences of the female from one of these holts and she invariably foraged upstream, probably to avoid the breeding female downstream.</p> <p>Many ghillies and water bailiffs were contacted. All reported regular sightings of otters including females with cubs. Collectively, many holts were known about, including breeding and suspected natal holts. Often breeding holts were described as being used year on year.</p>														
Potential issues: RTAs, but no hotspots have been indicated from the available data														



Figure 41. Lowland habitat of the River Teviot at Roxburgh

The Tweed is a large and diverse river system with significant tributaries. The Whiteadder Water and Blackadder Water drain the eastern slopes of the Southern Uplands. The Teviot is the main southern tributary in the SAC being fed by the Ale Water, the Jed Water and the Kale Water. The lower catchment is arable, but usually with willow scrub, riparian woodland and valley-side woodland and other semi-natural habitats providing an intact and continuous riparian corridor. There are frequent islands and numerous ponds. The upper catchments and headwaters run through upland habitats in the Southern Uplands and the northern slopes of the Cheviots.

The Tweed supports an excellent population of otters throughout the SAC with breeding confirmed in several rivers. In the 2003-04 survey there was a long dry spell prior to the fieldwork, whereas the 2011 survey was undertaken in fairly typical autumn conditions with sporadic rainfall and fluctuating water levels. The increasing trend between 2003-04 and 2011 cannot therefore be attributed to varying survey conditions.

A good variety of holts and couches were found on the Tweed. Of interest was a possible natal couch in a patch of greater tussock sedge (*Carex paniculata*). The couch comprised a large pile of chopped vegetation (approximately 70cm diameter) between tussocks, with a run into the structure on one side. It was located in a small, undisturbed valley mire of dense scrub and fen habitat and the structure was on the lower slopes of the valley side and therefore less vulnerable to flooding than on the valley floor. No spraint was present. The survey was undertaken just prior to dusk; young otters were heard in the vicinity of the structure so the surveyor retreated immediately.



Figure 42. The claw and head of a signal crayfish, which had been predated by an otter

The predated remains of a non-native signal crayfish were found at one site on the Kale Water. Signal crayfish (*Pacifastacus leniusculus*) are known to be present at a small number of sites on the Tweed catchment. The predation of this species illustrates the ability of otters to utilise novel food sources.

The Tweed Foundation has undertaken a programme of habitat improvements on the Tweed, both to terrestrial habitats, by fencing-off areas from livestock to stabilise banks, and also measures to increase the permeability to migrating fish.

Table 47. Assessment of the River Tweed SAC

Target	Assessment	Notes
Fish biomass stays within expected natural fluctuations		No recent data, last SCM of Atlantic salmon was in 2005.
No increase in pollutants potentially toxic to otters	✓	
Predicted presence of 80% of sample sites	✓	Evidence of otter found at 94% of sites and a predicted occupancy is 95%.
Population maintained or increasing (loss of occupancy between 2003-04 and 2011-12 not greater than 20%)	✓	
Otter population not significantly impacted by human induced kills		There are local RTA issues but it cannot be determined if these impact the SAC population.
Recommended Condition Assessment	FAVOURABLE	

5. DISCUSSION

5.1 Scotland

The UK otter population suffered a catastrophic decline in the mid twentieth century. Large areas of central and southern Scotland had very few signs of otter. The otter population then increased from the 1980s onwards. Otter distribution in Scotland was described as 'almost ubiquitous' by the third otter survey (Green & Green 1997). The 2003-04 survey reported an even higher occupancy (Strachan 2007). Analysis of the data which has not been corrected for differences in detectability indicates that across Scotland there is a significant relationship between the presence of otter field evidence and time through the five surveys. This relationship indicates that recorded otter presence increased from 1977 until the late 1990s which is followed by a decrease since 2004. It is recognised, however, that the very wet summers of both 2011 and 2012 may have affected the results so the decrease since 2004 was analysed further using GLMs. No relationship was found between river flow or rainfall and the presence of otter signs. A spate indicator was created, which defined spate conditions being present when the flow (at the nearest gauging station) was greater than the median flow. When the surveys that were undertaken in sub-optimal conditions (as defined by the spate indicator) were omitted from the analysis, there was no longer a significant difference between the latest two surveys. GLMs fitted to the full data set, with the spate indicator included as an explanatory factor, suggested that there was still some difference between the two latest surveys. This could indicate a number of possibilities: that there were other parameters influencing detectability, that the spate indicator was too crude or that there were fewer otter signs present. Reid *et al.* (2013) found that the surveyor and the number of bridges also affected the probability of finding otter evidence.

GLM analysis found that the wider countryside sites generally had a lower level of occupancy than the SAC sites when analysed across all survey periods for all of Scotland. This may be as a result of SACs having been selected based upon their high quality of habitat for otters and good otter populations. The direction of change in otter occurrence between successive time periods was, however, always the same in SACs and the wider countryside. Overall, this suggests that changes in the suite of SACs may equate to similar changes in the wider countryside in some areas.

In summary, the data suggest an overall decline between 2003-04 and 2011-12, but there is sufficient doubt about poor conditions and other detectability issues in 2011-12 that this apparent decline may be partly or wholly due to detectability issues. Correcting this by fitting a spate indicator retrospectively was a pragmatic approach to addressing the effect of sub-optimal conditions caused by high rainfall. It was not, however, an ideal approach and it may be that the spate indicator was too coarse to correct for detectability issues and/or that there were other detectability parameters. GLM analysis also found that monitoring the wider countryside was important in that SACs in general, had higher levels of recorded otter presence than the wider countryside.

5.2 Special Areas of Conservation

Four main attributes (and two discretionary attributes if applicable) were considered when assessing the SACs. A pass was required for all four main attributes in order for the site to be classed as being in favourable condition.

Of the 44 SACs, 30 were considered in favourable condition, four in favourable declining and 10 in unfavourable condition. Table 48 summarises the SACs which were considered as favourable declining or unfavourable.

Table 48. Summary of Unfavourable and Favourable Declining SAC assessments

SNH area	SAC	Recommended Status	Reasons
Northern Isles and North Highlands	Yell Sound Coast	Unfavourable	Published evidence of reduction in food availability and downward trend in number of occupied holts. Fewer holts found on both SACs in 2011-12 compared with 2003-04.
	Hascosay	Unfavourable	
	Caithness & Sutherland Peatlands	Unfavourable	Reduction in occupancy in 2011-12, compounded by a reduction in the previous SCM survey.
	Loch of Isbister	Favourable declining	The small sample size means that the occupancy data cannot be relied on. Some grazing issues are still present, but evidence of breeding suggests that the site is <i>not</i> in unfavourable condition.
	Ardvar & Loch a' Mhuilinn Woodlands	Favourable declining	The small sample size means that the occupancy data cannot be relied on. The habitat both in and adjacent to the SAC is excellent suggesting that the site is <i>not</i> in unfavourable condition.
South Highland	Loch Moidart & Loch Shiel Woods	Unfavourable	All sites were positive in 2003-04 but there was a loss of occupancy of nearly 50% in 2011-12.
	Ness Woods	Unfavourable	Occupancy in 2011-12 dropped approximately 13% to 67%. An assessment of unfavourable condition has been made, but the level of confidence in this assessment is low due to the particularly difficult terrain and the loss of a bridge from one of the sample sites which would likely to have been used as a spraint site.
	Insh Marshes	Favourable declining	The occupancy data for this site indicate a marginal fail. However, the location of the site within the River Spey catchment (favourable condition), the overall high quality of the habitat and the small sample size, have all been taken into account and suggest that the site is <i>not</i> in unfavourable condition.
	Rum	Favourable declining	All sites were positive in 2003-04 but there was a reduction in occupancy of >20% in 2011-12.
Argyll and the Outer Hebrides	Loch Etive Woods	Unfavourable	The small sample size means that the reduced occupancy data may not be reliable, so this assessment needs to be treated with caution.
Tayside and Grampian	Ballochbuie	Unfavourable	All sites were positive in 2003-04 but there was a loss of occupancy of approximately 68% in the 2011-12 survey.

River Dee	Unfavourable	A borderline fail but the unfavourable assessments for the associated SACs of Cairngorms, Ballochbuie and Muir of Dinnet, combined with a good sample size, support the overall conclusion.
Muir of Dinnet (Reassessment)	Unfavourable	Reliable evidence of reduction in food availability and also a change in the local population demographics, with fewer breeding females present.
Cairngorms	Unfavourable	A loss of occupancy of approximately 20% since the 2003-04 survey with a continued downward trend since full occupancy in 1991-94.

The attributes which caused most of the unfavourable assessments in this report were related to the occupancy of otters, i.e. 'presence' and 'population maintained or increasing'. Most SACs had a full complement of positive sites in the 2003-04 survey while in 2011-12 there have been losses of positive sites at many SACs. The only SACs to have gained in positive sites are the River Tweed, Glen Creran and Mull Oakwoods.

Of most concern is the failure of the Shetland SACs to pass the occupancy attributes due to the consistent decrease in occupied holts in many areas (Kruuk, 2014).

Recognising that the 80% occupancy threshold is based upon judgement, SACs are presented in Table 49 against a higher and lower threshold so that the influence of this threshold can be compared at different levels. In this assessment, the predicted occupancy values are used. It can be seen that, at the lower threshold of 70%, only one SAC (South Uist Machair) would be reassessed as a pass whereas at the 90% threshold, an additional nine SACs would fail.

Table 49. Influence of different thresholds to assess 'presence of otter'

SAC	No of sites surveyed	% of sites positive	Predicted occupancy	Occupancy		
				90%	80%	70%
Yell Sound Coast	10	100	100		NA	
Hascosay	2	100	100		NA	
Loch of Isbister	2	50	50	x	x	x
Caithness & Sutherland Peatlands	68	68	73	x	x	✓
River Borgie	4	100	100	✓	✓	✓
Durness	5	80	80	x	✓	✓
Foinaven	8	100	100	✓	✓	✓
Ardvar and Loch a'Mhuilinn Woodlands	4	75	77	x	x	✓
Inverpolly	7	86	85	x	✓	✓
Dornoch Firth and Morrich More	7	100	100	✓	✓	✓
Loch Maree Complex	17	88	89	x	✓	✓
Kinloch and Kyleakin Hills	4	100	100	✓	✓	✓

SAC	No of sites surveyed	% of sites positive	Predicted occupancy	Occupancy		
				90%	80%	70%
Strathglass Complex	12	92	91	✓	✓	✓
Ness Woods	6	67	64	x	x	x
Loch Ruthven	2	100	100	✓	✓	✓
River Spey	55	82	89	x	✓	✓
Insh Marshes	4	75	75	x	x	✓
Rum	10	70	76	x	x	✓
Glen Beasdale	2	100	100	✓	✓	✓
Loch Moidart and Loch Shiel Woods	8	50	53	x	x	x
Sunart	12	92	93	✓	✓	✓
Morvern Woods	10	90	90	✓	✓	✓
Loch Etive Woods	9	78	78	x	x	✓
Lewis Peatlands	19	89	89	x	✓	✓
North Harris	11	91	91	✓	✓	✓
Loch nam Madadh	8	100	100	✓	✓	✓
South Uist Machair	8	75	75	x	x	✓
Mull Oakwoods	11	100	100	✓	✓	✓
Glen Creran Woodlands	5	100	100	✓	✓	✓
Loch Fada	2	100	100	✓	✓	✓
Moine Mhor	4	100	100	✓	✓	✓
Tayvallich Juniper and Coast	4	100	100	✓	✓	✓
Taynish and Knapdale	5	80	83	x	✓	✓
Loch Lomond Woods	11	91	94	✓	✓	✓
Rannoch Moor	10	80	80	x	✓	✓
River Dee	48	75	79	x	x	✓
Ballochbuie	4	25	32	x	x	x
Glen Tanar	2	100	100	✓	✓	✓
Muir of Dinnet	2	100	100	✓	✓	✓
Cairngorms	23	57	71	x	x	✓
Dunkeld-Blairgowrie Lochs	4	75	81	x	✓	✓
River Tay	79	92	93	✓	✓	✓
Merrick Kells	7	86	95	✓	✓	✓
River Tweed	95	94	95	✓	✓	✓

5.3 Influence of weather, season and river conditions

There is a consensus that otter surveys should avoid periods of heavy rain, high water flow and the immediate period following flood events, (<http://www.snh.org.uk/publications/online/wildlife/otters/effects.asp>; Chanin, 2003a). The SNH website guidance states that *'It should be remembered that weather conditions can play a major part in determining the value of an otter survey and that sprainting frequency varies seasonally. Thus, surveys undertaken during periods of high water or peak leaf fall are unlikely to be productive.'*

Chanin (2003a) found that in a five year study of spraint frequency along a 1km length of the River Torridge (Devon), there was no significant seasonal variation, but there was a significant negative correlation with increased water flow in the river. Although Chanin found no evidence of seasonality in sprainting patterns in this study, other researchers have found marked seasonal differences, with more sprainting during the winter months than in summer (e.g., Conroy & French, 1987; Kruuk, 2006; Yoxon & Yoxon, 2014) and this strongly mirrors the experience of the surveyors in this study. For this work it was important to duplicate as far as possible the time period when the previous survey work had been done in 2003-04 so that any variation in seasonal sprainting behaviour did not significantly affect the results.

The effects of variation in environmental conditions on the probability of detection of otters were considered by Reid *et al.* (2013). At running water sites (i.e. not coastal or standing water), cumulative rainfall, particularly in the seven days preceding the survey, significantly affected the probability of detection. The 2011 and 2012 surveys were undertaken in very wet summers; it would have been impossible to adequately avoid sub-optimal conditions in many areas while remaining within the survey time-table and complying with restrictions due to deer stalking. It is considered unlikely that poor conditions could realistically be avoided in a survey of this scale even during an 'average' Scottish summer and so differences in detectability between sites and surveys are unlikely to be equal.

A more detailed analysis was conducted which focused specifically on the differences in recorded otter presence between 2003-04 and 2011-12 and which sought to take into account the possible impacts of spate conditions. The results from the analysis are mixed. For example, when sites were removed from the analysis based on the Q10 spate indicator, there was still a significant decrease in otter presence probability between the last two surveys, but not when sites were removed based on the Q50 spate indicator. The detectability simulation study found that only relatively small decreases in detection probability were needed to render apparently significant decreases non-significant. (Brewer & Spezia, 2013).

For the four regression analyses⁴, however, only the Q50 weighted model did not have a significant difference between the two surveys (although there was a difference when the sites in spate were the reference level) (Brewer & Spezia, 2013).

In summary, the difference in detectability between the 2003-04 survey and the 2011-12 survey is not clear. This is likely to be because there are many factors influencing detectability which may be different between surveys and also between SACs and individual survey sites. For example those with sheltered sprainting areas compared to those without, differences in whether high flow is associated with flooding of banks or not, differences in the number of suitable sprainting areas, and so on. Additionally, dry conditions may reduce detectability in coastal areas due to freshwater pools drying and not being sprainted.

5.4 Prey availability

There are a number of issues associated with assessment of prey availability for otters. Although there is plenty of data available on commercially important salmonids, there are limitations as to how these data can be interpreted in the context of food availability for otters. For example, catch data do not necessarily give an accurate picture of returning fish numbers when compared with data from fish counters (ASFB & RAFTS, 2012). The Scottish Government review of mixed salmonid fisheries acknowledges the limitations of much of the data available on salmonids both during their marine and freshwater phases. Their report concludes, however, that '*Declines in catches have been observed across the range of the species over the last few decades*' (Crawley, 2010).

⁴ Two each for Q10 and Q50 indicators, one with and one without the regression weights

Measures to conserve stock include habitat enhancement, stocking, combatting poaching, buying out coastal salmon nets, removing barriers to migration and advising on flow regimes as well as monitoring fish populations, principally salmon and sea trout, and more recently operating catch and release policies. At both the catchment level and the Scottish level this is likely to increase the availability of salmonids and, although the importance of different prey items is likely to vary geographically and with habitat, salmonids are consistently found to be an important food item in dietary studies.

Aquaculture has also impacted on wild fish stocks and there is increasing evidence that sea lice loadings are a major cause of mortality, especially to post smolts of salmon and sea trout, as well as increasing the susceptibility of adults to secondary infection (Whelan, 2010). It is considered that sea lice infestation was a primary cause of the crash in the west coast sea trout population since the 1980s (Scottish Government Fisheries Research Services: <http://www.scotland.gov.uk/Uploads/Documents/SeaLiceMulti.pdf>).

Research is on-going to address these issues, e.g. the use of native wrasse (*Labrus spp.*) in fish cages to control fish lice is being trialled, and there is encouraging evidence from Loch Fyne in Argyll that, with appropriate management, sea lice loads from aquaculture can be significantly reduced (A. Kettle-White, Argyll Fisheries Trust, pers. comm.).

Eels are known to be an important component of an otter's diet as a lipid-rich fish with a high calorific value (Kruuk, 2006). At the Dinnet lochs (Muir of Dinnet SAC), a long-term study of otter diet found that there has been a significant decline in eel remains in otter spraints (see Figure 43) coupled with an increase in birds and mammals. A declining otter population was recorded in parallel to the change in otter diet with a loss of recruitment at the lochs and fewer individuals (Kruuk, 2014).

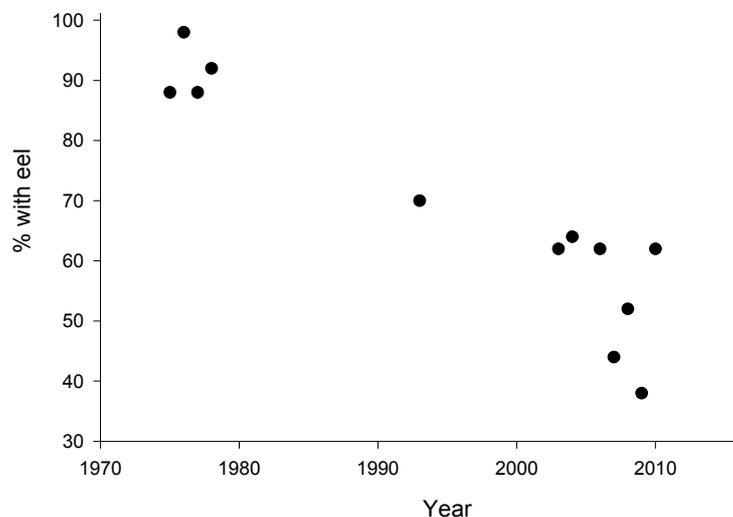


Figure 43. Proportion of otter spraints containing eels, 1970 to 2010 (from Kruuk, 2014)

A study by Jenkins & Harper (1980), undertaking an analysis of spraints collected from the River Dee system and from the Dinnet lochs, was repeated in 2012 (Beaton, 2013). The aim of the study was to establish if eels were a less frequent prey item in the otter diet than recorded in the late 1970s. The results indicate that eels have declined in frequency with a corresponding increase in salmonids, perch, three-spined stickleback, amphibians and birds. The authors note that there are many threats to eel populations, including changes in oceanic currents, parasite load and more local issues associated with free passage of eels, such as injury in hydro-electric schemes. It is known that eels have undergone a catastrophic decline throughout their European range since at least the mid-1990s (ICES,

2008). The situation in Scotland is less clear, although some data are available from SEPA and other sources such as the local fisheries trusts and possibly the Scottish Fisheries Co-ordination Centre. A study by Defra concluded that there was no compelling evidence for a declining trend in yellow eel stocks over the period between 1997 and 2005 (Defra, 2010). Their analysis of silver eel escapement suggested that the spawner escapement in Scotland remained above the EC target of 40%. The report also acknowledges a lack of information covering the critical period immediately following the collapse of glass eel recruitment in Europe.

5.5 Levels of toxic chemicals

Water quality is important to otters in two ways: first, in terms of the levels of bio-accumulating toxic chemicals which are accepted to be the cause of the otter population crash in the mid twentieth century (reviewed in Chanin, 2003b) and second, it can have an adverse impact on fish populations which are the primary prey item of otters. The SCM process only considers levels of toxic chemicals given the direct link between these and otter health and mortality.

Lead, cadmium and mercury are toxic heavy metals that can accumulate in the food chain (Mason *et al.*, 1986). Levels of these contaminants in the marine environment are monitored by Marine Scotland. Levels are decreasing and generally below values that would cause concern for human health although lead levels in the Forth, Clyde and Moray Firth are higher (Webster *et al.*, 2010). Polychlorinated biphenyls (PCBs) also accumulate in the food chain and cause toxicity, although the significance of PCB levels in otters is not fully understood (Green & Green, 1997). PCBs have also been linked to the use of contaminated food in fish farming (Hites *et al.*, in Webster *et al.*, 2010) but studies of PCBs in fish tissue did not indicate that levels are high enough to be of concern for human health.

Of recent concern are the polybrominated diphenyl ethers (PBDEs) and closely related compounds which are used as fire retardants. Monitoring by the Predatory Bird Monitoring Group and Cardiff University found that liver samples from 30 otters examined from England and Wales in 2010 contained PBDEs, but there are no data to confirm levels of toxicity in otters (Walker *et al.*, 2012).

Other research by Cardiff University has undertaken 755 *post mortems* of otters in England and Wales from 1992-2007 and measured indicators of health and the levels of persistent organic pollutants (POP), including organochlorine pesticides and PCBs. They found that levels of these POPs decreased through this period, but otter health, as defined by a number of parameters, has not improved. Specific concern was raised about the male reproductive health as decreasing baculum weight was found through the study period, and more recently they have found a greater frequency of cysts on the vas deferens. It was concluded that there are other driving factors affecting otter health and suggested that Endocrine Disrupting Chemicals (EDCs) may be responsible (Kean *et al.*, 2013).

Otter corpses, primarily RTAs from Shetland but also from other parts of Scotland, have undergone *post mortem* by Dr Adrian Philbey of the Royal (Dick) School of Veterinary Studies who runs the Scottish Otter Mortality Project. *Post mortems* on otters from Scotland have been undertaken since 2008, most of which have been road kills. Tissue samples have been stored for future analysis. To fully address the assessment of impacts of toxic chemicals on otters in Scotland, analysis of these tissues, and tissue from future dead otters would be required.

5.6 Human induced kills

Deaths of otters on roads are a significant cause of mortality in otter populations, especially along trunk roads (Philcox *et al.*, 1999; Grogan *et al.*, 2013). Extrapolated data indicate that otter road mortality could account for 25-30% of the population of otters, annually (Grogan *et al.*, 2013). Roads within 100m of fresh water or the coast are considered high risk, even if the road does not cross the river (Philcox *et al.*, 1999), which makes some SACs more vulnerable to RTAs. Otter road mortality was discussed in Strachan (2007) using data from surveys in focus zone squares where there had previously been high numbers of road casualties recorded. Strachan considered that road mortality was not limiting otter population growth; however, a study in the Loch Lomond and the Trossachs National Park suggested that there were fewer positive sites for otter in coastal habitat that was in close proximity to A-class roads (McMahon & McCafferty, 2006). The greatest number of positive sites had an absence of roads nearby, however this could also be related to disturbance. The SACs in this survey are all relatively remote from large conurbations, although some are in close proximity to major trunk roads, e.g. the main stem of the River Spey and the Insh Marshes.

Transport Scotland is phasing-in more specific contractual obligations to record data for mammal and raptor RTAs when re-letting operating contracts. This should improve the availability of data for trunk roads.

Otter mortalities due to marine traps such as lobster pots and creels, crab pots, eel fyke nets and discarded fishing nets are reviewed in the UK Marine SACs Project (http://www.ukmarinesac.org.uk/activities/fisheries/f4_10.htm) which reported in 2001. Deaths from entrapment are still considered to be an issue for coastal otters. There are also records of otters being caught in illegal salmon nets in 2010 on the River Tweed and on the River Teifi in Wales.

Otter mortality in fish and crustacean traps remains a concern and, with denser otter populations using coastal habitats, deaths in lobster and crab pots is regarded as potentially becoming a serious issue by a number of agencies (Crawford, 2010). Crayfish traps have also caused otter fatalities in the Thames catchment (Graham Scholey, Environment Agency, pers. comm.). A comprehensive review has been undertaken of the issue of otter mortality in eel fyke nets in Ireland (Poole *et al.*, 2007). The findings suggest that the level of otter mortality is probably low compared to other causes, such as road traffic. The report notes that the lack of reliable statistics on any form of otter mortality became obvious during the study and recommends that the reporting of otter mortalities, including by fishing gear, should be improved. A number of recommendations are made for the reduction or elimination of incidental capture of otters in eel fyke nets through a series of avoidance measures, or by the fitting of otter guards. Macdonald & Burnham (2011) note in their report 'The State of British Mammals' that concerns remain over otter mortality, including deaths in fish and crustacean traps and potential conflict with fisheries and fishermen. No further information on this issue has been identified.

Another practice which may cause mortality of coastal otters is laying tangle nets. These comprise a set of static fishing gear which are hung loosely over rocks and depend on fish or crustaceans becoming entangled. They are generally constructed of nylon monofilament and are required by law to be attached to the shore. There are informal reports of drowned otters from north-west Scotland but no data are available.

5.7 Recommendations

5.7.1 Sample sites

An alternative approach to surveying Ness Woods is suggested as the terrain is particularly difficult and time consuming and there are consequent Health and Safety concerns.

A review of the sample sites is recommended at Faraid Head, Durness to include perennial freshwater sources.

Two of the Rum survey sites are immediately adjacent to one another and it is recommended that one of these is moved so that the island is more effectively sampled.

The west coast site on South Uist Machair (site 3340) is unlikely to detect evidence of otter activity due to the lack of suitable sprainting sites. SNH staff note that otters are regularly seen on the beach; however, J. Twelves notes that otters are seldom found on west-facing beaches of South Uist but concentrate their activity inland. This is where a complex network of otter runs link the low-lying freshwater and brackish lochs and lead to the rocky seashores (Twelves, 2005). It is recommended that this site is re-located to a more diverse section of coast.

Shetland was surveyed in early summer. The surveyors felt that in some areas the survey was causing disturbance to breeding birds. Whilst effort was made to minimise this, it is recommended that the survey brief stipulates avoidance of the most sensitive bird breeding season on Shetland.

Access would be more readily granted with fewer conditions if those sites with hunting interests (deer stalking and grouse shooting) are scheduled outwith the busiest season.

The GLM analysis found differences in occupation between SAC sites and the wider countryside. The wider countryside generally had a lower level of sites with otter evidence than the SACs. Nevertheless, SAC sites are likely to be representative of the overall *direction of change* in the wider countryside if not its extent (Figure 3). It is therefore recommended that future monitoring of the Scottish population includes both SACs and the wider countryside.

5.7.2 Supporting information for assessment

Much of the information collected in the field, for example the river morphology parameters, has never been analysed. Additionally, many parameters are assessed subjectively, e.g. river depth. A review of the survey form should be undertaken in order to rationalise the field data collection and analysis process and the subsequent storage of this information. For robust comments to be made on the mandatory attributes 'prey availability' and 'levels of toxic chemicals', published data need to be available which relate directly to the assessment of these parameters. It is recommended that RTAs and other carcasses are subject to *post mortem* to determine condition of the animal and levels of pollutants, presence of diseases and parasites.

With regard to food availability, Godfrey (2005) undertook a review of the methodology for SCM of Atlantic salmon. This is implemented over successive cycles of SCM and will inform site assessment for otters on sites also designated for salmon. The monitoring programme of freshwater fish populations in Scotland's rivers, beginning in summer 2008, has been instigated by SEPA under the Water Framework Directive and data generated from this and from existing eel traps may offer a useful source of information in the future. In addition, the Scottish Government has commissioned an independent review of wild fisheries management in Scotland and part of this work will be to develop an evidence-based

management system for wild fisheries which may in due course contribute to SCM assessment of food availability targets for otters. Few data are available for non-commercial species of fish particularly marine species on which otters are known to feed.

5.7.3 *Field methodology*

Bridges were recorded if present, as they often provide good sprainting sites. Some bridges do not, however, offer any sprainting opportunities as they have no suitable surfaces at or close to water level that otters might utilise in this way. These bridges should not be recorded, or a distinction between these structures should be made on the form.

5.7.4 *Survey design*

The 2011-12 survey inherited the survey methodology of the previous otter surveys to give a 'like for like' comparison. Recent studies (Buckland *et al.*, 2010; Parry *et al.*, 2013; Reid *et al.*, 2013) have highlighted the issues of detectability in sign-based surveys. The wet summers of 2011 and 2012 illustrate the problem of detectability with unreliable 'absences' which may be due to adverse survey conditions. Statistical methods are now in common use that enable corrected occupancies to be modelled but can only be used if the survey is designed appropriately. The approach to monitoring otters needs to be reviewed in light of these advances in statistical modelling.

5.7.5 *Small sites*

Some small SACs have a very small number of sample sites. Assessing feature condition on the basis of data from such a small sample size is open to error. Where possible, the assessment of these smaller SACs should also consider the condition of overlapping or nearby larger SACs in their assessments.

5.7.6 *Targeted monitoring*

The apparent decrease in occupancy in the Caithness & Sutherland Peatlands SAC and the Cairngorms SAC may be of concern. It is recommended that selected areas are resurveyed in two years' time, but with a revised methodology designed to facilitate occupancy modelling.

Yell Sound Coast and Hascosay were assessed in this report as being in unfavourable condition due to longer-term studies indicating decline and a likely reduction in prey availability. Further investigations are recommended on Shetland to monitor otter numbers. The monitoring should be designed to detect changes in otter numbers. Repetition of some, or all, of the annual holt counts undertaken by J. Conroy and H. Kruuk would enable comparison with former holt counts. This should include the SACs as well as other areas on the islands given the importance of this population. Fish trapping data were collected by J. Conroy. It is recommended that statistical analysis is undertaken of these data and that monitoring of coastal prey is continued if deemed appropriate after analysis.

The standard 600m sample length for coastal sites should be reviewed given the greater density of coastal otters.

5.8 **Conclusions**

The current survey used a methodology inherited from previous otter surveys to enable direct comparison with previous work. The latest data indicate an apparent decline in otter occupancy at several SACs, mainly in the north and north-west, since 2003-04 survey. This is broadly reflected in the "wider countryside" (non-SAC) trend (figure 3). The wet summers of 2011 and 2012 raised the issue of poor survey conditions and the likelihood of 'false

absences'. When this was addressed by comparing the 2003-04 data and the 2011-12 data, it was found that very small differences in detectability could have a large effect on the significance of any differences between the two most recent surveys (and by inference, between other surveys). Attempts to correct for detectability differences were made by defining a crude spate indicator. This illustrated that detectability issues were present, but the spate indicator was far from perfect.

The main recommendation is that the standard survey method should be re-designed so that occupancy can be modelled, taking into account detectability issues. Some re-survey should be undertaken of the larger SACs assessed in this report as unfavourable to pilot the new methodology and re-assess their status. Further, more detailed monitoring on Shetland which can detect changes in otter numbers is also recommended.

6. REFERENCES

- Adams, C.E. & Maitland, P.S. 1998. The Ruffe population of Loch Lomond, Scotland: its introduction, population expansion and interaction with native species. *Journal of Great Lakes Research*, 24, 249-262.
- Anderson, H., Futter, M., Oliver I., Redshaw, J. & Harper, A. 2010. Trends in Scottish river water quality. Scottish Environment Protection Agency.
- ASFB & RAFTS. 2012. Annual Review. Association of Salmon Fishery Boards and Rivers & Fisheries Trusts of Scotland, Edinburgh.
<http://www.rafts.org.uk/wp-content/uploads/2012/03/2012-Annual-Review.pdf>
- Bacon, E. & Watt, J. 2010. Otter Site Condition Monitoring at Muir of Dinnet Special Area of Conservation. Unpublished report to Scottish Natural Heritage.
- Bailey, M. & Rochford J. 2006. Otter Survey of Ireland 2004/2005. *Irish Wildlife Manuals*, No. 23. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.
- Beaton, H. 2013. Are eels a declining food source for otter in Scotland? *British Wildlife*, 25(2), 103-108.
- Birkeland, K . 2003. The River Borgie cSAC Conservation Strategy. *Conserving Natura 2000 Rivers*. English Nature, Peterborough.
- Brewer, M. J., Elston, D.A., & Green, R. 2002. Scoping study to consider the options for a cost effective statistically robust otter surveillance programme in Scotland 2003-04. Unpublished report to Scottish Natural Heritage.
- Brewer, M. J. & Spezia, L. 2013. Statistical Support Framework-Supporting analyses of the data used in the 2013 report on site condition monitoring for otters. Unpublished report to Scottish Natural Heritage.
- Buckland, S.T., Studeny, A.C., Magurran, A.E. & Newson, S.E. 2010. Biodiversity monitoring: the relevance of detectability. In *Biological Diversity: Frontiers in Measurement and Assessment* (eds. A.E. Magurran and B.J. McGill), pp 25-36. Oxford University Press, Oxford.
- Chanin, P. 2003a. Monitoring the Otter *Lutra lutra*. *Conserving Natura 2000 Rivers*. Monitoring Series No. 10, English Nature, Peterborough.
- Chanin, P. 2003b. Ecology of the European Otter. *Conserving Natura 2000 Rivers*. Conservation Ecology Series No. 10. English Nature, Peterborough.
- Conroy, J.W.H. 2009. Survey of the Eurasian otter (*Lutra lutra*) population on the island of Hascosay and an assessment of the condition of the Hascosay SAC, Shetland. Unpublished Report to BP.
- Conroy, J.W.H. & French, D.D. 1987. The use of spraints to monitor populations of otters (*Lutra lutra* L.). *Symposia of the Zoological Society of London*, 58, 247-62.
- Crawford, A. 2010. Fifth Otter Survey of England 2009 - 2010. Environment Agency, Bristol.

Crawley, D. 2010. Report of the Scottish Mixed Stock Salmon Fisheries Working Group. Report by the Steering Group of the Freshwater Fisheries Forum, 100pp.
<http://www.atlanticsalmontrust.org/assets/files/Final%20MSF%20report.pdf>.

Defra, 2010. Eel Management Plan for the United Kingdom. Scotland River Basin District.

Council of the European Communities, 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Official Journal of the European Communities **L206**: 7–50.

Godfrey, J. D. 2005. Monitoring of Atlantic Salmon SACs. Report by the SFCC to Scottish Natural Heritage. Contract F02AC608.
<http://www.scotland.gov.uk/Resource/Doc/295194/0096508.pdf>.

Green, R. & Green, J. 1980. Otter Survey of Scotland: 1977-79. Vincent Wildlife Trust, London.

Green, R. & Green, J. 1987. Otter Survey of Scotland: 1984-85. Vincent Wildlife Trust, London.

Green, R. & Green, J. 1997. Otter Survey of Scotland: 1991-94. Vincent Wildlife Trust, London.

Green, J., Green, R & Jefferies D. J. 1984. A radio-tracking survey of otters *Lutra lutra* on a Perthshire river system. *Lutra*, 27, 85-145.

Grogan, A., Green, R., & Rushton, S. 2013. The Impacts of Roads on Eurasian Otters (*Lutra lutra*). *IUCN Otter Specialist Group Bulletin* 30 (1), 44-57.

Harris, S., Morris, P., Wray, S. & Yalden, P. 1995. A review of British mammals. Joint Nature Conservation Committee, Peterborough.

ICES 2008. Report of the 2007 session of the Joint EIFAC/ICES Working Group on Eels. Bordeaux, 3-7 September 2007. ICES CM 2007/ACFM: 23. 534 pp.

Jenkins, D. & Harper, R.J. 1980. Ecology of otters in northern Scotland 1. Otter (*Lutra lutra*) breeding and dispersion in mid-Deeside, Aberdeenshire, in 1974-79. *Journal of Animal Ecology*. 49, 713–735.

Jones, T. & Jones, D. 2004. Otter Survey of Wales 2002. Environment Agency, Bristol.

Kean, E. F., Lyons, G, & Chadwick, E. A. 2013. Persistent organic pollutants and indicators of otter health. A CHEM Trust report.
<http://www.otterproject.cf.ac.uk/resources/documents/Kean.Lyons.Chadwick2013ChemTrustReport.pdf>

Kruuk, H. 2006. *Otters: ecology, behaviour and conservation*. Oxford University Press, Oxford.

Kruuk, H. 2014. Otters and Eels: Long-term Observations on Declines in Scotland. *IUCN Otter Specialist Group Bulletin* 31 (1), 3-11.

Kruuk, H., Moorhouse, A., Conroy, J.W.H., Durbin, L. & Frears, S. 1989. An estimate of numbers and habitat preferences of otters *Lutra lutra* in Shetland, UK. *Biological Conservation* 49, 241-254.

Loch Lomond Fisheries Trust. 2009. Fisheries Management Plan 2009-13. University Field Station, Rowardennan, Loch Lomond.

Macdonald, D. & Burnham, D. 2011. *The State of British Mammals*. People's Trust for Endangered Species, London.

McMahon, J. & McCafferty, D.J. 2006. Distribution and diet of otters (*Lutra lutra*) in marine areas of the Loch Lomond and the Trossachs National Park, Scotland, UK. *Lutra*, 49(1), 29-46.

Mason, C.F, Last, N.I. & Macdonald, S.M. 1986. Mercury, cadmium and lead in British otters. *Bulletin of Environmental Contamination and Toxicology*, 37(6), 844–849.

McCafferty, D. 2005. Ecology and conservation of otters (*Lutra lutra*) in Loch Lomond and The Trossachs National Park. *Glasgow Naturalist*, 24 (3), 29-35.

Parry, G., Bodger, O., McDonald, R. A., & Forman, D. W. A. 2013. Systematic re-sampling approach to assess the probability of detecting otters *Lutra lutra* using spraint surveys on small lowland rivers. *Ecological Informatics*, 14, 64-70.

Philcox, C. K, Grogan A.L. & MacDonald D.W. 1999. Patterns of otter *Lutra lutra* road mortality in Britain. *Journal of Applied Ecology*, 36, 748-762.

Poole, W.R., Rogan, G. & Mullen, A. 2007. Investigation into the impact of fyke nets on otter populations in Ireland. *Irish Wildlife Manuals*, No. 27. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Preston, S.J., Portig, A.A., Montgomery, W.I., McDonald, R.A. & Fairley, J.S. 2006 Status and diet of the otter *Lutra lutra* in Northern Ireland. *Biology and Environment*, 106(1), 57-63.

Ratcliffe, P. 2012. Société Générale de Surveillance (SGS), Investigation of Stakeholder comment on alleged impacts on the River Borgie. (October 2012).

Reid, N., Lundy, M. G., Hayden, B., Lynn, D., Marnell, F., McDonald, R. A. & Montgomery, I. W. 2013. Detecting detectability: identifying and correcting bias in binary wildlife surveys demonstrates their potential impact on conservation assessments. *European Journal of Wildlife Research* DOI 10.1007/s10344-013-0741-8.

SEPA. 2010. Improving the quality of Scotland's water environment. Orkney and Shetland area management plan. 2010–2015. Supplementary to the river basin management plan for the Scotland river basin district.

Shine, A., Kubecka, J., Martin, D. & Duncan, A. 1993. Fish Habitats in Loch Ness. Loch Ness and Morar Project.
http://www.lochnessproject.org/adrian_shine_archiveroom/papershtml/loch_ness_fish_habitats.htm.

Strachan, R. 2007. National survey of otter *Lutra lutra* distribution in Scotland 2003-04. *Scottish Natural Heritage Commissioned Report No. 211* (ROAME No. F03AC309).
http://www.snh.org.uk/pdfs/publications/commissioned_reports/Report%20No211.pdf

Tay District Salmon Fisheries Board, 2009. Tay District Fisheries Management Plan 2009 – 2015. Almondbank, Perth.
<http://www.tayfoundation.org.uk/assets/projects/Taymanagementplan.pdf>

- Twelves, J. 2005. *Scottish Association of Marine Science Newsletter*, 29. ISBN 1475-7214.
- Walker, L.A., Moeckel, C., Pereira, M.G., Beith, S.J., Potter, E.D., Chadwick, E.A. & Shore R.F. 2012. Polybrominated Diphenyl Ethers (PBDEs) in Eurasian otters (*Lutra lutra*) collected from Britain in 2010: a Predatory Bird Monitoring Scheme (PBMS) Report. Centre for Ecology & Hydrology, Lancaster, 14pp.
- Webster, L., Robinson, C. D., Russell, M., Walsham P. & Moffat, F. 2010. A Review of hazardous substances in the Scottish marine environment: Update 2010. *Scottish Marine and Freshwater Science* 1 No 10.
- Wells, L. & Patterson, D. 2008. Dornoch Firth and Morrich More Special Area of Conservation: Otter survey 2005-07. Unpublished report supplied to Scottish Natural Heritage.
- Whelan, K. 2010. A Review of the Impacts of the Salmon Louse, *Lepeophtheirus salmonis* (Krøyer, 1837) on Wild Salmonids. Atlantic Salmon Trust, Perth.
- Yoxon, P. & Yoxon, K. 2014. Estimating otter numbers using spraints: is it possible? *Journal of Marine Biology*. Vol. 2014. Article ID 430683.

APPENDIX I: FIELD RECORD SHEETS

SAC Name:	Sample Number	Date	Surveyor	
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FAVOURABLE CONDITION FOR OTTERS (assess over 600m section)		
Proportion of river channel which is 'natural' (%)		
Overall naturalness (Scale 1-5, where 1=urban and 5 = natural)		
Count of fresh water features along coast		
Streams		
Pools		
Count of resting sites		
Sources of pollution		
ACTIVITY ASSESSMENT (Positive/negative impacts)	OTTER +/-	OTTER HABITAT +/-
Agricultural operations		
Grazing (incl deer)		
Burning (Muirburn)		
Fisheries Management		
Water management		
Impact on Water quality (direct or diffuse input)		
Forestry operations		
Recreation/disturbance		
Flood defence/coast defence		
Planning authority development		
Statutory development (no pp required)		
Lack of remedial management		
Presence of invasive species (incl. Bracken or scrub)		
Dumping/spreading/storage of materials		
Other (please specify)		

FIELD SIGNS (Counts)	600m	100m
Sprint counts		
Otter sightings		
Resting Sites		
Tracks and other signs		
Mink scats (Tick for presence)		
Mink footprints (tick for presence)		
Mink-other signs (tick for presence)		
Water vole latrines (estimate)		
Water vole-other signs (Tick, plus comments below)		

Comments:

SAC name		Sample no.			Date	Surveyor		Grid ref (if different to list)		
Direction of survey-rivers (Tick)		u/s	d/s	Split	Bridge check	RB	LB	Direction (compass) coasts and lochs		
HABITAT TYPE (Tick all that apply)										
Coast	Sea Loch	Estuary	FW loch	Reservoir	Running water	Bog/marsh	Canal	Other		
SHORE TYPE (Tick main ones)										
Bedrock	Boulders	Cobbles	Gravel	Earth/Clay	Peat	Sand	Man made	Other		
CURRENT (Tick main ones)					MEAN DEPTH (fill in approx % to add to 100)					
Rapid	Fast	Slow	Sluggish	Static	<0.5m	0.5-1m	1-2m	>2m		
MEAN WIDTH (tick one approximating to estimate by eye of the mean)										
<1m	1-2m	2-5m	5-10m	10-20m	20-40m	>40m				
BANK PROFILE (fill in approx % to add to 100)										
Vert/undercut	Steep (>45°)	Gentle	Composite	Re-sectioned	Reinforced	Embanked	Poached	Other		
LANDUSE WITHIN 50M OF BANKTOP (Tick main ones)										
BL/mixed wood	Conifer pln	Moorland	Scrub	Rough grass	Imp gland	Arable	Wetland	Open water	Suburban/urb	Rock/scre
EXTENT OF TREE AND ASSOCIATED FEATURES (Tick all that are present)										
None	Isolated	Scattered	Clumps	Semi continuous	Shaded channel	Exposed tree roo	Fallen trees	Stick piles		
NOTABLE NUISANCE PLANTS (Tick all that are present)										
None	Giant Hogweed			Him Balsam		Jap knotweed		Rhododendron		
ARTIFICIAL FEATURES (Tick all that are present)										
None	Weirs	Sluices	Culvert	Bridges	Outfall	Dam	Groyne	Other		
EVIDENCE OF RECENT MANAGEMENT (Tick all that apply)										
None	Dredging		Mowing		Weed cutting/spraying	Enhancement		Other		
WATER USE (Tick all that apply)										
Abstraction	Motor boats	Row boats	Angling	Shooting	Kepered	Nature reserve	None			
IMPACTS (Tick all that apply)										
Landfill	Litter	Sewage	Pollution	Industry	Housing	Mining	Afforestation			

APPENDIX II: FIELD METHOD

Otter SCM Field Methodology

Prior to fieldwork

- GPS set up should be to British National Grid, OSGB 1936 datum.
- Ensure that GPS has sufficient memory at the start of each day and spare batteries.
- Any access arrangements from SNH should be sorted prior to visit
- Ensure there are enough field record sheets
- Ensure GPS SPOT is enabled, if required

Using Waymark function of GPS

- Waypoint the starting point of survey section and record on way point sheet as four digit site code and S (XXXX S)
- Use left and right bank to describe orientation when *facing downstream* and record on form. The 600m can be split into up and downstream. Tick appropriate box on form.
- Waypoint the end of your 100m section and also the 600m section. Code the 100m as 1 and the 600m as 2 following the 4 digit site ID code i.e. XXXX-1. If the section is split up and downstream of the start point, record both end points.
- Use the find waypoint function on the GPS to measure distances i.e. after waymarking the start point, set GPS to find it. Distance from the start point will then be shown. Adjust for meanders etc. as linear distance only possible on most GPSs.
- If your sample point is at the boundary of the SAC, for instance, is at the upstream limit, ensure you survey into the SAC.
If at loch edge or coast, record direction using N/E/S/W.

Note: Sequential numbering for features and photos starts at each sample point, it does not run throughout the SAC/or survey season. Each 600m site should therefore have XXXXP1.

Counting spraints: Count individual spraints or make an estimate where there is a pile. If there is a historical pile, such as outside a holt or a coastal bathing site, put a note in the comments section. If the start point is at bridge, check both banks **just** under the bridge and include in counts.

Bridges: Indicate on recording form if bridge is suitable for sprainting sites at time of survey.

Evidence of breeding: Note small footprints. In coastal areas, comment on if there are abundant crab remains in spraint. These are considered a sub-optimal prey item. This may indicate juveniles, or adults that are struggling to find sufficient food. Note if a holt may be a breeding holt.

Within first 100m: Sum all spraint deposits within this 100m. Any resting sites should be waypointed and summarised. Label the waypoint in the field on GPS with the four digit code for that site and a number denoting the feature (F) number, e.g. XXXXF1.

Within 100m: Sum spraint for the rest of the 600m, the 600m count will include the 100m count.

Covering the ground: Judge the terrain and habitat to find resting sites and spraint. If you think you may have a natal (strong path and few/no spraints) or a breeding/rearing holt

(heaps of spraint), make this distinction in the notes. Coastal sections should be surveyed inland to 100m of the high tide line. Freshwater sections should be surveyed to 50m.

Photographs: Take one representative photo for each 600m section unless you have distinct differences in which case more photos should be taken. Other photos of specific features such as land-use change, point source pollution, and good examples of resting site such as a couch with bedding should be taken. Waypoint and edit with code to include four digit site number. Photographs should be coded thus XXXXP1 (P2 etc.) for the mandatory habitat photo. Photos of features (holts, pollution, management etc.) should be recorded XXXF1 (F2, F3 etc.).

On the PC, re-label the photos with the corresponding waypoint label, i.e. XXXXF1, XXXXP1. Photos for each SAC should be in their own folder.

Other mammals: Record presence of water vole and mink. Record the position of water vole colonies with a waypoint coded XXXX WV.

Recording otter habitat: The form will guide you as to whether you fill in a percentage or tick box.

Most of the categories are self-explanatory. The habitat should be assessed over the whole of the 600m section and for both banks.

Qualitative notes from chats with estate folk/ghillies etc. can be emailed through or put onto record sheets.

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