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Tutkintotyö

Eva-Maria Zühlke

The Occupancy of Conifer Plantations and Felled Conifer Plantations by Bird Species in the Process of Blanket Bog Restoration in the Flow Country, North Scotland

Työn ohjaaja: lehtori Ari Vanamo

Työn teettaja: RSPB Forsinard senior site manager Norman Russell

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Tampere 2009

Assigned by : RSPB Forsinard

Supervisor: Norman Russell

Keywords: Blanket bog, birds, LIFE peatlands project, Forsinard Flows
National Nature Reserve

Abstract

This project was done at RSPB Forsinard National Nature Reserve in northern Scotland. This reserve was established to protect some of the unique blanket bog which characterizes the whole area. Parts of the bog have been afforested in the 1960s and later. Some of the plantations were bought by the RSPB and felled in the LIFE peatlands project 2001-2006 to restore the damaged bog and to protect the SSSIs (Special Site of Scientific Interest) from the impact of the plantations. This project focuses on the bird species found in the plantations and felled plantations.

This project includes data of forestry point counts from years 2001,2002,2004,2005 and 2008 and an analysis of the data of the eight different forest blocks not all situated on the reserve, altogether 110 survey points. The counts of 2008 were all done apart from one, in earlier years fewer visits were made to the sites. Maps of the survey blocks cannot be published, they are kept secret out of the hands of egg poachers.

Woodland birds were recorded in conifer plantations and scrub birds in felled plantations. Bog species were rarely observed on the survey sites apart from meadow pipits. Bird numbers between different counts varied a lot. Bird species were mostly recorded in the habitat they were expected in. Meadow pipits and greenfinches however were commonly recorded where they were not expected. Greenfinches were expected in felled forests, but

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were almost only recorded in the standing conifers. Meadow Pipits were expected on the open bog and where open bog is close to a survey point. They were commonly recorded in the felled forest and sometimes even in standing conifer forest. Occasionally even skylarks were recorded in felled forest and they, too, were expected on open bog. Bog specialists greenshank, dunlin and golden plover were scarcely recorded in and near plantations as was expected.

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Tiivistelmä

Työn teettaja: Norman Russell
Työn ohjaaja: Ari Vanamo
Asiasanat: peittosuo, linnut, LIFE peatlands project, RSPB Forsinard Flows National Nature Reserve

Tutkintotyö on tehty pohjois Skotlannissa RSPB Forsinard Flows luonnonsuojelualueella. Alueella suojellaan ainutlaatuista peittosuota. 1960 luvulla ja myöhemmin osaan alueesta istutettiin havumetsää joka tuhoaa peittosuon. Turvemaaprojektissa 2001-2006 osa istutuksista kaadettiin suon ennallistamiseksi. Näin suojellaan viereiset alueet reunavaikutuksilta. Tämä työ keskittyy istutuksien ja kaadettujen istutuksien lintulajistoon.

Aineistoa on vuosilta 2001, 2002, 2004, 2005 ja 2008. Vuoden 2008 aineistosta puuttuu vain yksi lintulaskenta, aiemmista vuosista tutkittavilla alueilla käytiin harvemmin. Karttoja tutkituilta alueilta ei voida julkaista, etteivät ne päädy munavarkaiden käsiin.

Metsälintuja havaittiin havupuuistutuksissa ja vesakossa viihtyviä lintuja kaadetuissa istutuksissa. Suolintuja ei paljon havaittu paitsi niittykirvisiä. Lintumäärät vaihtelevat melko suuresti eri käyntien välillä ja lintuja havaittiin pääsääntöisesti missä niitä odotettiin olevan. Niittykirvisiä ja viherpeippoja esiintyi kuitenkin usein missä niitä ei odotettu. Niittykirvisiä oli odotettu avosuolla ja siellä missä laskentapaikka oli lähellä avosuota, mutta niitä havaittiin usein myös kaadetuissa havupuuistutuksissa ja joskus myös pystyssä olevissa istutuksissa. Viherpeippoja odotettiin olevan kaadetuissa istutuksissa, mutta niitä havaittiin melkein ainoastaan pystyssä

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olevissa istutuksissa. Peittosuohon erikoistuneet linnut, valkovikloa suosirriä ja kapustarintaa havaittiin hyvin harvoin istutuksien lähellä kuten odotettu.

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Foreword

This project was done on the RSPB Forsinard Nature Reserve. I had been residential volunteer there in winter 2004, summer 2006, 2007 and in 2008. In summer 2007 I asked the site manager Norman Russell if it was possible to do a project on the reserve and use it as final thesis at school. I thought it would be good to do a project there, because I love the place and know the site very well, because I have been there so often. In 2007 it was too late into summer to start a project about birds, because birds go quiet after spring and are hard to count when they stay quiet and hidden. And basically there was not enough time left of my stay to actually start a project and get it finished on time. That is why the whole project got started in april 2008. Forestry point counts were agreed as the topic. After some discussions how to get started I started the survey work. For some surveys I needed help from reserve staff and volunteers to get all surveys done in the appropriate period of time. After the point counts were done it was agreed to collect vegetation data from the survey points, since the point count surveys focus on birds and provide little information about the habitat. The whole plan was to find out why certain bird species are where they are and to find out which birds occupy the forest blocks which were felled in the LIFE peatlands project. I was also hoping to get some rough information if the felled forest is recovering into blanket bog. The vegetation data was also collected for that. During the stay at Forsinard I did not have time to analyze any data since I was working as a residential volunteer as well.

Back home while trying to analyze all the data I realized it did not quite work out as planned. There was too much data and too little time and knowledge how to analyze it reasonably. The supervising lecturer Ari Vanamo from my school then advised me to focus on the bird data and not to worry about the vegetation too much. With further lack of time the vegetation data was then left out completely and only the bird data was analyzed. The outcome of the project then is not quite the one that was

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expected and this project does not include any information which kind of vegetation the birds prefer and if first signs of bog recovery after afforestation can be seen. However the project still includes an analysis of the forestry point count data.

The text about the whole area is not sufficiently referenced, because I wrote it relying on the knowledge I got while volunteering there.

I want to thank everybody who helped with the planning, data collection and writing process.

Tampere, December 13th, 2009

Eva-Maria Zuhlke

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1. BACKGROUND

1.1 About the project

This project was done on the RSPB (Royal Society for the Protection of Birds) Forsinard Flows Nature Reserve in Northern Scotland. Forestry point counts had been done in previous years in areas on and near the reserve.

This project includes new point count surveys for the year 2008 and additionally vegetation surveys of the count areas. Bird data was collected from eight forestry blocks in 2 visits using a point count methodology commonly used in the RSPB (Royal Society for the Protection of Birds), altogether 110 points. All points were later surveyed for vegetation. The aim of the project is to analyse the changes in bird populations in the count areas over past years. The vegetation survey is supposed to give some information about the success of the bog restoration. The aim is also to find out if and how much the vegetation has influence on the birds in the area.

The count areas are all situated in the Flow Country in Northern Scotland. The areas are blocks of afforested peatland. The control blocks are outside the nature reserve. These blocks have been planted in different years and are unfelled. The survey blocks are on the nature reserve and were felled in different years as part of the LIFE peatlands project.

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Fig.1 Caithness Map

1.2 Historical Context

The area in Caithness and Sutherland that is mostly covered by blanket bog is called the Flow Country or the Flows. The Vikings called it like that because of the massive amount of water in and on the ground and in the air. The cool and wet climate conditions caused the formation of the bog and the area is naturally treeless apart from very few deciduous trees in river gorges and other sheltered places. The area is remote, partly because the ground is too soft to build houses and infrastructure in many places and partly because people had been forced to leave the straths (river valleys) in the 19th century during the Highland clearances.

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The village Forsinard itself is situated where the road A 897 and the railway line from Inverness to Wick meet. Forsinard has a railway station, 4 houses and a hotel with pub and post office service. The area is known for excellent trout lakes and deer stalking.

The office of Forsinard Flows Nature Reserve is situated in one of the houses. The old railway station building is used as the reserve Visitor Centre.

In the 1950s and 1960s in large areas of the Flows drains were cut to improve the land for agricultural purposes. Further in the 1970s and 1980s large forestry blocks were planted onto the bog. The government gave tax reduces to landowners for planting trees, even though the damaging effects of that to the bog had become into knowledge. The plantations mostly consist of non native Lodgepole pine (*Pinus contorta*) and Sitka spruce (*Picea sitchensis*) which can grow in very wet conditions. Most of the plantations were only planted for the tax reduces without intention to ever extract any timber and a large number of blocks were not fertilized sufficiently and tree growth is poor, especially on areas of deep peat of more than 1m depth. The timber is poor quality due to the shape of the stems and the large number of thick branches. The forestry has a big impact on the landscape which was once wide and open and is now closed up by the forest. The blocks have straight edges that don't follow any natural topographical lines (www.lifepeatlandsproject.com).

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Fig. 2 View from the Knockfin Heights to Ben Griam Beg

by Eva-Maria Zuhlke

The forestry dries out the peat on the surface, because the drains lead water away and because of increased evaporation through the trees. The groundwater level drops and causes the surface peat to dry and the bog vegetation to die. The peat plant communities disappear and leave the bare peat beneath the trees, now very vulnerable to erosion. The peat dries out irreversibly and becomes unsuitable for any surface vegetation. This means, once the forest is removed or dies the ground will be covered with dried out peat and needle litter and won't become bog again. New seedlings won't develop in the dense forestry blocks due to poor light and little nutrients (The Undiscovered Country. VHS/DVD).

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2. BLANKET BOG

2.1 Terminology

There are many terms used in English language and English literature about this subject.

The term *wetland* refers to all sites with a permanently or at least periodically relatively high water table. The term *peatland* is used for any site where at least 30cm of peat have accumulated. This term does not distinguish between active peat growing peatlands or inactive peatlands with no growing peat surface. The term *mire* is often used instead of peatland. This group seems to include all groups of peatland but not all wetlands. The term *fen* is used for minerotrophic mires, i.e. mires that receive water from surrounding land. The term *bog* is used for all ombrotrophic mires, i.e. mires that only receive water from precipitation. The term *marsh* is not strictly defined and mostly refers to a fen with tall grassy vegetation. The term *swamp* is not strictly defined either and is often used for a fen with forest cover (Peatlands and environmental change, Dan Charman, 2002, page 4, table 1.3) These groups can be divided into more specific subcategories, for example *raised bog* (see peat forming processes, terrestrialisation), *blanket bog*, *Aapa mire*, *patterned fen*, *palsa mire*, *basin mire*, *valley mire* (all mentioned in Peatlands and environmental change, Dan Charman, 2002, page 4, table 1.3).

2.2 Location of blanket bog on the globe

Blanket bog is a globally scarce habitat only occurring in parts of Great Britain and Ireland, western Norway, the Pyrenees, western Iceland (although this type of blanket bog is fen like due to wind blown volcanic soil), small areas in Labrador, Alaska, Kamchatka, Falkland Islands, Tierra

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del Fuego, New Zealand and the Ruwenzori Mountains in Uganda. Great Britain had between one tenth and one seventh of the world's blanket bog, before afforestation destroyed parts of it. The blanket bog elsewhere in Europe and around the world is very fragmented and does not form a single large expanse like in the Flow Country. (Birds, bogs and forestry The peatlands of Caithness and Sutherland, page 24).

2.3 Peat forming processes

It is necessary to know peat forming processes in order to understand the difference between blanket bog and other mires and to understand how peat comes to existence.

There are three major processes of peat formation. *Primary mire formation* occurs when formerly unvegetated mineral ground becomes exposed and peat forming plant communities vegetate it. Examples of this occur on the west coast of Finland (The Flow Country. The peatlands of Caithness and Sutherland, page 10).

Another process of peat formation is the *terrestrialisation* of water bodies. Stagnant or near-stagnant water bodies start to form anoxic layers in the bottom sediments. Dead plant material sinks into these layers and can't be effectively decomposed due to the lack of oxygen. This layer will become thicker and the water body becomes filled up with peat. If the climate is wet enough the peat layer can grow out of the basin of the water body. The margins however will have more rapid decomposition and do not form peat as fast as the centre of the former water body. This means the peat layer will rise to higher elevations in the centre and forms a so called raised bog (The Flow Country. The peatlands of Caithness and Sutherland, page 10).

The third peat forming process is *paludification* of dry ground. Formerly dry ground becomes wet and vegetated by peat forming plant communities (for example sphagnum mosses) and starts to accumulate peat. There are many examples where this has happened. When climate conditions are suitable

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entire landscapes can become paludified and even sloping ground can be covered by peat. This happens in areas with generally gentle relief and a cool and wet climate. Constant precipitation and low evaporation create waterlogged conditions on the ground and sphagnum mosses cover it. Sphagnum mosses create acidic conditions in their surrounding that are not suitable for many plants (The Flow Country. The peatlands of Caithness and Sutherland, page 10). This means there are other types of bogs and mires, not only blanket bog.



Fig. 3 View onto Sletill Hill with the railway in the front, dubh lochans and the felled Imriche forest block by Eva-Maria Zuhlke

2.4 Definition of blanket bog

The term 'mire' is used for all kinds of peatlands whether they are fens or true bogs. In many classifications of mires one group, blanket bogs, is very often left out, Moore observed in 1984 (The Flow Country. The peatlands of Caithness and Sutherland page 19).

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At first sight the blanket bog of Caithness and Sutherland looks similar to Arctic tundra due to the treelessness and the large number of small lakes and pools. There are also dry types of Arctic tundra and the wet types of Arctic tundra develop in climate conditions with low humidity and precipitation. The waterlogged conditions to create a wet type of Arctic tundra are caused by the summer thaw of permafrost. Blanket bog however does not occur on permafrost soils in dry climate, but in a temperate and extremely humid climate. The layer of organic material on the ground is mostly much thinner in the tundra than in areas of blanket bog (The Flow Country. The peatlands of Caithness and Sutherland, page18).



Fig. 4 Blanket bog

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Blanket bogs cannot easily be defined by vegetation, because the blanket bogs of the world show very different types of vegetation with very different plant species (The Flow Country. The peatlands of Caithness and Sutherland, pages 28-32). Blanket bog seems to be seen as the paludification of entire landscapes and therefore only occurs in a certain climate. This makes it necessary to define the climate in which blanket bog occurs. An annual rainfall of 1000 mm is seen as a minimum for the development of blanket bog. More important than that is the distribution of the rainfall quite evenly throughout the year in at least 160 'wet days' (a 24h period with at least 1mm rainfall). The climate for blanket bogs needs to be sufficiently cool to keep evaporation low. A mean temperature of less than 15°C in the warmest month of the year is necessary as well as mild winters (The Flow Country. The peatlands of Caithness and Sutherland), page 27). This kind of habitat may disappear completely in future due to climate change through higher temperatures and increased evapotranspiration..

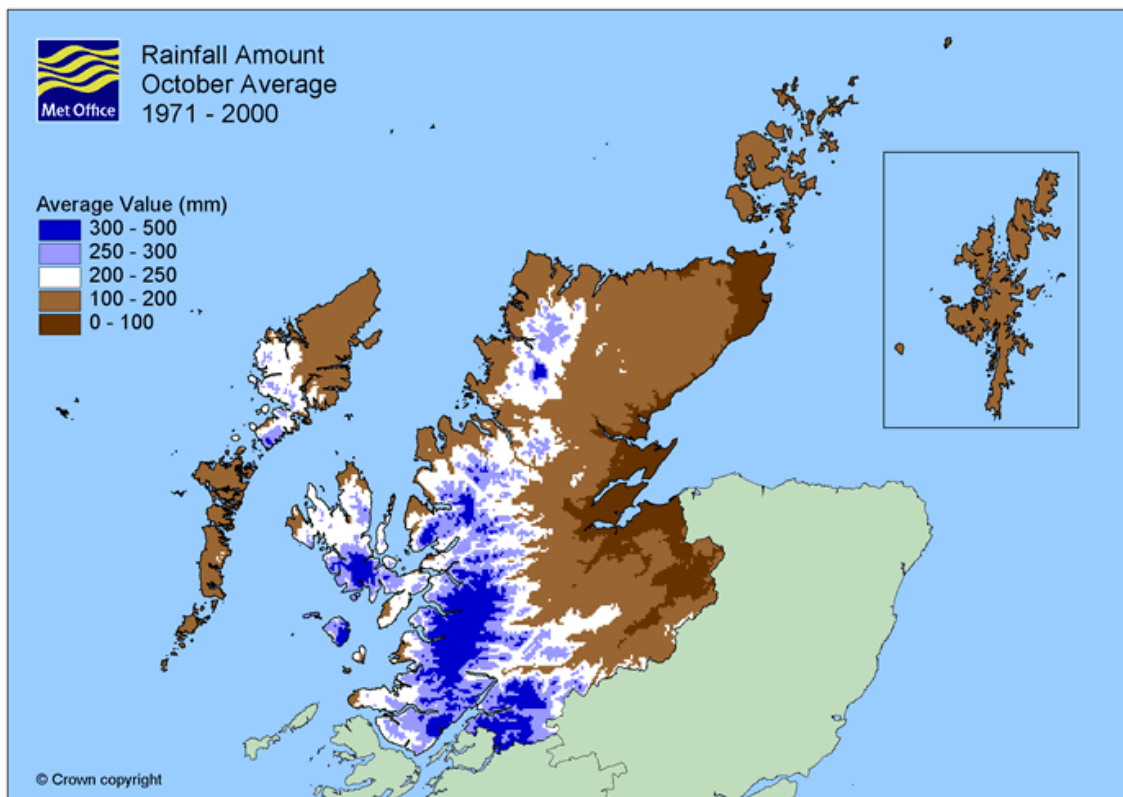


Fig. 5 Average rainfall in October 1971-2000 available at <http://www.metoffice.gov.uk/climate/uk/averages/regmapavge.html#>

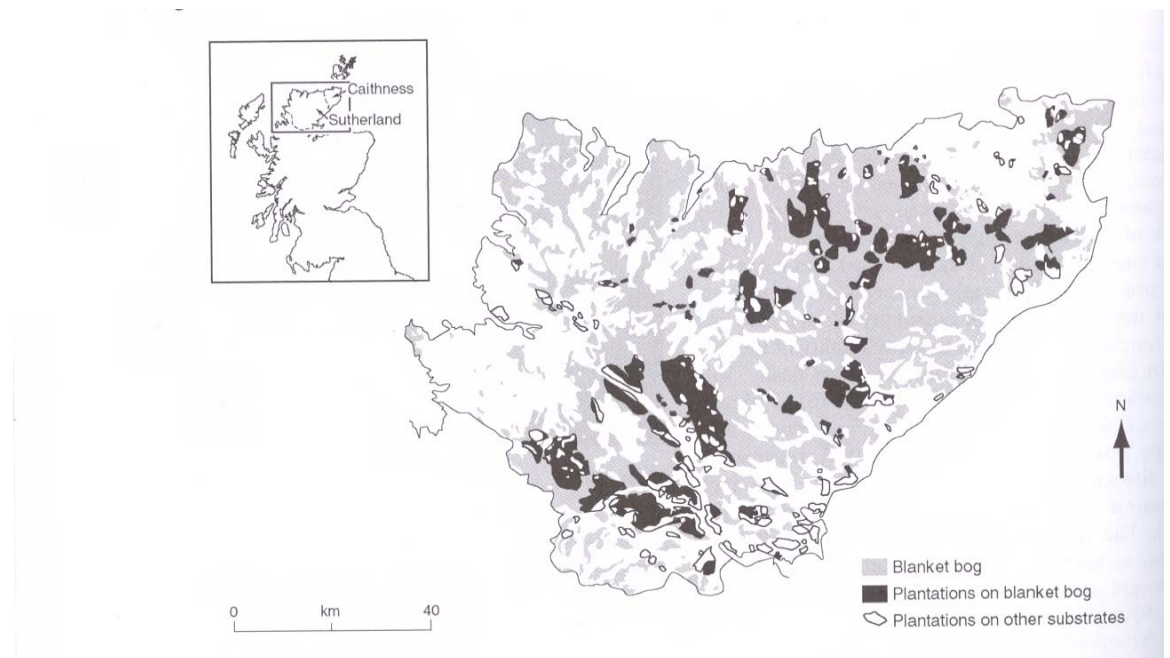
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3. HABITAT PROTECTION

3.1 Why protection is necessary

The blanket bog like any pristine habitat has a unique species composition of flora and fauna that is adapted to it. Turning the bog into forest or agricultural land will destroy the natural flora and fauna which cannot spread but onto peatland. This means direct habitat loss.

The blanket bog of Caithness and Sutherland is unique due to its size (it may be the largest expanse of blanket bog anywhere on Earth!). It is a globally important area for the flora and fauna of peatlands and therefore has a great conservation value (www.lifepeatlandsproject.com). The whole area of blanket bog in Caithness and Sutherland is 401 375 ha (The Flow Country. The Peatlands of Caithness and Sutherland, page 66).



Dan Charman, Peatlands and Environmental Change. p. 224, fig. 10.11

Considering the influence on climate change the area has an even greater value for conservation. Intact peatlands are carbon sinks due to the

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accumulation of dead plant material. Peat consists to about 50 % of carbon which will not be released back into the atmosphere as long as the peatland stays undamaged, this means it is not drained or peat is extracted for burning (Dan Charman, Peatlands and environmental change,2002, p.93).

The peatland forests mean direct habitat loss for the bog species. Through forest edge effects there is further decline in bog species on adjacent areas as well. The plantations are colonized by other fauna moving in and harbour predators, i.e. crows, foxes and smaller predators, that are a further threat to the ground breeding bog birds (www.lifepeatlandsproject.com).



Fig. 6 Standing forest Caol/Catanach block

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Fig. 6 Felled forest with tree regeneration, Caol block

by Eva-Maria Zuhlke

3.2 The RSPB Forsinard Flows National Nature Reserve

The Royal Society for the Protection of Birds recognized the importance of the area for birds and after some surveys with the opportunity in 1995 bought a part of Forsinard estate, a sporting estate, and turned it into a nature reserve. The place was considered to be the most pristine part of blanket bog in the area where the numbers of bog specialist birds as golden plover, dunlin and greenshank were the highest and the needed infrastructure to conduct surveys and to maintain a nature reserve already existed through the forestry tracks.

In 1987 there were 3980 pairs of golden plover estimated in the Flow Country. That is 17% of the EU population. There were 3830 pairs of dunlin estimated, which is 35% of the EU population. There were 630 pairs of greenshank estimated, which is 66% of the EU population (Peatlands and

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environmental change, Dan Charman, 2002, page 224, table 10.3). The reserve staff suspects that numbers have declined further since then.

Today the reserve also includes damaged peatland with hill drains and forestry blocks. The drains were blocked and the forests felled in the LIFE peatlands projects from 2001 to 2006 (www.lifepeatlandsproject.com).

Today the reserve is about 19 000 ha wide and is run by 4 full time staff members and two part time administrators and most of the time 3 residential volunteers. Further sites are under RSPB management through management contracts with landowners. The reserve also manages a cattle farm, Forsinain Farm, whose fields a lot of birds use to feed on and some even to breed.

3.3 The LIFE peatlands project

The LIFE peatlands project is EU co-financed project to restore peatlands in Europe as part of the Natura agenda.

The peatlands of Caithness and Sutherland are in good condition to a large extent, but some areas have been seriously damaged by afforestation and drainage. The project aims to restore afforested areas directly adjacent to SSSIs (Site of Special Scientific Interest). The forestry has negative impacts onto adjacent areas. The RSPB purchased 1556 ha of forestry near the reserve in order to fell trees and other landowners also agreed to fell some areas on their land. The RSPB further blocked all hill drains on the reserve. See map in appendix for felled areas on the reserve.

Another aim of the project was to raise awareness to the importance of peatlands as an important ecosystem. A number of events on and about the peatlands were organized for a local and national audience as well as leaflets and newsletters were produced and a film about the wildlife of the Flows was produced. Attitudes and awareness of local people and landowners was also surveyed (www.lifepeatlandsproject.com).

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Fig. 7 The felled Cross Lochs block, Ben Griam Beg

by Eva-Maria Zuhlke

4. BIRDS

4.1 Birds in the Flows

The Flows are nationally and internationally important for a number of rare birds. The many lochs are visited by waterfowl in the summer. Wigeon (*Anas penelope*), teal (*Anas crecca*), mallard (*Anas platyrhynchos*) and common scoter (*Melanitta nigra*) breed on them. The common scoter is a rare breeding bird in Britain as the main part of the population breeds in Iceland and Finland. Other rare birds that find suitable breeding conditions on these lochs are red-throated and black-throated divers.

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The bog with its immense number of small pools, *dubh lochans*, is good breeding and feeding ground for some rare waders. Greenshanks (*Tringa nebularia*) feed in the pools and breed nearby. Other rare waders that breed on the bog are golden plover and dunlin.

Other bog breeders are meadow pipit (*Anthus pratensis*) and skylark (*Alauda arvensis*). Their numbers have been declining over past years. Hen harriers (*Circus cyaneus*) and short eared owls (*Asio flammeus*) also breed in the area. The hen harriers of the Flows normally breed on open ground, but some breed in the felled forestry.

The height and remoteness of the area makes it suitable ground for golden eagles (*Aquila chrysaetos*). They can be seen sometimes, although they do not breed on the reserve.

There are good numbers of red grouse (*Lagopus lagopus scoticus*) in the whole area, and grouse shooting is popular. There also is a pair of ptarmigan (*Lagopus mutus*) on the reserve (records by reserve staff and myself, all species apart from golden eagle and ptarmigan are also in the data in the appendix).

4.2 Birds surveyed in the point counts

The birds counted for this project are not only bog birds, but also birds of forest, farm and shrubland. This is because a large number of the survey points are situated in standing or felled forest, in some distance to the open bog. Already before analyzing any of the data it became clear during the counts that some species like tits and finches only occur in standing forest and other species like dunnocks, robins and wrens are frequent in felled forest but also occur in standing forest. Meadow pipits and skylarks were expected where open bog was adjacent to a survey point. However, meadow pipits were also seen and heard in felled forest. Raptors were counted as well within 30 m around points, mostly hunting over felled forest. Bog

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specialists greenshank, golden plover and dunlin mostly did not be seen or heard within 30 m of points. It is thought that they prefer to stay away from forest edges.

4.3 Surveyed species in general and their preferred breeding habitat

Great tit (*Parus major*)

The great tit is a common bird, with about 2 million territories in the UK in the breeding season. It is most common in deciduous wood, also in villages, towns and farmland. It is less common in coniferous woods and scrub. It is not very commonly seen on bog or moorland, but slightly less uncommon on heathland.

The great tit was rated green conservation status in the UK and is not a species of concern in the European Union or globally.

Blue tit (*Parus caeruleus*)

The blue tit is commonly seen in towns, villages and deciduous woodland and also occupies farmland, reedbed and scrub. It is less common in coniferous wood, in heathland, coastal habitats and marshes and uncommon on bogs and moorland. There are 3,3 million territories in the UK.

The blue tit is rated green conservation status in the UK and is not a species of concern in the European Union or globally.

Coal tit (*Parus ater*)

The coal tit is mostly seen in coniferous forests less in deciduous forests and little in other habitats. There are about 604000 territories in the UK.

The coal tit is globally a species of least concern and is rated green conservation status in the UK. However the subspecies 'britannicus' is of amber concern.

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Goldcrest (*Regulus regulus*)

This small bird is mostly seen in coniferous forest, less in deciduous forests and sometimes in villages and is uncommon in all other habitats. There are around 773000 territories in the UK.

The species is globally of least concern and has green status in the UK, however it was previously rated as an amber species (2002-2007). 13 subspecies are recorded globally.

Common Crossbill (*Loxia curvirostra*)

The common crossbill occupies coniferous forests, sometimes scrub and almost never any other habitat. There are about 11000 territories in Britain.

The species is of green conservation concern in the UK and is globally not a species of concern.

Dunnock (*Prunella modularis*)

This bird occupies a number of habitats such as farmland, scrub, towns and villages and deciduous forest, it is also seen in coniferous forests, heath, reedbed, coastal habitats and marsh. It is uncommon in moorland and bogs. There are about 2,1 million territories in Britain.

This species is rated amber conservation status in the UK, since numbers have been declining. Globally and in the EU the species is of least concern.

Lesser Redpoll (*Carduelis cabaret*)

There are about 25000 pairs in Britain in summer. It is known to breed in woodland and birch and willow scrub, but it very frequently occupies conifer forests, less frequently scrub or bog and is rather uncommon in all other habitats.

This species is of red conservation status in the UK, because of recent declines in the breeding population. It was listed amber 2002-2007 and

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before that green. Its conservation status has not been evaluated in the EU, but it is globally not a species of concern.

Greenfinch (*Carduelis chloris*)

There are around 695000 territories in Britain. This bird is common in open woodland, farmland and gardens. This species frequently occurs in towns and villages, on farmland and in broadleaf woodlands, less in scrub and reedbed and is rather uncommon in all other habitats. The species is listed green conservation status in the UK, is not a species of concern in the EU and is also globally of least concern.

Siskin (*Carduelis spinus*)

There are about 357000 pairs in Britain. This species is known as a woodland species. It most frequently occupies conifer woodland and sometimes scrub, but is uncommon in all other habitats. The species is of green conservation concern in the UK, not of concern in the EU and of least concern globally.

Chaffinch (*Fringilla coelebs*)

There are around 5,6 million pairs in Britain in summer. This bird is common in forest, woodland and farmland. It is quite frequent in all habitats but in moorland, heath, marsh, bogs and coastal habitats. The species is of green conservation status in the UK, not of concern in the EU and globally a species of least concern.

Skylark (*Alauda arvensis*)

There are about 1,7 million territories in Britain. The Sky Lark is known as a bird of grassland, fields, tundra and sand dunes. It occupies moorland, heathland, arable farmland and bogs, also marsh, coastal habitats, pasture farmland, reedbed, scrub and villages and is uncommon in other habitats.

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The species is of red conservation concern in the UK and also has been before, it is listed SPEC 3 in the EU and is globally of least concern.

Meadow Pipit (*Anthus pratensis*)

There are about 1.7 million territories in Britain. This bird is common in grassland, heathland, marsh, bog and moorland and is also found in coastal habitats. It is uncommon in forest and scrub. The species is listed amber conservation concern because of recent breeding population declines. In the EU and globally it is not a species of concern.

Willow Warbler (*Phylloscopus trochilus*)

There are around 2 million territories in Britain. The bird is commonly found in scrub, coniferous and deciduous woodland, less in reedbed, heathland and marsh and fairly uncommonly in other habitats. The species is listed amber conservation concern in the UK, it is not a species of concern in the EU and globally of least concern.

Wren (*Troglodytes troglodytes*)

There are 8 million territories in Britain. The bird commonly breeds in deciduous woodland, scrub, pasture farmland, villages, towns and coniferous woodland. It is less common in all other habitats. The species is listed green conservation concern in Britain, it is not a species of concern in the EU and globally of least concern. However some of the subspecies are of amber or red concern.

Robin (*Erithacus rubecula*)

There are 5,5 million territories in Britain. The species mostly breeds in deciduous woodland and is also found in towns, villages, pasture farmland and coniferous woodland and also in arable farmland. It may occupy heathland, marsh and reedbed occasionally and is quite uncommon in

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moorland, bog and coastal habitats. The species is rated green conservation concern in the UK, not a species of concern in the EU and globally of least concern.

Stonechat (*Saxicola torquatus*)

There are about 15000 breeding pairs in Britain. In the breeding season this bird is commonly found in coastal habitats, heathland and grassland and also in bogs and marshes. It is less commonly found in scrub during the breeding season. It is uncommon in other habitats. The species is listed green conservation concern in the UK, it is not a species of concern in the EU and globally is of least concern.

Wheatear (*Oenanthe oenanthe*)

There are around 540000 individuals in Britain in summer. This species is most frequent in moorland and also common in heathland and grassland. It is also found in bogs and marshes and coastal habitat, but is uncommon in other habitats. The species is listed 3 Concern in the EU and because of that amber conservation concern in the UK. Globally the species is of least concern.

Song Thrush (*Turdus philomelus*)

There are 1 million territories in Britain. The bird is most frequent in deciduous woodland and also common in scrub, villages and coniferous woodland. It is also seen in towns and pasture farmland. It is less frequent in other habitats. The species is listed red conservation concern in the UK because of recent declines in the breeding population. It is not a species of concern in the EU and globally is of least concern.

Carrion Crow (*Corvus corone*)

There are 790000 territories in Britain. The bird is most frequent in towns and is also common in villages, pasture farmland and deciduous woodland.

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It is also found in coastal habitat, arable farmland and scrub. It does not often occupy bog. The species is listed green conservation concern in the UK, is not a species of concern in the EU and is globally of least concern.

Raven (*Corvus corax*)

There are 12000 territories in Britain. The bird is most frequent in moorland and also common in bogs and coastal habitat. It less often occupies woodland and pasture farmland. The species is of green conservation status in the UK, is not a species of concern in the EU and globally is of least concern.

Cuckoo (*Cuculus canorus*)

There are 14000 territories in Britain. The bird is common in reedbed and is also found in scrub and marsh. It also occupies coniferous and deciduous woodland, heathland and coastal habitats. The species is listed red conservation concern because of recent declines in the breeding population. In the EU it is not a species of concern and globally is of least concern.

Hen Harrier (*Circus cyaneus*)

There are about 690 territories in Britain. The species generally occupies moorland, marsh, steppe and fields. The species is listed red conservation status in the UK because of historical population decline. It is of SPEC 3 in the EU. Globally it is of least concern.

Short-eared Owl (*Asio flammeus*)

There are 2300 territories in Britain. The species is found in tundra, marsh, moor and grassland. The species is of amber conservation concern in the UK, because it is a species of European concern (SPEC 3). Globally the species is of least concern.

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Common Gull (*Larus canus*)

There are 48000 pairs in Britain. This bird is found on seacoasts, rivers, lakes and moorland. The species is of amber conservation concern because it is a species of European concern (SPEC 2). Globally the species is of least concern.

Greylag Goose (*Anser anser*)

There are 3200 wild pairs in Britain. The bird is found in reedbed, marsh, estuaries and lakes. It is most frequent in reedbed, but sometimes can be found in coastal habitats and heathland. It rarely occupies other habitats. The species is rated amber conservation concern in Britain, because the birds in Britain form a localized non-breeding population. The species is not of European or global concern.

Snipe (*Gallinago gallinago*)

There are 53000 pairs in Britain. The species is most frequent on lakes and is common on marsh and bog. It is also seen in moorland, heathland, grassland and along streams. It is not often seen on rivers and shores and is rare on farmland. In the UK the species is of amber conservation concern, because it is a species of European concern (SPEC 3). Globally the species is of least concern.

Golden Plover (*Pluvialis apricaria*)

There are 23000 pairs in the UK in summer. The bird is frequent in moorland, heathland, bog and marsh and rarely occupies other habitats. The bird is listed amber conservation concern in the UK. It is not a species of European concern and is globally of least concern.

Dunlin (*Calidris alpina*)

There are 9500 pairs in Britain in summer. The species is found on tundra, moor and heath. The species is of red conservation concern in the UK,

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because of decline of the non-breeding population. It is also a species of European concern (SPEC 3). Globally the species is of least concern.

Greenshank (*Tringa nebularia*)

There are 1100 pairs in Britain in summer. The bird is found in marsh, wet grassland and moorland. The species is listed green conservation concern in the UK and is not a species of European or global concern.

Common Scoter (*Melanitta nigra*)

There are about 50000 birds in Britain in winter (however a very small British breeding population exists in the Flow Country, records at Forsinard Flows reserve). The bird breeds on tundra lakes. The species is listed red conservation concern in the UK because of recent declines in the breeding population. It is not a species of European or global concern.

Red Grouse (*Lagopus lagopus*)

There are about 155000 pairs in Britain. The bird is common in marsh, bogs, moorland and heathland. The species is listed amber conservation concern in the UK. In the EU and globally it is not a species of concern.

5. SURVEY

5.1 Survey methods

5.1.1 Point count methodology

The point count methodology used for this survey is the one commonly used at RSPB Forsinard. See appendix for methodology and survey form.

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Unlike recommended in the methodology nobody ever recorded if birds were seen or heard.

Obtaining permission to survey

Visit the appropriate forestry staff to request permission to carry out forestry point counts and use forest roads. Comply with any requests to avoid areas because of forestry operations or roe deer stalking, unless these cannot be reconciled with the survey method, in which case the relevant point count sites should be dropped.

When to visit point count sites

Each point count should be visited twice, once in the two-week period 22/4 to 5/5 and once in the two-week period 22/5 to 4/6. Point count sites should be visited in the early morning, between 6:30am, as time is limited for point count surveys. Walk to any remoter point sites for a 6:30am start – this way you can get more points done each morning.

How to carry out point count surveys

At the start of a morning of point count surveys, fill in the boxes at the top of your point count form as per moorland survey plots. Results from one morning's point count surveys may run on to more than one form – use the sheet numbers boxes to indicate the sequential sheet number and total number of forms for the morning. Fill the boxes at the tops of continuation sheets also, giving date and weather, so that forms can be kept together should they become separated during photocopying etc. This also allows you to record any changes in the weather should there be any during the morning.

Locate the first point count sited as best you can using forestry maps and GPS if available. If using GPS try to get within 10m of the sample point according to the read-out of your GPS. Note on your point count form the point count site number (taken from your 1:50000 flow repeat marked map), grid reference and start time of your timed count. Record the coniferous tree species planted within 30m of the site, the number of broadleaved trees within 30m and the modal tree height (height of the largest number of

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individual trees). Coniferous trees will usually be sitka spruce (SS) or lodgepole pine (LP) or both. Estimate the percent cover of common heather (*Calluna vulgaris*) and percent cover of planted trees within 30m of the site. Stand at the site for five minutes, recording all birds which you hear or see, including birds which fly over. Birds seen and heard are recorded only as seen. Time the five minute period using an electronic watch or timer, so as to avoid looking at your watch repeatedly during the survey. Divide records into birds within 30m of the point count site and birds beyond 30m from the site, and record birds only heard separately from those which were seen, using the four columns for 'count' on your form. If you hear or see a bird in both distance categories, record it only in the closer distance category. If you hear a bird calling or singing from apparently the same location a number of times, treat this as one bird. If you hear a flock but do not see it, record the minimum number of birds present – usually this will be two, provided you hear two birds calling simultaneously. When the five minute period is up, proceed to the next point count site, and so on until it is 10am or weather conditions prevent further surveys.

5.1.2 Vegetation survey methodology

There is a methodology used for habitat condition monitoring at RSPB Forsinard, which could have been changed slightly making it suitable for surveying forest blocks. This method would have been far too time consuming for this project, so the site manager agreed with an RSPB ecologist on another one. See appendix for survey form.

Some vegetation data is needed to explain bird densities and species occurrence in the count areas. A variety of variables was considered. The most obvious one is if the forest is felled or still standing. If it is felled, the brush height and density possibly has an impact what bird species live in there. If the forest is still standing, age, tree height, diameter of stems and volume in the block is relevant. The amount of needle litter and other plant

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litter has to be surveyed, too. It has an impact on the nutrient content and pH of the soil and therefore on the vegetation. The peat depth affects the growth of trees as trees can get nutrients from the mineral soil underneath shallow peat. The volume of brash on felled sites can explain the condition and amount of left over bog vegetation from underneath the forest. The study was also to give some information whether felled sites are redeveloping to bog or near natural bog or if they are developing into another kind of habitat. Therefore the ground vegetation has to be surveyed for the presence of bog species and other species. The survey of ground vegetation in unfelled forest indicates how much of the original bog vegetation has survived to the current date. The presence and amount of bog grasses and other grasses, bog mosses and other mosses and dwarf shrubs have to be surveyed. If bog species prevail, the area has a good chance of redeveloping into blanket bog after felling. If not, the bog regeneration may not be as successful as was hoped. The grazing by deer on a site may have an impact on the presence and abundance of certain plant species as deer eat certain plants or parts of them and leave others. If a site is heavily grazed it can have an impact on the species composition of the ground vegetation. To survey the amount of grazing it was discussed to count deer pellets or groups of pellets and to survey signs of browsing and grazing on the vegetation. On some of the felled sites tree regeneration is a problem. This also has an impact how the further development of the site will be. It was suggested to count numbers of seedlings over and under 30cm of height and to count the number of trees still alive after felling (in some blocks trees were pushed over by machines rather than cut and some trees did not die but continue growing in a horizontal position). Tree regeneration of broadleaves was considered irrelevant, as they naturally occur on the bog in very low densities and the vast majority of regeneration in felled blocks is coniferous. Furthermore, forest blocks have been planted in different years, some have been fertilized more than others and forest blocks have been felled in different years at different ages using different felling methods. This means

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some blocks have had more time to recover before the survey. It is also relevant how much of the block surface has actually been planted and if subblocks were left unplanted. Blocks also include rides between the subblocks and small open areas. This information can be calculated from maps.

It was discussed if an older methodology used by reserve staff could be used. This is not possible as it is time consuming and does not cover all the data that is needed. Time however is limited and the reserve ecologists suggested to rather make notes on the variables in the field than take too many time consuming measurements. In the end it was agreed to estimate percentage coverage of some plants. It is not absolutely accurate, but allows to compare different sites as long as the coverage is estimated by the same person. The plant knowledge of the surveyor was taken into account when it was decided which species to survey more closely. It was also considered that the surveyed species have to be distinctive, since the percentage cover estimate should cover the whole area within a 30m radius around the survey point of the bird surveys. It was agreed that the points that got surveyed for birds in 2008 should be revisited for the plant survey. The original bird survey form (see appendix) covers very little of plant data.

The surveyed variables are modal tree height and diameter at breast height, tree species, and percentage of the planted area within 30m radius for any forest, felled and unfelled. If there was felled forest as well as standing forest near a point, both were taken together as the percentage of the planted area. The percentage of brash cover was surveyed as at points with only felled forest, pretending the standing forest was bog. In the felled areas average brash height was estimated and modal tree height was measured with a tape measure after estimating the modal tree. Sometimes it was impossible to measure felled trees. In that case the height was estimated. The height of standing trees was measured using the '*stick method*'.

The percentage covers of plants were taken for dwarf shrubs, dead plant litter (including dead heather and dead grass), needle litter, mosses other

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than sphagnum, bare peat, *molinia caerulea*, *eriophorum vaginatum*, *eriophorum angustifolium*, other grasses, tree regeneration under 30cm in height and tree regeneration over 30cm in height. The cover of *sphagnum* mosses was only surveyed on the area that was surface before the forest, this means plough throw and ditches were left out. This is because the ditches are wet and sphagnum mosses will vegetate them quickly. It is more important to see how much sphagnum survived after felling. Grazing was surveyed as presence of signs of grazing or brousing simply as 'yes' or 'no' and the number of hoof prints seen during the survey of the 30m radius area. Accurate numbers were very difficult to count during the survey, so they were recorded roughly. The peat depth was measured on the point of the bird survey unless the point is on a track or right next to a small river. In that case the measurement was taken next to the planted area. It was measured by pushing a cane with a scale into the ground until it hit the mineral soil.

6. RESULTS

6.1 About the data and field work

Point counts were done since the year 2000 in the following survey plots, and there is data from the years 2000, 2001, 2002, 2004, 2005 and 2008. The data of 2008 is almost complete with only 1 first visit not done due to no survey permission. Additionally in 2008 there was a point count done in the Talaheel block. The points were mostly the same as the ones used on an incomplete survey in 1999 with some added points to cover the whole block. The Talaheel block was the first block felled, already in 1998, with very small trees and is thought to be the block in which the bog will recover quickest. It was surveyed, because it may be interesting to compare the

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results of the Talaheel block to other felled blocks, which were all felled later and had bigger trees.

6.2 Expected Results

According to the habitat information given in the list of birds above the birds can be fitted into 3 groups, depending which of the 3 habitats that the survey covers, they prefer. The survey plots cover conifer forest, scrub (felled forest), and bog (points on the edge of a block).

According to the habitat occupancy above the following of the surveyed species are expected to occur in conifer forest: great tit, coal tit, goldcrest, common crossbill, lesser redpoll, siskin, chaffinch, willow warbler, wren and robin.

The following surveyed scrub occupying species can be expected in felled forestry: dunnock, blue tit, greenfinch, willow warbler, wren, stonechat, carrion crow and cuckoo.

And some species are expected only on bog: skylark, meadow pipit, stonechat, wheatear, raven, hen harrier, short-eared owl, greylag goose, snipe, golden plover, dunlin, greenshank and red grouse.

Note that willow warbler, dunnock and wren were expected in both conifer forest and felled forest.

6.3 Actual results

By looking at the data two species were not expected where they occurred: meadow pipit and greenfinch. Meadow Pipits were expected on open bog or where a survey point is adjacent to open bog, but they were also often seen and heard in felled forest. Greenfinches were expected in scrub or felled forest, but never were surveyed in the fellings, but in standing forest.

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Bird numbers surveyed in one visit in one block varied greatly, the smallest number recorded being 8 and the biggest 90. Weather conditions do not always explain these differences.

Cross Lochs block

For the Cross Lochs block bog species were expected at points 3 and 9 and additionally meadow pipits at point 4. Points 3 and 9 are adjacent to at least a small part of open bog and at point 4 there is an open part with a small river flowing through. For all other points forest species were expected before felling and scrub birds after felling. However meadow pipits were recorded in almost all counts at points where they were not expected. 18 meadow pipits were recorded in standing forest in the 2nd count in 2001, one in the 2nd count in 2002, three in the 1st count in 2004 and two in the 1st count in 2005. In both counts in 2008 meadow pipits were recorded in felled forest (seven in the 1st and six in the 2nd count).

One green finch was recorded in the 2nd count in 2001 in standing forest even though it was expected to occur in scrub. In the 1st count in 2004 one dunnock was recorded in standing forest. In the 2nd count in 2005 one coal tit and one goldcrest were recorded in felled forest, although they were otherwise only recorded in standing forest. In 2008 skylarks were recorded in felled forest (eight in the 1st and two in the 2nd count) although they are known as birds of open ground. Great tit, coal tit, goldcrest, robin, chaffinch, siskin, willow warbler, wren, redpoll and dunnock were recorded while the block was standing. Crossbills were expected when the block was unfelled, but were not recorded. Bigger numbers of siskin and chaffinch were expected, too. After felling wren, willow warbler and dunnock were still often recorded.

6.4 Results by block

Woodcock Hill block

In the Woodcock Hill block bog species were expected at points 1, 3, 6, 7, 8 and 12, meadow pipits also at point 9 due to a stream and a very wide forest

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ride. Forest loving birds were expected at all points in all surveys since the block has not been felled. In the 2nd visits of years 2001 and 2002 no unexpected species were recorded, apart from one rock pipit, that is rarely seen inland near Forsinard. There were unexpected meadow pipits recorded (four in the 1st visit in 2004, one in the 1st visit in 2005). Greenfinches were recorded in standing forest (one in the 1st visit in 2004, twelve in the 1st visit in 2008 and two in the 2nd visit of 2008). All other species that were recorded were expected to occur in this habitat. In some counts bigger numbers of tits, chaffinch and siskin were expected. Dunnocks were recorded fairly frequently although they prefer scrub or felled forest. Greylag geese are seen in the area but seem to be recorded more often in this block than in others.

Imriche block

Forest loving species were expected in all counts at the first two points. Bog species were expected at points 4, 5, 8, 11, 12 and 13. In the 2nd visit in 2001 the whole block was not felled and there were 21 unexpected meadow pipits recorded as well as five unexpected greenfinches. The next count in the block was the 1st visit in 2004 when the block had been completely felled. There were two unexpected coal tits, one unexpected goldcrest and one unexpected chaffinch recorded. There also were two unexpected meadow pipits. Stonechats are common in the region but are not frequently seen in the forest. There were three recorded in this count. In the 2nd visit in 2004 only a small number of birds was recorded. However, there was one tree pipit, which is occasionally seen in the forests, but not regularly. In the 1st visit in 2005 twelve unexpected meadow pipits were recorded. One wheatear was there as well. This bird is common in the region, but usually would not turn up in forest. In the 1st visit in 2008 two unexpected skylarks and one unexpected meadow pipit were recorded. One wheatear as well was observed. In the 2nd visit of 2008 one unexpected crossbill was recorded in felled forest. Six unexpected skylarks and three unexpected meadow pipits

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were recorded. The four robins recorded were not expected in felled forest either.

Talaheel block

This block had the smallest trees with a large number of dead trees and trees completely missing and was felled earlier than all other blocks. The canopy was never closed in this block. There is only data from one count in 2008. No unexpected birds were recorded. Meadow pipits were recorded at almost every point. They do not seem to mind the small amount of brash at all and seem to think that the area is all open bog. A few wrens were recorded. Willow warblers were expected but not recorded. Wrens are frequent in almost any habitat so it is no surprise they were observed. Willow warblers occur in scrub, but it seems the amount of brash was not enough for them. The same could be said for dunnocks. Only two were recorded in the count. Four skylarks were recorded in the block. They seem to mind the very small amount of brash and regard the area as felled forest unlike meadow pipits. Altogether there are few birds that do not prefer bog in this block. The bird records seem to confirm that this block is similar to open bog and tree removal was a success. In moorland bird surveys in this block no other species than the ones mentioned here were observed.

Bhaird block

The point counts in this block were done with 12 survey points and later only with 9 and the points were labeled with different numbers as well. With the help of an old map it was possible to figure out which points of the counts with 9 points are identical with points of the counts with 12 points. In the result table the old 12 points were kept and the points of newer counts renamed after the identical point of older counts. The points that were only surveyed in older counts were not surveyed any more and there is no data for them. In this block species of open ground were expected at points 3, 4 and 5. At points 9 to 12 the forest is not felled until today. In the 2nd visit in

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2001 one blue tit and one greenfinch were unexpectedly surveyed in standing conifer forest. Six meadow pipits were also surveyed in standing forest. Two common gulls and one pied wagtail were also recorded. The pied wagtail was not expected. In the 2nd visit in 2002 two meadow pipits occurred in standing forest. In the 1st visit in 2004 again two meadow pipits were recorded where they were not expected, one in felled forest and the other in standing forest. In the 1st visit in 2005 two greenfinches were surveyed in standing forest. A flock of 41 meadow pipits was recorded in felled forest (this is no typing mistake, the surveyor worked at RSPB Forsinard back then and marked this record with an exclamation mark). Another single meadow pipit was also recorded in felled forest. One swallow and one common gull were also recorded. Swallows do breed in the region but are not expected on bog or in forest. An incomplete 2nd visit in 2005 did not include unexpected records. The 1st visit in 2008 also did not include unexpected records. In the 2nd visit in 2008 one meadow pipit and one skylark were recorded in felled forest.

Lonielist block

This block has a few interesting features: there is a large open bog area in the middle with bog pools and there are further small open parts scattered around the block. There are also many streams flowing through. Bog species were therefore expected at points 4, 10 and 11. Meadow pipits were also expected near streams, at points 5, 7 and 9.

In the 2nd visit in 2001 six meadow pipits were surveyed where they were not expected. A very surprising result was two dunlin at point 2 on the track and in standing forest and two greenshanks at point 9 on the track on the edge of standing forest and a small open area. These birds were expected near the bog pools in the open area and outside the block. In the 2nd visit in 2002 one skylark was recorded on the track in standing forest. This however can be explained by the skylark's habit to sand bath to keep its feathers

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clean. It uses the tracks for this because the sand on the track is easiest to find. Ten meadow pipits were recorded where not expected. One unexpected meadow pipit was recorded in the 1st visit in 2004. In the 2nd visit in 2004 one skylark was recorded in felled forest away from open areas. One robin was also recorded in felled forest although it prefers standing forest. There were two tree pipits in standing forest. This species was not expected, but has been seen in the region by reserve staff on a few occasions. In the 1st visit in 2005 one chaffinch was recorded in felled forest although it is a bird of woods and farms. Six skylarks were recorded in felled forest, as well as one robin and ten meadow pipits. In the 1st visit in 2008 two skylarks and two meadow pipits were recorded in felled forest. There were seven unexpected meadow pipits in the 2nd count of 2008. More willow warblers and dunnocks were expected in this visit.

Alltan Dubh block

This block includes lochs which are used by common scoters in the breeding season. It also includes a large open area which is too wet to be walked on. There also is a pool system within the block. Bog species were expected at point 4, 6, 8 and 10. Forest birds were expected at points 1, 3 and 6 to 12 in all surveys.

In the 2nd visit in 2002 five unexpected meadow pipits were recorded. Four wheatears were also recorded, three of them were not expected since they are not forest birds. In the 1st visit in 2004 one unexpected meadow pipit was observed. More scrub birds were expected especially at the first points, but their absence or invisibility can be explained with poorer weather conditions (showers). The very small number of birds at the first points repeats itself in the 2nd visit, which was done in slightly better weather. At points 1 to 5 the forest had been felled the winter before the count. This means the trees are still green, but not standing. This may have confused the birds. In the 1st visit in 2005 two unexpected meadow pipits were recorded. There were also two mallards, which would normally not be in coniferous

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wood or scrub, but their presence can be explained with the lochs nearby.

One curlew was recorded where bog birds were not unexpected. In this visit points 6 to 11 were not surveyed probably because they are not situated on the reserve and survey permission may not have been given. These points were not surveyed in the 2nd visit in 2005 either. Two expected meadow pipits were recorded. There were not many birds, but this can be explained by poor visibility. In the 1st visit in 2008 three greenfinches were recorded in standing forest. Two unexpected meadow pipits were observed in felled forest. There were no unexpected birds recorded in the 2nd visit. A greater number of forest birds was expected for points 6 to 12. Weather conditions do not explain their absence.

Caol block

In this block bog species were expected at points 1 and 4 and a few at point 6. Waterfowl was expected at point 12. Forest birds were expected at points 9 to 12 in all counts.

In the 2nd count in 2002 the forest was standing at all points. Ten meadow pipits were recorded at points 8 to 12. Wrens and willow warblers were recorded very frequently. More chaffinches and siskins were expected. In the 1st visit in 2004 very few birds altogether were recorded, although weather conditions were not bad. Five unexpected meadow pipits were observed. There were no forest birds apart from a few coal tits. One tree pipit was recorded. Tree pipits were not expected, but have been recorded on a few occasions. One greenshank was recorded at point 4. There are pools nearby and greenshanks like to feed in them. Almost all forest from points 1 to 8 was felled when this survey was done. The felled trees probably still had brown needles on. This may explain the small number of birds. In the 2nd visit in 2004 there were still not many birds present. The coal tits were not there, but instead a few willow warblers and a wren were present. Eight unexpected meadow pipits were recorded. In the 1st visit in 2005 four unexpected meadow pipits and one unexpected skylark were

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recorded. There also was one unexpected chaffinch in the felled forest.

There were few willow warblers, wrens were frequent. There also was one stonechat and one pied wagtail. The pied wagtail was not expected in bog or forest. More willow warblers and some dunnocks were expected. Points 9 to 12 were not surveyed in this visit. They lie outside the reserve and survey permission may not have been given. In the 2nd visit in 2005 these points were also not surveyed. There were two unexpected meadow pipits recorded. There also was one unexpected goldcrest, which usually does not occur in scrub. Willow warblers and wrens were frequent, and there was one robin and one dunnock. In the 1st visit in 2008 four unexpected meadow pipits were observed. There also was one unexpected skylark at point 12 and one very unexpected crossbill at point 6. There were three unexpected greenfinches in the standing forest at points 10 and 11. Willow warblers were frequent, as well as dunnocks in the felled forest and forest species in the standing part of the plot. There were two redpolls in the felled forest. They are commoner in standing forest, but may occupy scrub. There were four common Scoters at point 12, on the loch. In the 2nd visit in 2008 nine unexpected meadow pipits were observed. There also were four even more unexpected crossbills. Forest species appeared in the standing part. Dunnocks were frequent in the felled part. There were few wrens and even fewer willow warblers. There was one greenfinch in felled forest at point 6, where it was expected, but never seen in the other surveys. There was one greenshank at point 12. It was expected close to the loch, however not on the side where the forest comes almost to the water line.

Cnoc a Bothain block

Unfortunately there is no planting and felling data for this block available. In this block bog species were expected at points 2, 3, 4, 9 and 10. Meadow pipits were also expected at points 5 and 6 due to the little stream. There were less forest birds expected in this block than in others, since the trees are quite big, especially on the east side of the block and the forest is very

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dense in parts not allowing much daylight inside. In the 2nd visit in 2001 no bog species were recorded at the points where they were expected. There were two unexpected greenfinches recorded. There were two meadow pipits at point 5. A large number of chaffinches was recorded for the whole block, more siskins were expected. Willow warblers and wrens were fairly frequent. There was one reed bunting recorded at point 11. This species was not expected in dense forest. At points 2 and 3 no birds were observed within 30. Point 7 was not surveyed at all, it was probably forgotten. In the 2nd visit in 2008 there was one unexpected greenfinch Wrens and willow warblers were recorded fairly frequently. Eight redpolls were recorded in just 2 points of felled forest. Greater numbers of forest birds were expected, apart from siskin numbers. There were 39 siskins observed in the whole block. No birds were observed within 30m at point 2, like in the count of 2001. This could be coincidence, since just 2 counts were done and nobody knows if birds were there in the time in between. There is no obvious reason why birds would avoid this point.

7. CONCLUSIONS

7.1 Conclusions and possible mistakes

The number of birds recorded in one block varies greatly and weather conditions do not always explain the high differences in the number of birds counted. Birds can fly and, of course, do so with no respect of surveys. This fact certainly accounts for variations in bird numbers, however, there may still be other reasons why in some counts very few birds were observed and in others comparatively many. Since counts were done by different surveyors, a possible reason could also be that some surveyors may have estimated the 30m radius around the survey point inaccurately. It is difficult to decide whether a bird that is only heard is within 30m of a point, since

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some birds sing louder than others and the surveyor does not know in which direction they are singing to. When a bird is singing towards the surveyor it will sound louder than one in the same distance to the point that is looking away from the surveyor.

Another source of mistakes could be that different birds prefer different times of the day for singing. Skylarks for example will stop singing around 14:00 for about 30min for know obvious reason (observed during moorland bird surveys). Some bird species are very active in the morning and some are more active later during the day. Some birds are more weather dependent than others. In bright sunshine more skylarks will sing than in cloudy conditions even when temperature, time of day etc. are the same (observed during moorland bird surveys).

Since birds fly around species may turn up where they are not expected. This will mostly applie where only one bird at a time was recorded where it was not expected. However meadow pipits and greenfinches frequently occur where they were not expected. Greenfinches mostly prefer gardens and are common in the few gardens at Forsinard and Forsinain, and they should be commoner in scrub than in conifer forest. In the counts they were almost only observed in unfelled forest. Maybe they dislike that the felled forest has nothing green like needles or leaves and therefore they rather go into the green standing forest. Meadow pipits frequently occur in felled forest. They are probably not very fuzzy about their preferred habitat and adapt to other habitats very quickly. Skylarks are also bog birds, but they are a lot less recorded in felled forest. In the counts of 2008 there are few examples of skylarks in felled forest. In earlier counts they were not observed in felled forest. This may be coincidence. If in following years skylarks are more often recorded in felled forest they may be adapting to this new habitat.

The bog specialists dunlin, golden plover and greenshank were not recorded in felled forest or standing forest (apart from 2 dunlin in the Lonielist block in one visit). These birds are said to avoid forest edges and the data seems to

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confirm this. Greenshanks were observed near pools even where forest was nearby. They were most likely only feeding in the pools but not breeding there.

Some tests of statistical relevance of these unexpected records would be useful if the amount of data allows any conclusions. These are left out here due to no time and too little knowledge of statistics.

7.2 Why statistics were left out

Originally statistical analysis was planned to be included in this project. Help with this was not available in the end. The book 'Choosing and using statistics. A biologist's guide' by Calvin Dytham includes a key which helps students to choose the right statistical tests for their projects.

According to chapter 2 of this book one needs to follow eight steps to get good data and good statistical analysis. This means the biologist first decides what he wants to know and then creates hypotheses. Then he plans the project and makes up his mind what data he expects with approximate values. After that he uses the key in the book and does the recommended tests with the expectations. In case he runs into trouble he could easily change the plan and set up his project differently without losing time with collecting real data and then realizing it does not work.

In this case I did not plan the whole project, but continued the collection of data after a given methodology and then wanted to do statistics with the new data as well as earlier data. I did not find out what the original plan in the RSPB was for this data or why point counts were done since 2001.

Originally I was planning to get some information if some recovery of the felled blocks into bog can already be seen. That is why I collected plant data. And secondly I wanted to see if the presence and absence of bird species in different blocks was correlating with the state of recovery into bog. All of this would be too much and too time consuming for a

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polytechnic final thesis and I would have needed firstly more knowledge and experience of statistics and secondly help from someone. I got the advice to focus on the birds. This means I had to forget about bog recovery and I would not be able to see if bird species composition correlates with it. With no real idea what all this data was for I would have wanted to simply summarize and display the data. The key in 'Choosing and using statistics', a biologist's guide, Second edition, 2003 is offering help to do this, but it requires profound statistical knowledge to even use this key. This key also seems to imply students use statistics programmes and not just Excel. This is why I forgot about statistics. All I could do in the end was to look at the results and try to get some conclusions from that.

8. Evaluation

8.1 What could be better, different etc and why

In the end almost nothing of this project worked out as expected. The topic was not outlined sufficiently and a lot more was planned than what could be done in the amount of time. The whole set of vegetation data does not have any function or significance in the whole final thesis and could have been left out. However, it may be a useful record for RSPB Forsinard Flows. Someone may need this data later. The vegetation survey methodology is completely new and vegetation data of earlier years is not comparable. The method is based on percentage cover estimates. Everybody estimates the percentage cover of a plant species over a certain area different. Data recorded by different surveyors is not comparable, only the survey blocks and points are comparable among themselves. It is also very difficult to estimate percentage covers over the whole area within a 30m radius and the percentage estimates are quite inaccurate.

Before starting a project like this it makes sense to search for literature before starting. A huge problem while writing this was that the books were

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almost all from further away and half of them had to be returned to the library after only 4 weeks. Unfortunately the subject of this project was not specified until it started, so I had looked for literature that was not useful for this project with this topic. There also was little literature available about blanket bog and birds in the afforestations and none about birds in felled peatland forests.

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References

LIFE peatlands project. Restoring active blanket bog of European importance in the north of Scotland, various organizations and bodies, Scottish Natural Heritage, Forestry Commission Scotland, RSPB, Forest Enterprise, Plantlife, 2007, (viitattu 09.08.2009), saatavissa <http://www.lifepeatlandsproject.com>

The Undiscovered Country, VHS, video by the RSPB

Peatlands and environmental change, Dan Charman, 2002, page 4, table 1.3

Charman, Dan 2002. Peatlands and Environmental Change.

Birds, bogs and forestry The peatlands of Caithness and Sutherland, page 24

The Flow Country. The peatlands of Caithness and Sutherland, page 10

The Flow Country. The peatlands of Caithness and Sutherland page 19

The Flow Country. The peatlands of Caithness and Sutherland, page 18

The Flow Country. The peatlands of Caithness and Sutherland, pages 28-32

The Flow Country. The peatlands of Caithness and Sutherland), page 27

Map of average rainfall in October, 1971-200, viitattu: 03.12.2009,

Saatavissa:

<http://www.metoffice.gov.uk/climate/uk/averages/regmapavg.html#>

The Flow Country. The Peatlands of Caithness and Sutherland, page 66

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Dan Charman, page 224, fig. 10.11

Dan Charman, Peatlands and environmental change, 2002, p.93

Peatlands and environmental change, Dan Charman, 2002, page 4, table 1.3

Bird Facts. British Trust for Ornithology, (12.08.2009), available at

http://www.bto.org/birdfacts/indexa_short.htm

Choosing and using statistics. A biologist's guide, Calvin Dytham, 2003,
p.1-21

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Vegetation survey form

Observer: CE

Point no. + grid ref	felled/unfelled F/U	tree species	modal tree height	modal dbh	tree regeneration under 30cm %	over 30 cm %	bare peat %	needle litter %	other litter %	dwarf shrub %	sphagnum % *	other mosses %	molinia %	E.angustifolium %	E.vaginatum %	other grasses %	signs of grazing/browsing X%g/b	deer hoofprints no.	peat depth	brush height	brock cover	comments
34 197 48694	F	LP/SP	3.50	8cm	1	0	2	0	10	45	10	20	10	20	25	25	no	ca. 40	1.55m	30cm	95	10 tracks
34 202 48797	F	LP/SP	2.80	5cm	1	1	1	0	5	15	10	80	5	30	30	30	no	ca. 20	1.85m	10cm	45	12 tracks
34 349 48690	F	LP/SP	1.80	3cm dbh	1	1	1	0	15	50	10	80	0	30	1	10	no	-	1.55m	20cm	95	
34 451 48552	F	CP/SP	1.76	3cm dbh	1	1	1	0	3	55	10	15	-	3	1	25	no	-	1.55m	20cm	95	

* only for original bog surface!

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data Cross Lochs block

visit no. 2	2001											
date	25.05.2001	25.05.2001	25.05.2001	25.05.2001	25.05.2001	25.05.2001	25.05.2001	25.05.2001	25.05.2001	25.05.2001	25.05.2001	
observer	MB	MB	MB	MB	MB	MB	MB	MB	MB	MB	MB	
wind												
rain												
cloud %		5	5	5	5	5	5	5	5	5	5	
visibility	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	no	no	no	no	no	no	no	no	no	no	no	
great tit			1									1
blue tit												0
coal tit	1				1							2
goldcrest			1	1			1	1	1			5
crossbill												0
dunnock												0
redpoll				3				3		3	2	11
siskin												0
green finch								1				1
chaffinch					2	1				1		4
bullfinch										1	1	3
skylark												0
meadow pipit		3		2	3	3	2	3	3	3	4	26
rock pipit												0
willow warbl	2							1				3
wren	2	1	1	2	1	1	1	1	3		1	13
robin												0
stonechat												0
wheatear												0
reed bunting												0
song thrush					1							1
redwing												0
collared do	2											2
crow												0
raven												0
cuckoo												0
buzzard												0
hen harrier												0
short eared owl												0
greylag goose												0
teal												0
common gull												0
snipe												0
golden plover												0
dunlin												0
greenshank												0
red grouse												0
pied wagtail												0
all unfelled												72

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visit no.	2002												
date	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	
observer	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	
wind	1	1	1	1	1	1	1	1	1	1	1	1	
rain	none	none	none	none	none	none	none	none	none	none	none	none	
cloud %	0	0	0	0	0	0	0	0	0	0	0	0	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	
great tit													0
blue tit													0
coal tit										1			1
goldcrest							1						1
crossbill													0
dunnock													0
redpoll	1								1	4			6
siskin													0
green finch													0
chaffinch					1								1
bulfinch													0
skylark													0
meadow pipit				2					1				3
willow warb	1				1							1	3
wren	1					1							2
robin					1		1				1		2
stonechat													0
wheatear													0
song thrush													0
redwing													0
blackbird													0
wheatear													0
crow													0
raven													0
cuckoo				1									1
buzzard													0
hen harrier													0
short eared owl													0
common gull													0
greylag goose													0
snipe													0
golden plover													0
dunlin													0
greenshank													0
red grouse													0
all unfelled													20

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2004											
site name	X-Lochs										
point no.	1	2	3	4	5	6	7	8	9	10	
visit no.	1										
date	22.04.2004	22.04.2004	22.04.2004	22.04.2004	22.04.2004	22.04.2004	22.04.2004	22.04.2004	22.04.2004	22.04.2004	
observer	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	
wind	4	4	4	4	4	4	4	4	4	4	
rain	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
cloud %	0	0	0	0	0	0	0	0	0	0	
visibility	G	G	G	G	G	G	G	G	G	G	
frost/snow	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
great tit											0
blue tit											0
coal tit								2		2	4
goldcrest											0
crossbill											0
dunnock		1									1
redpoll		1									1
siskin	6										6
green finch											0
chaffinch											0
bullfinch											0
skylark											0
meadow pipit			7	3			3		2		15
tree pipit											0
willow warbler											0
wren					1						1
robin					1	1		1			3
stonechat											0
wheatear											0
song thrush											0
crow											0
raven				1							1
cuckoo											0
hen harrier											0
short eared owl											0
Common Gull											0
teal											0
greylag goose							1				1
snipe											0
golden plover											0
dunlin											0
greenshank											0
Common Scoter											0
red grouse											0
all unfelled											33

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visit no.	2004														
date	08.06.2004		08.06.2004		08.06.2004		08.06.2004		08.06.2004		08.06.2004		08.06.2004		
observer	NNR		NNR		NNR		NNR		NNR		NNR		NNR		
wind	5		5		5		5		5		5		5		
rain	light	drizzle	light	drizzle	light	drizzle	light	drizzle	light	drizzle	light	drizzle	light	drizzle	
cloud %	100		100		100		100		100		100		100		
visibility	G		G		G		G		G		G		G		
frost/snow	nil		nil		nil		nil		nil		nil		nil		
great tit															0
blue tit															0
coal tit			2								2				4
goldcrest											1				1
crossbill															0
dunnock															0
redpoll													1		1
siskin															0
green finch															0
chaffinch								1							1
bulfinch															0
skylark															0
meadow pipit															0
rock pipit															0
tree pipit															0
willow warbler							1						1	1	4
wren			1					1						1	3
robin															0
stonechat															0
wheatear															0
reed bunting															0
song thrush															0
redwing															0
collared dove															0
crow															0
raven															0
cuckoo															0
buzzard															0
hen harrier															0
short eared owl															0
greylag goose															0
teal															0
common gull															0
snipe															0
golden plover															0
dunlin															0
greenshank															0
red grouse															0
all unfelled															14

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site name	X-Lochs 2005										
point no.	1	2	3	4	5	6	7	8	9	10	
visit no.	1										
date	25.04.2005	25.04.2005	25.04.2005	25.04.2005	25.04.2005	25.04.2005	25.04.2005	25.04.2005	25.04.2005	25.04.2005	
observer	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	
wind	0	0	0	0	0	0	0	0	0	0	
rain	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
cloud %	5	5	5	5	5	5	5	5	5	5	
visibility	G	G	G	G	G	G	G	G	G	G	
frost/snow	light frost	light frost	light frost	light frost	light frost	light frost	light frost	light frost	light frost	light frost	
F/U	Felled	Unfelled	Felled	Unfelled	Unfelled	Unfelled	Unfelled	Unfelled	Unfelled	Unfelled	
great tit											0
blue tit											0
coal tit			1				1		1		3
goldcrest						1					3
crossbill											0
dunnock											0
redpoll					3						3
siskin		2									2
green finch											0
chaffinch		2									2
bullfinch											0
skylark											0
meadow pipit		1		1				1			3
tree pipit											0
willow warbler		1						1		1	3
wren				1	2	1					5
robin									1		1
stonechat											0
wheatear											0
blackbird											0
song thrush							1				1
swallow											0
pie wagtail											0
crow											0
raven											0
cuckoo											0
hen harrier											0
short eared owl											0
Common Gull											0
mallard											0
teal									1		1
greylag goose											0
snipe											0
golden plover											0
dunlin											0
greenshank											0
curlew											0
Common Scoter											0
red grouse											0

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visit no.	2		2005		31.05.2005		31.05.2005		31.05.2005		31.05.2005		31.05.2005		31.05.2005		31.05.2005		31.05.2005		31.05.2005	
date	31.05.2005		31.05.2005		31.05.2005		31.05.2005		31.05.2005		31.05.2005		31.05.2005		31.05.2005		31.05.2005		31.05.2005		31.05.2005	
observer	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB
wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
rain	showers	lat	showers	lat	showers	lat	showers	lat	showers	lat	showers	lat	showers	lat	showers	lat	showers	lat	showers	lat	showers	lat
cloud %	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
frost/snow	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil
F/U	Felled	Unfelled	Felled	Unfelled	Unfelled	Unfelled	Unfelled	Unfelled	Unfelled	Unfelled	Unfelled	Unfelled	Unfelled	Unfelled	Unfelled	Unfelled	Unfelled	Unfelled	Unfelled	Unfelled	Unfelled	Unfelled
great tit																						0
blue tit																						0
coal tit				1		3																4
goldcrest				1																		1
crossbill																						0
dunnock																						0
redpoll																						0
siskin																						0
green finch																						0
chaffinch																						0
bullfinch																						0
skylark																						0
meadow pipit																						0
rock pipit																						0
tree pipit																						0
willow warbler																					1	1
wren					2																	2
robin																						0
stonechat																						0
wheatear																						0
reed bunting																						0
song thrush																						0
redwing																						0
collared dove																						0
crow																						0
raven																						0
cuckoo																						0
buzzard																						0
hen harrier																						0
short eared owl																						0
greylag goose																						0
teal																						0
common gull																						0
snipe																						0
golden plover																						0
dunlin																						0
greenshank																						0
red grouse																						0
																						8

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visit no. 1	2008												
date	29.04.2008	29.04.2008	29.04.2008	29.04.2008	29.04.2008	29.04.2008	29.04.2008	29.04.2008	29.04.2008	29.04.2008	29.04.2008	29.04.2008	
observer	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	
wind	2	2	2	2	2	2	2	3	3	3	3	2	
rain	no	no	no	no	no	no	no	no	no	no	no	no	
cloud %	60	60	60	60	60	60	60	45	45	45	45	60	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	
great tit													0
blue tit													0
coal tit													0
goldcrest													0
crossbill													0
dunnock									1	1	1	1	3
redpoll													0
siskin													0
green finch													0
chaffinch													0
skylark		1				1	3	3					8
meadow pipit		3		1	1	1	2				1		10
willow warb	1	1			2	2		2					8
wren					2	1		2	1	1	1	1	8
robin													0
stonechat													0
wheatear													0
song thrush													0
crow													0
raven													0
cuckoo													0
hen harrier													0
short eared owl													0
Common Gull													0
greylag goose													0
snipe													0
golden plover													0
dunlin													0
greenshank													0
Common Scoter													0
red grouse													0
all felled								1					1
													38

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visit no.	2008											
date	26.05.2008	26.05.2008	26.05.2008	26.05.2008	26.05.2008	26.05.2008	26.05.2008	26.05.2008	26.05.2008	26.05.2008	26.05.2008	
observer	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	
wind	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	
rain	no	no	no	no	no	no	no	no	no	no	no	
cloud %		65	65	65	65	65	65	65	65	45	45	45
visibility	M	M	M	M	M	M	M	M	G-M	G-M	G-M	
frost/snow	no	no	no	no	no	no	no	no	no	no	no	
great tit												0
blue tit												0
coal tit												0
goldcrest												0
crossbill												0
dunnock							1		1			2
redpoll												0
siskin												0
green finch												0
chaffinch												0
skylark				3		1				1		5
meadow pipit		1		1	2			4		1	1	10
willow warbler					1					1	1	3
wren												0
robin												0
stonechat												0
wheatear												0
song thrush												0
redwing												0
crow												0
raven												0
cuckoo												0
buzzard												0
hen harrier												0
short eared owl												0
greylag goose												0
snipe												0
golden plover												0
dunlin												0
greenshank												0
red grouse												0
all felled												20

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visit no. 2	2001 Woodcock Hill																
date	25.05.2001	25.05.2001	25.05.2001	25.05.2001	25.05.2001	25.05.2001	25.05.2001	25.05.2001	25.05.2001	25.05.2001	25.05.2001	25.05.2001	25.05.2001	25.05.2001	25.05.2001		
observer	PB	PB	PB	PB	PB	PB	PB	PB	PB	PB	PB	PB	PB	PB	PB		
wind		1		1		1		1		1		1	0-1		0-1		
rain	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none		
cloud %	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10		10
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		
frost/snow	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none		
great tit																	0
blue tit																	0
coal tit													1				1
goldcrest								1					1				3
crossbill													1				1
dunnock																	0
redpoll																	0
siskin	1																1
green finch																	0
chaffinch	1			2		1						2			2		8
bullfinch																	0
skylark																	0
meadow pipit								1		2			2		1		6
rock pipit		1															1
willow warbler						1				1						1	2
wren					1										1		4
robin			1														1
stonechat																	0
wheatear																	0
reed bunting																	0
song thrush																	0
redwing																	0
collared dove																	0
crow																	0
raven																	0
cuckoo																	0
buzzard																	0
hen harrier																	0
short eared owl																	0
greylag goose				2													2
teal				2													2
common gull																	0
snipe																	0
golden plover																	0
dunlin																	0
greenshank																	0
red grouse																	0
pied wagtail																	0
																	35

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visit no.	2002 Woodcock Hill															
date	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	30.05.2002	
observer	KR	KR	KR	KR	KR	KR	KR	KR	KR	KR	KR	KR	KR	KR	KR	
wind	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
rain	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none	
cloud %	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	
great tit																0
blue tit																0
coal tit																0
goldcrest							1									1
crossbill																0
dunnock																0
redpoll	2															2
siskin		2			1	1	1									5
green finch																0
chaffinch			1	1	1	1					2	1				7
bullfinch																0
skylark																0
meadow pipit								1				3				4
willow warbler																0
wren													1			1
robin																0
stonechat																0
wheatear																0
song thrush																0
redwing																0
blackbird																0
wheatear																0
crow																0
raven																0
cuckoo																0
buzzard																0
hen harrier														1		1
short eared owl																0
common gull																0
greylag goose																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
red grouse																0

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visit no. 1	2004 Woodcock Hill												
point no.	1	2	3	4	5	6	7	8	9	10	11	12	
date	22.04.2004	22.04.2004	22.04.2004	22.04.2004	22.04.2004	22.04.2004	22.04.2004	22.04.2004	22.04.2004	22.04.2004	22.04.2004	22.04.2004	
observer	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	
wind	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	
rain	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
cloud %	30	30	30	30	30	30	30	30	30	30	30	30	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
great tit													0
blue tit													0
coal tit	2						1		1	1	1		6
goldcrest								1					1
crossbill													0
dunnock													0
redpoll													0
siskin													0
green finch				1									1
chaffinch	2				1					1			5
bullfinch					1			1					2
skylark													0
meadow pipit				2	3			1	1	1			8
tree pipit													0
willow warbler			2			1							4
wren			2										2
robin		1	1				1						3
stonechat													0
wheatear													0
song thrush	2		1					1					4
crow													0
raven													0
cuckoo													0
hen harrier													0
short eared owl													0
Common Gull													0
teal													0
greylag goose													0
snipe													0
golden plover													0
dunlin													0
greenshank													0
Common Scoter													0
red grouse													0

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visit no.	2	2004	Woodcock Hill														
date	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	
observer	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	
wind	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
rain	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
cloud %	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
great tit																	0
blue tit																	0
coal tit			1	1						2			1				5
goldcrest									1								1
crossbill																	0
dunnock					1												1
redpoll																	0
siskin																	0
green finch																	0
chaffinch					1								1	1			3
bullfinch																	0
skylark																	0
meadow pipit								1		2		1					4
rock pipit																	0
tree pipit																	0
willow warb	1			1			1	1	1					1	1		7
wren																	0
robin													1		1		2
stonechat																	0
wheatear																	0
reed bunting																	0
song thrush																	0
redwing																	0
collared dove																	0
crow							1										1
raven																	0
cuckoo																	0
buzzard																	0
hen harrier																	0
short eared owl																1	1
greylag goose																	2
teal																	0
common gull																	0
snipe																	0
golden plover																	0
dunlin																	0
greenshank																	0
red grouse																	0

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point no.	2005 Woodcock Hill															
visit no. 1																
date	25.04.2005	25.04.2005	25.04.2005	25.04.2005	25.04.2005	25.04.2005	25.04.2005	25.04.2005	25.04.2005	25.04.2005	25.04.2005	25.04.2005	25.04.2005	25.04.2005	25.04.2005	
observer	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	
wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
rain	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
cloud %	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	light frost	light frost	light frost	light frost	light frost	light frost	light frost	light frost	light frost	light frost	light frost	light frost	light frost	light frost	light frost	
great tit																0
blue tit																0
coal tit			2							1		1				4
goldcrest			2			1			1			1		1	2	8
crossbill			1			1						7				9
dunnock																0
redpoll		2				2						3	2		2	11
siskin																0
green finch																0
chaffinch	1	1					1						2		1	6
bullfinch																0
skylark																0
meadow pipit		1		1				3	6	1						12
tree pipit															1	1
willow warbler					2			1	1	1	1	1	1			7
wren	1			1		2				1				1		6
robin															1	1
stonechat																0
wheatear																0
blackbird			1													1
song thrush						1										1
swallow																0
pied wagtail																0
crow																0
raven																0
cuckoo																0
hen harrier		2														2
short eared owl																0
Common Gull																0
mallard																0
teal																0
greylag goose																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
curlew																0
Common Scoter																0
red grouse																0

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visit no. 1	2008 Woodcock Hill															
date	04.05.2008	04.05.2008	04.05.2008	04.05.2008	04.05.2008	04.05.2008	04.05.2008	04.05.2008	04.05.2008	04.05.2008	04.05.2008	04.05.2008	04.05.2008	04.05.2008	04.05.2008	
observer	EZ/DK	EZ/DK	EZ/DK	EZ/DK	EZ/DK	EZ/DK	EZ/DK	EZ/DK	EZ/DK	EZ/DK	EZ/DK	EZ/DK	EZ/DK	EZ/DK	EZ/DK	
wind	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
rain	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	50
cloud %	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	50
visibility	G	G	G	G	G	G	G	G	G	M	M	M	M	M	M	50
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	
great tit			2													2
blue tit																0
coal tit	6	1	2	1	3	2	3						1	3	2	24
goldcrest																0
crossbill								1				2				3
dunnock																0
redpoll																0
siskin			1		1											2
green finch	1	3		1	4	1						1	1			12
chaffinch	5	2	2	2					1	3	3	2				20
skylark																0
meadow pipit										1						1
willow warbler				2					1							3
wren								1								1
robin				1							1				1	3
stonechat																0
wheatear																0
song thrush																0
crow			1													1
raven																0
cuckoo	2															2
hen harrier																0
short eared owl																0
Common Gull																0
greylag goose																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
Common Scoter																0
red grouse																0
visit no. 2															74	

visit no. 2	74															
date	01.06.2008	01.06.2008	01.06.2008	01.06.2008	01.06.2008	01.06.2008	01.06.2008	01.06.2008	01.06.2008	01.06.2008	01.06.2008	01.06.2008	01.06.2008	01.06.2008	01.06.2008	
observer	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	
wind	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
rain	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
cloud %	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
visibility	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
great tit																0
blue tit																0
coal tit													1			1
goldcrest			1	2									1		1	5
crossbill			1	1								1	2			6
dunnock					2				1			1		5		9
redpoll			3													3
siskin	1	1	3			1						4		2	1	13
green finch					2											2
chaffinch												1		1		2
skylark																0
meadow pipit										1						1
willow warbler			1	1	1				1		1					5
wren						1									1	2
robin	2	1							1					2		6
stonechat																0
wheatear																0
song thrush												3				3
redwing													1			1
crow																0
raven																0
cuckoo																0
buzzard																0
hen harrier																0
short eared owl																0
greylag goose																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
red grouse																0
all unfelled															59	

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visit no. 2	2001 Imriche															
date	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	
observer	MB	MB	MB	MB	MB	MB	MB	MB	MB	MB	MB	MB	MB	MB	MB	
wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
rain	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none	0
cloud %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	0
frost/snow	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none	0
great tit																0
blue tit																0
coal tit			2	1			1		1			2	1			8
goldcrest							2		1							3
crossbill																0
dunnock																0
redpoll				2							2				2	6
siskin																2
green finch	3		2							2						5
chaffinch							1					1	2			4
bullfinch																0
skylark																0
meadow pipit	1	4	2		3					3	4			2	2	21
rock pipit																0
willow warb	2							1	1			1	1	1		6
wren	2	2	1	1	2				1		1			1		11
robin				1					1							2
stonechat																0
wheatear																0
reed bunting																0
song thrush																0
redwing																0
collared dove																0
crow																0
raven																0
cuckoo																0
buzzard																0
hen harrier																0
short eared owl																0
greylag goose																0
teal																0
common gull																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
red grouse																0
pieb wagtail																0
all unfelled																68

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visit no. 1	2004 Imriche															
date	23.04.2004	23.04.2004	23.04.2004	23.04.2004	23.04.2004	23.04.2004	23.04.2004	23.04.2004	23.04.2004	23.04.2004	23.04.2004	23.04.2004	23.04.2004	23.04.2004	23.04.2004	
observer	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	
wind	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
rain	from point 1	from point 1	from point 1	from point 1	from point 1	from point 1	from point 1	from point 1	from point 1	from point 1	from point 1	from point 1	from point 1	from point 1	from point 1	
cloud %	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
F/U	Unfelled	Unfelled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	
great tit																0
blue tit																0
coal tit								2								2
goldcrest									1							1
crossbill																0
dunnock								2			1					3
redpoll										1				1		3
siskin																0
green finch																0
chaffinch									1							1
bullfinch																0
skylark																0
meadow pipit			3	2		5								1		11
willow warbler																0
wren								1								1
robin						2		3		1				1		7
stonechat	1	1							1							3
wheatear																0
song thrush																0
redwing																0
blackbird																0
wheatear																0
crow																0
raven																0
cuckoo																0
buzzard																0
hen harrier			1													1
short eared owl																0
common gull																0
greylag goose																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
red grouse																0
visit no. 2	2004 Imriche														33	

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date	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	
observer	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	
wind	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	
rain	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
cloud %	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
F/U	Unfelled	Unfelled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	
great tit																				0
blue tit																				0
coal tit																				0
goldcrest																				0
crossbill																				0
dunnock																				0
redpoll	1											2		1		1				5
siskin																				0
green finch																				0
chaffinch																				0
bullfinch																				0
skylark																				0
meadow pipit																			1	1
rock pipit																				0
tree pipit													1							1
willow warbler														1	2					3
wren																			1	1
robin															1					1
stonechat																				0
wheatear																				0
reed bunting																				0
song thrush																				0
redwing																				0
collared dove																				0
crow																				0
raven																				0
cuckoo																				0
buzzard																				0
hen harrier																				0
short eared owl																				0
greylag goose																				0
teal																				0
common gull																				0
snipe																				0
golden plover																				0
dunlin																				0
greenshank																				0
red grouse																				0
																				12

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visit no. 1	2005 Imriche															
date	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	
observer	NNR	NNR	NNR	NNR	NNR	NNR	NNR	NNR	JP	JP	JP	JP	JP	JP	JP	
wind	5	5	5	5	5	5	5	5	3	3	3	3	3	3	3	
rain	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
cloud %	0	0	0	0	0	0	0	0	80	80	80	80	80	80	80	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
F/U	Unfelled	Unfelled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	
great tit																0
blue tit																0
coal tit																0
goldcrest																0
crossbill																0
dunnock																0
redpoll																0
siskin																0
green finch																0
chaffinch			1													1
bullfinch																0
skylark								1		1	1					3
meadow pipit	1		1					2	5	4	1	3		3	2	24
tree pipit																0
willow warbler									1							1
wren				2	1								1		1	5
robin																0
stonechat																0
wheatear								1								1
blackbird																0
song thrush																0
swallow																0
pied wagtail																0
crow																0
raven																0
cuckoo																0
hen harrier																0
short eared owl																0
Common Gull																0
mallard																0
teal																0
greylag goose																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
curlew																0
Common Sooter																0
red grouse																0
																35

visit no. 2	2008 Imriche															
date	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	
observer	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	
wind	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	
rain	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	
cloud %	100	100	100	100	100	100	100	100	95	95	95	95	95	95	95	
visibility	M	M	M	M	M	M	M	M	M	M	M	M	M	M	G-M	
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	
F/U	Unfelled	Unfelled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	
great tit																0
blue tit		1														1
coal tit																0
goldcrest																0
crossbill														1		1
dunnock																0
redpoll			2													2
siskin																0
green finch																0
chaffinch					1			2		3				2		8
skylark														1	2	15
meadow pipit	1		1	1	2				2							7
willow warbler			1	1						1				1		5
wren	1															1
robin									3						1	4
stonechat																0
wheatear																0
song thrush																0
redwing																0
crow																0
raven																0
cuckoo													1			1
buzzard																0
hen harrier																0
short eared owl																0
greylag goose																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
red grouse																0
																45

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visit no. 1	2008 Imriche															
date	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	
observer	SM/DK	SM/DK	SM/DK	SM/DK	SM/DK	SM/DK	SM/DK	SM/DK	SM/DK	SM/DK	SM/DK	SM/DK	SM/DK	SM/DK	SM/DK	
wind	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	
rain	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	
cloud %	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	
F/U	Unfelled	Unfelled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	
great tit																0
blue tit																0
coal tit																0
goldcrest	1															1
crossbill																0
dunnock														1		1
redpoll																0
siskin	5															5
green finch																0
chaffinch																0
skylark						1			2		1				1	5
meadow pipit						2										3
willow warb	1		1					2		1		2	1	1	1	10
wren		1							1	2		1		1	1	7
robin																0
stonechat																0
wheatear		1														1
song thrush																0
crow																0
raven																0
cuckoo																0
hen harrier																0
short eared owl																0
Common Gull																0
greylag goose																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
Common Scoter																0
red grouse																0
visit no. 2	2008 Imriche														33	

visit no. 2	2008 Imriche															
date	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	25.05.2008	
observer	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	
wind	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	
rain	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	
cloud %	100	100	100	100	100	100	100	100	95	95	95	95	95	95	65	
visibility	M	M	M	M	M	M	M	M	M	M	M	M	M	M	G-M	
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	
F/U	Unfelled	Unfelled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	Felled	
great tit																0
blue tit	1															1
coal tit																0
goldcrest																0
crossbill													1			1
dunnock																0
redpoll		2														2
siskin																0
green finch																0
chaffinch					1		2		3				2			8
skylark						1							1	2	5	15
meadow pipit	1		1		2							2				7
willow warbler		1	1		1				1			1				5
wren	1															1
robin								3						1		4
stonechat																0
wheatear																0
song thrush																0
redwing																0
crow																0
raven																0
cuckoo												1				1
buzzard																0
hen harrier																0
short eared owl																0
greylag goose																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
red grouse																0
visit no. 2	2008 Imriche														45	

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visit no. 2	2008 Talaheel																	
date	04.06.2008	04.06.2008	04.06.2008	04.06.2008	05.06.2008	05.06.2008	05.06.2008	05.06.2008	05.06.2008	05.06.2008	06.2008	04.06.2008	04.06.2008	04.06.2008	05.06.2008	05.06.2008	05.06.2008	05.06.2008
observer	EZ	EZ	EZ	EZ	SM	SM	SM	SM	SM	SM	EZ	EZ	EZ	EZ	SM	SM	SM	SM
wind	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
rain	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
cloud %	20	20	20	20	20	15	15	15	15	15	15	20	20	20	20	15	15	15
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
great tit																		
blue tit																		
coal tit																		
goldcrest																		
crossbill																		
dunnock			1						1									2
redpoll																		0
siskin																		0
green finch																		2
chaffinch																		0
skylark							1			1				1				4
meadow pip	2	2	1				2	2	2	2	2	2	2	2	4	3	3	2
willow warbler																		2
wren	1		2				1											4
robin																		0
stonechat			1									1	1				2	5
wheatear																		0
song thrush																		0
crow																		0
raven																		0
cuckoo																		0
hen harrier																		0
short eared owl																1		1
Common Gull																		0
greylag goose																		0
snipe																		0
golden plover																		0
dunlin																		0
greenshank												1						1
Common Scoter																		0
red grouse																		0
																		52

visit no. 2	2001 Bhaird														
date	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001	23.05.2001
observer	CR	CR	CR	CR	CR	CR	CR	JP	JP	JP	JP	JP	JP	JP	JP
wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
rain	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none
cloud %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
frost/snow	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none
F/U	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled
great tit								1						1	
blue tit														1	
coal tit										2		1		2	
goldcrest														1	
crossbill								4						1	
dunnock								2						1	
redpoll															
siskin	2														
green finch														1	
chaffinch								1					2	3	
bullfinch															2
skylark															
meadow pipit		2		1	7	4	3			1	1	2	1		
rock pipit															
willow warbler									2			1	1	2	1
wren												1		1	
robin															
stonechat															
wheatear															
reed bunting															
song thrush															
redwing															
collared dove															
crow															
raven															
cuckoo															
buzzard															
hen harrier															
short eared owl															
greylag goose															
teal															
common gull											1			1	
snipe															
golden plover															
dunlin															
greenshank															
red grouse															
pied wagtail															1
															62

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visit no.	2002 Bhairst															
date	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	
observer	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	
wind	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
rain	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none	
cloud %	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none	
F/U	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	
great tit																0
blue tit																0
coal tit																0
goldcrest					1											1
crossbill																0
dunnock																0
redpoll														1		1
siskin								2								2
green finch																0
chaffinch														1		1
bullfinch																0
skylark																0
meadow pipit					2	1	1						2			6
willow warbler		1											2			6
wren											1					1
robin											1					1
stonechat																0
wheatear																0
song thrush																0
redwing																0
blackbird																0
wheatear																0
crow																0
raven																0
cuckoo											1					1
buzzard																0
hen harrier																0
short eared owl																0
common gull																0
greylag goose																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
red grouse																0

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visit no. 1	2004 Bhairst													
date	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	
observer	TH	TH	TH	TH	TH	TH	TH	TH	TH	TH	TH	TH	TH	
wind	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	
rain	light	light	light	light	light	light	light	light	light	light	light	light	light	
cloud %	90	90	90	90	90	90	90	90	90	90	70	70	70	70
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	no	
F/U	felled	felled	felled	felled	felled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	
great tit														0
blue tit														0
coal tit								1	1			2	1	5
goldcrest														0
crossbill														0
dunnock				1										1
redpoll														0
siskin														0
green finch														0
chaffinch														0
bullfinch														0
skylark														0
meadow pipit		1		1		1		1		1				4
tree pipit														0
willow warbler			1	2	2	1	1	2				2	1	14
wren					1		1							2
robin	1						1				1		1	4
stonechat														0
wheatear														0
song thrush							1							1
crow														0
raven														0
cuckoo														0
hen harrier														0
short eared owl														0
Common Gull														0
teal														0
greylag goose														0
snipe														0
golden plover														0
dunlin														0
greenshank														0
Common Scoter														0
red grouse														0

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visit no. 1	2005 Bhairst															
date	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	
observer	AB	AB	AB	AB	AB	AB	AB	JJP	JJP	JJP	JJP	JJP	JJP	JJP	JJP	
wind	2		2		2		2		4		4		4		4	4
rain	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none	
cloud %	10		10		10		10		80		80		80		80	80
visibility	G		G		G		G		G		G		G		G	
frost/snow	none		none		none		none		none		none		none		none	
F/U	felled		felled		felled		unfelled		unfelled		unfelled		unfelled		unfelled	
great tit													1			2
blue tit																0
coal tit								1	1	1	1	1	1	1	1	7
goldcrest																0
crossbill															5	5
dunnock			2													2
redpoll																0
siskin																0
green finch										1	1					3
chaffinch													2	2	3	7
bullfinch														1		1
skylark							1									1
meadow pipit		1		2		4		1								45
tree pipit																0
willow warbler					1				1			1	3	1		7
wren	1	1	1	2	1											6
robin																0
stonechat																0
wheatear																0
blackbird																0
song thrush																0
swallow		1														1
pied wagtail																0
crow																0
raven																0
cuckoo																0
hen harrier																0
short eared owl																0
Common Gull												1				1
mallard																0
teal																0
greylag goose																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
curlew																0
Common Scoter																0
red grouse																0
																88

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visit no.	2005 Bhairst									
date	01.06.2005	01.06.2005	01.06.2005	01.06.2005	01.06.2005	01.06.2005	01.06.2005	01.06.2005	01.06.2005	01.06.2005
observer	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
wind	1	1	1	1	1	1	1	1	1	1
rain	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil
cloud %	90	90	90	90	90	90	90	90	90	90
visibility	G	G	G	G	G	G	G	G	G	G
frost/snow	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil
F/U	felled	felled	felled	felled	felled	unfelled	unfelled	unfelled	unfelled	
great tit										0
blue tit										0
coal tit										0
goldcrest									1	1
crossbill										0
dunnock										0
redpoll										0
siskin										0
green finch										0
chaffinch										0
bullfinch										0
skylark										0
meadow pipit					1	1				2
rock pipit										0
tree pipit										0
willow warbler										0
wren		1			1					2
robin								3		3
stonechat										0
wheatear										0
reed bunting										0
song thrush									1	1
redwing										0
collared dove										0
crow										0
raven										0
cuckoo										0
buzzard										0
hen harrier										0
short eared owl										0
greylag goose										0
teal										0
common gull										0
snipe										0
golden plover										0
dunlin										0
greenshank										0
red grouse										0
										9

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visit no. 1	2008 Bhaired									
date	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008
observer	DG	DG	DG	DG	DG	DG	DG	DG	DG	DG
wind	1	1	1	1	1	1	1	1	1	1
rain	no	no	no	no	no	no	no	no	no	no
cloud %	20	20	20	20	20	20	20	20	20	20
visibility	G	G	G	G	G	G	G	G	G	G
frost/snow	no	no	no	no	no	no	no	no	no	no
F/U	felled	felled	felled	felled	felled	felled	felled	unfelled	unfelled	U/F
great tit										0
blue tit										0
coal tit									4	4
goldcrest										0
crossbill										0
dunnock									1	1
redpoll										0
siskin										0
green finch										0
chaffinch									1	1
skylark					1					1
meadow pipit										0
willow warbler					1			2		4
wren	1	1	1				1	3		9
robin									2	2
stonechat	1									1
wheatear										0
song thrush										0
crow										0
raven										0
cuckoo										1
hen harrier										0
short eared owl										0
Common Gull										0
greylag goose										0
snipe										0
golden plover										0
dunlin										0
greenshank										0
Common Scoter										0
red grouse										0
										<u>24</u>

visit no. 2	2008 Bhaired									
date	03.06.2008	03.06.2008	03.06.2008	03.06.2008	03.06.2008	03.06.2008	03.06.2008	03.06.2008	03.06.2008	03.06.2008
observer	BW	BW	BW	BW	BW	BW	BW	BW	BW	BW
wind	1	1	1	1	1	1	1	1	1	1
rain	no	no	no	no	no	no	no	no	no	no
cloud %	100	100	100	100	100	100	100	100	100	100
visibility	G	G	G	G	G	G	G	G	G	G
frost/snow	no	no	no	no	no	no	no	no	no	no
F/U	felled	felled	felled	felled	felled	felled	felled	unfelled	unfelled	U/F
great tit										0
blue tit										0
coal tit								1	1	2
goldcrest										0
crossbill										0
dunnock										0
redpoll										0
siskin									1	1
green finch										0
chaffinch										0
skylark						1				1
meadow pipit						1				1
willow warbler		1						1		3
wren								1		2
robin									2	2
stonechat					2					2
wheatear										0
song thrush									1	1
redwing										0
crow										0
raven										0
cuckoo										0
buzzard										0
hen harrier										0
short eared owl										0
greylag goose										0
snipe										0
golden plover										0
dunlin										0
greenshank										0
red grouse										0
										<u>15</u>

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visit no. 2	2001 lonielist															
date	04.06.2001	04.06.2001	04.06.2001	04.06.2001	04.06.2001	04.06.2001	04.06.2001	04.06.2001	04.06.2001	04.06.2001	04.06.2001	04.06.2001	04.06.2001	04.06.2001	04.06.2001	
observer	JJP	JJP	JJP	JJP	JJP	JJP	PB	PB	PB	PB	PB	PB	PB	PB	PB	
wind	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
rain	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none	
cloud %	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none	
F/U	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	
great tit																0
blue tit																0
coal tit						2								1		3
goldcrest																1
crossbill	1															1
dunnock									1							1
redpoll									1							1
siskin						1		1								2
green finch																0
chaffinch			1	1							1	1	1			5
bullfinch																0
skylark																0
meadow pipit	1	2	1		2	5	2	4			2			2		21
rock pipit																0
willow warb	1	1	1											1	1	5
wren					1		1				2					4
robin																0
stonechat																0
wheatear																0
reed bunting																0
song thrush																0
redwing																0
collared dove																0
crow																0
raven																0
cuckoo																0
buzzard																0
hen harrier																0
short eared owl																0
greylag goose																0
teal																0
common gull																0
snipe																0
golden plover																0
dunlin		2														2
greenshank											2					2
red grouse																0
pie wagtail																0
																48

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visit no. 2	2002 Lonielist																
date	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002		
observer	GB	GB	GB	GB	GB	GB	GB	GB	GB	GB	GB	GB	GB	GB	GB		
wind	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
rain	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none		
cloud %	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25		
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no		
F/U	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled		
great tit																0	
blue tit																0	
coal tit	1			1					1				1			4	
goldcrest			1	1							1		1			3	
crossbill																0	
dunnock									1						1	2	
redpoll										1			3	3		7	
siskin									1							1	
green finch																0	
chaffinch										1						1	
bullfinch													1	1		2	
skylark																1	
meadow pipit	2	1							2	4	2	4	3	1	2	3	26
willow warb	2			2	2			1	1		1		2	1	1	1	12
wren	2	1						1	1				1			1	7
robin															1		1
stonechat																	0
wheatear																	0
song thrush				1													1
redwing																	0
blackbird																	0
wheatear																	0
crow																	0
raven																	0
cuckoo																	0
buzzard																	0
hen harrier																	0
short eared owl																	0
common gull																	0
greylag goose																	0
snipe																	0
golden plover																	0
dunlin																	0
greenshank																	0
red grouse																	0
																	68

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visit no. 1	2004 Lonielist															
date	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	06.05.2004	
observer	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	
wind	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
rain	showers	showers	showers	showers	showers	showers	showers	showers	showers	showers	showers	showers	showers	showers	showers	
cloud %	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
F/U	felled	felled	felled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	felled	felled	unfelled	felled	felled		
great tit																0
blue tit																0
coal tit							1									1
goldcrest									2						1	3
crossbill																0
dunnock		1													1	3
redpoll																0
siskin																0
green finch																0
chaffinch																0
bullfinch																0
skylark																0
meadow pipit								2	1	2				2	1	8
tree pipit																0
willow warb		2		1			1	2	1					2		9
wren		1		2				1	1	1					1	7
robin																0
stonechat																0
wheatear																0
song thrush																0
crow																0
raven																0
cuckoo																0
hen harrier																0
short eared owl																0
Common Gull																0
teal																0
greylag goose																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
Common Scoter																0
red grouse		1														1
visit no. 2	2004 Lonielist														32	

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visit no. 2	2004 Lonielist														32	
date	01.06.2004	01.06.2004	01.06.2004	01.06.2004	01.06.2004	01.06.2004	01.06.2004	01.06.2004	01.06.2004	01.06.2004	01.06.2004	01.06.2004	01.06.2004	01.06.2004	01.06.2004	
observer	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	
wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
rain	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
cloud %	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
F/U	felled	felled	felled	unfelled	unfelled	unfelled	unfelled	unfelled	felled	felled	felled	unfelled	felled	felled	felled	
great tit																0
blue tit																0
coal tit																0
goldcrest								2					2			4
crossbill																0
dunnock																0
redpoll							2									2
siskin																0
green finch																0
chaffinch					1				1							2
bullfinch																0
skylark															1	1
meadow pipit																0
rock pipit																0
tree pipit					1		1									2
willow warb	1			1		1						1		1		5
wren	1									2						3
robin		1						1								2
stonechat																0
wheatear																0
reed bunting																0
song thrush																0
redwing																0
collared dove																0
crow																0
raven																0
cuckoo																0
buzzard																0
hen harrier																0
short eared owl																0
greylag goose																0
teal																0
common gull																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
red grouse																0

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visit no. 1	2005 Lonielist														
date	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	26.04.2005	
observer	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	
wind	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3	
rain	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
cloud %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
F/U	felled	felled	felled	felled	felled	felled	felled	felled	felled	felled	felled	felled	felled	felled	
great tit															0
blue tit															0
coal tit															0
goldcrest															0
crossbill															0
dunnock															0
redpoll															2
redpoll															0
siskin															0
greenfinch															0
chaffinch															1
bullfinch															0
skylark															6
meadow pipit															42
tree pipit															0
willow warbler															7
wren															9
robin															1
stonechat															0
wheatear															0
blackbird															0
song thrush															0
swallow															0
pie wagtail															0
crow															0
raven															0
cuckoo															0
hen harrier															1
short eared owl															0
Common Gull															0
mallard															0
teal															0
greylag goose															0
snipe															0
golden plover															0
dunlin															0
greenshank															0
curlew															0
Common Scoter															0
red grouse															69

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visit no. 1	2008 Lonielist													02.05.2008	
date	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	02.05.2008	EZ
observer	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	2-3
wind	1	1	1	1	1	1	1	1	2-3	2-3	2-3	2-3	2-3	2-3	no
rain	no	no	no	no	no	no	no	no	no	no	no	no	no	no	15
cloud %	15	15	15	15	15	15	15	15	15	15	15	15	15	15	G
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	no
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	no	no	
F/U	felled	felled	felled	felled	felled	felled	felled	felled	felled	felled	felled	felled	felled	felled	
great tit															0
blue tit															0
coal tit															0
goldcrest															0
crossbill															0
dunnock	1	1													3
redpoll						3	2				2				7
siskin															0
green finch															0
chaffinch															0
skylark		1			1						1			1	4
meadow pipit		1			1	1	1		1	2	3		1		11
willow warb	1	1			1	1	1							1	5
wren			2	1					1	1					5
robin															0
stonechat													1		1
wheatear		1													1
song thrush															0
crow															0
raven															0
cuckoo															0
hen harrier															0
short eared owl															0
Common Gull															0
greylag goose															0
snipe															0
golden plover															0
dunlin															0
greenshank															0
Common Scoter															0
red grouse		1													1
visit no. 2	2008 Lonielist													38	

visit no. 2	2008 Lonielist													38	
date	31.05.2008	31.05.2008	31.05.2008	31.05.2008	31.05.2008	31.05.2008	31.05.2008	31.05.2008	31.05.2008	31.05.2008	31.05.2008	31.05.2008	31.05.2008	31.05.2008	EZ
observer	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	2
wind	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2
rain	no	no	no	no	no	no	no	no	no	no	no	no	no	no	
cloud %	70	70	70	70	70	70	70	70	70	70	70	70	70	70	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	no	no	
F/U	felled	felled	felled	felled	felled	felled	felled	felled	felled	felled	felled	felled	felled	felled	
great tit															0
blue tit															0
coal tit															0
goldcrest															0
crossbill														1	1
dunnock															0
redpoll															0
siskin															0
green finch															0
chaffinch															0
skylark														1	1
meadow pipit	2	2		1	4	2			2		5		1		20
willow warbler						1								1	2
wren					1	1			1						3
robin															0
stonechat	2										1				3
wheatear															0
song thrush															0
redwing															0
crow															0
raven															0
cuckoo															0
buzzard															0
hen harrier									2						2
short eared owl															0
greylag goose															0
snipe															0
golden plover															0
dunlin															0
greenshank															0
red grouse															0
visit no. 2	2008 Lonielist													32	

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visit no. 2	2002 Alltan Dubh															
date	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	
observer	KR	KR	KR	KR	KR	KR	KR	KR	KR	KR	KR	KR	KR	KR	KR	
wind	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
rain	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none	
cloud %	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	
great tit						1										1
blue tit																0
coal tit							2		2	1						5
goldcrest													1			1
crossbill																0
dunnock																0
redpoll	2												1	1		4
siskin	1	2			1											4
green finch																0
chaffinch			1	2						1	1					5
bullfinch									2							3
skylark															1	0
meadow pipit	2				2	2	1	1		1			3	1	2	15
willow warbler																0
wren																0
robin																0
stonechat																0
wheatear																0
song thrush																0
redwing																0
blackbird				1												1
wheatear						1			1	1			1			4
crow																0
raven																0
cuckoo																0
buzzard																0
hen harrier																0
short eared owl																0
common gull																0
greylag goose																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
red grouse																0
All unfelled																43

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visit no. 1	2004 Alltan Dubh															
date	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	
observer	AB/JG/TH	AB/JG/TH	AB/JG/TH	AB/JG/TH	AB/JG/TH	AB/JG/TH	AB/JG/TH	AB/JG/TH	AB/JG/TH	AB/JG/TH	AB/JG/TH	AB/JG/TH	AB/JG/TH	AB/JG/TH	AB/JG/TH	
wind	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
rain	showers	showers	showers	showers	showers	showers	showers	showers	showers	showers	showers	showers	showers	showers	showers	
cloud %	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
F/U	felled	felled	felled	felled	felled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	
great tit																0
blue tit																0
coal tit									2							2
goldcrest								1	1	1						3
crossbill																0
dunnock											1					1
redpoll												1				1
siskin																0
green finch																0
chaffinch												2				2
bullfinch																0
skylark																0
meadow pipit					1	1							1			3
tree pipit																0
willow warbler								1	2	2					1	6
wren													1			1
robin							1					2	1			4
stonechat																0
wheatear																0
song thrush																0
crow																0
raven																0
cuckoo																0
hen harrier																0
short eared owl																0
Common Gull																0
teal																0
greylag goose																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
Common Scoter																0
red grouse																0
visit no. 2	2004 Alltan Dubh														23	

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visit no. 2	2004 Alltan Dubh														23	
date	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	
observer	JG	JG	JG	JG	JG	JG	JG	JG	JG	JG	JG	JG	JG	JG	JG	
wind	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
rain	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
cloud %	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
F/U	felled	felled	felled	felled	felled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	
great tit																0
blue tit																0
coal tit																3
goldcrest									1							1
crossbill																0
dunnock																0
redpoll																0
siskin																0
green finch																0
chaffinch																0
bullfinch									1							1
skylark																0
meadow pipit																0
rock pipit																0
tree pipit																0
willow warbler						1	1	1	1	1	1	1		2		8
wren							1	1					1			3
robin													1			1
stonechat																0
wheatear																0
reed bunting																0
song thrush													1			1
redwing																0
collared dove																0
crow																0
raven																0
cuckoo																0
buzzard																0
hen harrier																0
short eared owl																0
greylag goose																0
teal																0
common gull																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
red grouse																0
																20

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visit no. 1	2005 Alltan Dubh															
date	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	
observer	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	
wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
rain	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
cloud %	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
F/U	felled	felled	felled	felled	felled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	F/U	
great tit																0
blue tit																0
coal tit				1												1
goldcrest				1												1
crossbill																0
dunnock			1	1			2									2
redpoll																0
siskin																0
greenfinch																0
chaffinch	3			2												1
bullfinch																0
skylark																0
meadow pipit			1		3	1										5
tree pipit																0
willow warbler			3	2		1										6
wren				3			1									1
robin																0
stonechat																0
wheatear																0
blackbird																0
song thrush																0
swallow																0
pied wagtail																0
crow																0
raven																0
cuckoo																0
hen harrier																0
short eared owl																0
Common Gull																0
mallard		1				1										2
teal																0
greylag goose																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
curlew					1											1
Common Scoter																0
red grouse																0
visit no. 2	2005 Alltan Dubh														34	

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visit no. 2	2005 Alltan Dubh														34		
date	25.05.2005	25.05.2005	25.05.2005	25.05.2005	25.05.2005	25.05.2005	25.05.2005	25.05.2005	25.05.2005	25.05.2005	25.05.2005	25.05.2005	25.05.2005	25.05.2005	25.05.2005	25.05.2005	34
observer	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	
wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
rain	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	0
cloud %	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
visibility	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	0
frost/snow	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	0
F/U	felled	felled	felled	felled	felled	felled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	F/U	0
great tit																	0
blue tit																	0
coal tit																	2
goldcrest																	0
crossbill																	0
dunnock						1		1									2
redpoll																	0
siskin																	0
green finch																	0
chaffinch	1																1
bullfinch																	0
skylark																	0
meadow pipit		1				1										1	3
rock pipit																	0
tree pipit																	0
willow warbler			2														2
wren	1	1				1		1									4
robin	1																1
stonechat																	0
wheatear																	0
reed bunting																	0
song thrush																	0
redwing																	0
collared dove																	0
crow																	0
raven																	0
cuckoo																1	1
buzzard																	0
hen harrier																	0
short eared owl																	0
greylag goose																	0
teal																	0
common gull																	0
snipe																	0
golden plover																	0
dunlin																	0
greenshank																	0
red grouse																	0
																	16

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visit no. 1	2008 Alltan Dubh													
date	05.05.2008	05.05.2008	05.05.2008	05.05.2008	05.05.2008	05.05.2008	05.05.2008	05.05.2008	05.05.2008	05.05.2008	05.05.2008	05.05.2008	05.05.2008	05.05.2008
observer	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ
wind	1	1	1	1	1	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2
rain	no	no	no	no	no	no	no	no	no	no	no	no	no	no
cloud %	2	2	2	2	2	2	2	2	2	2	2	2	2	2
visibility	M	M	M	M	M	G	G	G	G	G	G	G	G	G
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	no	no
F/U	felled	felled	felled	felled	felled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	F/U
great tit						1	2							3
blue tit														0
coal tit	2			1				5	1	1	1	2		13
goldcrest				1						1				4
crossbill								2	1					5
dunnock														0
redpoll														0
siskin	1													2
green finch									1				2	3
chaffinch	1							6		1				8
skylark														0
meadow pipit		1			3	1								5
willow warbler				1	2									3
wren												1		2
robin						1	1	2				1		6
stonechat		1			1									2
wheatear														0
song thrush														0
crow														0
raven														0
cuckoo														0
hen harrier														0
short eared owl														0
Common Gull														0
greylag goose														0
snipe														0
golden plover														0
dunlin														0
greenshank														0
Common Scoter														0
red grouse														0
														57

visit no. 2	2008 Alltan Dubh													
date	03.06.2008	03.06.2008	03.06.2008	03.06.2008	03.06.2008	03.06.2008	03.06.2008	03.06.2008	03.06.2008	03.06.2008	03.06.2008	03.06.2008	03.06.2008	03.06.2008
observer	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
wind	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	2-3	2-3	
rain	no	no	no	no	no	no	no	no	no	no	no	no	no	
cloud %	80	80	80	80	80	80	80	80	80	80	80	80	80	80
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	no	no
F/U	felled	felled	felled	felled	felled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	F/U
great tit														0
blue tit														0
coal tit				3										3
goldcrest													1	1
crossbill	3							2						5
dunnock														0
redpoll														0
siskin								3	3					6
green finch														0
chaffinch								1					1	2
skylark										1				1
meadow pipit					2									2
willow warbler				1					1					2
wren	2	2										1	1	7
robin			1						1		1	1	1	4
stonechat														0
wheatear														0
song thrush														0
redwing														0
crow														0
raven														0
cuckoo														0
buzzard														0
hen harrier														0
short eared owl														0
greylag goose														0
snipe														0
golden plover														0
dunlin														0
greenshank														0
red grouse														0
														34

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visit no. 2	2002 Caol															
date	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	05.06.2002	
observer	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	
wind		1	1	1	1	1	1	1	1	1	1	1	1	1	1	
rain	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none	
cloud %	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none	
F/U	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	
great tit																0
blue tit																0
coal tit			1				1	1	2	3	2	1		2	13	
goldcrest				2						1					3	
crossbill															0	
duncock			2	1					2	1				1	7	
redpoll					2	2						2	1		7	
siskin															0	
green finch															0	
chaffinch												2			2	
bullfinch			2			2									4	
skylark					1			2							3	
meadow pipit					3				2						13	
willow warb	2			2		3	1	1	1	1	3	2			15	
wren			2			1	1	1	2	1	2	1	1		11	
robin			3			2	2								7	
stonechat															0	
wheatear															0	
song thrush												2	1		3	
redwing															0	
blackbird															0	
wheatear															0	
crow															0	
raven															0	
cuckoo															0	
buzzard															0	
hen harrier															0	
short eared owl															0	
common gull						2									2	
greylag goose															0	
snipe															0	
golden plover															0	
dunlin															0	
greenshank															0	
red grouse															0	
																90

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visit no. 1	2004 Caol														
date	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	28.04.2004	
observer	KR	KR	KR	KR	KR	KR	KR	KR	KR	KR	KR	KR	KR	KR	
wind	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	
rain	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
cloud %		25	25	25	25	25	25	25	25	25	25	25	25	25	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
F/U	felled	felled	felled	felled	F/U	felled	felled	felled	unfelled	unfelled	unfelled	unfelled	unfelled		
great tit															0
blue tit															0
coal tit						2						2	2		6
goldcrest															0
crossbill															0
dunnock															0
redpoll															0
siskin															0
green finch															0
chaffinch															0
bullfinch															0
skylark															0
meadow pipit	1	3			1		1						1		7
tree pipit												1			1
willow warbler															0
wren															0
robin															0
stonechat															0
wheatear															0
song thrush															0
crow															0
raven															0
cuckoo															0
hen harrier															0
short eared owl															0
Common Gull															0
teal															0
greylag goose															0
snipe															0
golden plover															0
dunlin															0
greenshank						1									1
Common Scoter															0
red grouse															0
															15

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visit no. 2	2004 Caol														
date	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	02.06.2004	
observer	TH	TH	TH	TH	TH	TH	TH	TH	TH	TH	TH	TH	TH	TH	
wind	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
rain	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
cloud %	80	80	80	80	80	80	80	80	80	80	80	80	80	80	
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
F/U	felled	felled	felled	felled	felled	felled	felled	felled	felled	unfelled	unfelled	unfelled	unfelled	unfelled	
great tit															0
blue tit															0
coal tit															0
goldcrest															0
crossbill															0
dunnock															0
redpoll															0
siskin															0
green finch															0
chaffinch															0
bullfinch															0
skylark					1										0
meadow pipit	3	1	1		2			1	2	1					11
rock pipit															0
tree pipit															0
willow warb	1	1						1							3
wren								1							1
robin															0
stonechat															0
wheatear															0
reed bunting															0
song thrush															0
redwing															0
collared dove															0
crow															0
raven															0
cuckoo															0
buzzard															0
hen harrier															0
short eared owl															0
greylag goose															0
teal															0
common gull															0
snipe															0
golden plover															0
dunlin															0
greenshank															0
red grouse															0
															16

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point no.	2005 Caol										
visit no. 1	2005										
date	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	28.04.2005	
observer	NNR	NNR	NNR	NNR	NNR	NNR	NNR	NNR	NNR	NNR	
wind	1		1		1		1		1		
rain	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	
cloud %	20	20	20	20	20	20	20	20	20	20	
visibility	G	G	G	G	G	G	G	G	G	G	
frost/snow	light frost	light frost	light frost	light frost	light frost	light frost	light frost	light frost	light frost	light frost	
F/U	felled	felled	felled	felled	felled	felled	felled	felled	felled	felled	
great tit											0
blue tit											0
coal tit											0
goldcrest											0
crossbill											0
dunnock											0
redpoll											0
siskin											0
greenfinch											0
chaffinch	1										1
bullfinch											0
skylark							1				1
meadow pipit	1	1	1				1				4
tree pipit											0
willow warbler					1	2					3
wren			2	2	2	2			2	2	12
robin											0
stonechat							1				1
wheatear											0
blackbird											0
song thrush											0
swallow											0
pied wagtail							1				1
crow											0
raven											0
cuckoo											0
hen harrier											0
short eared owl											0
Common Gull											0
mallard											0
teal											0
greylag goose											0
snipe											0
golden plover											0
dunlin											0
greenshank											0
curlew											0
Common Scoter											0
red grouse	2										2

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visit no. 2	2005 Caol									
date	27.05.2005	27.05.2005	27.05.2005	27.05.2005	27.05.2005	27.05.2005	27.05.2005	27.05.2005	27.05.2005	27.05.2005
observer	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB	AB/DB
wind	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
rain	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil
cloud %	80	80	80	80	80	80	80	80	80	80
visibility	G	G	G	G	G	G	G	G	G	G
frost/snow	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil
F/U	felled	felled	felled	felled	felled	felled	felled	felled	felled	felled
great tit										0
blue tit										0
coal tit										0
goldcrest						1				1
crossbill										0
dunnock						1				1
redpoll										0
siskin										0
green finch										0
chaffinch										0
bullfinch										0
skylark	1							1		2
meadow pipit			2		2			2		6
rock pipit										0
tree pipit										0
willow warbler		1	2			2		1	1	7
wren	2					1	1	1		5
robin								1		1
stonechat										0
wheatear										0
reed bunting										0
song thrush										0
redwing										0
collared dove										0
crow										0
raven										0
cuckoo										0
buzzard										0
hen harrier										0
short eared owl										0
greylag goose										0
teal										0
common gull										0
snipe										0
golden plover										0
dunlin										0
greenshank										0
red grouse										0
										23

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visit no. 1	2008 Caol																
date	03.05.2008	03.05.2008	03.05.2008	03.05.2008	03.05.2008	03.05.2008	03.05.2008	03.05.2008	03.05.2008	03.05.2008	03.05.2008	03.05.2008	03.05.2008	03.05.2008	03.05.2008		
observer	DK/EZ	DK/EZ	DK/EZ	DK/EZ	DK/EZ	DK/EZ	DK/EZ	DK/EZ	DK/EZ	DK/EZ	DK/EZ	DK/EZ	DK/EZ	DK/EZ	DK/EZ		
wind	1-2	1-2	1-2	1-2	1-2	1-2	0-1	0-1	0-1	0-1	1-2	1-2	1-2				
rain	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no		
cloud %	10	10	10	10	10	10	90	90	90	90	90	90	90	90	90		
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no		
F/U	felled	felled	felled	felled	felled	felled	felled	felled	felled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled		
great tit																0	
blue tit																0	
coal tit													6	4	3	1	14
goldcrest													1				1
crossbill														2		3	6
dunnock	1		2			1		1									5
redpoll					2												2
siskin															1		1
green finch																	3
chaffinch													1				2
skylark								1									2
meadow pipit	1		1			1				1							6
willow warbler			2				1								1		7
wren	1									1	1						3
robin																	0
stonechat																	0
wheatear																	0
song thrush																	0
crow																	0
raven																	0
cuckoo																	0
hen harrier																	0
short eared owl																	0
Common Gull																	3
greylag goose																	0
snipe																	0
golden plover																	0
dunlin																	0
greenshank																	0
Common Scoter																	4
red grouse																	0
																	59

visit no. 2	2008 Caol																
date	27.05.2008	27.05.2008	27.05.2008	27.05.2008	27.05.2008	27.05.2008	27.05.2008	27.05.2008	27.05.2008	27.05.2008	27.05.2008	27.05.2008	27.05.2008	27.05.2008	27.05.2008		
observer	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ		
wind	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
rain	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no		
cloud %	100	100	100	100	100	100	100	100	50	50	50	50	50	50	50		
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no		
F/U	felled	felled	felled	felled	felled	felled	felled	felled	felled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled		
great tit																0	
blue tit																0	
coal tit														2		3	5
goldcrest															1	3	4
crossbill															2		6
dunnock	2		1														6
redpoll																	0
siskin															4		4
green finch									1								1
chaffinch													1		1		2
skylark																	0
meadow pipit		2	1	2		1			2	2	2						12
willow warbler										1	1						2
wren					1				2		1						4
robin																	1
stonechat																	2
wheatear																	0
song thrush																	0
redwing																	0
crow																	0
raven																	0
cuckoo																	1
buzzard																	0
hen harrier																	0
short eared owl																	0
greylag goose																	0
snipe																	0
golden plover																	0
dunlin																	0
greenshank																	1
red grouse																	0
																	51

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visit no. 2	2001 Cnoc a Bothain													
date	22.05.2001	22.05.2001	22.05.2001	22.05.2001	22.05.2001	22.05.2001	22.05.2001	22.05.2001	22.05.2001	22.05.2001	22.05.2001	22.05.2001	22.05.2001	22.05.2001
observer	MB	MB	MB	MB	MB	MB	MB	MB	MB	MB	MB	MB	MB	MB
wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0
rain	none	none	none	none	none	none	none	none	none	none	none	none	none	none
cloud %	95	95	95	95	95	95	95	95	95	95	95	95	95	95
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G
frost/snow	none	none	none	none	none	none	none	none	none	none	none	none	none	none
great tit													1	1
blue tit														0
coal tit					1	2	1		1				3	1
goldcrest						1							1	2
crossbill														0
dunnock														0
redpoll						1								1
siskin										2				2
green finch						2								2
chaffinch	1				3	3	2		1	2	2	1		15
bullfinch					1									1
skylark														0
meadow pipit						2								2
rock pipit														0
willow warb	1				2		1				1			6
wren	1				2	2	1						1	7
robin														0
stonechat														0
wheatear														0
reed bunting												1		1
song thrush														0
redwing														0
collared dove														0
crow														0
raven														0
cuckoo														0
buzzard														0
hen harrier														0
short eared owl														0
greylag goose														0
teal														0
common gull														0
snipe														0
golden plover														0
dunlin														0
greenshank														0
red grouse														0
pied wagtail														0

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visit no. 2	2008 Cnoc a Bothain															
date	05.06.2008	05.06.2008	05.06.2008	05.06.2008	05.06.2008	05.06.2008	05.06.2008	05.06.2008	05.06.2008	05.06.2008	05.06.2008	05.06.2008	05.06.2008	05.06.2008	05.06.2008	
observer	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	EZ	
wind	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	
rain	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	
cloud %		5		5		5		5		15		15		15		15
visibility	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
frost/snow	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	
F/U	unfelled	unfelled	F/U	felled	F/U	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	unfelled	
great tit																0
blue tit																0
coal tit		2		1						2		1				6
goldcrest								1							1	2
crossbill								1								1
dunnock								1								1
redpoll						6		2				1				9
siskin		4		4					10	4				6	7	4
green finch		1														1
chaffinch															1	1
skylark																0
meadow pipit						1								1		2
willow warb		1				1		1		1				1		5
wren		1				1		1				2				5
robin		1						2		1						4
stonechat																0
wheatear																0
song thrush																0
crow																0
raven																0
cuckoo																0
hen harrier														1		1
short eared owl																0
Common Gull																0
greylag goose																0
snipe																0
golden plover																0
dunlin																0
greenshank																0
Common Scoter																0
red grouse																0
																78