

# Management of Greylag Geese on Rathlin Island – a scoping report

## A report for the Causeway Coast and Glens Heritage Trust



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Any advice, opinions or recommendations expressed in this report are based upon due diligence including the authors' interpretation of field conditions experienced at the time of survey. The authors do not accept any responsibility for material changes to field conditions which may have occurred subsequent to the survey date.

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#### **Executive Summary**

A resident population of feral greylag geese *Anser anser* has been established on Rathlin Island for over 15 years. In winter the island also hosts migrant geese from Scotland and possibly Iceland. However an increase in numbers of feral geese on the island has given rise to concerns amongst landowners that the geese are damaging farmland and endangering the health of livestock.

This project was commissioned to scope the justification for and feasibility of controlling greylag geese on the island as part of a wider management programme for the island.

The aims of the project were:

- to gather data on the numbers and distribution of geese on Rathlin Island;
- to scope the potential need for management of feral geese on Rathlin;
- subject to the above assessment, to identify appropriate management options;
- to identify further research and monitoring required for a full feasibility study or management programme.

A questionnaire answered by 58 island residents provided information on attitudes towards the geese and possible management measures. Additional interviews with affected farmers provided more detailed insight into goose related issues. Their concerns centred around the effects of geese on grazing and silage, although the potential for transmission of disease to livestock was also cited.

Systematic counts and field observations were carried out on both Rathlin Island and Fair Head on the adjacent mainland, since a link between the two sites was already known from sightings of neckbanded birds. In addition attempts were made to catch and mark birds with neck-bands under licence, resulting in three birds being captured and marked. A grazing intensity survey was carried out in the main feeding area around Church Bay, by recording the density of droppings along transects in each field.

The maximum number recorded feeding on the island was 99 birds and the lowest count was 42, with the number of geese declining as the project progressed. Numbers at Fair Head remained consistently high with over 170 birds counted on several occasions. There was significant interaction between these two sites, including the movement of geese from feeding fields at Fair Head to roost on Rathlin at Lough Ushet. Links with other sites in County Antrim were also investigated through field observations and collation of data on greylags and other goose species.

A combination of the goose counts and grazing intensity survey confirmed that in late winter the geese favour the good quality grassland in the hinterland of Church Bay, although there are also several frequently used fields in the west of the island. However the number of geese on Rathlin Island in late winter is relatively small and may be higher at other times of year such as postbreeding or in early winter when the feeding resource is richer.

The timing of this project limits the scope for quantifying the extent agricultural impacts of the feral greylags on Rathlin Island. For example, the lack of growth in the sward precluded any comparison being made with areas where no grazing was recorded. Instead it may be easier to measure impacts in summer if numbers of geese are feeding in silage crops.

It seems likely that the population of feral birds is increasing and that this will continue and so the potential for conflict with farmers and landowners on the island is also likely to increase. Some management measures require to be licenced by the statutory agencies and licences will not be issued unless there is clear evidence that the geese are causing serious agricultural damage. Thus before a comprehensive management programme can be developed, there is a need for additional evidence to answer some key questions about the geese on Rathlin Island.

These include the following measures:

- 1. Obtain information on the numbers and distribution of geese throughout all seasons;
- 2. Undertake a survey of breeding birds;
- 3. Record evidence of agricultural damage to pasture and silage and conduct trials (e.g goose exclusion) to establish impacts of geese;
- 4. Undertake further capture and marking of geese with collar bands and GPS transmitters to clarify breeding distribution.

Once evidence is presented which satisfies the statutory agencies that licences can be issued for control of geese, it is recommended that a programme of egg-pricking should be initiated. This measure has the advantages that only feral geese are targeted and it is more likely to be acceptable to the local community and visitors. However it is likely that this measure would have to be extended to other sites, such as Fair Head, to maximise the effects of control on Rathlin.

Targeted shooting or scaring of birds at the most affected fields could also be undertaken in tandem with an egg-pricking programme.

A cull of moulting birds is not recommended at this point since it is unlikely that this measure would be sanctioned by the statutory bodies without conclusive evidence of widespread and serious agricultural damage on the island. A cull could also have significant public relations implications, since it would have to be carried out in the summer, probably on Lough Ushet where the process may be visible to the public.

Finally, it is essential that monitoring of all management measures must be carried out so that their success or otherwise can be determined and specific measures can then be discontinued or adapted depending on the results.

## 1 Introduction

#### 1.1 Background

Rathlin Island is Northern Ireland's only inhabited offshore island with a resident population of around 150 people (RDCA 2017). Agriculture, fisheries and tourism are the mainstays of the island's economy, and the island's importance for seabirds and other biodiversity is one of the main attractions for visitors. This importance is recognised through a number of statutory nature conservation designations including a Special Protection Area (SPA) and Special Area of Conservation (SAC) designated under European legislation.

In addition, nature conservation organisations such as the Royal Society for the Protection of Birds (RSPB) and National Trust own or manage parts of the island while the western end at Kebble is owned and managed by DAERA Northern Ireland Environment Agency (NIEA) as a National Nature Reserve.

Livestock farming is also a significant activity for many islanders, with the raising of sheep and beef cattle most prevalent. Livestock from Rathlin Island is regarded as a premium product on the market and some farmers have won national organic farming awards (RDCA 2017). Farming on Rathlin is often also closely linked to the management of areas for nature conservation including key habitats such as maritime heath, rare plants and priority bird species such as chough and corncrake.

Recently an increase in numbers of feral greylag geese *Anser anser* on Rathlin Island has given rise to concerns amongst landowners that the geese are damaging farmland and endangering the health of livestock. At the same time a feasibility study into the eradication of rats and ferrets on the island, prepared by Wildlife Management International Limited in 2011, is being revisited. It was therefore considered timely to scope the justification for and feasibility of controlling greylag geese on the island as part of a wider management programme.

The Causeway Coast and Glens Heritage Trust (CCGHT) secured funding for a scoping project on goose management on behalf of the Rathlin Island European Marine Site Management Group. The Management Group oversees the management scheme for the SAC and SPA and comprises a range of statutory and non-Government organisations including -

DAERA Marine Division, DAERA Northern Ireland Environment Agency (NIEA), Rathlin Development and Community Association (RDCA), Causeway Coast and Glens Borough Council (CCGBC), CCGHT, HM Coastguard, Ulster Wildlife, Royal Society for the Protection of Birds (RSPB) and the National Trust.

#### 1.2 Project aims

The aims of the project were:

- to gather data on the numbers and distribution of geese on Rathlin Island;
- to scope the potential need for management of feral geese on Rathlin;
- subject to the above assessment, to identify appropriate management options;
- to identify further research and monitoring required for a full feasibility study or management programme.

The project timescales did not permit a census of breeding birds and only a limited time window was available for the survey and monitoring of wintering geese and impact assessment within the subject area. Thus the report does not present a definitive management scheme for the geese, but does provide a range of options for potential management measures and identifies further research required to inform a management scheme.

## 2. Greylag Geese - an introduction

#### 2.1 Description and taxonomy

The greylag goose *Anser anser* is the largest and bulkiest of our "grey" geese, being typically 75-90 centimetres (cm) in length with a wingspan of 147-180 cm. They are brown-grey overall with large orange-pink bills and pink legs and have a strikingly pale-grey forewing which is visible in flight (Figure 1).

#### Figure 1 Greylag goose in flight



Image: CCO public domain

There are two recognised races of greylag goose - the western nominate race *anser* breeds in Iceland, Scandinavia and Britain, while the eastern race *rubrirostris* breeds in south east Europe to central Asia (BWPi 2004). There are minor morphological differences between the two races; western birds are generally smaller and darker, with orange rather than pinkish bills. Birds breeding in eastern Europe often appear to be intermediate in appearance (Svensson *et al* 2009).

The species is listed as Least Concern in the IUCN Red List of Threatened Species and is listed in Annex II/1 of the Birds Directive as a species which may be hunted under national legislation (see Section 2.5).

#### 2.2 The Greylag Goose in Britain and Ireland

The species occurs in Britain and Ireland all year round but numbers are boosted in winter by Icelandic migrants which arrive from October. The total Icelandic population is currently estimated at 107,000 birds (Wetlands International 2017) of which 95,000 winter in northern Britain (Mitchell 2016) and an estimated 5,000 migrate to Ireland (Boland & Crowe 2008).

However since Icelandic and resident birds are inseparable in the field and they overlap extensively in range from October to March it is extremely difficult to identify which population birds originate from. The vast majority of Icelandic birds winter on the Orkney archipelago in the far north of Scotland, with a five-year average of 68,210 birds between 2010/11 and 2014/15 (Frost *et al* 2016). Orkney also has a large resident population, but around half of these wintering birds are thought to be of Icelandic origin (Mitchell 2016).

By far the most important Irish site for wintering greylag geese is the Swilly/Foyle complex with a five-year average of 2,073 birds between 2010/11 and 2014/15 (BirdWatch Ireland 2017). The site supports a mixed flock of Icelandic and local feral birds but the population is thought to be of predominantly Icelandic origin (Boland & Crowe 2008). The winter flocks at Strangford Lough and Lough Neagh/Beg probably also include a high proportion of Icelandic birds.

Resident birds in northern Scotland and the Western Isles were until recently considered as a remnant of the indigenous population, which possibly covered much of Britain. Elsewhere in Britain the resident population has been re-established and most birds are derived from re-introductions, releases and escapes. Both populations are increasing and have effectively merged so that they are no longer geographically distinct (Mitchell *et al* 2012). Since these populations are impossible to distinguish from each other they are now collectively known as the British greylag goose.

Whether Ireland ever had a native resident breeding population is still open to debate. Despite this for convenience the feral greylags in Northern Ireland have been grouped with the re-established "British population" by the British Trust for Ornithology (BTO) on the WeBS database and denoted as "British and Irish Greylag".

There is growing evidence from ring re-sightings of interchange between resident British greylags and geese in Ireland. However, the extent of this interchange is not known since there is no annual census of feral greylag geese in Ireland.

In Britain the range and population of resident greylag geese has increased significantly in the past few decades, averaging 28% a year between 2002/03 and 2012/13 (Hayhow *et al.* 2015) and is presently estimated at 140,000 birds (Musgrove *et al.* 2011). The population of resident greylag in Ireland increased by 60% between a census in the mid 1990's (Browne and O'Halloran 1998) and the next all Ireland census in 2007 (Boland & Crowe 2008), an increase of 5% per annum. The increased range of breeding greylag in Ireland is also evident when comparing the changes in breeding distribution between the original Bird Atlas in 1968-72 and the most recent Atlas published in 2013, as illustrated in Figure 2 below (Balmer et al 2013).

#### 2.3 Feral Greylags in Northern Ireland – a brief history

Most of Ireland's resident population originates from captive breeding and release of birds during the twentieth century. There is little data to support a remnant breeding population in Ireland and so there is a tendency to refer to this population as "feral". The population is thought to be in excess of 2,000 (Bird Watch Ireland 2017) and is now widespread throughout Ireland.

The first documented resident Greylag Geese in Ireland were known from Castle Coole in County Fermanagh where geese were believed to be present from at least 1700. Other "Wild" and "Great Harrow" geese, which were almost certainly Greylags, were also known from Counties Dublin and Down in the 18<sup>th</sup> century (Holloway 1996).

The Castle Coole birds spread and became established elsewhere on Lower Lough Erne only when additional birds were introduced in the 1960s (Owen & Salmon 1988). Also in the 1960s, birds were introduced to Strangford Lough as part of a wider translocation programme by the Wildfowlers' Association of Great Britain and Ireland (WAGBI). Elsewhere small feral populations had become established at Annamoe County Wicklow and at Cobh in County Cork (Merne 1986), but by the time of the first Breeding Bird Atlas nesting was only recorded at Lough Erne and Strangford Lough (Sharrock 1976).

The present status of feral Greylags in Northern Ireland is poorly understood. However it is clear that they have increased significantly, as have the resident populations in Britain. The last census that covered the whole of Ireland was undertaken in 2007/08 (Boland & Crowe, 2008). The largest accumulation of resident greylag at that time was within the Lough Foyle/Lough Swilly area, estimated at 440 geese. However the estimated number of feral greylag for this area has been recently increased to 1,000 birds by the Irish Greylag Goose Study Group (Birdwatch Ireland 2017).

At three other key sites in Northern Ireland - Belfast Lough, Lough Neagh and Strangford Lough - the 2007/08 census recorded 956 geese in January 2008, but only 265 (presumably feral) geese in August, illustrating the additional input of presumed Icelandic birds. However direct comparisons are not possible since coverage in August was less complete.

The second Bird Atlas also illustrates an expansion in breeding distribution with records from a much wider area including Cork, Wexford and Tyrone (Gibbons *et al* 1993). Breeding was also recorded for the first time at Belfast Lough where free-flying birds had been introduced to Victoria Park in the late 1980s from the collection at Ward Park in Bangor (Scott 2004). Since then new breeding populations have become established in western counties, north Donegal, the Lough Neagh basin and North Antrim (including Rathlin Island) while the longer established populations at Lough Erne, Strangford Lough and Belfast Lough have expanded significantly (Balmer *et al* 2013) (see Figure 2).

Anecdotal counts in North Down during the summer of 2016 indicate numbers of feral/resident greylag in excess of 400 geese (K.Mackie unpublished data) which indicates a marked increase in this area since the last census. Early autumn concentrations of greylag in East Antrim exceeded 400 in both 2015 and 2016 (K Mackie unpublished data) but due to the mobility of flocks at this time of year, and the lack of marked geese, the breeding provenance of these flocks is at present unknown.

The distribution of tracked geese from north Down (Clewley et al., 2017) suggests that interaction between these late autumn flocks is unlikely and they can therefore be considered to be separate.

This suggests at least a three-fold increase in the number late summer/early autumn greylag since the 2007/08 census for this area.

#### 2.4 Ecology of Greylag Geese

Wintering Greylags in Ireland feed almost exclusively on farmland and mainly on open expanses of improved ryegrass pasture. Where available they will feed on winter stubbles and waste root crops in early winter before moving to pasture and winter cereals from late winter into spring. They prefer large open fields which offer a clear open view to potential predators and have a tendency to distance themselves from roads (Keller 1991).

Flock sizes vary from small family groups to large aggregations where families mix with non-breeders or failed breeders. At dusk birds from disparate groups may join together before moving to communal roost sites, usually on a lake or sheltered inlet on the coast. However Greylag geese will also continue to feed on clear, moon-lit nights, particularly if mammalian predators are limited (Boland & Crowe 2008). The distance between roost site and foraging site is usually within 5km (Newton *et al* 1973) but will vary depending on the availability of suitable feeding sites. The distance travelled between roost and feeding site has been found to decrease as the winter progresses (Bell 1988).

From March onwards greylag geese intending to breed can be seen as pairs as they look for a suitable nesting site. Nesting birds choose a wide variety of nest sites including wooded islands and wetlands where inaccessible swamps or reedbeds offer security from mammalian predators. A study in Scotland in the 1970s sampled 476 nest sites and found that the vast majority of nests (415) were on wooded islands, since islands without woodland were often occupied by gulls. A further 53 were located in dense vegetation on the shores of lakes or large rivers, while seven were in moorland and one in woodland (Young, J.G. 1972a).

Eggs are laid from early April with a clutch of 5-6 eggs and an incubation period of 28-29 days. Incubation is by the female alone but male birds are attentive throughout the incubation period, often standing guard over the nest site (Gibbons et al 1993, BWPi 2004).

Hatching commences in May and family parties will congregate on ponds and lakes eventually gathering together into a larger flock. In a local study average brood size in North Down and SE Antrim in mid-June 2016 was 3.9 young per pair (K. Mackie unpublished data). This is comparable to a mean of 3.68 on the Uists (1988-2003 & 2006-2008) (Trinder et al. 2009), but contrasts with a mean brood size of 2.28 goslings per successful pair found in Icelandic birds between 2004 and 2014 (Mitchell 2015) and a 10 year mean (2006-15) 2.91 in the Outer Hebrides (Mitchell 2016).

In the summer Greylag geese undergo a complete moult including their flight feathers, which renders them flightless for up to three weeks between late May and August (BWPi 2004). Nonbreeding birds or failed breeders tend to moult from early to mid-June, earlier than successful breeders, which time their moult to synchronize with the fledging period of goslings (late June to early July).

After moulting Greylags aggregate into larger flocks and may extend their foraging range away from the breeding area. A study in the Netherlands on resident birds showed that they wintered within 10km of their breeding sites (Voslamber et al. 2010). A recent study on feral geese in Belfast using

transmitters found that the majority of greylag stayed within 15 km of the catch site (Clewley et al., 2017).

Post moult migration may also occur and has been observed in the re-established population in England where Greylag geese from Gloucestershire undergo an annual post moult migration to Cumbria and southern Scotland (M.Brown pers.com.). On Rathlin ringing evidence demonstrates that birds move between the island and Islay / Colonsay in western Scotland (see Section 4.3).

Breeding success can be monitored by assessing the overall proportion of fully grown juveniles within the population by ageing autumn flocks using plumage characteristics. This becomes more difficult as they progressively replace juvenile feathers throughout the winter. The 10 year mean for the Scottish Hebrides (British population) 2006-2015 is 27.4% of juveniles (Mitchell, 2016), whereas the 10 year mean for the Icelandic population for 2003-2012 was 22.6% (Mitchell 2015).

#### 2.5 Legal and conservation status in Ireland

In Northern Ireland the Greylag Goose is afforded protection by the Wildlife (NI) Order 1985 (as amended). This legislation establishes a close season, running between 1<sup>st</sup> February and 31<sup>st</sup> August in any year, during which Greylag Geese cannot be killed or taken.

As a quarry species, it is legal for Greylag Geese to be killed or taken outside this period, except on Sundays or during the hours of darkness. In addition, Article 6 of the Order prohibits certain methods of killing or taking wild geese and it is an offence to seal dead geese in Northern Ireland.

Although the breeding birds in Northern Ireland are derived from introduced birds, they are fully protected during the breeding season and it is an offence to intentionally or recklessly disturb nesting birds or to take, damage or destroy their nests. An exemption exists under Article 5 of the Order whereby authorised persons may under licence kill geese outside the close season if it can be shown that this was necessary for public health or to prevent serious agricultural damage.

In the Republic of Ireland greylag geese can be shot from 1st Sept to 16th October with an extended season to Jan 31st at Lady's Island Lake, Co Wexford, as well as Gearagh East and Gearagh West in Co Cork. These regulations are designed to help restrict feral greylag numbers whilst providing protection to Icelandic greylag later in the winter. Greylag is amber-listed in Birds of Conservation Concern in Ireland since it has a localised wintering distribution, restricted to fewer than ten sites (Colhoun & Cummins 2013).

The inability to separate wild Icelandic greylag from resident greylags has implications for site designation and wildlife management particularly when flocks of resident geese are large such as at the Lough Swilly/Foyle complex. In November 2012 a catch and marking programme was initiated by a partnership between Inch Wildfowlers Club, the National Parks and Wildlife Service and BirdWatch Ireland to help investigate relative abundance and distribution of the two populations throughout the winter. As knowledge of the provenance of other flocks in Ireland is limited this marking programme has been extended to other parts of the country under a newly convened " Irish Greylag Study Group".



Figure 2 Greylag Goose breeding distribution historical change

Map reproduced from Bird Atlas 2007–11, which is a joint project between, BTO, BirdWatch Ireland and the Scottish Ornithologists' Club. Map reproduced with permission from the British Trust for Ornithology.

## 3 Conflicts with humans and agriculture

#### 3.1 Damage to grasslands and crops

In recent decades changes to agricultural practices such as the growing importance of silage and increased use of fertilisers in grassland management have resulted in greater opportunities for feeding geese (Kirby *et al* 1999). Increasing numbers of geese and their reliance on agricultural crops has inevitably led to conflict with farming mostly through yield loss and sward damage caused by overgrazing, compaction or damage through trampling. Fouling of grass through accumulation of goose faeces may also be an issue where geese are at a high density.

Research has shown that intense grazing by geese can have a detrimental effect on grass yield. For example a study on Islay (Percival and Houston 1992) found that where grass fields had been grazed heavily by barnacle geese, up to 82% of the standing crop was lost. Heavily grazed areas also resulted in a 38% reduced silage yield in mid-June. However, the study also showed that where grazing wasn't intense there were no significant losses of yield due to geese.

Other studies have found that Islay farms had a lower livestock carrying capacity than control farms on the mainland and were later in taking first silage cuts. For example, in late winter/early spring goose grazing can remove a significant part of the sward leaf area which reduces the ability of the grass to photosynthesise, and so yield is delayed (Kirby *et al* 1999, McKenzie 2014). Deleterious effects of grassland grazing appear to be especially prominent if it occurs in spring (Colhoun & Day, 2002) when repeated grazing of new seedlings increases risk of die off. In addition, fields exposed to repeated intensive grazing by geese may need to be reseeded more regularly as geese selectively target grass species leading to the establishment of weeds within the sward (Bjerke et al. 2014).

Where large concentrations of geese occur, the areas affected are often clearly visible. Lack of sward height and the proportion of bare ground are features of the goose-grazed areas as illustrated by the picture in Figure 3, where the grass in the foreground has not been systematically grazed by geese.

In contrast the grazing of winter cereals may create increased yields as the grazing can encourage growth through tillering (Lorenzen & Madsen, 1986) but there are also documented adverse effects, particularly in connection to harsher winters. However studies have found that yield losses in cereals caused by goose damage were generally small, resulting in <5% yield reduction, although in extensive systems like Scottish crofts this could potentially be significant (Gibbons et al 1993).

Very few studies have managed to quantify the impacts on crops by trampling or puddling (Fox et al. 2016) due to the complication of artificial replication for controlled experiments and variation in soil structures. In Ireland it has been recorded that goose damage to winter cereals was generally not significant, although at Braganstown, County Louth the farm manager commented that damage was caused when the site is flooded and the trampling of pool margins damages the crops (Boland & Crowe 2008).

#### 3.2 Goose management schemes

The documented impact on grass yield and condition has resulted in the implementation of local goose management schemes in Scotland, most notably on Islay, the Outer Hebrides and more

recently Orkney. In relation to resident greylag geese, some schemes support shooting of geese both in the open and closed seasons, under licence, as well as egg pricking in the nesting season. Intensive monitoring programmes have been an important prerequisite for these schemes as it has provided population models to guide and design appropriate levels of management.

Adaptive management procedures are in place on Islay where there is more than one goose species involved, with different levels of international protection and conservation status. Over the next few years, different methods of coordinated scaring techniques and diversionary crops will be trialled, as well as lethal control under license. The Faroe Islands Government has recently lifted a hunting ban on greylag geese in an attempt to reduce the effects of their resident greylag population on agriculture. If crop damage can be proven there, licenses to cull at any time of year can be given. However, since there is little baseline data on greylag numbers, productivity or movement, it is likely the effects of such controls will not be adequately assessed (Vang & Jensen 2016).

#### Figure 3 Illustration of Goose feeding impacts on Islay



Source: McKenzie 2014

#### 3.3 Human health and animal welfare

Goose droppings are large and visible and faecal deposition rate has been measured as up to 0.39 pounds per day dry weight (USFWS 2005). In some situations goose droppings may give rise to human health concerns, particularly in waterbodies where there is a public water supply or human activity such as swimming. There are several pathogens associated with goose droppings which

could potentially be transmitted to humans including *Cryptosporidium, E. coli* and *Salmonella*. Since 2003 the water supply on Rathlin Island has been sourced from an 80 metre deep bore well which flows through 4.5 kilometres of distribution mains. Prior to this the water supply was derived from three of the freshwater lakes but the current system significantly reduces any potential for contamination of water supplies from goose or other animal droppings. In fact, there is little documentation regarding transmission of disease to humans from goose faeces suggesting that zoonosis is not a significant issue and the risk of infection is believed to be low (USFWS 2005).

In some areas farmers have expressed concerns that goose droppings may result in animal health issues, from the ingestion of goose droppings. Recent claims from Lake Windermere in The Lake District relating to lambs dying from *Salmonella* poisoning as a result of ingesting Canada goose *Branta canadensis* droppings could not be substantiated. In that case it has been pointed out that goose droppings could not be isolated as the cause of death and that there are other potential sources of *Salmonella* including poultry, cattle and sheep (Hartley & Bryant 2012).

Conversely, vanderWal,R.&Loonen (1998) describe an incidence where reindeer (*Rangifer tarandus platyrhynchus*) actively select barnacle goose droppings in Svalbard to increase their fibre intake and improve digestibility of forage. With regard to avoiding faeces covered pasture, a controlled experiment using different degrees of fouling and sheep, concluded that although sheep showed initial avoidance for intensely fouled turf, they eventually grazed it normally after all other grass had been depleted (Pochard & Kear 1968).

On Rathlin there have been at least two recent reports of cattle dying from Blackleg, reportedly caused by ingestion of goose droppings. Blackleg is a fatal disease of young cattle caused by the bacterium *Clostridium chaevuoei*. It can occur in any area, and can be extremely localised, for example affecting only one field within a farm unit. Blackleg mainly occurs in permanent pastures during the warm summer months and is ingested by animals from contaminated soil or occasionally feed and so can also occur in housed animals. Even in areas where it has not previously occurred, activities such as soil excavation or drainage can initiate outbreaks, presumably by creating suitable conditions for spore activation. The disease is almost entirely preventable by vaccination (Laven 2003). None of the literature sourced for this project referred to any potential link between goose droppings and blackleg in cattle.

The risk of collision by geese with aircraft is well-documented, particularly in the aftermath of the incident in January 2009 which resulted in an aircraft crash landing in the Hudson River at New York after colliding with Canada geese. There is no airport or runway on Rathlin although there is a little-used temporary airstrip for microlights on Rathlin, situated in the Church Bay area (Flood & Parker 2011).

In Northern Ireland the feral population of greylag geese at Victoria Park has been the subject of specific scrutiny due to its proximity to the Belfast City Airport. The airport has recently commissioned a research project into the movements and ecology of the greylag geese in Belfast to help with assessing collision risk and whether translocation of geese might be a management option. This project has used collar-mounted GPS devices to transmit positions of individual geese using the Global System for Mobile Communications. This technology has proven to be very cost effective for studying the distribution of roosting and foraging sites through a full calendar year in the greater Belfast area (Clewley et al. 2017).

## 4 Greylag geese on Rathlin Island

#### 4.1 Assessing numbers and distribution - methodology

One of the main objectives of the project was to obtain information on the status, distribution and movements of geese on Rathlin Island. The key methods used were as follows:

- 1. Field observations on Rathlin Island and the mainland;
- 2. Capture and marking of birds on Rathlin;
- 3. Consultation with landowners and the birdwatching community;

#### 4.1.1 Field observations

Systematic counts and field observations were carried out on both Rathlin Island and Fair Head on the adjacent mainland, since a link between the two sites was already known from sightings of neckbanded birds (Section 4.3). These counts included three which were undertaken simultaneously with observers stationed at Rathlin Island and Fair Head.

Several visits were also made to search for geese around Lisanoure House (Loughguile) and the farmland of the River Bush floodplain. Lisanoure House was known to the authors as a site which supported a small recently established breeding population and a large roost on the lake, with birds occasionally feeding in surrounding fields (D. Allen pers. obs. / R. Wild pers. comm.).

Similarly the River Bush floodplain was known to hold feeding geese on occasions around Benvardin House and other locations. For this reason potential linkages between these sites and the Rathlin population were investigated (Section 4.3). The locations of these survey areas are illustrated in Figure 4, and details of all survey visits are presented in Appendix 1 of this report. It was beyond the scope of the project to include more distant locations which regularly support greylag geese such as Lough Foyle, Lough Neagh and Belfast Lough.

The survey visits to Rathlin Island focused on mapping the numbers and distribution of the birds and gathering data on grazing intensity by measure the density of droppings (Section 5.3). Four separate visits were made to Rathlin Island in February and early March 2017. Two of these sessions involved overnight stays which enabled roosting birds to be observed and facilitated the setting of cannon nets (see 4.1.2). A total of seven goose counts were undertaken on Rathlin during the project period.

All suitable areas were scanned with binoculars for the presence of geese from a vehicle or on foot. Bicycles were used to facilitate coverage on the final visit in March. Telescopes were used to age birds or to read neck collars of birds in feeding groups.

The numbers and distribution of all geese found were recorded on field maps and data entered into an Excel spreadsheet. Goose distribution was mapped using ArcGIS on a permitted Bing base map layer.





#### 4.1.2 Capture and marking

Cannon netting attempts were made on Rathlin Island on two separate occasions under licence. The purpose of the exercise was to mark birds so that goose movements to and from the island could be monitored both during the project and in any subsequent monitoring programme. Although opportunities were limited through mixed weather and the time required for geese to respond to bait, the first attempt was successful catching three adult geese on February 10<sup>th</sup> with a half net (11mx11m) set in Field 24 (Figure 5). The second attempt on February 17<sup>th</sup> in Field 12 failed, as one goose sat down too close to the net (danger zone) allowing the flock to wander through the target area and out of range. With an adequate level of reconnaissance already achieved the potential to mark larger numbers remains excellent but was beyond the timeframe of the current project.

#### 4.1.3 Consultations and desk study

Since the project timescales were restricted to late winter, it was essential to obtain information from other sources to build a more complete picture of goose numbers, distribution and behaviour on the island. Key consultees included the Rathlin Development and Community Association, the RSPB and individual landowners who had direct experience of the geese. In addition, an information request was made to the birdwatching community in Northern Ireland via the Northern Ireland Birdwatchers' Association website and blog.

These consultations provided information on the distribution of geese at other times of the year, including the breeding season and moulting period. A small number of previous records of greylag and other geese were also sourced from the Centre for Environmental data and Recording (CEDaR).



Figure 5 Successful cannon netting - Field 24

#### 4.2 Survey results

There are few accurate counts of greylag geese in winter from Rathlin, Fair Head or other inland sites, as these areas are not covered by Wetland Bird Survey (WeBS) counts. This project enabled systematic counts to be carried out on Rathlin Island during late winter 2017, along with several coordinated simultaneous counts at Fair Head. Table 1 provides a summary of all maximum counts while full details and maps of the individual fields used by geese are presented in the report Appendices.

#### 4.2.1 Rathlin Island

The number of geese recorded on the island was extremely variable and changed daily as birds departed and arrived at the island throughout the day. The maximum number of feeding geese recorded on Rathlin Island was 99 birds on 1<sup>st</sup> February 2017. Numbers declined later in the month, dropping to 42 birds on 17<sup>th</sup> February. By early March birds were beginning to pair up and several pairs were recorded in apparently suitable breeding locations (see Appendix 2). The largest number recorded on the island was at dusk on 16<sup>th</sup> February when 170 were counted flying in to roost at Lough Ushet. Since only 42 birds remained on the island to feed the following day, it is assumed that the rest of the birds flew back to Fair Head or other feeding sites on the mainland.

The geese favoured the best quality grassland and particularly the fields around Church Bay. However geese were also recorded regularly feeding in fields at Kinramer and Ballygill Middle with counts of 23 and 38 respectively. The usage of individual fields by geese is discussed in more detail in Section 5.

The provenance of the geese frequenting Rathlin at this time of year is unclear, although it is likely that most of the birds are from the resident feral population. However it is known from direct observations that birds move to and from the mainland on a daily basis whilst links with geese on Islay and western Scotland have also been established (see Section 4.3).

Very little information on wintering geese on Rathlin was available from other sources since they are not counted systematically as part of the WeBS or any other monitoring programme. A count of 100 greylag geese was made on Rathlin Island on 14<sup>th</sup> October 2010 (CEDaR data). Reports from islanders also indicate that numbers may be larger in autumn or early winter and it is possible that many geese move to better quality grassland on the mainland as the winter progresses.

#### 4.2.2 Fair Head

The number of geese feeding at Fair Head was significantly higher than on Rathlin during all of the co-ordinated counts, as illustrated by Figure 5. This is likely to be due to the large expanse of intensively managed grassland available at Fair Head (and proximity of a fresh water lake) which is very attractive to geese in late winter. Between 170 and 180 birds were recorded feeding on both 9<sup>th</sup> and 10<sup>th</sup> February and again on 10<sup>th</sup> March. On the 9<sup>th</sup> February the numbers increased to a total of 220 birds just before dusk when all birds moved onto Lough na Cranagh to roost. On 9<sup>th</sup> February the flock included single pink-footed and Greenland white-fronted geese, whilst on the first visit on 25<sup>th</sup> January no greylags were present, although a group of seven Greenland white-fronted geese was recorded, suggesting a high turn-over of birds at the site.



Figure 5 Results of co-ordinated counts at Rathlin Island and Fair Head

#### 4.2.3 Lisanoure House

A reconnaissance visit of the fields around Lisanoure House at midday on 19<sup>th</sup> January 2017 failed to locate any birds either on the lake or on the surrounding fields. However a visit just before sunrise on 17<sup>th</sup> February found in excess of 340 birds leaving the lake, most of which headed in a northerly direction. A similar number of birds returned to the lake at sunset that evening, mostly from the north. The destination of these birds is still unknown as the numbers on both Rathlin and Fair Head fell significantly short of this total.

#### 4.2.4 River Bush floodplain

Two sessions of driving and scanning fields throughout this area yielded no birds. However a flock of 30 grey geese (probably greylags) was seen flying west past Benvarden on 10<sup>th</sup> February (R. Donaghey pers. comm.). These birds were heading away from the Bush flood plain to an unknown destination.

Site	Roost counts	Maximum Feeding counts
Rathlin Island	170 (16.02.2017)	99 (01.02.2017)
		73 (08.02.2017)
		49 (09.02.2017)
		62 (10.02.2017)
		42 (17.02.2017)
		62 (10.03.2017)
Fair Head	220 (09.02.2017	220 (09.02.2017)
		183 (10.02.2017)
		92 (17.02.2017)
		71 (27.02.2017)
		171 (10.03.2017)
Lisanoure castle (Loughguile)	340+ (17.02.2017)	0

#### Table 1 Summary of Greylag Goose counts at study sites

#### Figure 6 Geese at Fair Head



#### 4.3 Goose movements

#### 4.3.1 Neck collars

Ringing and marking programmes involving greylag geese enable the movements and distribution of individual birds to be observed and recorded over time. Neck collars are particularly useful as these can be easily read in the field, either in long vegetation or on water. Between 1998 and 2006, 1,115 geese were marked with either leg or neck bands many greylag geese have been fitted with neck collars on the Outer and Inner Hebrides as part of their management and monitoring programme, to help understand site fidelity and population dynamics.

The Irish Greylag Study Group has also been active catching and ringing geese, particularly at Lough Swilly, County Donegal to help understand the movements and distribution of both Icelandic birds and the local feral population.

Two neck-collared birds were recorded during the field work in north Antrim. These collared geese were both caught on Islay, Scotland as by-catch along with Greenland white-fronted geese. One was ringed at Gortan Chuim in January 2015 and the other near Bowmore in November 2014 (Bob Swann pers. comm.). A further three birds were captured and collared on Rathlin Island during the project. Record details of these collared birds both before and during the project are provided in Table 2 below.

Neck collar	Date	Location	Grid reference
Orange NCL	31/01/2015	Gortan Chuirn, Islay	NR2561
	01/04/2015	nr. Port Charlotte, Islay	NR2458
	16/06/2015	Loch Fadda, Colonsay (with brood)	NR3795
	11/11/2015	Oa, Islay	NR3042
	19/11/2015	Kinnabus Farm, Islay	NR2942
	05/03/2016	Oa, Islay	NR2942
	01/02/2017	Ballygill Middle, Rathlin Island	D1251
	09/02/2017	Fair Head, Co Antrim	D1742
	10/02/2017	Fair Head, Co Antrim	D1742
	17/02/2017	Fair Head, Co Antrim	D1742
	10/03/2017	Ballygill North, Rathlin Island	D1252

#### Table 2 Neck collar details (current project in italics)

Neck collar	Date	Location	Grid reference
Orange NDD	11/11/2014	Ronnachmore, nr Bowmore, Islay,	NR3058
	29/09/2015	Bridgend, Islay	NR3360
	02/05/2016	Fair Head, Co Antrim	D1742
	03/07/2016	Lough Ushet, Rathlin Island, Co. Antrim	D1548
	09/02/2017	Fair Head, Co Antrim	D1742
	10/02/2017	Fair Head, Co Antrim	D1742
	17/02/2017	Fair Head, Co Antrim	D1742
	27/02/2017	Fair Head, Co Antrim	D1842

Neck collar	Date	Location	Grid reference
Orange B VH	10/02/2017	Caught and collared at Demesne, Rathlin Island	D1650
	17/02/2017	Mullindress, Church Bay, Rathlin Island	D1551
	10/03/2017	Ballynoe/Craigmacagan, Rathlin Island	D1550

Neck collar	Date	Location	Grid reference
Orange B VI	10/02/2017	Caught and collared at Demesne, Rathlin Island	D1650
	10/03/2017	Kinkeel, Rathlin Island	D1449
	26/03/2017	Craigmacagan Lough	D1549

Neck collar	Date	Location	Grid reference
Orange B VJ	10/02/2017	Caught and collared at Demesne, Rathlin Island	D1650
	10/03/2017	Kinkeel, Rathlin Island	D1449
	26/03/2017	Craigmacagan Lough	D1549

These data illustrate the linkage between Rathlin Island and other sites in both Scotland and Northern Ireland. The sightings also confirm the mobility of the birds at this time of year. Both NCL and NDD originate from Islay and it is likely that both birds originate from the resident British population since they were present in Scotland and Northern Ireland during the breeding season.

**NCL** was seen with a brood on Colonsay in June 2015, but appeared to spend much of winter 2015/16 on Islay and had not been recorded for nearly a year before being seen on Rathlin on 1<sup>st</sup> February 2017. It spent most of the next month at Fair Head where it was recorded on three occasions and was not seen again on Rathlin until the final field visit on 10<sup>th</sup> March. On that date it

was recorded with a mate at a small lough in Ballygill North, suggesting that it may attempt to nest there. The implication is that Scottish birds could be augmenting the feral population on Rathlin.

**NDD** on the other hand, had previously been recorded in Northern Ireland, with records from both Fair Head and Rathlin Island in summer 2016. In late winter 2017 this bird was consistently recorded from Fair Head, but never from Rathlin Island.

The birds fitted with neck collars on Rathlin proved elusive until the final visit on 10<sup>th</sup> March, when all three were seen on the island. Prior to this there had only been one re-sighting since the birds were collared on 10th February, when orange **B|VH** was recorded a week later (17<sup>th</sup> February) in the fields at Mullindress behind Church Bay. This bird wasn't seen again until 10<sup>th</sup> March when it was found with a small group of 7 birds in rushy fields at the boundary of Ballynoe and Craigmacagan townlands. Also on 10<sup>th</sup> March **B|VI** and **B|VJ** were seen together as a pair in a flock of 14 birds at Kinkeel beside Mill Bay (Figure 6). They were subsequently seen together at Craigmacagan Lough from 26<sup>th</sup> March – a likely nesting site for the pair (Hazel & Ric Watson pers. comm.).

The records in Table 2 do not reveal the full complexity of the movements of birds to and from these areas, even on a daily basis. For example on 17<sup>th</sup> February NCL was present amongst 55 birds at Fair Head between 0830 and 1330, at which point 30 birds (including NCL) took off and flew north. At 1630 the site was revisited and 92 birds were counted, this time including NDD but not NCL. This alone illustrates the regularity of movement between sites – not only between Rathlin and Fair Head, but also presumably other sites on the mainland and perhaps further afield.

#### Figure 6 Neck-banded birds on Rathlin Island (10<sup>th</sup> March 2017)



#### 4.3.2 Additional observations

It is clear that the greylag geese were using additional sites to those covered during the project. Despite negative searches of the Bush flood plain it is possible that some birds were feeding in fields which were not visible from the roads. However, it is also possible that the geese may be moving further afield, possibly linking with birds using the Foyle/Swilly complex. Indications of the extent of these movements may be inferred from the data gathered during this project. Some examples are provided below:

- 30 birds were seen flying west from Benvardin, River Bush on 10<sup>th</sup> February;
- Over 340 greylags left a roost at Lisanoure House at dawn on 17<sup>th</sup> February, but the combined Rathlin Island / Fair Head totals by midday was just 97 birds. No birds were found at the Bush flood plain during a search later in the day;
- A single barnacle goose was present in the Lisanoure flock on 17<sup>th</sup>. Single barnacle geese were subsequently recorded from Myroe, Lough Foyle on 18<sup>th</sup> February / 10<sup>th</sup> March and Rathlin Island on 27<sup>th</sup> February (NIBA 2017). Whilst different birds may be involved it is possible that these records relate to the same bird;
- Single pink-footed and Greenland white-fronted geese were present at Fair Head on 9<sup>th</sup> February, but only the white-front was there on the 10<sup>th</sup>. A single pink-footed goose was however at Myroe, Lough Foyle on 18<sup>th</sup> February, which could possibly be the same bird. A pink-footed goose at Belfast Waterworks on 30<sup>th</sup> January and 1<sup>st</sup> March may be a different bird.

Conversely some birds are clearly very faithful to specific sites. For example, a distinctive leucistic greylag was present at Fair Head on every visit and was never seen on Rathlin or any other location, although presumably the same goose was reported to be on Rathlin two years previously (Liam McFaul, pers. comm.).

Evidence was also obtained that geese feeding on the mainland will roost on Rathlin overnight, before returning to the mainland the following morning. At dusk on 16<sup>th</sup> February 170 birds flew into Lough Ushet from the sea, while the following day a maximum of 42 birds was left on the island. Early on 17<sup>th</sup> only 55 birds were recorded at Fair Head, demonstrating that many birds had relocated elsewhere. The combined number of birds at the Lough Ushet and Lisanoure roosts on the night of 16<sup>th</sup>/17<sup>th</sup> February was in excess of 510 birds, a significant proportion of which could not be accounted for during the daytime survey.

#### 4.4 Breeding population

The breeding population of feral geese on Rathlin Island is likely to be derived from the release of birds onto the island for shooting between 15 and 20 years ago. The number of birds released is not known but a self-sustaining population soon became established on the island.

Predation of adult geese including incubating females is not a significant issue on Rathlin due to the absence of foxes *Vulpes vulpes*. However clutches of eggs and young geese are still likely to be vulnerable to predation by introduced ferrets *Mustela furo*, which are known to be an important predator of goose nests in some situations (Kristiansen 1998).

The timing of this project has precluded a survey of breeding numbers and distribution, although some data were provided by island residents. It is clear that on Rathlin nests are dispersed in a variety of situations across the island and have been found in heather, rushes or other tall vegetation, usually within a few hundred metres of a lake or pond and often in an elevated location. The margins and hinterland of the larger lakes including Ushet and Kebble are thought to support several pairs each (Liam McFaul pers. comm.) The map in Appendix 2 illustrates nest sites reported by residents and the location of pairs recorded during the final survey on March 10<sup>th</sup>.

An estimate of breeding numbers and productivity may also be obtained by counting broods on the island's waterbodies, particularly in May or June since post-breeding and moulting birds assemble on the larger lakes such as Kebble and Lough Ushet. The proportion of breeding birds can be estimated as the minimum number of adults required to account for the observed number of broods (= number of juveniles / mean brood size) divided by the total number of adults.

In the absence of systematic count data, only an approximate estimate of breeding numbers can be made by extrapolation from recent counts. For example a count of approximately 100 birds was recorded from Lough Ushet in early July 2016 (G. Platt pers. comm.). Moulting flocks are generally comprised of juveniles, their parents and a proportion of immature non-breeding birds. The mean proportion of breeding adults among 7 breeding flocks around Belfast in 2016 was 0.27, mean brood size 3.63 (n=19), (K.Mackie unpublished data). The mean proportion of breeding birds on the Uists (1986-2007) was 0.214 (sd 0.063) (Trinder et al 2009). Using both these figures as guides we could tentatively extrapolate for the Lough Ushet flock of 100 geese would contain between 10-14 successful breeding pairs

Also in summer 2016 it is reported that 5-8 broods were on Kebble Lake (Liam McFaul pers.comm.) and so allowing for other small post-breeding groups on the Island, it can be estimated that the breeding population is in the region of 15-30 pairs.

Broods are tended by both parents but after a few weeks the broods amalgamate and large crèches can form. On Rathlin this can be seen in summer on the larger lakes such as Ushet and Kebble (Liam McFaul pers. comm.). During this period many are also accompanied by growing young and the geese are strongly attached to water bodies so that they can avoid predators and other dangers. On Rathlin the largest moulting flock seems to be at Ushet Lough (Liam McFaul pers. comm).

Breeding Greylag Geese have also become established at Fair Head with breeding reported by local farmers from Lough na Cranagh, most likely on the island or crannog which gives the lake its name. Although it is likely that these birds originated on Rathlin, there is anecdotal information that small numbers of captive birds may have escaped from a local farmyard. Greylag geese have also bred at Lisanoure House lake for at least the past two years (R. Wild pers. comm.).

## 5 Impact Assessment

#### 5.1 Introduction

The project timescale allowed limited scope for assessment of damage to agricultural interests for the following reasons:

- 1. Data on goose numbers and distribution on the island were only obtained during the late winter period of February to early March;
- 2. Impacts on silage yield and wild bird cover could not be assessed prior to the main growth period.

Nevertheless the project presented an opportunity to obtain baseline information and to identify further work which is required to enable a full assessment to be made. The main elements of the assessment were as follows:

- 1. Interviews with islanders and formal questionnaire
- 2. Goose distribution and grazing intensity survey

#### 5.2 Interviews and questionnaires

#### 5.2.1 Methods

As part of the project a meeting was held with representatives of the Rathlin Community and Development Association (RDCA) in order to understand the background to the project and to elicit views from key members. In addition several other landowners were interviewed about the geese, including the RSPB warden who also farms land used by the geese.

A formal questionnaire was also presented to attendees at a public meeting relating principally to the proposed eradication of rats and ferrets on the island. The questionnaire also included a series of questions about the issue of feral geese on the island (see Appendix 8). The questions were designed to obtain data on the attitude of the islanders to the geese, the issues involved and the need for management.

#### 5.2.2 Results

Fifty-eight questionnaire responses were received and the results are summarised anonymously in Appendix 8. The questionnaire revealed that a significant majority (42/58) considered the feral geese to be a problem on the island, although only a small proportion of the respondents (11/58) were directly affected as landowners. Nevertheless there was widespread support (45/58) for management of feral geese on the island, with several respondents making a clear distinction between the feral geese and wild migratory geese. The main issues relating to the geese were cited by those affected as damage to grazing and silage along with the potential for transmission of disease to livestock.

The questionnaire sought to find out what types of control would be acceptable to islanders if management was required. The preferred methods were egg-pricking (47/58) and scaring (39/58) while culling of moulting birds was also acceptable to the majority (31/58). However shooting was less acceptable to the respondents, even in the open season. Almost as many respondents were not

in favour (20/58) as were supportive of shooting as a control measure (25/58). One respondent cited concerns for other wildlife (Irish hares) while another was also concerned that any management measures should be informed by further study and analysis of the issues.

Most of the respondents directly affected by geese considered them to be a year-round issue. However separate interviews with farmers on Rathlin also identified that one of the main issues was damage to silage in late summer, especially by trampling. This may coincide with the largest numbers of geese being present on the island when broods of young birds swell the resident population. A specific issue highlighted on Rathlin was the potential effect of goose grazing on areas of early cover provided by the RSPB for corncrakes *Crex crex*. The seasonality of this issue means that specific impacts could not be assessed during this project, but there is a need to include potential effects on conservation cover in any future assessment of agricultural impacts. A single Fair Head landowner interviewed about the geese using his fields had no specific concerns although did state that he occasionally tried to move geese from silage fields during the growing season.

#### 5.3 Grazing intensity survey

#### 5.3.1 Methods

Data on goose numbers and distribution was obtained through field surveys as described in Section 4.1 of this report. The distribution of geese on the island was systematically mapped and details of goose activity within each field recorded.

An additional survey of the grazing intensity within selected fields was also undertaken, by counting droppings along walked transects. Data were gathered from 21 fields in the Church Bay area, where the highest levels of goose activity had been recorded, along with selected fields in the west of the island. The fields included those which were known to have been regularly used by geese and also included fields where no geese had been recorded during the survey period. This exercise provided data on the level of use of these fields by geese and provided some insight into potential effects on grass yield or condition.

The survey involved walking transects through each field and recording the presence and density of droppings encountered per square metre. Each transect followed a route through the centre of the field and along one edge, so that a variety of aspects within each field could be sampled. At 20 metre intervals a 1x1 metre quadrat was inspected for droppings and the number of individual droppings recorded. Maximum counts and mean densities of droppings per m<sup>2</sup> were calculated.

Roost deposits were counted as single droppings and the numbers of deposits were recorded separately as evidence of roosting (Figure 7). Additional data collected included the freshness (or otherwise) of the droppings. Vegetation data were not recorded, since it was too early in the season for any obvious effects on vegetation structure to be visible.

Both maximum and mean counts of droppings per m<sup>2</sup> were obtained from each of these fields. A number of other fields across the island were also surveyed in less detail, where less structured transects were undertaken and maximum counts of droppings per m<sup>2</sup> recorded. All data from these surveys are presented in Appendix 6 of this report.



#### 5.3.2 Results

Density of droppings / m<sup>2</sup> provides a reliable indication of overall feeding intensity within individual fields. Fields where geese are recorded during counts may only be occupied for short periods but the survey of dropping density provides evidence of the regularity of use over a period of time, particularly as droppings remain visible in the vegetation for 3–4 weeks (Madsen 1985).

The survey was targeted at the Church Bay area where the largest groups of geese were most regularly recorded during the project. The survey found that the highest density of droppings were in the cluster of fields directly to the east of the harbour at Church Bay. Two of these fields (Fields 12 and 15) had densities of > 2 droppings / m<sup>2</sup>, whilst a density of 1-2 / m<sup>2</sup> was recorded in three adjacent fields. Only two other fields surveyed (Fields 23 and 33) had a density of >1 / m<sup>2</sup>, and Field 33 had a group of 14 geese grazing in it at the time of the survey.

The findings confirm that in late winter the geese favour the good quality grassland in the hinterland of Church Bay in the townlands of Demesne and Mullindress. These results are consistent with the goose distribution surveys which recorded grazing geese using these fields on several occasions. The results for Field 15 were interesting since geese were seldom recorded in this field during the surveys yet the field held the second highest dropping density of all fields surveyed (2.3 /  $m^2$ ), suggesting that it has been in quite regular use.

Conversely, very low densities of droppings were found in several fields where groups of >20 birds had been recorded once, indicating that these fields were not in regular use. For example no droppings at all were recorded along the transect in Field 21, which held a group of 34 birds briefly on  $17^{th}$  February, which suggests very localised or short-term grazing. Similarly in the adjacent Field 22 a very low density was found (0.2 / m<sup>2</sup>) despite geese being recorded there on three occasions, including the day of the survey, again suggesting that the geese do not spend long periods in the field.

Droppings were often localised within fields, being generally more frequent around puddles or ponds where geese would gather to drink. Where roost deposits were present, these were also often beside these features. In Field 12, which had the highest recorded density  $(2.7 / m^2)$  most droppings were along the field edge rather than in the field centre where they were significantly reduced. This may reflect access to water in the ditch (or adjacent field) or be due to the increased sward height at the field margin managed for corncrake cover. Dropping deposits along the field boundary indicated that birds also roosted here.

Three strips of fenced-off wild bird or corncrake cover, associated with Fields 15, 26 & 27, were also walked as part of this survey. No droppings were found within the fenced areas, although in Field 15 droppings were found up against the fence line but not beyond regardless of the fact it was fully accessible to the geese if they had wanted to walk in.

There was no discernible difference in vegetation structure between fields where higher densities of droppings and those where densities were low or absent. This is mainly due to the lack of growth in the fields at this time of year, but may also be due to the relatively small numbers of geese present on the island during the survey. It is possible that more visible effects may be recorded in summer when goose numbers are swollen by young birds and birds seek out silage or wild bird cover.

Away from the core survey area, a number of fields were also walked at Kinramer and Ballygill Middle / North. Here droppings were found to be localised and restricted to field boundaries close to ponds. This was particularly notable at Ballygill Middle where goose distribution may be influenced by occasional shooting which pushes birds away into other areas. At Kinramer Field 4 held roost deposits indicating a roost of up to five birds and a maximum of 4 droppings / m<sup>2</sup>, although the mean along the transect walked was significantly less than this.

#### 5.4 Conclusions

The numbers of geese on Rathlin Island in late winter is relatively small and may be higher at other times of year such as post-breeding and in early winter when the feeding resource is richer. However by late winter Rathlin is clearly secondary to Fair Head as a feeding centre for greylag geese.

In addition the dropping densities recorded during the survey are generally low and indicative of use by relatively small numbers of geese for short periods, which may reflect the wide choice of feeding areas available to the geese. The density of >  $2/m^2$  is comparable to a recent survey of brent goose droppings at sites in Dublin Bay which routinely recorded mean densities of between 2 and 4 /  $m^2$  on

the grassland surveyed (Mayes 2012). However there is no clear measure of what density of droppings are diagnostic of reduced yield or other agricultural damage.

Indeed the timing of this project precludes any definitive conclusions about the agricultural impacts of the feral greylags on Rathlin Island. The interviews and field studies suggest that the greatest impacts could potentially be in spring or summer when larger numbers of birds may be feeding in silage crops. Similarly, although there was no evidence of geese feeding in fenced-off bird cover areas, this may potentially become an issue later in the growing season.

The mere presence of geese does not necessarily equate to agricultural damage. Yet it seems likely that the population of feral birds is increasing and will continue to do so since nesting sites and feeding habitat is widespread on the island, and foxes are absent. As such the potential for conflict with farmers and landowners on the island is also likely to increase.

More information is required to establish what areas the birds are using in summer and whether there is demonstrable damage to silage or forage areas. In particular less intensive grassland systems and smaller farm units such as those on Rathlin Island may be affected by lower grazing intensity than elsewhere and this should be investigated further. A proposed pathway for further studies and potential trial goose management is set out in Section 6.

## 6. Discussion and Recommendations

#### 6.1 Making a case for goose management

There are a number of options for managing or controlling populations of feral geese ranging from occasional shooting during the open season to a programme of complete eradication (see Section 6.2). Some of these management measures require to be licenced by the statutory agencies and licences will not be issued unless there is clear evidence that the geese are causing serious agricultural damage.

Thus before a comprehensive management programme can be developed, there is a need for additional evidence to answer some key questions about the geese on Rathlin Island. Table 3 summarises these key issues and the work required to enhance the evidence base for control of geese on Rathlin Island.

Whilst it may not be necessary to obtain all of the evidence identified in Table 3, as a minimum it is important to have a detailed understanding of the provenance of the geese and also to find out more about the breeding population, since targeting nesting birds would avoid any potential conflicts with wild migratory geese which may mix with feral birds in winter. It is also important to be able to demonstrate and ideally quantify the extent of damage caused. These three steps are discussed in more detail below.

Evidence / information required	Tasks	
Proportion of wintering birds from the feral	Capture of geese and ringing / marking of feral birds	
population		
Identify other sites used by greylags and their	Capture of geese and fitting with GPS transmitters	
linkages		
Number of breeding pairs and post-breeding	Nest survey and survey of post-breeding flocks to	
population on Rathlin	assess productivity	
Trend in goose numbers	Monitoring of breeding and wintering birds annually	
Field use during the calendar year	Monitoring of feeding birds	
Evidence of damage to grassland / bird cover	Large scale grazing intensity study	
	Assess impact of other grazers eg rabbits and hares	
Quantify damage in terms of economic loss	Estimate yield loss using exclusion experiments and	
	measuring sward height. Investigate the quantity and	
	effects of goose droppings in animal fodder.	
Source of damage (i.e feral or migratory geese)	Capture of geese and ringing / marking of feral birds	
	Monitoring of feeding birds	

#### Table 3Enhancing the evidence base

#### 6.1.1 Understanding the provenance of geese

Effective management of geese on Rathlin will only be possible if the linkages with other sites can be fully understood. For example many control measures may prove to be ineffective if birds are simply pushed temporarily to other sites, before returning to Rathlin. Even if full eradication is attempted, birds may simply re-colonise from populations in adjacent areas.

On Rathlin there is already evidence of significant links between the island and Fair Head, where there is a small breeding population. There is also evidence of movement between western Scotland and Rathlin, including a marked bird which bred on Colonsay in 2015 but was paired in suitable habitat on Rathlin in 2017. For these reasons it is essential that the capture and marking of geese on Rathlin continues to provide information on interchange with Scottish and Irish birds. It would also be important to catch and mark birds at Fair Head which supports larger numbers of geese in winter.

Capture and marking is important both in winter and post-breeding where broods of feral birds can be marked. Flightless moulting birds could be corralled by a small number of people in canoes or small boats on the larger lakes, particularly Lough Ushet where it is known a large post-breeding flock occurs (NIBA 2017 / L. McFaul pers.comm).

During the current project, unsuccessful attempts to find birds which left the roost at Lisanoure House confirmed the difficulty in locating geese within the wider landscape. For this reason the use of GPS transmitters such as those recently fitted to geese in Victoria Park, Belfast, is recommended. The use of neck bands and leg rings remains important as monitoring of marked birds can still provide useful data on greylag movements and mortality.

#### 6.1.2 Surveying nesting geese

Nest surveys are important not only to obtain data on the size of the nesting population but also to develop effective nest-searching methodology for egg-pricking should this management option be

selected. An initial assessment of breeding birds demonstrates that breeding geese are scattered widely across the island, with potential implications for survey coverage.

However, initial indications are that most nests are likely to be located within a few hundred metres of a water body and so targeting of suitable habitat around lakes and ponds may result in most nests being found. If required the additional use of trained dogs could significantly increase the efficiency of nest searches. Nest surveys or post-hatching surveys should also be carried out at Fair Head, Lisanoure House and any other sites in North Antrim where breeding is suspected.

#### 6.1.3 Evidence of agricultural damage

The introduction of certain measures and experiments may provide evidence of serious agricultural damage which is necessary before certain control measures can be permitted by the statutory agencies. These include:

- Trial goose exclusion areas to show effects of goose grazing on sward height and structure;
- Investigation of the quantity and effects of goose droppings in animal fodder.

It is acknowledged that quantifying damage to pasture can be challenging since this is not yielded like root crops or cereals. Quantifying damage to silage can also be difficult since yields vary naturally from year to year. However issues such as reduction of stock numbers on pasture grazed by geese or an increase in the numbers /duration of animals being housed indoors may provide some measure of damage (Halcrow 2013). Information on reduced silage yields from goose grazed fields versus fields which are not regularly grazed may also provide supporting evidence.

A perception regarding the detrimental effect of goose droppings on animal welfare or health is currently unsubstantiated but further investigation through the Department of Agriculture/Veterinary Division could be encouraged. Since the statutory agencies must be satisfied that there is evidence of serious damage before licences can be issued any work as outline above should be undertaken in co-operation with DAERA NIEA.

#### 6.2 Management Options

#### 6.2.1 Introduction

Once a decision has been made to introduce a goose management scheme, a range of management options is available. However a piecemeal approach is unlikely to be effective in controlling the numbers of geese on the island and a more systematic approach would be required.

On Islay ongoing agricultural conflict with grazing geese has resulted in the development of a holistic and coordinated approach to goose management. "Adaptive management" is defined as *"learning and adapting, through partnerships of managers, scientists, and other stakeholders who learn together how to create and maintain sustainable ecosystems"*, (Williams *et al.* 2009). In effect this means that management techniques can be introduced, modified or discarded depending on their effectiveness. Such an approach requires detailed monitoring of the effects of each management measure tested.

Table 4 sets out some of the management options which could be relevant for greylag geese on Rathlin Island. These range from non-lethal scaring at one end of the spectrum to round-up and cull at the other. Goose management on Rathlin is currently restricted to the occasional shooting of geese during the open season (1st September to 31st January) by a small number of landowners. However islanders report that the geese are difficult to shoot and this ad hoc measure is ineffective, temporarily moving geese to fields elsewhere on the island. It is therefore suggested that a more systematic and adaptive approach would be required in order to effectively manage feral geese on Rathlin.

#### 6.2.2 Round-up and cull of geese

No cull of this type has previously been licenced in Northern Ireland and it is unlikely that this measure would be sanctioned by the statutory bodies without conclusive evidence of widespread and serious agricultural damage on the island. It should also be recognised that a cull could have significant public relations implications, since it would have to be carried out in the summer, probably on Lough Ushet where the process may be visible to the public.

#### 6.2.3 Shooting and scaring

An increase in shooting effort during the open season does not require specific licencing but may be ineffective as birds will simply move in response to the shooting, possibly to other parts of the island or the mainland, and will return when shooting effort decreases. However, increasing adult mortality is an important parameter when attempting to reduce a population such as greylag where longevity of individuals can be in excess of 20 years. Using trained marksmen with suitable firearms and ammunition loads could be trialled in September, which is during the open season but before the potential arrival of Icelandic greylags. From mid-October onwards this approach carries the risk that Icelandic migratory greylags or even non-target goose species could be shot. The questionnaire showed that shooting was less favoured by islanders than other control measures and so further liaison may be required before this measure is adopted.

The effects of scaring (visual and auditory) tend to be temporary, with geese often becoming habituated to the devices or at best moving to a different field nearby. However scaring could be trialled to prevent birds from grazing specific field units, particularly in tandem with shooting where this is licenced during the close season.

#### 6.2.4 Egg-pricking / oiling

Control of nesting birds through egg-pricking or oiling may represent the most effective long-term method of reducing the resident population of feral birds on Rathlin, subject to licencing by NIEA. The key advantages of this approach are:

- Only feral geese are targeted;
- More likely to be ethically acceptable to the local community and visitors.

Countering this, however, egg-pricking or oiling represents a long-term remedy, nests may be difficult to locate and the action would need to be extended to other sites, such as Fair Head, in order to maximise the effect of control on Rathlin.

## Table 4Management options

Option	Licence required	Time of year	Comments
Scaring techniques	No	Year round in	Scare crows and bangers for day-
		feeding areas or	feeding birds. Flash lights and laser
		in particular the	pens for night-feeding birds. Tape
		period leading up	or string to prevent movement into
		to harvest.	silage or bird cover. Potential
			impacts on other species should be
Tatablish discussions of a discus	N		assessed.
Establish diversionary feeding	NO	Year round	Should be done in conjunction with
or sacrificial crops			silago crops More information
			needed on main silage areas
			affected
Continue in-season shooting	No	Sentember-end	Increase effort and use trained
		January	marksman. Maintain detailed bag
		,	records. In conjunction with
			further research into provenance
			of birds in winter. Risk that non-
			target goose species could be shot.
Extension of shooting into close	Yes – DAERA NIEA	February/March	Licence could be granted for an
season over affected areas			extension of shooting over the
			most affected areas, subject to
			evidence of impact. Should be
			done in conjunction with co-
			ordinated static scaring
Egg pricking or oiling of eggs	Yes – DAERA NIEA	April/May	Requires survey to locate nesting
			birds (possibly using trained dogs).
			Will need repeated for several
			population Extend to other areas
			(e.g. Eair Head) where significant
			connectivity between sites is
			demonstrated
Round up and cull moulting	Yes – DAFRA	June/July	Organised exercise based at main
adults and young	TCO DALENT	suncysury	moulting site(s) (e.g. Ushet Lough).
			to corral and capture birds. Would
			require major public relations
			exercise as may be visible to public
			and visitors.
Round up and translocate	Yes - DAERA	June/July	Requires suitable receptor site.
moulting birds			Done in conjunction with marking
			of birds to monitor subsequent
			movements.
Cannon netting	Yes – DAERA NIEA	August - March	Acts as scaring deterrent and
			allows birds to be marked for
			Turther research.

Management of Greylag geese on Rathlin Island – a scoping report

#### 6.3 Recommended approach

The recommended approach for Rathlin is to initiate the following key steps as outlined in this report.

- 5. Obtain information on the numbers and distribution of geese throughout all seasons;
- 6. Undertake a survey of breeding birds;
- 7. Record evidence of agricultural damage to pasture and silage and conduct trials (e.g goose exclusion) to establish impacts of geese;
- 8. Undertake further capture and marking of geese with collar bands and GPS transmitters to clarify breeding distribution.

Once evidence is presented which satisfies the statutory agencies that licences can be issued for control of geese, it is recommended that a programme of egg-pricking should be initiated. This could be undertaken in tandem with combined shooting / scaring at the most affected fields.

Monitoring of all management measures must be carried out so that their success or otherwise can be determined and specific measures can then be discontinued or adapted depending on the results.

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Appendix 1	urvey visit details
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Date	Site visited	Personnel	Activity
19.01.2017	Lisanoure House	CM/DA/KM	Observations
25.01.2017	Fair Head	CM	Count
01.02.2017	Rathlin Island	CM/DA	Consultations / count
08.02.2017	Rathlin Island	КМ	Consultations / observations
09.02.2017	Rathlin Island	KM/(CM)	Consultations / count
09.02.2017	Fair Head	СМ	Count / observations
10.02.2017	Rathlin Island	КМ	Cannon netting / observations
10.02.2017	Fair Head	RD	Count / observations
16.02.2017	Rathlin Island	КМ/СМ	Consultations / observations
17.02.2017	Rathlin Island	KM/(CM)	Cannon netting / count
17.02.2017	Fair Head / Lisanoure House	DA	Counts / observations
17.02.2017	River Bush	СМ	Observations
27.02.2017	Fair Head / River Bush /	СМ	Count
	Lisanoure House		
10.03.2017	Rathlin Island	КМ/СМ	Count / observations
10.03.2017	Fair Head/ River Bush /	DA	Count
	Lisanoure House / Myroe		

KM – Kerry Mackie

CM – Clive Mellon

DA-Dave Allen

RD-Richard Donaghey



#### Appendix 2 Greylag goose breeding areas on Rathlin Island



Appendix 3 Greylag goose wintering distribution on Rathlin Island 2017 – composite map

Appendix 4 Goose activity Rathlin Island – field data

Field number*	Land use	No. of geese recorded	Dates recorded	<b>Droppings</b> Yes/no	Density of droppings (max /	Use of field by geese	Comments
					mean per m <sup>2</sup> )		
1	Silage	0	n/a	Y	Max. 1/m²	n/a	Most droppings beside pond at southern end. Known nesting site.
2	Silage	0	n/a	Y	Max. 2/m <sup>2</sup>	n/a	Feathers also found
3	Silage	0	n/a	Y	Max. <1/m <sup>2</sup>	n/a	Droppings not fresh
4	Grazing	23	08.02.2017	Y	Max. 3/m <sup>2</sup>	Feeding / drinking	Flock of 23 present at 1715
		8	17.02.2017		Mean 0.1/m <sup>2</sup>	Roosting	8 seen at 1430 on 17 <sup>th</sup>
		18	10.03.2017				18 on morning only – possibly drinking
							Evidence of roosting by up to 5 birds
5	Silage	0	n/a	Y	Max. 2/m <sup>2</sup>	n/a	Most droppings on S slope beside wetland.
							Birds may be disturbed by shooting.
6	Silage	0	n/a	Y	Max. 5/m²	n/a	Most droppings on S slope beside pond
							Birds may be disturbed by shooting.
7	Silage	38	01.02.2017	Y	Max. 1/m²	Feeding	Neck collar NCL present
		4	09.02.2017		Mean 0.09/m <sup>2</sup>	Roosting	2 roost deposits found on 10 <sup>th</sup> March
8	Grazing	5	09.02.2017	Υ	Max. 2/m <sup>2</sup>	Possibly drinking	Flushed from roadside at 0715
9	Grazing	3	09.02.2017	n/c	n/c	Unknown	Flushed from roadside at 0716
10	Grazing	9	09.02.2017	Y	Max 3/m <sup>2</sup>	Unknown	Flushed from roadside at 0718
					Mean 0.3/m <sup>2</sup>		No fresh droppings on 10 <sup>th</sup> March
11	Grazing	0	n/a	Υ	Max. <1/m <sup>2</sup>	Roosting	Evidence of roosting by small group
12	Silage / Wild bird	38	08.02.2017	Y	Max. 8/m²	Feeding	In regular use by geese. Birds move
	cover	34	09.02.2017		Mean 2.7/m <sup>2</sup>	Roosting	frequently between fields 12-16 through
		31	10.02.2017				open gates and fences. Droppings more
		34	17.02.2017				concentrated at field edges. Evidence of
							roosting. Cannon net set on 17th Feb -
							unsuccessful
13	Grazing (cattle)	49	01.02.2017	Y	Max. 6/ m <sup>2</sup>	Feeding / drinking	Birds often move between Field 12. Most
		34	09.02.2017		Mean 1.1/m <sup>2</sup>	Roosting	congregate around the flooded pool.
		1	10.03.2017				Evidence of roosting.
14	Silage / Wild bird	14	10.02.2017	Y	Max. 4/m <sup>2</sup>	Feeding	Birds move frequently between fields 12-16
	cover	28	17.02.2017		Mean 1.1/m <sup>2</sup>		through open gates and fences.
		3	10.03.2017				
15	Silage / Wild bird	11	10.02.2017	Y	Max. 6/m²	Feeding	Moved into field 14
	cover	2	10.03.2017		Mean 2.3/m <sup>2</sup>		No droppings found in fenced-off bird cover

Field number*	Land use	No. of geese recorded	Dates recorded	<b>Droppings</b> Yes/no	Density of droppings (max	Use of field by geese	Comments
					/ mean per m <sup>2</sup> )		
16	Silage / Wild bird	10	01.02.2017	Y	Max. 3/m <sup>2</sup>	Feeding/drinking	Moved into field 13
	cover	25	09.02.2017		Mean 1.0/m <sup>2</sup>		Moved from field 12
		3	10.02.2017				Moved into field 14
17	Grazing	4	09.02.2017	Ν	n/a	Feeding	Moved into field 13
		2	17.02.2017				No droppings found on 10 <sup>th</sup> March
18	Silage	35	10.02.2017	Y	Max. 1/m²	Feeding	Birds were intentionally flushed from field
					Mean 0.06/m <sup>2</sup>		12 for netting operation
19	Silage	12	08.02.2017	n/c	n/c	Feeding	Recorded at 1705 (08.02)
		25	09.02.2017				Maximum of 25 by 1700 (09.02)
		12	10.02.2017				Birds flushed from field 12 (see field 18)
20	Grazing	5	10.02.2017	Y	n/c	Roosting	Evidence of roosting in field centre (up to 7
			16.02.2017			Feeding	birds). 5 birds recorded at 1730 on 16 <sup>th</sup> Feb
21	Silage / Grazing	34	17.02.2017	Ν	n/a	Feeding	Moved from field 12 at 1430
	(sheep)						No droppings found on 10 <sup>th</sup> March
22	Silage	22	09.02.2017	Y	Max. 1/ m <sup>2</sup>	Feeding	8 birds at 1300 increased to 22 by 1700.
		6	17.02.2017		Mean 0.2/m <sup>2</sup>		
		5	10.03.2017				
23	Silage	22	09.02.2017	Y	Max. 6/m²	Feeding	Moved from Field 22
					Mean 1.3/m <sup>2</sup>		
24	Silage / Grazing	12	09.02.2017	Y	Max. 3/m <sup>2</sup>	Feeding	Small groups visited field during the day
		15	10.02.2017		Mean	Feeding	Birds flushed from field 12 (see field 18).
							Net set in this field 10 <sup>th</sup> Feb – 3 birds caught
25	Silage	12	01.02.2017	Y	Max. 2/m <sup>2</sup>	Feeding / drinking	Present 1530
					Mean 0.4/m <sup>2</sup>		Most droppings around pond at top of field
26	Silage / Wild bird	0	n/a	Y	Max. 2/m <sup>2</sup>	Feeding	No fresh droppings on 10 <sup>th</sup> March.
	cover				Mean 0.5/m <sup>2</sup>		No droppings found in fenced-off bird cover
27	Grazing / football	0	n/a	N	n/a	n/a	Field walked – no evidence of goose
	pitch						activity.
							No droppings found in fenced-off bird cover

Field number*	Land use	No. of geese recorded	Dates recorded	<b>Droppings</b> Yes/no	Density of droppings (max	Use of field by	Comments		
					/ mean per m <sup>2</sup> )	80000			
28	Grazing	0	n/a	N	n/a	n/a	Field walked – no evidence of goose activity.		
29	Grazing	0	n/a	Y	Max. 2/ m <sup>2</sup> Mean 0.2/m <sup>2</sup>	n/a	Small numbers of droppings only		
30	Unknown	0	n/a	Y	Max. 1/ m <sup>2</sup> Mean 0.15/m <sup>2</sup>	Feeding	Small numbers of droppings only		
31	Unknown	0	n/a	Y	Max. 4/m² Mean 0.6/m²	Feeding	Most droppings at southern edge of field		
32	Unknown	0	n/a	N	n/a	n/a	Field walked – no evidence of goose activity.		
33	Grazing	14	10.03.2017	Y	Max. 8/m <sup>2</sup> Mean 1.8/m <sup>2</sup>	Feeding Roosting	Birds flushed onto sea at Mill Bay. Evidence of roosting. Neck collars BIVI and BIVJ present as a pair.		
34	Grazing	7	10.03.2017	n/c	n/c	Feeding	Small field, birds concealed amongst rushes. Neck collar BIVH present.		
35	Grazing	0	n/a	N	n/a	n/a	Fields walked – no evidence of goose activity		
36	Grazing	22	10.03.2017	n/c	n/c	Feeding / drinking	Variable numbers through the morning. Max. 22 at 1245		
37	Unknown	3	10.03.2017	Y	Max. 1/ m <sup>2</sup> Mean 0.2/m <sup>2</sup>	Feeding	Birds flew west		
38	Grazing	0	n/a	Y	n/a	Roosting	3 roost deposits found 10 <sup>th</sup> March		
39	Unknown	0	n/a	Υ	Max. 2/m² Mean 0.1/m²	Feeding / drinking	Droppings found by flooded areas		

\* Fields are shown by number in Appendix 5

Y = Yes, N = No, n/c = not counted, n/a = not applicable

## Appendix 5 Goose Activity Rathlin Island – field maps



#### Management of Greylag geese on Rathlin Island – a scoping report







## Appendix 6 Results of grazing Intensity survey - data table and map

Field Number	Max droppings/m2	Mean droppings/m2	Comments
4	1	0.1	4 roost deposits
7	1	0.09	2 roost deposits
10	3	0.3	No fresh droppings at time of survey
12	8	2.7	Most concentrated along fringes. Evidence of roosting
13	6	1.1	Concentrated at pool edge and eastern side
14	4	1.1	Most in middle of field
15	6	2.3	Droppings throughout field. None in fenced off wild bird cover
16	3	1	most by pool
17	0	0	None found
18	1	0.06	one old dropping
21	0	0	Sheep grazed
22	1	0.2	Few droppings found
23	6	1.3	most at southern boundary
24	3	0.4	sheep grazed
25	2	0.4	most around flooded area at top of field
26	2	0.5	None in fenced-off wild bird cover
27	0	0	None in fenced-off wild bird cover
28	0	0	None found
29	2	0.2	a few droppings only
30	1	0.15	a few droppings only
31	4	0.6	most along southern edge
32	0	0	None found
33	8	1.8	Geese grazing at time of survey. Evidence of roosting
37	1	0.2	
38	0	0	roost deposits found nearby
39	2	0.1	beside flooded areas



#### Appendix 7 Distribution of wintering geese at Fair Head, County Antrim



## Management of Greylag geese on Rathlin Island – a scoping report

## Appendix 8 Questionnaire Responses

Question 1	Were you aware that Greylag Geese had been introduced onto Rathlin and are now breeding on the island as a feral population?										
Yes		No			Other			No response			
45			5		0			5			
Question 2	Were you aware that wild geese from Iceland and elsewhere may also visit the island in winter?										
Yes		No			Other			No res	ponse		
46		6			Not previously t	o fera	al population – 1	5			
Question 3	Do you think C	Greylag Geese d	are a problem on Rat	hlin?							
Yes		No			Other			No res	ponse		
42		7			Don't know/nee	ed mo	re information - 4	5	5		
Question 4	Have the gees	e been a proble	em for you?								
Yes		No		Other			No res	ponse			
11				0	0						
Question 5	If yes, what is	the nature of t	he problem?								
Damage to grazir	ng and silage	Cause dis	ease to livestock	Both dam	age and disease		Create a mess		Not applicable/not answered		
7		1	3		3		1		46		
Question 6	What time of	year are these	problems caused?	-							
All year		Spring		Summer	Summer		Winter/spring		Not applicable/not answered		
10		2	1 (May-Sept		nber) 1			44			
Question 7	Do you discour	age the geese o	on your land and if s	o, how?							
Yes - shooting	Yes – chasiı	ng/scaring	Yes – both shooti	ng and scaring	Yes - unspecifie	d No		Not applicable/not answered			
5	1		1		2		13	36			

Question 8	Do you see any benefits to the geese being on Rathlin?												
Yes	No			No			Other		Not applicable/not answered				
10				34			1 - Don't ki	now		12			
8 - attractive feature/nice to see				31 - No			1 - Found	comments interesting	by re-				
1 - interesting for	tourists			2 - No	ot in such larg	ge numbers		using them	n creatively (catching, cl	ipping			
1 – safety of winte	ering bird	ds		1 - No	ot the feral ge	eese		wings and	domesticating geese ar	nd use			
								for meat,	eggs, feathers etc.)				
								interesting	. I do not know enough	about			
								this issue t	o comment.				
Question 9	Would	l you suppo	ort the r	manag	gement of the	e geese if ne	cessary?						
Yes				No				Other			Not app	licable/n	ot answered
45 (1-non-lethal o	nly)			5				1 – Don't k	now 1 – Probably		6		
Question 10	If so w	vhich mana	agement	t or co	ontrol measu	res would yo	ou support?						
Egg-pricking (spri	ng)	Sca	aring (al	ll year		Shooting (	open season		ason)	Round-up and cull (summer)			
Y - 47		Y - 1	39			Y - 25			Y - 23		Y - 31		
N - 2		N -	- 7			N - 20			N - 19		N - 11		
Don't know - 0		Doi	on't knov	w - 0		Don't knov	<i>v</i> - 0			Don't know - 3			
No response - 8		No	respon	ise - 12	2	No response - 13		No response - 16			No response - 13		
Question 11	Would	l you allow	v access	to you	ur land to mo	nitor or con	trol geese?						
Yes				No				Other		Not applicable/not answered			
32				2				1 – need to	r	23			
Question 12	What r	numbers o	of geese	would	d you regard	as acceptab	le in summer	•					
None	L	ess than 2.	20		20-50		Less than 1	100 Less than 200 Dor			know	/ not	Not answered
									eno		nough information		
11	1 11 11 3		3	1 15		15	5 6						
Question 13	What r	numbers o	of geese	would	d you regard	as acceptab	le in winter						
None	L	.ess than 2	20		20-50		Less than 1	00	Less than 200	Don't	know	/ not	Not answered
									enoi		ough information		
11	1	13	10 1				2	14			7		