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Management and Conservation for Farmland Waders

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Summary

- **Five wading bird species (Oystercatcher, Lapwing, Curlew, Redshank and Snipe) are among the highest wildlife conservation priorities on Scottish farmland**
- **Lapwing and Curlew have seen some of the highest population declines of widespread birds in Scotland in recent decades**
- **Reasons for the declines relate to changes in habitat management and predation**
- **The key to protecting and recovering wader populations is management to provide suitable nesting and feeding habitat and low predation pressure**

Introduction

The term 'wader' or 'wading bird' is used to describe certain families of birds that are classified within the order Charadriiformes[1], which also includes the gulls, terns and auks. Waders feed primarily on invertebrates and almost all species are associated with wetlands or shallow water for at least part of the year, although many make use of drier habitats including farmland, moorland, mountain-tops and woodland, particularly during the breeding season. All species have slender and often long bills, used for probing soft ground for invertebrates, and most have quite long legs to allow them to wade into shallow water to feed in mud and sand. Waders in Scotland are almost exclusively ground-nesting birds, laying their eggs in a shallow scrape.

About 30 wader species regularly occur in Scotland, mostly belonging to the sandpiper (Scolopacidae) and plover (Charadriidae) families and occurring in the largest numbers as autumn and winter visitors to coastal habitats such as estuaries and rocky or sandy shores. Although 20 species of wader regularly nest in Scotland these include three scarce species with c.300-1100 pairs each (Dotterel, Whimbrel and Greenshank) and seven very rare species with fewer than 60 pairs each (Little Ringed Plover, Black-tailed Godwit, Ruff, Purple Sandpiper, Red-necked Phalarope, Green Sandpiper and Wood Sandpiper). The remaining ten species are relatively widespread and each has a population measured in thousands of pairs (Oystercatcher, Golden Plover, Ringed Plover, Lapwing, Curlew, Dunlin, Common Sandpiper, Redshank, Woodcock and Snipe).

[1] In North America waders are referred to as 'shorebirds' and 'wader' is often used to describe larger long-legged birds such as storks and herons.

Oystercatcher, Lapwing, Curlew, Redshank and Snipe are often referred to as farmland waders as they are dependent on agricultural land for breeding habitat to a greater degree than any of the other species, although Golden Plover, Ringed Plover, Dunlin and Woodcock all use farmland to some extent in parts of the country. Although they are still relatively widespread and common, farmland waders are among the highest conservation priorities in Scotland. This is because four out of the five species have undergone some of the largest population declines of any Scottish birds in recent decades and all five species are red or amber listed species of conservation concern across the UK (Eaton et al. 2015).

Oystercatcher (*Haematopus ostralegus*)

Skirlie (Scots) Gille-brìghde (Gaelic)


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The Oystercatcher is a conspicuous and noisy bird of farmland across much of Scotland in spring and early summer. In the winter they are largely confined to the coast where they feed on shellfish (mainly mussels and cockles), although much of the Scottish breeding population moves south and west to England, Wales, Ireland and France in the winter while birds from Scandinavia and mainland Europe move to our eastern coasts.

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This species was formerly restricted to the coast for breeding too, but started to colonise inland areas from the early 1800s, initially nesting on river shingles and loch shores before spreading into adjacent farmland areas where they use their long bill to feed primarily on earthworms. Unlike other waders, oystercatchers will sometimes nest close to buildings and often in unusual locations such as flower-beds or on drystone walls or on top of fence posts. Nesting on flat gravel roofs was first noted in Aberdeen in the 1960s and has since spread to other towns and cities, with these birds often feeding in urban parks and on lawns. Unlike other waders, adults can take food to their young rather than requiring the young to move to areas where they can feed themselves; a feature which enables rooftop nesting.

Oystercatchers usually return to inland breeding areas in February, initially remaining in flocks around rivers, ponds and lochs, before moving to breeding territories and laying eggs in April. On farmland, they will nest on grassland or arable fields and prefer short (c.5cm) vegetation that allows early detection of approaching predators. Most young have fledged by the end of June and birds have typically departed from inland breeding areas by mid-July.

After population increases during the 20th century, Scotland's Oystercatcher population declined by 37% from 1995-2015 (Harris et al. 2017) and it is an amber-listed species of conservation concern in the UK. The most recent population estimate for Scotland is 84,500-116,500 pairs (Foster et al. 2013).

Lapwing (*Vanellus vanellus*)

Peesie, Teuchat (Scots) Curracag (Gaelic)

The Lapwing is a familiar and popular species with many farmers: their tumbling display flights and wheezing calls during March, April and May are traditional signs of spring. Lapwings return to inland breeding areas from mid-late February and usually lay eggs in April. Like the Oystercatcher they choose short (c.5cm) vegetation on grassland, spring-sown crops or fallow land for nest sites, but are much more restricted to open areas away from trees and buildings. On marginal upland farms they will often nest on heath, bogs or wetlands with short vegetation adjacent to more improved pasture. Where conditions are favourable Lapwings often form loose colonies of several pairs that work together to drive away predators. Chicks typically hatch in early May, but replacement clutches after failed attempts may not hatch until June.

Where Lapwings nest on dry grassland or arable fields it is essential that there is suitable invertebrate-rich habitat nearby for the chicks to feed, as the Lapwing gets most of its food (insects and earthworms) from near the soil surface as it has a short bill. Wet grassland, unimproved grassland or fallow land with open vegetation provide the best feeding areas.

The breeding season is generally complete by late July when Lapwings move to the coast. However, unlike the Oystercatcher, flocks of Lapwings can be seen inland throughout the autumn and winter during mild periods, although many of these are likely to be migrants from Scandinavia and mainland Europe rather than local breeders.

The Lapwing declined by 58% in Scotland from 1995-2015 (the third largest decline of any widespread species during that period) (Harris et al. 2017) and it is a red-listed species of conservation concern in the UK. The most recent population estimate for Scotland is 71,500-105,600 pairs (Foster et al. 2013).

Curlew (*Numenius arquata*)

Whaup (Scots) Guilbneach (Gaelic)

The Curlew is our largest wader, with a distinctive long, curved bill and bubbling calls given in display flights over breeding areas. Curlews generally spend the winter near the coast and typically return to breeding areas in March. They tend to favour upland areas and many breed on heather moorland and peat bogs, but they also use farmland in the upland margins and lowland areas, mainly nesting in grassland fields but also arable crops. They feed mainly on earthworms using their long bill to probe soft soil and mud.

Curlews generally lay eggs in early May, with the chicks hatching in early June. This later breeding period than Oystercatchers and Lapwings is associated with a requirement for the nest to be more concealed in vegetation (c.15cm or more tall), for example in tussocky or rushy pasture, heath or bog, hay or silage crops or growing cereals. Curlews have usually left their inland breeding areas by late July.

The Curlew declined by 59% in Scotland from 1995-2015 (second largest decline of any widespread species during that period)(Harris et al. 2017) and it is a red-listed species of conservation concern in the UK. The most recent population estimate for Scotland is 58,800 pairs (Foster et al. 2013).

Redshank (*Tringa totanus*)

Cam glas (Gaelic)

The Redshank is the least common and least well known of the five farmland waders, but where it does occur it draws attention to itself by its loud, piping calls. They spend the winter at the coast, particularly on mudflats and estuaries and nest most abundantly on coastal saltmarsh and machair. They tend to be less common on farmland, but where conditions are favourable they can form loose colonies like Lapwings. They favour wet grassland or wetlands with grass or rush tussocks to conceal the nest and shorter areas of vegetation for feeding (5-15cm sward height). Pools of shallow standing water are particularly attractive to Redshanks which feed on the small invertebrates that they support.

Redshanks start to lay eggs around mid-April and chicks hatch in late May, with birds departing for the coast in July. There has been a significant population decline in Scotland, with the population estimated at 11,700-17,500 pairs (Foster et al. 2013).

Snipe (*Gallinago gallinago*)

Heather Bleater, Horsegowk (Scots), Naosg (Gaelic)

The Snipe is usually found in true wetland habitats with dense rushes or other vegetation 15cm tall or more, rather than the wet grassland and arable habitats favoured by the other species, although they need patches of more open vegetation or bare mud for feeding. Although they are quite secretive and difficult to observe closely, breeding birds draw attention to themselves by their unique 'drumming' display flights, where the birds produce a bleating sound from the air vibrating their outer tail feathers. Breeding birds also make loud, mechanical 'chipping' calls, often from an exposed perch such as a fencepost.

Snipe nest in dense cover of rushes, sedges or other wetland plants and can be found nesting in lowland wetlands as well as in wet flushes and bogs in moorland habitats. Feeding usually takes place within similar areas of cover and particularly where these adjoin areas of shallow standing water, with the very long bill used to probe the soft ground for invertebrates. Unlike the other waders, Snipe can be found in farmland wetlands throughout the year, except during periods of heavy frost and ice. In winter, numbers are swelled by immigrants from the continent. The Snipe is the only one of the five farmland waders that can still be legally hunted (from 12 August to 31 January only).

The Snipe is also the only farmland wader in Scotland with a breeding population that is not declining (Harris et al. 2017), estimated at 34,000-40,000 pairs (Foster et al. 2013). However, it is an amber-listed species of conservation concern due to a UK-wide decline in the non-breeding population.

Other species

Ringed Plover and Dunlin can be found breeding on the machair of the Western Isles at very high densities. Although the usual nesting habitats of these species are shingle beaches and upland bogs respectively, the agricultural land of the machair supports a third or more of the British population of both species.
Golden Plover nest on upland heaths and bogs, but often feed on lowland farmland during the winter and also regularly use upland pasture close to nesting areas for feeding during the breeding season.

The Woodcock is unusual among waders as it nests in forests and woodland and is nocturnal. It will often feed at night on wet ground in farmland areas close to woodland.

Causes of Wader Declines

The reasons behind wader declines have been subject to considerable research effort, particularly with regard to Lapwings and Curlews, the fastest declining species. Although loss of suitable nesting habitat to forestry or development is a factor at some sites, the main proximate cause of declines is low productivity of fledged chicks. Waders typically lay four eggs (with replacement clutches possible if eggs are lost at an early stage), and many studies suggest that about 0.6-0.8 fledged young must be reared by each pair to offset annual adult mortality. While this means that waders can withstand the loss of 80-85% of their eggs or young each year, losses are frequently higher than this, leading to population declines. The reasons behind low productivity include the destruction of eggs by predators, livestock or agricultural machinery and the loss of chicks to starvation due to loss or deterioration of feeding habitat, predation or the effects of weather. A wide range of different agricultural management factors can contribute to wader declines.

Drainage

Damp ground, including corners or patches of fields, with or without shallow areas of standing water, are important feeding areas for waders and their young, providing an abundance of invertebrates in soft ground that is easily probed. However, these are also the type of areas that are often targeted for drainage work for agricultural improvement, thus reducing the food available for growing chicks. Drainage of wetlands can also remove potential nesting habitat for Snipe.

Grazing management

Lapwings and Oystercatchers require short vegetation for nesting in the spring and even those species, such as Redshank and Curlew, which like some nesting cover from tussocks of grass or rushes will avoid very dense areas. Under-grazing leads to extensive areas of tall, rank grass or rushes that are likely to be avoided by nesting waders and chicks will find it difficult to move around and feed in such habitats. Snipe is the only species likely to use dense rushes. However, over-grazing that produces a very short sward throughout the breeding season is also likely to be detrimental as Curlews and Redshank require tussocks of rushes or grass for nest concealment and chicks benefit from having some cover from predators among the vegetation. Heavy grazing by livestock during the nesting period can also lead to nest abandonment, egg trampling and even predation of eggs by livestock.

Soil management

Soil invertebrates, and particularly earthworms, are essential to provide food for waders and their chicks during the breeding season. Factors that may lead to fewer invertebrates and hence poor chick survival in habitats used by waders include low pH (earthworms require a pH of at least 5.5 to thrive), soil compaction, low soil organic matter and ploughing of permanent pasture.

Reduced applications of lime, farmyard manure and other fertilisers to upland pasture in recent years may have led to a decline in their value to foraging waders in some areas. However, more intensive management of grassland in lowland areas with high rates of fertiliser and pesticide use may also result in lower quality wader habitat as the grassland becomes less botanically diverse, with lower invertebrate populations.

Timing of cultivation and field operations

Lapwings and Oystercatchers nesting on cultivated ground are vulnerable to nest destruction by machinery if crop sowing is carried out in April or early May. Traditionally many farmers have moved or avoided nests when cultivating, but nests are likely to be more difficult to spot from larger and faster modern tractors, particularly if contractors are used who are unaware of the presence or location of nesting waders on the farm. Rolling of grassland in April and May poses a similar threat to these species if they are nesting on grass fields, while cutting in May and June can be a threat to Curlews nesting in silage fields.

Changing from spring to winter cropping is likely to result in the loss of Lapwings and Oystercatchers from arable farmland, as both species prefer to nest on very short vegetation in the spring time, with good visibility across the surrounding area. Winter crops are generally too tall and dense to attract these species.

Tree planting

Forestry and woodland planting can lead to the direct loss of wader habitat if it occurs on sites used for nesting or feeding, although planted areas may continue to be used while the trees are small, before the ground vegetation becomes shaded. Tree planting adjacent to or close to wader habitat is also detrimental as woodland can harbour predators such as crows, foxes, badgers and buzzards. Even if these predators are not present, the proximity of woodland is often perceived as a predation threat by waders, which will usually avoid such areas.

Predation

Research suggests that predation of wader eggs is mainly carried out by mammals, particularly at night, although crows also take eggs. The most likely mammalian predators of wader eggs include foxes, badgers, stoats, weasels, mink, otters, hedgehogs and rats, with foxes generally considered to be the most important egg predator in most areas. Mammal predators will also take wader chicks, but a wide range of birds, including crows, raptors, gulls and herons, also contribute significantly to chick predation. Where high densities of waders are present at a site, they will work together to drive away predators by repeatedly diving at them and chasing them. As wader populations decline and nesting occurs at lower densities, they become less able to drive away predators in this way.

The most important factors driving wader declines are likely to vary depending on location and farming systems and different factors often interact.

Where farms have specialised in arable production, suitable nesting sites may be available for Lapwings and Oystercatchers on cultivated fields, but the nearby areas of pasture that would have been used for feeding by chicks in traditional mixed farming systems may no longer exist and any wet corners that have not been drained are likely to have been abandoned and overgrown with rushes that are too dense to be used as wader feeding areas.

Where lowland farms are predominantly grassland (as in dairy producing areas), grassland management is often too intensive for waders to nest successfully, with regular rolling and cutting of silage fields or high stocking rates on grazed fields throughout the breeding season and a grass sward with low botanical diversity supporting fewer invertebrates for surface feeding species such as Lapwings.

Drainage of wet areas in fields also removes valuable feeding areas and where areas of wet or unimproved pasture suitable for waders survive in the lowlands, they are often small and fragmented, making them more vulnerable to predators present in the surrounding landscape.

In the upland margins, the generally less intensive agricultural management may suit breeding waders (and these areas tend to be the remaining strongholds for many species), but at the same time reductions in lime and manure applications may be reducing the invertebrate food availability in the soil in some areas. Predator control on upland sporting estates benefits waders on adjacent marginal farmland, but in some areas woodland planting close to suitable habitat may increase predation risk.

In the Machair of the Western Isles, the traditional farming systems which result in a mosaic of low-intensity cropping and grazing, combined with the lack of mammalian predators on the islands, has led to some of the highest densities of breeding waders in Europe. The main threat to waders in these areas has been the introduction of non-native predators such as Mink and Hedgehogs, although the abandonment of traditional machair management due to socio-economic pressures and grazing damage to crops by increasing goose populations have also been cited as a threat.

Managing Farmland for Waders

Although their habitat requirements differ slightly, broadly similar measures will benefit Lapwing, Curlew, and Oystercatcher. Redshanks are a little more demanding, generally requiring some standing water throughout the breeding season. Snipe require more densely vegetated wetlands than the other species, but all five species can be found on the same sites if there is enough variety of habitats.

In order to halt and reverse the decline of farmland waders, farm management should aim to deliver the following during the April-June breeding season:

- High quality feeding habitat
- Suitable nesting habitat
- Low predation pressure

High quality feeding areas are usually damp grasslands that are not managed intensively or wetlands with soft, easily probed soil and with a relatively short and open sward, but with some cover from taller vegetation. Suitable nesting habitat is generally short vegetation (c.5cm) for Lapwing/Oystercatcher or slightly taller vegetation (c.15cm) for Curlew/Redshank and may be found in grassland, rough grazing or arable fields that have low levels of disturbance from livestock or machinery during the breeding season.

After hatching, wader chicks can move up to 200 metres (and have exceptionally been recorded moving up to 2km) to find suitable feeding areas, although on wet pasture the same area may be used for nesting and feeding. The further that chicks have to move to find suitable feeding areas, the more hazards and barriers they are likely to encounter, such as ditches, roads, hedges, woodland, fences with rabbit netting and predators. Ideally therefore, management should aim to provide nesting and feeding habitat either on the same site, immediately adjacent to each other, or within a short distance and with no obvious barriers to chick movement between them. The feeding and nesting habitat should be in areas of relatively open landscape and not enclosed by dense woodland and forestry.

High quality feeding habitat

- Maintain areas of permanent pasture, with areas of wet ground to provide feeding areas rich in earthworms and other invertebrates.
- Do not cultivate old pasture, particularly where such areas are scarce, as this is likely to reduce the invertebrate population in the soil. It may take 4 years or more for invertebrate populations to recover.
- Graze the pasture over the winter and/or the spring to ensure that it is relatively short and open from April-June to make the

ground more accessible to waders and their chicks, although some tussocks of taller vegetation provide useful cover from predators. A varied sward height of between 5-15cm is likely to provide the greatest benefits.

- If dense rushes cover a significant proportion of the grassland, a rush cutting rotation should be established to open up the sward.

Box 1: Rush Cutting

When wetland or wet grassland is left ungrazed or undergrazed, rushes can spread over the site forming a tall dense sward that is unsuitable for waders (other than snipe) to nest or feed in. Where this has happened, cutting with a rotary or flail mower can help to open up the sward and make the site suitable for a range of waders again.

- Cutting should only take place between 1 August and 1 March
- Cutting during hard frosts will make access to wetter ground easier and reduce soil damage
- Rushes should be cut close to the ground (<10cm)
- Aftermath grazing by cattle, or rolling of cut areas can help to break up the remaining root balls
- Cutting and baling rushes for removal, where possible, is ideal to prevent the cuttings smothering the ground
- Cut 20-45% of the dense rush area in a random pattern each year and cut different areas annually
- Lime application can help reduce rush growth on acid soils in the long-term and may also improve the invertebrate populations for feeding waders

The long-term aim should be to convert dense rushes to damp pasture with 20-30% rush cover in small patches, to benefit a wide range of wader species.

- Avoid soil compaction from machinery or high numbers of livestock and consider measures outwith the nesting season to alleviate compaction (e.g. soil aerators/ sward-lifters) if it is though to be a problem.
- Maintain soil fertility and pH to support soil invertebrates, but avoid very high inputs of fertiliser, which are likely to result in a sward that is too dense as well as reducing the botanical diversity of the sward and associated surface invertebrates. Lime and light to moderate farmyard manure applications are likely to benefit soil invertebrates, particularly on naturally acidic soils. Test soil pH every 4-5 years to determine if lime is required.
- Create wet areas and/or wader scrapes to enhance feeding opportunities and perhaps attract birds back to areas where they have been lost.

Box 2: Wader Scrapes

A wader scrape is a small shallow area of standing water with muddy edges that attracts feeding waders. They are particularly attractive to breeding Redshanks but may also attract waders into new areas early in the breeding season, possibly encouraging them to nest if the surrounding habitat management is suitable. Wader scrapes can be created by mechanical excavation or by flooding existing hollows by breaking field drains or using a pipe sluice to control water levels. The ideal location is well away from any trees or woodland and within an area of damp pasture where the water table is already close to the surface.

- Scrapes should be no more than 45cm deep in the middle and have gently sloping edges
- They should measure at least 20m^2 in area
- Maximise the length of the edge of the scrape by making them long and thin or irregularly shaped features
- Scrapes should hold water from early March until late June
- Any soil excavated from the scrape should be spread thinly on the surrounding area and not banked up

Scrapes should not be fenced off as livestock grazing and trampling around the edges improves accessibility by feeding waders. Concerns have been raised over the risk of wader scrapes helping to spread liver fluke to livestock. When created in areas of damp pasture (a habitat which already has a fluke risk) there is currently no evidence that scrapes will increase that risk.

Safe nesting habitat

On arable land:

- Provide spring-sown crops close to suitable feeding habitat
- Aim to undertake cultivation before early April (cereals) or after early May (fodder crops) to protect lapwing nests
- If cultivation is necessary during April/early May, make an effort to locate nests and avoid them when using machinery.
- Bare or sparsely-vegetated fallow land can provide an alternative to spring-sown crops for nesting lapwings and oystercatchers.

On grassland:

- Graze grassland over the winter or early spring to ensure a short sward (5cm) in early April when Lapwings start to nest.
- For Lapwings, exclude grazing from early April until mid-May, but ideally keep the stocking rate <1 Livestock Unit (LU)/ha until early June to reduce the risk of trampling of any late or replacement nests.
- For other species, keep the stocking rate <1LU/ha (and preferably lower) between April to mid-June.
- Do not roll or cut grassland between 1 April and 30 June. Delaying silage or hay cutting into July will give curlews an opportunity to rear their chicks in the cover of these fields.
- When cutting hay or silage in areas with waders, cut towards the edge of the field so that any chicks can escape from the field.

On rough grazing:

• Maintain relatively short, open vegetation (5-15cm sward height) by grazing on heathland, bogs or acid grassland adjacent to inbye grassland feeding areas that are rich in invertebrates.

• Keep the stocking rate <1LU/ha (and preferably lower) between April to mid-June.

Reduce predation risk

To reduce predation risk indirectly:

- Maintain a diverse sward structure in feeding areas so that short vegetation suitable for feeding is interspersed with patches of taller vegetation such as taller grasses or rushes to provide cover.
- Ensure the close proximity of nesting and feeding areas, so that chicks are not exposed to predation risk while crossing unsuitable habitat.
- Avoid creating wader habitat near dense woodland or planting dense woodland close to good wader habitat
- Consider removing dense woodland that is close to good wader habitat.

Recent research (Laidlaw et al. 2016) has suggested that creating patches or strips of taller vegetation (e.g. field margins) in fields used by nesting waders could reduce predation risk by providing a habitat for small mammals that predators such as foxes will eat in preference to wader eggs or chicks. The same research suggested that wetland features with surface flooding could create barriers to mammalian predators, thereby reducing predation risk. However, the effectiveness of such measures is still unclear.

To reduce predation risk directly:

- Carry out legal control of predators, particularly foxes and crows, where these are considered to be a problem. Control should be focused immediately before and during the nesting season (1 March-30 June).
- On islands where non-native predators have recently become established (e.g. hedgehog and mink in Western Isles and stoat in Orkney) a co-ordinated effort is required to remove these species.
- Consider anti-predator fencing where high quality wader habitat supporting or capable of supporting high concentrations of waders is contained within a relatively small (up to 50ha) area

Box 3: Anti-predator fencing

Electrified fencing has been used effectively on lowland wet grassland in England to increase Lapwing breeding productivity from 0.23 to 0.79 fledged young per pair by excluding predators (Malpas et al. 2013). This increase raises productivity above the level required to maintain stable populations. Two designs have been used, with the second also suitable as a livestock fence:

- Nine alternating live and earth wires up to a height of 1.1m with the gap between wires increasing from 6cm near the ground to 20cm near the top.
- 1m high fence with 8cm square livestock netting buried 25cm into the ground. Two live wires 10cm and 20cm above the netting and another live wire offset 20cm from the outside of the fence, 65cm above the ground.

Fencing is only likely to be cost-effective on small areas (<50ha) with high quality habitat that can support high densities of waders. One advantage is that it can exclude protected predators such as badgers and otters, but care must be taken not to obstruct access to and from places of shelter of any protected species.

Predator control can be costly and time-consuming, so it is worth making an effort to monitor whether predator numbers are high (e.g. by using trail cameras) and whether waders are producing low numbers of chicks, before embarking on a predator control programme. Predator control will always be more effective when used a supplement to high quality habitat management rather than as a way of attempting to maintain wader numbers on sub-optimal habitat (Bolton et al. 2007).

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