

Manx Marine Environmental Assessment
Ecology/ Biodiversity
Protected Species

Birds



Shag at the Ayres, Isle of Man Photo: J Cubbon.

MMEA Chapter 3.6

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Manx Marine Environmental Assessment

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Birds

Introduction

In the British Isles as a whole, seabirds are a very important part of our biodiversity, and an estimated 8 million birds of 25 species breed, surrounded by the rich waters of the North-East Atlantic. Due to its geographical position, the British Isles has a particular international responsibility for its seabirds as they follow no international boundaries. It holds 90% of the world's Manx shearwaters and 68% of the world's Northern gannets (Mitchell et al. 2004). The UK alone has 34% of the world's breeding European shags and 33% of the North Atlantic population of common guillemots (JNCC 2012a). The Isle of Man, though an island and only a small part of the British archipelago, is important for some elements of this significant birdlife. It has a particular responsibility for the following seabirds that have Manx breeding populations recorded with more than 1% of the UK and Isle of Man population, indicating that there are relatively high numbers of these birds breeding: cormorant, shag, herring gull, great black-backed gull, little tern and black guillemot (Selman 2006), the latter lying towards the southerly edge of its range.

There are seabirds all around the Manx coast, both in summer and outside of the breeding period. The sandy coast surrounding the northern plain supports breeding terns, oystercatchers and ringed plover and wintering waders, whilst the rockier coast elsewhere supports colonies of auks and gulls. The largest breeding colonies are found on the Calf of Man, Peel Hill, the Ayres, Maughold Brooghs and the cliffs around the Sugarloaf, though there are more dispersed colonies at other sites and some species, such as the waders, have a dispersed breeding distribution.

The Manx coast and territorial waters have long been valued for supporting a wealth of wildlife which is important to the Island's character and interest. Both seabirds and their eggs have been exploited hugely in the past (Cullen and Jennings 1986; Baldwin 2010, 2011) but are now recognised as an indicator of the health of our seas and are monitored in collaboration with the neighbouring jurisdictions, through the Seabird Monitoring Programme (SMP) Partnership, which on the Isle of Man involves the Department of Environment, Food and Agriculture, Manx National Heritage and Manx BirdLife, with data also provided by others on the Isle of Man.

This Chapter provides a summary description of marine bird species on the Isle of Man and notes potential issues regarding the development of the marine environment and birds (both marine and other species such as migrants) in the marine environment. Many species that feed on the coast have been noted, but those that are essentially terrestrial, though perhaps coastal, have not been included, for instance the chough, though an iconic species of the Manx coast whose population is important in the British Isles context. We outline the importance of the Isle of Man for these birds, whether breeding, migrating or wintering, the relevant legal protection measures, and identify the most important breeding locations of some species. Sources of more detailed information are provided and key references are listed.

Baseline

The status and protection of Manx seabirds

The Manx Ornithological Society maintains a list of the birds recorded in the territory of the Isle of Man (Cullen 2009) and updates are published in its journal, *Peregrine*.

Seabirds were given specific protection in Manx legislation under the Seagull Preservation Act 1867 and they had protection even before that due to their value to fishermen as indicators of fish, but they are now protected under the Wildlife Act 1990 (as amended), which protects all birds against intentional or reckless killing, injury or removal, and their nests and eggs are also protected. Schedule 1 species (see Table 1) receive special protection, bringing in offences involving disturbance at the nest. Research that involves the capture of birds, the attachment of identification markers or more invasive techniques, may be licensed under this Act and the Veterinary Surgeons Act 2005. Enquiries regarding licensing under either Act should be addressed to the Department of Environment, Food and Agriculture.

Conservation status is also rated by listing birds of conservation concern. A list of Manx Birds of Conservation Concern (MBoCC) is being developed, but reference can also be made to the Birds of Conservation Concern in the UK, Channel Islands and the Isle of Man (Eaton et al. 2015, see Table 1). In this system:

- Red list species are of high conservation priority, i.e. those that are Globally Threatened according to International Union for Conservation of Nature (IUCN) criteria; those whose population or range has declined rapidly in recent years; and those that have declined historically and not shown a substantial recent recovery.
- Amber list species are of medium conservation priority, i.e. those with an unfavourable conservation status in Europe; those whose population or range has declined moderately in recent years; those whose population has declined historically but made a substantial recent recovery; rare breeders; and those with internationally important or localised populations.
- Green list species are of low conservation priority, those that do not qualify for red or amber listing.

Seabirds trends are reported through the Seabird Monitoring Programme (JNCC 2012a) and some further data on the breeding success of particular species may be available locally.

Table 1. The conservation status of Manx seabirds and coastal waterbird species: specially protected species listed on Schedule 1 of the Wildlife Act 1990 and Birds of Conservation Concern (Eaton et al. 2015) with breeding status and comments on local status.

Species	Schedule 1	Red List	Amber List	Breeding species.	Comments
Arctic Skua		X			Recorded at sea, mainly in the late summer and autumn.
Arctic Tern	X		X	X	Nest on the Ayres, where there is a problem with disturbance.
Balearic Shearwater		X			Only one or two records each year.
Bar-tailed Godwit			X		Small numbers of non-breeders feed in the Castletown-Derbyhaven area or sometimes on the Ayres.
Black Guillemot			X	X	Breeds in cavities in a number of cliff areas, harbours and marinas, in significant numbers. Declining in the Isle of Man.
Black-headed Gull			X	X	A surprisingly rare breeder (Ayres only) but common enough in winter.
Black-tailed Godwit		X			Small numbers as a passage migrant, mainly Castletown-Derbyhaven area.
Black-throated Diver			X		Small numbers of non-breeders mainly off the north-west coast.
Buff-breasted sandpiper					Recorded occasionally on passage.
Common Gull			X	X	Locally rare, < 5 pairs nest on the Ayres.
Common Sandpiper	X		X		Small numbers as a passage migrant on the coast.
Common Scoter		X			Small flocks can be seen at any time but mainly in the autumn and winter.
Common Tern	X		X		Former breeder recently only seen on passage.
Curlew	X	X		X	Concern expressed at decline in breeding populations across the Isle of Man. Winter flocks common.
Curlew sandpiper			X		Individuals recorded on passage.
Dotterel		X			Occasionally recorded.
Dunlin			X		Common passage migrant and winter visitor on soft shores.
Eider			X	X	Commonly breeding around coastline. Overwintering flock on the north coast ~ 300.
Fulmar			X	X	Common breeder but declining.

Gannet			X		Feed in Manx waters all year round (Scar Rocks, Galloway colony is close) but don't breed here. Wakefield et al. showed that gannets feeding around IoM are from Ailsa Craig.
Glaucous Gull			X		Rare - occasional.
Goldeneye			X		Amber-listed as a breeding rarity though not a Manx breeder. Occurs mostly in winter.
Golden Plover	X				Amber-listed for international wintering importance. Winter flocks common.
Great Black-Backed Gull			X	X	Significant numbers breed – decline evident on Calf of Man and wider Isle of Man.
Great Cormorant				X	Commonly breeding around the Isle of Man coastline. Colonies concentrated at a few key sites.
Great Crested Grebe					Occasional records offshore.
Great Northern Diver			X		Amber-listed for international wintering importance. Seen often in the winter, mainly off the north west coast.
Great Skua			X		Seen offshore.
Green Sandpiper			X		Occasional migrant.
Greenshank			X		Individuals recorded occasionally on passage.
Grey Heron				X	Occurs year round feeding around rocky shores and harbours.
Grey Plover			X		Small numbers on soft shores.
Guillemot			X	X	Common cliff breeder.
Herring Gull		X		X	Declining but common. Significant breeding population.
Iceland Gull			X		Rare - occasional Seen once/twice most years usually on the west coast.
Kittiwake		X		X	Localised cliff breeder – evidence of declines and losses. Big losses for the Calf of Man.
Knot			X		Small numbers of passage birds on soft shores.
Lapwing	X	X		X	Rare and declining as a breeder.
Leach's Petrel			X		Rare - small numbers recorded.

Lesser Black-backed Gull			X	X	Not common. Fewer breed than great black-backs or the much commoner close relative, the herring gull. Numbers declining.
Little Auk					Recorded occasionally offshore.
Little Egret	X				Regular sightings across the Isle of Man in line with increasing colonisation in the UK.
Little Gull					Rare - small numbers recorded.
Little Stint					Individuals recorded on passage
Little Tern	X		X	X	Nest annually on the Ayres. Small numbers breed.
Long tailed Duck		X			Individuals offshore in winter.
Mallard			X	X	Common.
Manx Shearwater	X		X	X	Small recovering breeding population. Common at sea.
Mediterranean Gull			X		Rare - occasional records.
Oystercatcher			X	X	Common breeding and wintering on soft shores.
Pintail	X		X		Occasional but annual records on passage.
Pochard		X			Small numbers of wintering Birds. Significant (for the IOM) wintering population on the gravel pits.
Puffin		X		X	Of particular concern. Small and localised breeding populations declining.
Purple Sandpiper			X		Small numbers of wintering flocks on rocky shores.
Razorbill			X	X	Common but declining.
Red-necked Grebe		X			Rarely recorded.
Redshank			X		Common winter and passage migrant along coastline. Historical breeder.
Red - throated Diver					Non-breeders at sea, particularly off the north-west.
Ringed Plover	X	X		X	Common soft shore breeder and winter visitor.
Ruff		X			Rare – occasional records.
Sanderling			X		Flocks common on passage refuelling on soft shores.
Sandwich Tern	X		X		A localised breeder with a declining range. Breeding attempts in the 1970's but none since. Regularly seen in the Isle of Man in spring and summer.

Scaup	X	X			Scarce.
Shag	X	X		X	Significant breeding population in decline.
Shelduck	X		X	X	Resident bird. Commonly breeding around the coastline.
Slavonian Grebe		X			Rare - occasional.
Smew			X		Rarely recorded.
Sooty Shearwater					Rare - occasional.
Spoonbill	X		X		Rarely recorded.
Spotted Redshank			X		Rare - Occasional. Seen on passage.
Storm Petrel	X		X		Amber-listed for its localised breeding population, though not recorded breeding on the Isle of Man currently.
Teal			X	X	Small numbers breed on inland waters. Common in winter.
Turnstone			X		Common winter visitor and passage migrant on a range of shores.
Velvet Scoter		X			Occasional, but annual.
Whimbrel		X			Regular passage migrant, but more are seen in spring than in the autumn.
Wigeon			X		Common winter visitor mostly on south-east shores and northern dubs.
Wood Sandpiper			X		Rarely recorded.
Yellow-legged Gull			X		Individuals present for several months.

Areas can be designated for birds at the national level, as Areas of Special Scientific Interest, though not all of the eligible seabird sites have been designated yet. For other purposes, sites may be designated as National Nature Reserves, as Areas of Special Protection for Birds (or the similar Bird Sanctuaries remaining designated under the Wild Bird Acts) with the consent of the landowner, or as non-statutory Wildlife Sites. See MMEA Chapter 3.7 (Marine and Coastal Conservation).

International Co-operation & International Sites

Many of the seabirds found around the Isle of Man are migratory species, moving between their land-tied nesting sites and other coastal or offshore areas used at other times of the year. Terns are famous for their long-distance movements south and north again. Even resident gull populations may move back and forth across national boundaries on a regular basis and Manx shearwaters are famous for travelling long distances even whilst nesting, foraging far out to sea, with nests and important foraging areas which may be in different jurisdictions. International cooperation is therefore important to effectively conserve seabirds.

The following international conventions to which the Island is a signatory (through the United Kingdom), are relevant:

The Convention on Migratory Species or CMS (see Bonn Convention 2012) concerns, in particular, species which migrate across national boundaries, recognising that the conservation of these species requires action by all states in the chain of movement in order to maintain their life cycles. It specifically requires the conservation of migratory species and their habitats, paying special attention to those with an unfavourable conservation status; the support and promotion of research on migratory species; the protection of endangered migratory species listed on Appendix I (including the white-tailed sea eagle *Haliaeetus albicilla*, a species which probably bred on the Isle of Man previously but is now extinct there, but reintroduced in Scotland and Ireland) and the conclusion of agreements for the conservation and management of species with an unfavourable conservation status (Appendix II species, see the list below). The aim is to restore such species to a favourable status or maintain them at that level across their ranges. The convention therefore sets the principles for, and forms an umbrella for the underlying agreements and lists the species of concern. Government policies should take account of the needs of migratory species, for instance in development planning, designations, etc. Further details can be found on the convention website (Bonn Convention 2012).

The Agreement on the Conservation of African-Eurasian Migratory Waterbirds (see AEWA 2012) was made under the CMS in order to preserve the use of an important bird flyway from arctic and other northern breeding sites through Europe and the Middle East and into Africa. 255 species are included and 118 countries within the range, of which 62 are parties to the convention. It is clearly essential to the survival of such species that a cohesive network of wetlands is maintained throughout this flyway and that account is taken of the use of major routes in planning developments that might affect birds moving through them, or the availability of habitats and key sites used for refuelling.

The Agreement on the Conservation of Albatrosses and Petrels (see ACAP 2012) is also a CMS agreement. In 2001, the Isle of Man agreed to be included in the signing by the UK of ACAP, in anticipation that in future the agreement may be extended to northern hemisphere species. All albatrosses have now been included in this agreement, giving it a global scope. Activities are mostly focused in the southern oceans but in future this may become more important locally.

The Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia was created under CMS after it was noted that a majority of the migratory birds in the region have a poor conservation status and many are in decline due to habitat change, collisions with built structures, shooting and poisoning (JNCC 2012c). An action plan has been agreed. Of 130 range states, 29 have signed the MoU. It covers more than 70 species.

The Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention) requires the conservation of wild flora and fauna and their natural habitats, especially those requiring international cooperation, with an emphasis on endangered or vulnerable species. Birds of particular concern are listed in Appendix II. It also requires the conservation of endangered natural habitats and the avoidance or minimisation of deterioration of such habitats and the habitats of endangered species. Parties must have regard for wild fauna and flora in consideration of planning and development, pollution, and education and for their habitats in planning and development. Appropriate sites for migratory species listed in Appendices II and III should receive protection and Parties must strictly control the introduction of non-native species.

The Convention on Wetlands of International Importance (the Ramsar or Wetlands Convention, see Ramsar 2012) promotes the wise use of all wetlands including inshore marine areas. Wetlands of international importance may be designated as Ramsar Sites and potential sites have been identified for the Isle of Man (Pienkowski 2005), with one inland site designated so far. Parties promote the conservation of wetlands and waterfowl and endeavour through management to increase waterfowl populations on appropriate wetlands. The convention has a strategic plan coordinating such work.

The Convention for the Protection of the Marine Environment of the North East Atlantic (the Oskar Convention) requires that all possible steps be taken to prevent and eliminate pollution of the seas. It also requires that measures be taken to protect the maritime area against the adverse effects of human activities, to safeguard human health and conserve marine ecosystems and, when practicable, restore marine areas which have been adversely affected. Annex V covers the conservation of wildlife.

Under the Bern and Ramsar Conventions, sites can be put forward for international recognition as Emerald Sites or Wetlands of International Importance respectively, but no Manx sites have been designated for seabirds at the international level at the time of writing. Current seabird numbers do not reach the standard threshold for 'international importance' of 1% of a biogeographic population or a wetland of international importance with 20,000 wetland birds.

For further information about conservation designations on the Isle of Man please see MMEA Chapter 3.7 (Marine and Coastal Conservation).

Manx Ornithological Records

Manx BirdLife holds a digital database of geo-referenced bird records for the Isle of Man¹ (including the Calf), linked to ArcGIS mapping software, containing records from 1998 onwards including those from work undertaken by Manx BirdLife staff and from members of the public. Most Isle of Man bird records go onto this database and in recent years, all of those submitted to the Manx Ornithology Society (MOS). However, some members of the public post sightings on Birdtrack and eBird directly. Not all Calf and Ayres bird reports are entered onto the MBL database but all formal survey results are. The MOS has a Bird Recorder for the Isle of Man and annual bird reports are produced from the full Manx BirdLife data and published in their journal 'Peregrine'. Their webpage is hosted on the Manx BirdLife website, where a list of Peregrine articles can be viewed. Records for the Calf of Man are published separately, in the annual Calf of Man Bird Observatory reports, published by Manx National Heritage. Historical information on Manx birds is reviewed in Cullen and Jennings (1986). Records for the Ayres NNR are published in the Ayres NNR Annual Reports available from DEFA.

A comprehensive baseline survey of terrestrial and coastal areas was undertaken for the Manx Bird Atlas, 1998-2003 (Sharpe et al. 2007), including a complete seabird survey in 1999 as part of the coordinated British Isles-wide counts for Seabird 2000 (Sharpe and Sapsford 1999 for the detailed local report, Mitchell 2004 for the full report; data available from the JNCC or Manx BirdLife). This year (2017), the seabird survey was repeated by

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Manx BirdLife. The results are yet to be published. Ongoing seabird count data are provided to the Seabird Monitoring Programme and available through the JNCC website (JNCC 2007/2008).

At sea, the JNCC has undertaken surveys but much has yet to be learned. Stone et al. (1995) report the results of surveys around the British Isles, including the Irish Sea and broad-brush maps are provided (available from the JNCC website). The Wildfowl and Wetlands Trust undertook more recent surveys of inshore seabirds in the Irish Sea, including Manx waters, and the data is available for Seabirds at Sea from the JNCC or the OBIS-SEAMAP website, which also includes some mammal and turtle data <http://seamap.env.duke.edu/>. In 2017, tagging of Manx shearwaters from Bardsey has shown that many of the tagged individuals move northwards towards the Isle of Man and Calf of Man, utilising Manx waters for feeding (Porter 2017).

There has been detailed intertidal bird monitoring of an area of the south coast from Santon Gorge to Poyll Vaaish by Manx BirdLife for the Department of Infrastructure, related to a runway extension development, but no report was available at the time of writing.

There may be further data in grey literature covering site assessments or held on UK databases. Consideration should be given by potential developers to agreeing data sharing agreements for survey work, with Manx BirdLife and DEFA, when undertaking environmental impact assessments or preliminary surveys. Although sensitive at first it is important that such scientific information is not lost to the Isle of Man.

The Calf of Man & the Manx Shearwater (*Puffinus puffinus*)

The Calf of Man has the Isle of Man's only registered bird observatory which was established in 1959 and became an official British Bird Observatory from 1962. Each year from March to November resident wardens keep detailed records of migration and of the breeding birds. An account is given in Archer et al. (2010) and an annual report is published.

For further information please refer to Manx National Heritage at: <http://www.gov.im/mnh>.

The Manx shearwater is an amber-listed species of particular conservation concern on the Isle of Man, being originally described from the Calf. A majority of the world population breeds within the British Isles. Historically the Calf held the largest colony of Manx shearwaters in the world with an estimated breeding population of over 30,000 pairs in the 18th century (O'Hanlon 2011, Cullen and Jennings 1986). Numbers became severely depleted with youngsters being taken for human consumption and by the early 1800s, the Manx shearwater population was all but extirpated (Brooke 1990), with the main causative factor being linked to the accidental introduction of brown rats (*Rattus norvegicus*) (O'Hanlon 2011).

O'Hanlon also reports that since 1979 attempts to re-establish the breeding population of Manx shearwater have involved localised rat baiting around the Calf and this has been successful in allowing shearwaters to breed once more and to gradually increase, year by year, with 91 apparently occupied breeding burrows recorded in 2010 (Harris 2010) and 115 in 2011 (O'Hanlon 2011). Breeding numbers would appear to be slowly increasing within current known colony limits and by 2017 an island estimate of 400 pairs was made following detailed study of the three main colonies (Lazenbury 2017; Lazenbury & Sapsford in prep). However this is a tiny population compared with the historic figures and with other shearwater islands and it is therefore hoped that more concerted efforts to eradicate rats from the Calf will enable the population to increase further. Given the importance of the

British Isles for breeding grounds for Manx Shearwaters, the Isle of Man has the potential to regain its status as an internationally important and recognised site. Further information on Manx shearwaters can be found in Brooke (1990), Hamer (2003) and Lockley (1942).

Following on from the Manx shearwater work, in 2016, a project was set up by Manx Wildlife Trust to encourage Puffins (*Fratercula arctica*) to breed back on the Calf. The project involves 100 decoy puffins at two sites on the Calf, on the east and west coasts, along with a speaker system playing puffin calls. Puffins have since been seen landing on the Calf in 2017 and 2018 but there are no signs of breeding yet.

The Ayres National Nature Reserve and wider Ayres

The Ayres National Nature Reserve and wider Ayres occur over a 'raised beach' and it is this geological feature that has given rise to a wide variety of specialised habitats including shingle beach, sand dunes, dune grassland, dune wetlands, lichen heath, gaelic heath and scrub. The diversity of habitat, within a relatively confined area, supports a good number of bird species, of which 14 of those recorded in 2011 as breeders or utilising the site are listed on the UK birds of conservation concern red list (Eaton et al. 2009) and 49 on the amber list. Noteworthy breeding species include shelducks, oystercatchers, ringed plovers, lapwings, curlews, Arctic and little terns. In 2017, 59 breeding species were recorded on the Ayres NNR and wider Ayres (10 red listed, 17 amber listed and 32 green listed) and 122 non breeding species (33 red listed, 55 amber listed and 34 green listed). Notable breeding coastal species in this locality include little tern, Arctic tern, ringed plover, oystercatcher, lapwing, curlew, common gull, black-headed gull, herring gull and lesser black-backed gull.

The bird life at the Ayres has been monitored regularly by the Ayres NNR Wardens since 1998. Breeding bird surveys and nest monitoring are undertaken annually. In addition local experienced ornithologists submit bird records of notable sightings to the warden. Nest records are submitted to the BTO annually by the Manx Ringing Group. During the breeding season (1st April to 31st July) restrictions are in place to protect ground nesting birds and these include dogs on leads and temporary fencing and signage around the tern colonies. Some predator management is also undertaken.

From 1998 to 2012 total clutch count (including relays) for little terns on the NNR fluctuated between a low of 6 clutches and a peak of 30 clutches. During this period fledgling success also greatly varied but a peak of 22 fledglings was recorded in 2006. From 2013 onwards the number of breeding pairs and productivity rate has been calculated. While the number of breeding pairs has greatly increased over the past 5 years (peak count 50 pairs) productivity has been poor (ranging from 0 to 0.63), frequently below the minimum to sustain the population, indicating that the colony must be recruiting from elsewhere.

Annual reports for the Ayres NNR have been produced by the wardens since 1998 and these are available for public viewing from the Manx Museum Library. Some notable records are included in the journal Peregrine.

Current Research and Monitoring

The Department of Environment, Food and Agriculture has contracted Manx BirdLife to provide annual reports on species trends by resurveying 10% of the Island each year in the breeding season and comparing this with previous years and the Manx Bird Atlas baseline data. The survey was completed in 2017, but the findings are not yet available.

The resurvey data above provides more reliable data for widespread species than for colonial species and is based on observations made from walked transects. DEFA therefore considers that the seabird colony censuses undertaken every 15 years and coordinated through the Seabird Monitoring Programme (SMP) Partnership, are important to provide reliable data on breeding seabird populations. SMP have enabled a 2017 seabird survey to be carried out, with Government and NGOs on the Isle of Man inputting into this process. This has involved boat-based counts to include coastal nest sites not visible from the land. However the findings are not available at this time.

Detailed monitoring work is undertaken by wardens on the Calf (MNH) and the Ayres (DEFA and MNH). The Manx Shearwater Restoration Project has been working towards eradicating rats from the Calf and Kitterland since autumn 2012 and already positive effects are being seen on the bird fauna. Manx Whale and Dolphin Watch produce some bird data whilst undertaking their standardised cetacean surveys.

The Manx Ringing Group has ongoing colour ringing projects for the following coastal species: little tern, Arctic tern, cormorant, herring gull, lesser black-backed gull, great black-backed gull, black-headed gull, common gull, mute swan, rock pipit and ringed plover. The colour ringing projects are increasing our knowledge of these species including their movements and breeding behaviour. In addition a wider number of bird species are metal ringed. For further information contact the Manx Ringing Group (manxrg@gmail.com).

The information above, if continued in the long term, will be valuable for considering species statuses and conservation actions, reviewing the effects of policies and considering the effects of changes in the countryside and at sea, including cumulative marine developments.

Detailed research on breeding success, foraging ranges and diet is undertaken by the SMP and its individual partners at study sites outside of the Isle of Man, but the results will be important in interpreting monitoring data from the Isle of Man. Similarly, the Future of the Atlantic Marine Environment (FAME) project (FAME 2013) is tagging birds during breeding to produce detailed foraging data that will allow their foraging ecology to be modelled and applied to other sites, with important potential for the assessment of development sites in the marine environment. The Seabird Study Group provides a forum for discussing research and publishes a journal.

Initial Considerations for Future Marine Development

Potential Effects

Marine birds could be affected in a number of ways by the full range of potential marine developments. Impacts may be direct (e.g. from the device or structure itself) or indirect (e.g. reducing visibility by increasing turbidity), adverse (e.g. collision mortality or oil contamination) or beneficial (e.g. creation of foraging habitat or protection of prey). Effects can result from changes in prey species or habitats, disturbance or displacement reducing the habitat available or affecting success, or by creating barriers to movement which could have direct impacts or indirectly increase the energetic costs of commuting flights between breeding and foraging sites. Additionally, the impacts may be temporary or long term and last the lifetime of the device.

Bird species vary in their susceptibility to these issues. There are, for instance, differences in their flight altitudes or swimming depths, manoeuvrability in the air/water, liability to disturbance and their perception of risk, for example some species will fly through wind turbine arrays and may be at risk of collision, whilst others will avoid such sites. As the scientific evidence builds up, we are gradually getting a picture of which species are truly at risk from particular kinds of developments, and what the specific issues are for a particular guild of birds. This is far from concluded, however and new technologies will require a reconsideration of issues (see for example McCluskie et al. 2012 on wind and tidal energy). There are also differences in behaviour between species which may affect surveys, for instance storm petrels are active at night, but gannets settle on the sea. It is therefore important to consider separately the different groups of birds that might be affected, the issues that might be predicted and the appropriate survey methods. It is possible to model some issues, such as strike rate at wind turbines, but even this could be greatly improved if there were good data for the avoidance rates of each species, rather than using an assumed level, though whilst an assumption is required a conservative (precautionary) level is appropriate.

It is standard practice to assess the various potential impacts and consider mitigation, but Inger et al. (2009) also challenge researchers to look at how marine developments might actually be designed to make a positive impact for biodiversity. As new research and mitigation options become available it will be important to bring these into consideration, with potential improvements in each application and development. Furthermore, an understanding of the cumulative effects is crucial.

In the example of offshore energy generation, this is a young sector with developing technology and therefore our knowledge of the impacts of this changing arena is not comprehensive. Work on specific projects is adding to our overall knowledge and review studies are gradually appearing (Witt et al. 2012 regarding wave energy; Huddleston 2010 regarding offshore wind) and many new areas of research were covered in a recent conference (BOU 2012) which highlighted the lack of good data on avoidance rates, the variability of flight height results and the differences in susceptibility between species. However, we do know what the potential issues are likely to be and guidance is being published and added to as experience grows. Also, a growing knowledge of the physical processes active in the marine environment, combined with an understanding of marine ecology, allows predictions of areas with great potential for seabird activity, for instance identifying areas with water mixing and internal waves in stratified waters.

In the UK, COWRIE (Collaborative Offshore Wind Research Into the Environment), an independent body set up by the Crown Estate to research the environmental impacts of offshore wind developments, has developed guidance on offshore surveys, study methods and impact assessments and work has been commissioned in UK waters to advance the use of high definition digital imagery for bird surveying, though boat-based surveys remain important for flight altitude assessment and direction of movement. Commissioned research has been undertaken on species particularly vulnerable to offshore windfarms in the UK and on occasion this research has crossed into Manx waters (Langston et al. 2010). There has not yet been scope to integrate this research as an on-Island resource.

Currently, there is very limited experience of operational wave and tidal stream devices at sea, and hence very little information about their impacts on marine birds. As there is limited direct information, inferences about *potential* impacts from a theoretical background of the type of effects likely, the probable sources of these effects and the likely key receptors of these effects, namely birds, is set out in McCluskie et al. 2012.

Sensitivity of receptors

Some species are a higher priority for conservation than others, so lists of birds of conservation concern, and their international status are relevant to considerations of the degree of likely impact, but welfare is a matter relating to all species. Changes in population levels may therefore be a conservation issue for threatened species but collisions may be an issue for any bird. Where there are birds utilising an area that emanate from important breeding colonies, this will be a particular consideration with respect to retaining the conservation status of those breeding sites.

Important foraging areas at sea are largely unknown but breeding sites are well recorded (see above). Site designations are still at an early stage and there has been no assessment for birds at sea. Areas of Special Scientific Interest have been designated for seabirds at the Central Ayres (the Ayres National Nature Reserve) and Maughold Cliffs and Brooghs and a Marine Nature Reserve abuts the latter. Langness, Sandwick and Derbyhaven ASSI include an important wader roost. There is also legal protection for sites held by Manx National Heritage, including the Calf of Man and the Sugarloaf, two areas of importance for their seabird colonies in the Manx context. The sensitivity of coastal sites has been mapped for the Manx oil pollution contingency plan and potential Ramsar sites have been listed in Pienkowski (2005). Emerald Sites might be designated in future under the Bern Convention. Peel Hill is another site recognised for its importance to Manx breeding seabirds. Important Bird Areas (IBAs) are listed in Pritchard et al. (1992), which includes the Isle of Man Sea Cliffs, a substantial area incorporating much of the rocky coastline.

Critical sites and broad flyway information is available on the Wings over Wetlands (2012) website (the UNEP-GEF African-Eurasian Flyways Project) which includes a Critical Site Network Tool showing important sites around the Irish Sea between which significant numbers of birds may be moving at particular times of year. This may be useful to those planning developments in the paths of movement. Detailed flightlines may, however, only be determined by research, which is more challenging at sea than on land, due to problems siting equipment.

Initial Considerations for handling potential effects

The design of appropriate mitigation measures relies on knowledge of the biology of the species affected and how their behaviour may respond to changes in their environment. There are therefore some potential effects for which mitigation can be provided and its effectiveness demonstrated by monitoring studies of sites where it has been applied but other effects may still be difficult to mitigate because we cannot predict the responses of the birds. Research on and monitoring of mitigation methods is therefore needed.

Some offshore energy technologies are only just emerging but wind turbines and oil and gas installations have been built for some years and therefore there is a greater knowledge of their effects. Recent research regarding offshore wind turbines has generated a great number of reports. In Northern Ireland the Department of Enterprise, Trade and Investment produced a Strategic Environmental Assessment of Offshore Wind and Marine Renewable Energy (DETINI 2010) along with an action plan, revised in 2012. More recently a draft Regional Locational Guidance (RLG) for Offshore Renewable Energy Developments in Northern Ireland Waters has been produced for comment, to bridge the two documents

mentioned. It includes a consideration of the availability of mitigation methods to reduce the potential effects (see table 7.2 in DETINI 2011).

Most mitigation measures focus on location, design and the subsequent construction methods. Once a development has been built, actions may be limited to monitoring the risks and mitigating where practicable, such as switching off wind turbines if risk thresholds of bird numbers are reached. There is an RSPB internal group currently considering the issue of compensation however this is still in the preliminary stages.

COWRIE has now closed and has been replaced by the Strategic Ornithological Support Services Group (SOSS), set up to advise the offshore wind farm industry and address the problems of dealing with potential bird impacts when considering applications for development. Information on their projects is available from their website <http://www.bto.org/science/wetland-and-marine/soss> and information on mitigation is still available on the COWRIE site <https://tethys.pnnl.gov/institution/collaborative-offshore-wind-research-environment-cowrie>.

Recent conference proceedings of relevance to offshore wind farms and migratory birds show that there is a lively interest in the issues and in methods of surveying and monitoring. For instance Timothy Coppack (Institute of Applied Ecology, Germany) has been using automated *in situ* monitoring of migratory birds at Germany's first offshore wind farm using a radar system together with a Visual Automatic Recording System, an infra-red camera mounted on the turbine hub looking over the rotor-swept area (see Coppack et al. 2008) and Coppack, Kulemeyer and Schulz). Jan Kube (Switzerland) is considering options for mitigation of bird collisions at offshore wind farms using 2 research platforms, looking at the periods that are a significant risk to migrant birds, how to monitor them and migration forecasting, and alternatives to lighting that might form an attractant to birds. Andrew Gill (Cranfield University) is undertaking field-scale experiments to assess the effects of offshore wind farms on marine organisms. Changes in fish behaviour could have an impact on predatory birds. Though there are recognised mitigation methods for wind farms, it is hoped that these will be further improved, so a check for up to date methods and upcoming technology is recommended. This is even more important with emerging technologies that may develop at a greater rate.

Knowledge Gaps and Recommendations for Future Survey and Monitoring

There are currently limited seabird records from Manx waters. However, this will be increased once the findings of the 2017 seabird survey are available. Nevertheless, our knowledge of where they forage, for example, is poor. Wintering populations such as the divers are not well known, with most data linked to terrestrial watch-points, but providing indications of peak periods of activity and key inshore areas for some species, though there is some seabirds at sea data (references above). As most of the data is coastal (breeding or shore-based observations), additional systematic marine survey data would be very useful to determine important foraging areas for each seabird species within Manx waters and at different times of the year. In summer, it would be very instructive to link the birds using such areas with breeding sites, which may require radio-tracking studies such as those being undertaken in the UK through the FAME project, though Manx sites are not involved in this project currently. Manx waters may be used by birds breeding locally or those breeding on the other Irish Sea coasts. Gannets forage, from Ailsa Craig, and Manx shearwaters are

likely to be foraging from Welsh breeding colonies, such as Bardsey and Pembrokeshire, and other sites, in addition to the Calf.

Any major development proposal is likely to require up to date and detailed survey information on the use of an area by birds, whether as a foraging area, a flight route, or for coastal developments and service links, as a breeding site, so there is likely to be a strong onus on developers to produce their own data. Marine data are few in comparison with the terrestrial information on birds and data gathering at sea is expensive so data sharing agreements would benefit all of those interested in the sustainable development of the Irish Sea and the protection of its birdlife. The integration of key data sets, including impact assessment studies, would be beneficial, and coordination of data gathering and analysis with neighbouring jurisdictions, in order to provide a fuller picture of the use made of the Irish Sea by birds at the coast and offshore.

A wind energy developer has pointed out that in the UK conflict has arisen where developments have been invited prior to having knowledge of the best potential sites (or at least the least damaging areas) and this might have been avoided if more data were available. This raises the issue of whether to assess impacts site by site, on application, and deal with issues as they arise, or take a strategic approach and provide survey data across Manx waters that identifies those areas with significant issues, prior to opening up the area for development, providing efficiency in the planning system and developer applications, but requiring significant investment ahead of site-based considerations. Long term benefits are suggested by the strategic approach, providing well-sited developments, though delays would be likely in opening up such development.

It is also acknowledged that due to the relatively recent interest and development of offshore energy projects, there is probably more focus on these activities than other issues. While this in part reflects the currency of renewable energy and the amount of associated bird-relevant work being conducted, there is much still to learn about the impacts of other marine industries, e.g. aggregate extraction, drilling, on seabird ecology.

Migratory routes through the Isle of Man are not documented though some points of landfall are known and the Calf of Man Bird Observatory produces detailed data of bird movements via the Calf. The use of sea areas by birds other than the seabirds is a key gap in our knowledge of birds at sea, both locally and generally, and a potential issue with regard to developments that produce new obstructions above the water surface, especially if they were on a route used by raptors, which are thought to be at risk. Data, however, is not easy to produce and can be expensive, with particular challenges provided where this must be done at sea, however, thermal imaging and radar can now be used to identify and track bird movements, in addition to radio-tracking and aerial photography. Although siting radar at sea provides problems, a land-based site could provide data out to the territorial limits, though not in the detail provided closer inshore. A few species have had UK radio-tracking studies, such as whooper swans, which move through and winter on the Isle of Man, but the routes, heights, conditions and avoidance behaviour of species moving across the Irish Sea are generally unknown and difficult to assess. Langston et al. (2010) review and recommend survey methods for birds, for offshore wind farm developments. Such information could indicate whether there are risks to migrating birds from potential developments and what might be undertaken to mitigate such issues.

Monitoring studies will be important in showing whether birds are at risk from particular kinds of developments or not, and what (if any) behavioural changes occur that might lessen the effect (e.g. do birds fly higher over obstacles, move around them or through them), or cause another issue such as a displacement of activity, and also to show the result

of mitigation undertaken in order to enlighten the designers of future developments and thereby improve the designs and lessen any negative impacts.

Research on breeding success, foraging ranges and diet by the SMP will be important in interpreting monitoring data from the Isle of Man. Local data would be very useful as such results can vary between areas, depending on the prey species available, the local habitats and the local availability of food. A programme linking local seabird species with their food resources and feeding grounds would be particularly useful and a regular assessment of breeding success would help to evaluate changes occurring in the marine environment.

Summary

Manx waters are likely to form a new arena for development very soon and it is important that the risks to birds are taken into account at an early stage in the designs, providing adequate surveys to support the proposals and producing a viable mitigation strategy as a part of the environmental assessment process. Though there is good information on the birds on the Isle of Man we recognise that our knowledge of the birds at sea is poor. Survey will therefore be required to support proposals. It is hoped that data may also be pooled so that such developments can be improved and the risks minimised, learning at each step of the process. Offshore developments have already been undertaken elsewhere and studies are therefore being published that will help us to learn from others' experiences. Monitoring of Manx waters should, in the same way, add to the overall pool of knowledge to further improve the environmental elements of the designs. In this way we may be able to achieve sustainable development.

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