Ecology of Carlingford and Environs

Approach to Carlingford from the South.

An Ecological Report on Carlingford and Environs, County Louth, Ireland.

Carlingford Tidy Towns Committee 2009

Supported by the Heritage Council

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Prepared by Breffni Martin

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Breffni Martin holds a B.Sc. in biology from University College Dublin and is chairman and founder of the North Louth Branch of Birdwatch Ireland and a director and founder of the Louth Nature Trust. Since moving to the Carlingford area in 2002 he has undertaken many ecological surveys in the area including the Irish Wetland Birds Survey, the Countryside Birds Survey amongst others.

Foreword

Carlingford Lough and its hinterland is widely recognized one of the loveliest scenic areas on the east coast of Ireland.

The whole Carlingford Lough area is a magnet for all those who enjoy the great outdoors be they sailors, anglers, riders or hill-walkers.

It is an area of dramatic landscapes, epic tales, unusual and special geology, archaeological riches and, of course, wildlife. The Cooley Mountains have been described as the most ecologically intact upland area in Ireland, despite the ravages of the Táin Bó Cuailgne (the famed Cattle Raid of Cooley, which is set in this area).

Carlingford town, once one of the most important ports on the east cost, still retains a rare antique feel, which draws in large numbers of visitors every year.

Increasingly, many of these visitors, who come for the old walls, or hill walking, are coming to a greater appreciation of wildlife too.

Carlingford Tidy Towns has done a marvellous job over the years in making the town look its best. While nature was never ignored it was less of a core concern but the attention paid to nature has increased greatly, with the increase in points available for it in the national Tidy Towns competition. Carlingford Tidy Towns has seen that 'nature' offers Carlingford a chance to improve its marks in the annual Tidy Towns competition and to improve the attractiveness of the town and surrounds, to locals and visitors alike.

This report is a result of that vision, in that the town Tidy Town Committee commissioned local ecologist Mr Breffni Martin to survey the town's natural resources and suggest ways to enhance these and build them into the town's tourist offer.

The result is an eye opener and an education, showing that Carlingford is of international importance to nature. Read it, learn from it, act on it.

Brendan McSherry
Louth Heritage Officer
December 2009

Introduction

Carlingford is a small town in the north of County Louth near the border with Northern Ireland. It has been inhabited for millennia, and given its propitious location at the foot of an impressive mountain, beside a rich sea lough, and surrounded by a fertile hinterland, it is little wonder that it was attractive to its original settlers. Today it continues to draw settlers and visitors alike, for whom its attractions, be they historical, cultural, architectural, culinary, or natural, continue to fascinate.

Because of this, Carlingford is covered by, and surrounded with several designations, indeed it could be described as a small town sandwiched between a large Special Area of Conservation (SAC), a Natural Heritage Area (NHA) and a Special Protection Area (SPA). The town itself is a recorded monument, with three national monuments in it. It also has an architectural conservation area with more than 50 protected structures in it, as well as supporting a rich biodiversity given its size. The Tidy Towns committee therefore decided to commission an ecological survey of the town, with the support of the County Council, so that in 2008, an application was made to the Heritage Council for a grant to enable the survey to be completed and the Heritage Council approved this in early 2009.

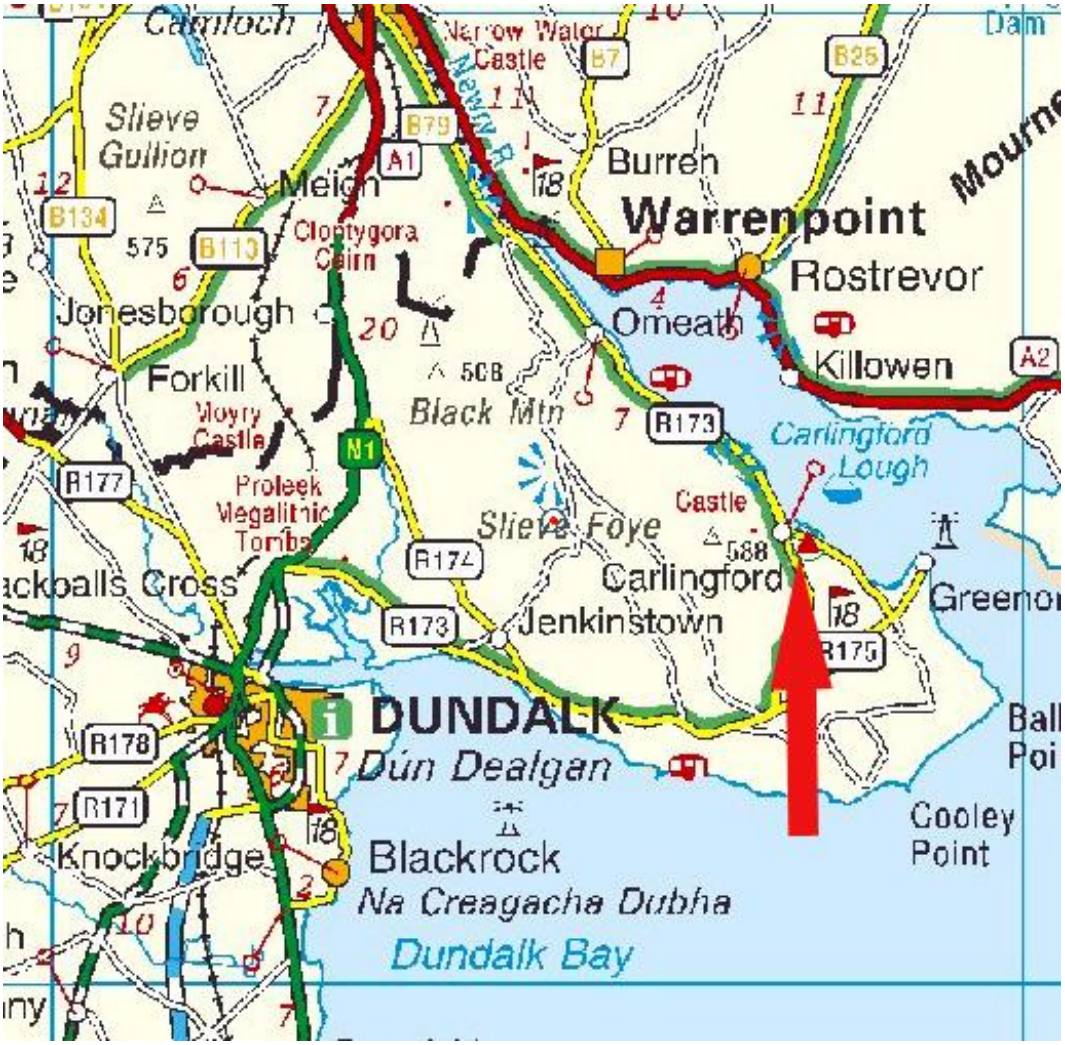
The purpose of the ecological survey was to identify and catalogue species and habitats in general, and of conservation interest, in Carlingford and environs, to suggest how these may be conserved, and to suggest other actions that may enhance biodiversity in the town. Given its emphasis on biodiversity, the study focuses on native species as opposed to introduced or exotic species (see appendix 1). Finally the report suggests ways in which biodiversity could be used to enhance the attraction of the town to eco-tourists, a potential growth area for the town.

Location And Study Area

Carlingford is located in the north of County Louth on the south shore of Carlingford Lough, a sea-lough through which the border between Ireland and Northern Ireland runs. The Irish word for Carlingford is Cairlinn being the shortened form of Cathair Linn translating literally as "City of the Pool", however the real origin of the name is probably Viking, the Old Norse name (Karlingafjorthr). The town is at the foot of Carlingford Mountain to the north-west. At 589 metres, Sleive Foye, in Irish 'mountain of the giant', is impressive. Across the Lough are the Mourne Mountains whose highest peak stands at 849 metres. To the southeast is an expansive area of open mudflats leading to the open sea while to the southwest is mainly farmland with some woods and wetlands.

For the purposes of this study Carlingford Bay refers to the area between Greenore and Carlingford.

Birds and mammals are identified by their common names while other species are identified by both common (where available) and scientific names to avoid ambiguity.



Carlingford: between mountain and lough

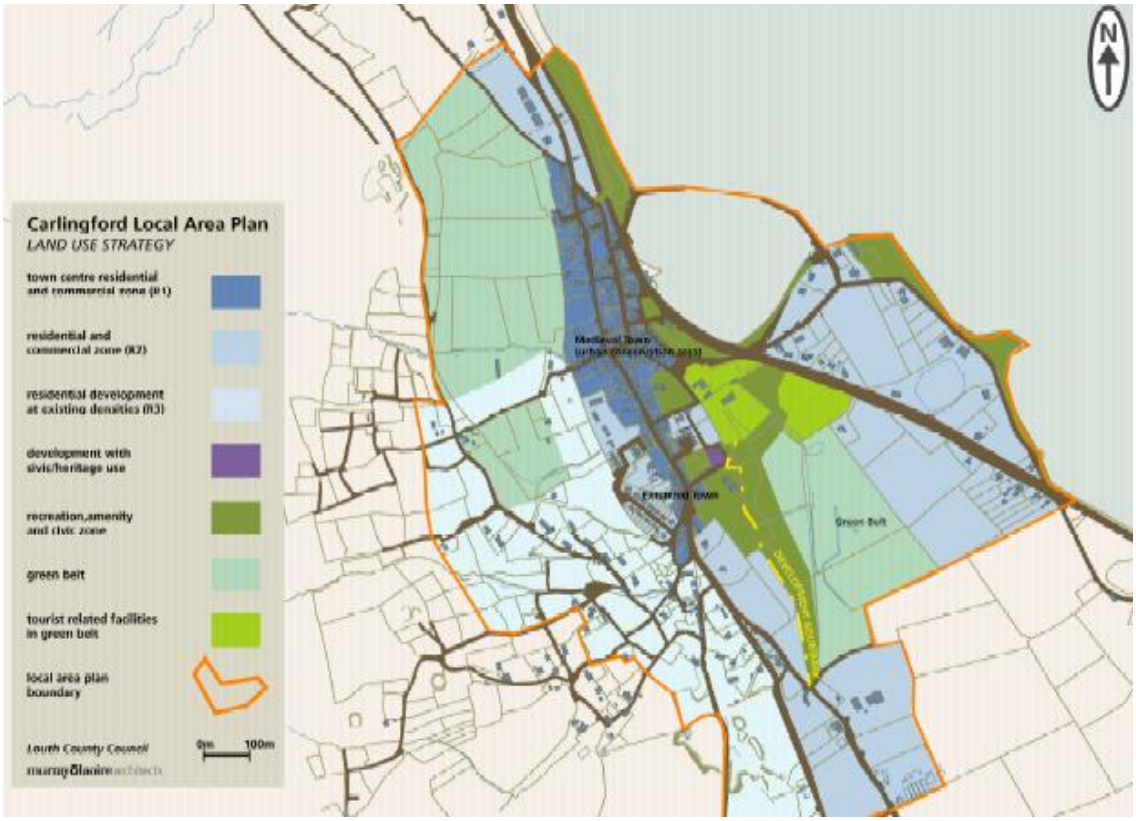
Planning Context

The Louth County Development Plan reflects the high ecological quality of the area in terms of zoning by the local planning authorities, with Development Control Zone 1 reflecting the highest protection level in the mountain area (county development plans do not extend to cover sea areas and foreshore). Control Zone 2 also has a strong conservation objective: "To protect the scenic quality of the landscape and facilitate development required to sustain the existing rural community", while Control Zone 5 provides for some development southwards from the town: "To protect and provide for the development of agriculture and sustainable rural communities and to facilitate certain unique developments of strategic, local, regional or national importance." The margins of EU sites are shown in blue below. At the time of writing a new County Development Plan is under development and this is likely to further strengthen the protection afforded by these zones.

Legend

- Development Control Zone 1
- Development Control Zone 2
- Development Control Zone 3
- Development Control Zone 4
- Development Control Zone 5
- Development Control Zone 6

Carlingford has its own local area development plan (the grey area in the map), which includes in its objectives "To protect the Area of Outstanding Natural Beauty, Area of High Scenic Quality, Coastline of Special Scenic Quality and Scenic Route (as designated in the Louth County Development Plan) around Carlingford from inappropriate development." The Local Area Plan also includes a map identifying "green belt areas that will be immune from development: "Green Belt: The only permitted land use in this category is agriculture, associated agricultural uses and development according to guidelines for development in Areas of Outstanding Natural Beauty, as delineated in the 1997 Louth County Development Plan." The green belt area is highlighted below in light green:

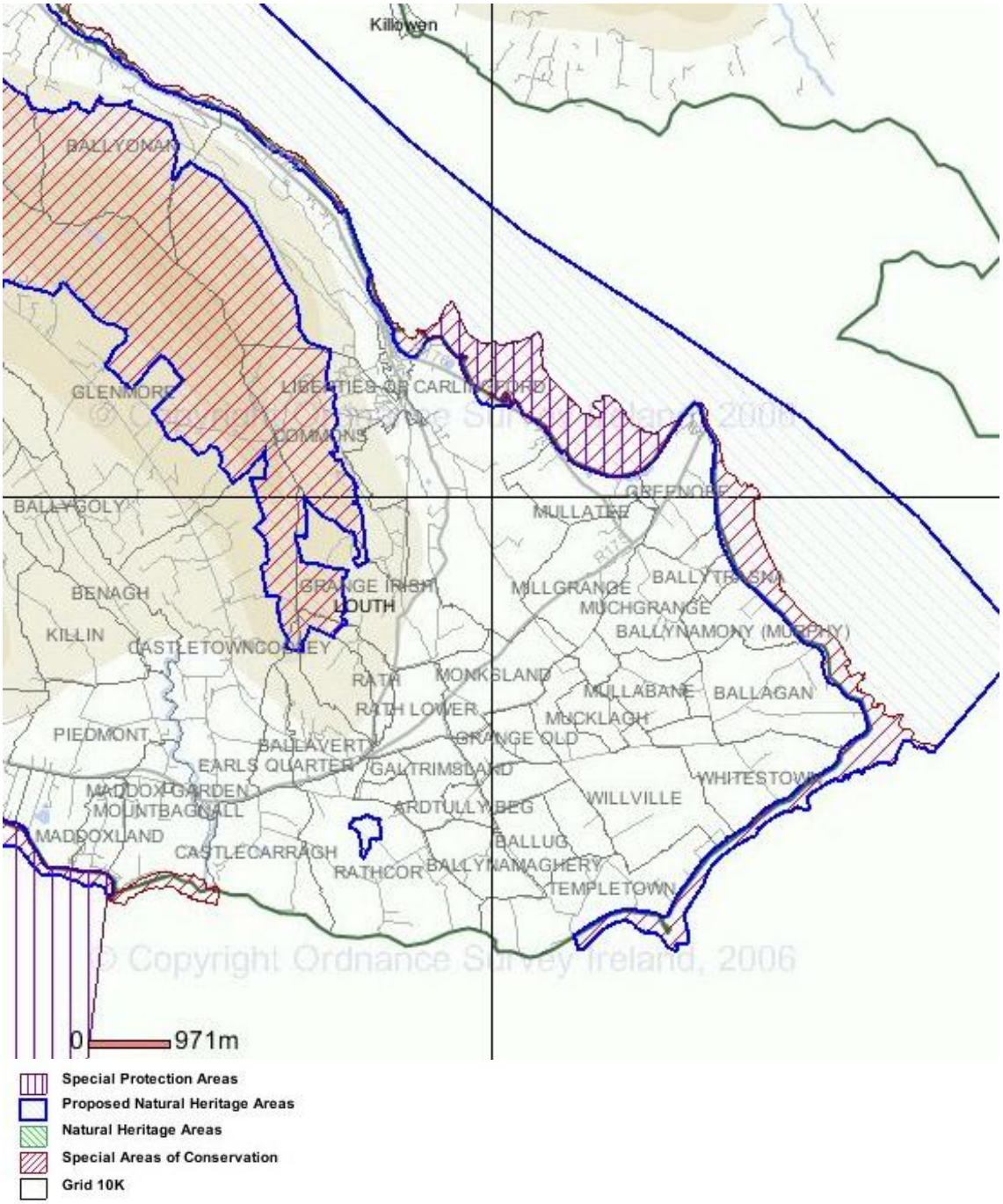


Conservation Context

The town itself has been occupied since medieval times but has undergone considerable expansion recently so that it presents a complex mosaic of old and new, settled habitat and disturbed ground, shore and hill. It is a member of the Irish Walled Towns Network and listed as Medieval Heritage Town meaning that built environment enjoys considerable protection.

Taaffe's Castle Carlingford with Carlingford Mountain in the background

Carlingford is also surrounded by areas designated for environmental conservation. The designated areas in proximity to Carlingford are shown below:



The study area focussed on the town itself and, in particular, areas of interest for wildlife and habitats not currently designated for nature conservation.


The study area is shaded in red (scale 1:5000).

The core study area corresponds to about one square kilometre. The wider "environs" area includes several sites of interest with 5km of Carlingford. These include Shilties Lough, a wet woodland to the south (Liberties of Carlingford), a pond a little further to the south (Millgrange), "The Locra" a wetland area near Greenore, the Sleive Foye woodland to the north and other sites of interest in the Cooley mountains.

Methods

Desktop study: Prior to the commencement of, and throughout the study, a search for literature and data on the ecology, flora, fauna, geology, climate and history of Carlingford was carried out. This involved the examination of published and unpublished literature and data sets, maps, aerial photographs and other sources.

Field study: The study area was divided into twenty transects covering all habitat types in the area. These were surveyed in timed visits during winter, spring, early summer, late summer and early autumn primarily for birds and flora. Insects such as moths, butterflies, dragonflies and damselflies were also noted. A specific survey for signs of terrestrial fauna and for bats was undertaken during the late summer. The survey focused on the various habitats in the town including gardens, fields, hedgerows, streams, ponds, marshes, shoreline and ancient buildings.

Particular attention was paid to the wetland to the south of the Ghan House, an 18th century Georgian building with a rich garden and a pond, the shoreline from Hospital Point, ancient buildings in the town and the area around the Castle.

Finally a nature trail covering these areas is suggested, with several stopping points to observe various items of interest.

Background

Geology and Soils of the Carlingford Area

Carlingford bears traces of Silurian, Carboniferous, Paleogene and Pleistocene geology and so is worth describing in some detail.

Most of Carlingford sits on Silurian sedimentary rocks (sandstones, siltstones and shales) of the Longford-Down Inlier. The original sediments from which these rocks are formed – sands, silts and muds – were deposited about 440 million years ago in the seas off a continent called Laurentia at which time the north western section of Ireland was situated near the ancient Iapetus Ocean at about the Tropic of Capricorn. These metasedimentary rocks are apparent today in the rock upon which King John's Castle sits, along the rocky shore and in the rocky islands along the Carlingford Shore. This gave rise to the brown podzolics, clays, and podzols in the immediate Carlingford area.

Subsequently, by the early Carboniferous, 350Ma ago, Ireland was in equatorial latitudes, and the sea was advancing northwards over the land. Rocks from about this time (320 million years ago) are preserved in the low-lying fertile farmland to the south and east of Carlingford in the form of limestone bedrock.

The next major event to affect the geology of Carlingford was the opening of the Atlantic Ocean which started about 65 million years ago in the Palaeogene Period (Paleocene Epoch) resulting in significant igneous activity during the period 61 to 52 million years ago. Carlingford Mountain (Slieve Foye) represents the eroded root of a much bigger volcano formed at that time. The intrusions are dominated by granite, a silicic or felsic rock, but there are also significant volumes of mafic rocks (containing magnesium and iron) such as gabbro, dolerite and basalt. This gives the upland area to the northwest of Carlingford a peat bog character.

At the start of the Quaternary about 2 million years ago, the beginning of the Ice Age, there were probably as many as six separate episodes of ice advancing and retreating over the area with the most recent being between about 19,000 and 13,000 years ago. The ice sheets flowed in a southeasterly direction from Lough Neagh, down Carlingford Lough and from the west. The glaciers eroded the bedrock gouging out Carlingford Lough and giving it its Fjord-like form today. The ice transported a mixture of sediments of all sizes (boulders, cobbles, gravel and clay) which it would later deposit, forming moraines and drumlins to the south and east of Carlingford, giving a lithosol soil type typical of glacial deposits.

As the ice melted two phenomena occurred simultaneously affecting sea level. Firstly the volume of seawater increased causing sea levels to rise. At the same time, but more slowly, the earth's crust rose because it was no longer burdened by the weight of snow and ice in a phenomenon known as crustal rebound. As a consequence, for a time after the ice melted, Carlingford was under water, then slowly rose. Evidence of this can be found in several raised beaches in the area, for example the rise in the land immediately to the east of the sailing club, and the Cuttings at Greenore.

From about 10,600 years ago there was a sudden pause in the warming and the resultant cold-snap wiped out species such as Reindeer, Giant Irish Deer and others, and replaced the grassland with tundra-type vegetation. At this time some glaciation started again with the formation of Corrie lakes in the nearby Mournes.

From 10,000 years ago the climate started to warm again leading to a heavily wooded habitat consisting initially of birch and hazel, and subsequently oak, elm, and pine.

The above section draws heavily on Sadhbh Baxter's excellent publication 'A Geological Field Guide to Cooley, Gullion, Mourne &. Slieve Croob", 2009, as well as the Geological Survey of Ireland, and Cassell's Atlas of Evolution 2001.

Impact of Human Settlement

The first human settlers are thought to have arrived about 9,000 years ago. These Mesolithic hunter-gatherers would have made a living by foraging along the shore for gastropods, bivalves, crustaceans and fish, as well as foraging in the woodland by the shore for fruit and nuts. The earliest direct evidence of these people is from flints and middens found at a raised beach area beside the harbour. Middens are caches of food detritus and other material left by ancient people or animals, in the case they refer to caches of the shells of various seafood collected from the shore and discarded. There is also some evidence of Mesolithic activity at the raised beach at The Cuttings at Greenore. Given the sheltered nature of Carlingford, it is likely that it too was occupied at this time but there is no remaining direct evidence.

About 6,000 years the knowledge of farming arrived in Ireland beginning the Neolithic era and its impact on the land was much more dramatic than the Mesolithic. This is because the new arrivals, being farmers rather than hunter-gatherers, their first act was to clear the land of trees for that purpose. It is thought that this initial clearance brought about the first hedgerows. This is because by clearing patches of land and surrounding them with felled trees and branches in order to keep livestock in and marauders out, would have created opportunities for smaller hawthorn and blackthorn, which, with bramble, would create an almost impermeable barrier. Many Irish hedgerows are known to be very ancient. They also brought animals and plants with them whose impact would further change the landscape forever.

This period also saw a change in climate, from warm and dry to slightly wetter and cooler. This had the effect of transforming the pine woodland to peat bog, some of which is in evidence on Carlingford Mountain.

Given its strategic location and the easy availability of food from the sea and fertile farmland, the area of Carlingford was probably intermittently or continuously settled from this time, though evidence is sketchy. There is evidence that the area was raided, and possibly temporarily settled, by Vikings, around 900 AD (nearby Annagassan was raided in 841 AD). The first historical evidence of settlement was the construction of a castle by Hugh de Lacy, a Norman knight, about 800 years ago. A small town quickly grew up around the castle presumably accompanied by an intensification of agricultural activity in the hinterland.

The town was walled and several iconic buildings were built that survive today including King John's Castle (ca 1200), Carlingford Abbey (ca 1300), Taaffe's Castle (a castellated town house, ca 1400) and others. The old walls of these buildings support many species of flora (including mosses and lichens) as well as providing roosting and nesting for bats and birds. Much of the development of Carlingford during the 19th century involved in-filling the immediate shore area, construction of a railway line (Greenore to Newry) along the shore and an enclosed harbour. The railway was abandoned around 1952 and the current road was built. In the last decade Carlingford has seen significant modern development both along the shore and in the hinterland. Nevertheless it retains much of its biodiversity value despite these developments.

The following quotation from Art Cosgrove in the Oxford History of Ireland gives an idea of what Carlingford wasl like in historical times:

"For all its tendency towards Ulster, Carlingford was seen as being at the northern extremity of the Pale, as shown by a complaint of the inhabitants of Carlingford and Cooley in March 1410:

The town and lordship are situated on the frontier of the marches of County Louth in a valley between the sea and the mountains… and are cut off from the rest of the county by high mountains and wooded passes as well as by the arm of the sea flowing backwards and forwards, so they are not able to be helped against the Irish and Scots and on account of that they are often burned and devastated."

Soil Types

The Silurian shale bedrock in the immediate Carlingford area gave rise principally to brown podzolics with associated gleys and podzols, while the principal soil in the area immediately to the east is acid brown earths with associated gleys and brown podzolics. The mountain area to the north of Carlingford shows characteristics of blanket peat and peaty podzols (Source: A Soil Type Map of County Louth – Teagasc 1995 and National Soil Survey Of Ireland, An Foras Talúntais M. J. Gardiner and T. Radford, 1980). Brown podzolic soils are a subdivision of the Podzolic soils and although classed with podzols because they have an iron-rich, or spodic horizon, they are, in fact intermediate between podzols and Brown earths. They are associated with hilly sloped countryside, high precipitation and mild weather. They are generally considered useful and productive soils.

Water Characteristics

Well water extracted from the area is generally of an alkaline quality due to the influence of the limestone bedrock (personal communication Louth County Council Water Services). Surface water in the town consists of runoff from the mountain, two mountain streams and a sea inlet/drain near Ghan House, giving rise to a partly brackish swamp area to the south. The mountain water tends to be slightly acidic probably due to the influence of the igneous bedrock and peat.

Climate

The climate of the Cooley peninsula is generally typical of the north-east coast of Ireland except for the fact that Carlingford itself enjoys a unique microclimate because it is protected by the mountains to the west and north, and is under the maritime influence of Carlingford Lough, itself protected by the mountains on either side. The enclosed nature of the lough also gives rise to fog and elevated humidity under certain conditions. However, the location of the mountain means that Carlingford receives slightly less direct sunlight than the surrounding countryside, and slightly more rain because it is in the rain shadow of the Carlingoford mountain (Source: personal communication, Noreen Brennan, Met Éireann – see appendix 4).

Effect of the Lough

Carlingford Lough is a sea lough that was gouged out by the most recent glaciation episode (the last ice Age). As such it is deep (about 10 metres) in the middle but shallow at the mouth with skerries and loose boulders. It is fed by the freshwater Newry River as well as numerous small streams all along the Lough, the runoff from which must be significant. The Lough is generally calm due to its oblique orientation in relation to the prevailing south-westerly winds. However under some conditions (a strong south easterly for example) it can be quite churned up and can on occasion flood lower lying parts of Carlingford, particularly when accompanied by precipitation in the mountain and low pressure.

The Lough, together with Lough Foyle, is covered by a special, cross-border body, the Loughs' Agency. The main role of the Lough is to manage various aquaculture activities, notably the bottom culture of mussels.

Habitats

The main habitats (classified according to Fossitt, Heritage Council, 2000) identified in the study area are as listed below. The habitats are divided into non-marine and marine and each habitat described is given the classification reference from Fossett (2000).

Types of Habitat

The habitats present in the study area are as follows:

Marine

L Littoral (intertidal)
LR Littoral rock
LR2 Moderately exposed rocky shores – Carlingford bay (i.e. the area between Carlingford and Greenore)

LS Littoral sediment
LS1 Shingle and gravel shores - between the harbour and Hospital Point
LS3 Muddy sand shores – Carlingford bay
LS4 Mud shores – Carlingford bay

LS5 Mixed sediment shores – Carlingford bay

SR Sub-littoral Rock
MW Marine Water Body

Passing reference is made to the latter two habitats, the first, permanently under water and the second, open water.

Non-marine

F Freshwater
FL Lakes and ponds
FL8 Other artificial lakes and ponds – SUDS type pond behind the community centre (SUDS: Sustainable Urban Drainage System, typically draining surface runoff urban water into a wetland).

FW Watercourses
FW2 Depositing/lowland rivers – several mountain streams
FW4 Drainage ditches - Ghan House and Wood's land

FS Swamps
FS1 Reed and large sedge swamps - Ghan House/Woods wetland

G Grassland and marsh
GA Improved grassland
GA1 Improved agricultural grassland - Ghan House horse pasture
GA2 Amenity grassland (improved) – playing fields beside community centre

GS Semi-natural
GS4 Wet grassland – Ghan House

W Woodland and scrub
WN Semi-natural woodland

WD Highly modified/non-native woodland – behind St Oliver's Park
WD5 Scattered trees and parkland – amenity area fronting harbour

WL Linear woodland/ scrub
WL1 Hedgerows – Ghan House area and behind St Oliver's Park

E Exposed rock and disturbed ground
ER Exposed rock
ER2 Exposed calcareous rock – shore area around Hospital Point and harbour

ED Disturbed ground
ED3 Recolonising bare ground – Cu Chullain Heights, Oyster Cove, Clos Na Manach and other areas where construction has recently occurred

B Cultivated and built land

BC4 Flower beds and borders – much of the town

BL Built land
BL1 Stone walls and other stonework – throughout the town
BL3 Buildings and artificial surfaces – throughout the town

C Coastland
CW Brackish waters
CW2 Tidal rivers – channel at Ghan House

CC Coastal constructions
CC1 Sea walls, piers and jetties - harbour

Note that the wetland area on the grounds of the Ghan House and Woods land is a complex mosaic of habitats in transition following various development, both historical and recent. In particular john Woods has gone to great lengths to excavate, plant and develop the area as a high-biodiversity wetland.

European Union and Other Designated Sites in or near the Study Area

There are two main designations mandated by EU legislation in the form of the Birds Directive (Special Protection Area (SPA)) and the Habitats Directive (Special Area of Conservation (SAC)) – see map above. The formal titles of these directives are respectively EU Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds and EU Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats, and of wild flora and fauna. The birds designation is assigned where there are significant numbers of species listed in Annex 1 of the directive, in this case Light-bellied Brent Geese (the usual test of significance is 1% of national, international or flyway population). There is a further designation under the Irish Wildlife Act as amended in 2000, namely Natural Heritage Areas (NHA). According to the act, an NHA is "an area worthy of conservation for one or more species communities, habitats, landforms or geological or geomorphological features, or for its diversity of natural attributes." Where an NHA has been identified but where statutory protection has not yet been provided it is designated proposed NHA (pHNA).

Most of the study area borders designated areas in one way or another, a testimony to the overall very high ecological quality of Carlingford. All of the mudflats in Carlingford bay are designated as an SPA primarily for the over-wintering birds, notably Pale-bellied Brent Geese

The same area is also designated an SAC primarily selected for perennial vegetation of stony banks and drift lines, both habitats listed on Annex I of the EU Habitats Directive.

Furthermore all upland area is designated SAC along with much of the Cooley mountains principally for the presence of four Annex 1 EU Habitats Directive types, one of which is defined as " a mosaic of alpine/sub-alpine heath and grassland" while

the other three are different types of rocky habitats. Both mountain and bay are also pNHAs under the Wildlife Act.

Carlingford Lough is also a Ramsar Site under the Convention on Wetlands of International Importance, called the Ramsar Convention, an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. "Negotiated through the 1960s by countries and non-governmental organizations that were concerned at the increasing loss and degradation of wetland habitat for migratory waterbirds, the treaty was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975. It is the only global environmental treaty that deals with a particular ecosystem, and the Convention's member countries cover all geographic regions of the planet."

Finally Carlingford Lough is designated as a Site/Area of Special Scientific Interest (ASSI – note that this designation is specific to Northern Ireland equivalent to an SSSI in Britain) and as an Area of Outstanding National Beauty (AONB), a UK designations.

Site Synopses (National Parks & Wildlife Service) for SPAs, SACs and NHAs are given in Appendix 2.

Marine Areas

Hospital Point and Harbour Area.

Habitat

Hospital Point is a rocky outcrop immediately to the east of the harbour. The area consists of a moderately exposed rocky shore with rocky outcrops, sand and shingle, mud and mixed sediment (LR2, LS 1, 3, 4 and 5 per Fossett), an impressive array of habitats in a small area.

Mammals

Otter spraints (droppings) was found along the shore area and on a stone bridge in the Ghan House area, evidence that otters at least occasionally frequent the area. A dead juvenile otter was found in 2008 near Shilties Lough. Mink, an invasive American mustelid, is known to predate nesting terns on Green Island and doubtless occasionally visits the area. Mink are farmed in Ireland for their pelt. Mink is an opportunistic predator feeding on duck, pheasant, fish, crab, rodents, eels etc. As with Foxes and Stoats, surplus killing occurs which can lead to problems on islands with bird colonies. In 2007 it is thought that a mink wiped out the entire colony of breeding Sandwich Terns on Green Island.

Both Grey and Common (also known as Harbour) Seals use the Lough and haul out on the rocks between Greenore and Carlingford. In the most recent detailed survey an average of 22 Harbour seals were noted in Carlingford Lough (mainly hauling out at The Black Rock) with the population ranging from 11 to 31 during the summer months. Common seals probably also pup at this site, however because Common Seal pups can swim with their mother from birth, it is difficult to estimate numbers. The

Grey Seal population in Carlingford lough has declined in recent years with peak counts in 1996 of up to 30 individuals and less than five observed up to 2002. Pups have only been observed at the site in 1998 when four were observed. A count by the author on 23/8/09 produced four Grey and 18 Common Seals hauled out at Black Rock. (Source: Harbour Seal Population Assessment in the Republic of Ireland, Cronin, Duck et al, 2003). Otters and Grey Seals are Annex II species under Habitats Directive

Dolphins occasionally visit the lough, recent records including a pod of Bottle-nosed Dolphins in August 2008 and another in June 09, apparently in pursuit of shoals of Mackerel.

Bottlenose dolphins Carlingford Lough – photo D Cunningham

Birds

Birds using the area fall into five categories: breeding, non-breeding over-summering, over-wintering, transitional and vagrant/rare/scarce. Maximum numbers are seen at low tide in December/January when they feed on the mudflats. At high tide numbers may be considerably smaller, as birds are crowded together on the small rocky islands and some depart for the fields or, like the Brent, to distant salt marshes at Marsh South and Rockmarshal in Dundalk Bay. Maximum numbers reflect the low tide numbers and may be higher than the Irish Wetland Birds Survey (IWeBs) numbers, which are normally estimated on the upper tidal cycle.

Carlingford Biodiversity: Bar-tailed Godwit, Knot, Curlew, Redshank, Greenshank

Overwintering

Swans

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Both Whooper and Mute Swans turn up during the winter both at Shilies Lough and in the wetlands behind the Ghan House and Woods' land. Over time they may breed on an island in Woods' land and are probably primarily prevented from doing so by the lack of sufficient open water for feeding of young.

As the area develops following various plantings by John Woods, it is likely to become more productive and to support even greater biodiversity than at present. Male Mute Swans are arguably the heaviest flying bird and require extensive open water for landing and takeoff.

Light-bellied Brent geese

A flock of up to 400 Light-belliedbrent geese use the mudflats between Greenore and Carlingford every winter. The birds arrive from their breeding grounds in the Canadian arctic by way of Greenland and Iceland before arriving in Strangford Lough in early September. From here they gradually disperse all over Ireland, with a flock varying between 100 to 400 individuals using the Carlingford Bay depending on the time in the season and the tide. Interestingly these birds roost primarily at Rockmarshal, tacking around the coast to get there, rather than the shorter overland route, and often flying directly into the prevailing wind. Peak numbers occur in September, when the birds are starting to leave Strangford Lough and dispersing around the country, and again in March when they gather for their return migration to Iceland and Canada. The population of Brent geese has been steadily increasing from a low of about 5000 birds (worldwide) in the 1950s to nearly 40,000 today thanks to various conservation measures, in particular the protection of overwintering grounds, such as Carlingford Bay. While overwintering the birds almost constantly eat, concentrating first on the Eel Grass in the mudflats, and subsequently moving onto Ulva and Enteromorpha both seaweed algae, all of which are present on the mudflats. Occasionally a few Dark-bellied Brent, their more easterly cousins, are seen on the mudflat and recently a Black Brant, their American cousin, was found there.

Pale-bellied Brent geese are present in internationally important numbers and are part of the reason for the designation of the area as a SPA.

Shelduck

A few Shelduck use the mudflats for feeding during the winter where they feed on their chief prey item, Hydrobia ulvae, a species of tiny snail that lives in mud in estuaries. These birds are generally resident in Ireland, except when almost the entire national flock departs in August to moult their flight feathers at Bridgwater Bay in the UK, returning in October/November. At least two pairs of Shelduck breed in the area, discreetly choosing holes under banks of bramble along the shore and emerging triumphant in early July with their handsome ducklings.

Shelduck with ducklings

Mallard

The area supports 10 or 20 over-wintering mallard. These are probably resident Irish birds which go inland to freshwater areas for breeding.

Wigeon

Twenty to 30 Wigeon over-winter in the area but this number is swelled in spring and autumn often to over 150 birds. Their evocative whistling and splashing about in the water in late winter and spring makes them particularly noteworthy. Most of these birds breed in Iceland and over-winter in Ireland.

Two males and a female Wigeon Carlingford Lough

Teal

Like the Wigeon, the 20 or 30 Teal which use the area in winter come in from Iceland where they breed. The first icy strong northerly wind often brings in large flocks which then disperses around the country. When the fields behind the Ghan House get wet in the winter, up to 100 teal may come in to forage there.

Teal Shilties Lough

Scaup

The Scaup is a diving duck which feeds mainly on mussels and other molluscs for which it dives to the seabed. In the past flocks of up to 1000 birds were seen on Carlingford lough but these days only a few dozen birds seem to overwinter on the lough with individual birds or small flocks occasionally seen out on the lough from the harbour.

Goldeneye

Goldeneye, another diving duck which feeds on molluscs, crustaceans, and fish. Like the Scaup, numbers of this attractive duck have declined in recent years. Both species migrate in primarily from breeding grounds in Iceland.

Red-breasted Merganser

Up to 50 Red-breasted Merganser use the lough and can be seen resting and preening out on the mudflats, often around the Black Rock area. These are saw-bills, so called because of their serrated bill which is adapted for the pursuit hunting of fish.

Grey Heron

There are usually one or two Grey Herons feeding on the small streams that run down to the shore. At least 4 pairs breed in a heronry in a wet woodland area south of the Carlingford liberties. Up to 30 can be seen feeding in the wetland behind the Ghan House mainly on Woods' land.

Grey Herons – photo John Woods

Little Egret

Once a rarity, this Mediterranean species is spreading northward relentlessly and is now a common sight on the lough or, like the Grey Heron, in Shilties Lough, where is feeds on small fish, invertebrates and the like. In the summer of 2009, a pair probably bred in the heronry mentioned above. This is based on family parties of up to eight birds being seen flying in and out of the wet woodland (pers comm. B. McSherry).

Little Egret with Black-headed Gulls – note yellow "slippers"
Cormorant

Twenty or thirty cormorants can regularly be seen offshore on the rocks sitting quietly or standing up drying their wings. Their cousin the Common Shag, can also sometimes be seen, often coming into the lough when it is stormy at sea.

Cormorants, Grey Heron and Little Egret – on an island at Carlingford Lough

Little Grebe

Little Grebes over-winter at Shilties Lough and can also sometimes be seen out on the louth particularly in autumn. These smallest of Irish grebes generally breed in freshwater rivers, ponds and lakes and are generally resident all year round.

Great Crested Grebe

Little Grebes

The lough holds up to 300 over-wintering Great Crested Grebes so it is usually possible to see one or two from the harbour at Carlingford. However they prefer freshwater for breeding and so abandon the lough during the summer.

Moorhen

A few Moorhens spend the winter at Shilties lough and a pair regularly breeds there; up to 10 pairs have been seen in the wetland behind Ghan house and Woods' land where they successfully breed every year.

Coot

Coot occasionally occur in autumn on the Lough and Shilties Lough; these are likely to be dispersing first winter birds. A pair has bred on in the wetland behind Ghan house.

Oystercatcher

Up to 500 Oystercatcher use the area on occasion, though more typically about 200 birds may be seen from hospital point spread out over the lough and in the surrounding fields. Despite their name, oysters are probably one of the few species of mollusc that oystercatchers do not regularly feed on. Small numbers of non-breeding birds spend the summer in the area while their breeding fellows head to Iceland and The Faroes as well as other parts of Ireland and Britain. There is little interchange with Scandanavian or continental populations (Migration 2003).

Ringed Plover

A good population of this small attractive wader overwinters on the mudflats, often joining up with the Dunlin. One or two pairs attempt to breed in the small shingle beach between the harbour and hospital point, though given the numbers of walkers, they probably only rarely succeed, so well camouflaged that eggs and chicks are inadvertently trodden on.

Ringed plover

Grey Plover

Grey Plover

Up to a dozen Grey Plovers may be seen on the mudflats feeding on small invertebrates on the mud with their typical stop start movement. Their relative, the Golden Plover, only rarely occurs in the area, though large numbers occur elsewhere in Carlingford lough.

Lapwing

Lapwings once bred commonly in Ireland and indeed in the damp pasture around Cooley but their numbers have now declined drastically. However a very large number of birds arrive to overwinter in Ireland with up to 400 birds on the mudflats on occasion. Lapwings have been proposed as the possible Irish national bird due to their green white and orange plumage. They are easily identified by their attractive crest and floppy chaotic flight.

Lapwing – Ghan House

Knot

Small numbers of Knot can be seen foraging over the mudflats in search of bivalves, mainly small clams (notably pinkish Baltic tellin (Macoma balthica)), occasionally up to 100 birds. This rather drab dumpy mid-sized wader flies in from breeding grounds Greenland and the High Canadian Arctic.

Knot - mudflats

Turnstone

Up to 100 Turnstones use the mudflats depending on the state of the tide. These are often under recorded because of their black, brown, and white camouflage, their tendency to spread out and their feeding method which involves foraging in seaweed or, as their name suggests, turning over stones, in search of a variety of invertebrates. A few can invariably be seen during the summer in their spectacular summer plumage. These are probably failed breeders who have returned early of late departing birds.

Turnstone in summer plumage

Dunlin

This small wader specialises in taking small worms and invertebrates in the mud. Typically a large very busy flock swarms over the mud following the tide like a hundred busy sewing machines. Small numbers breed in Ireland but the majority fly in from the North with three separate sub-species populations either over-wintering in Ireland or passing through.

Dunlin

Redshank

After the Oystercatcher, the Redshank is probably the most common species on the mudflats all year round where they feed by sight on a variety of worms and invertebrates (hydrobia sp, corophium and Nereid worms). Like the Curlew (below), the Redshank used to be a widespread breeding bird in Ireland, but populations have decreased in recent years for the same reason as the decline in curlew breeding. In winter, the resident population is joined by birds from Britain and Europe. Redshanks

are often the first bird to fly when disturbed, alerting the other birds with its piercing alarm call, hence its poetic name, ‘the sentinel of the marshes’’.

Redshank

Greenshank

During the winter a few Greenshanks are always present on the mudflats where they can be seen dashing after prey species in the pools and small streams. Our Greenshanks breed in Scandanavia and northern Russia in pine forests near bogs. Distinguished from Redshanks by their green legs and lighter colour overall.

Greenshanks with Curlew, Redshank and Teal

Godwits

Small numbers of both Black-tailed and Bar-tailed Godwits occur on the mudflats with up to 50 or 60 birds on occasion, the Bar-tailed Godwit predominating. In all probability the mixed nature of the sediment on the mudflats does not suit their feeding technique, which involves probing deeply into the mud with their long tentative bills, the softer mud further up the lough being more suitable for Black-tailed Godwit, and the sandier substrate towards the mouth of the lough for the Bar-tailed Godwit.

Curlew

Up to fifty specimens of this iconic species with its spectacularly decurved bill use the mudflats, though more typically 10 to 15 birds can be seen. Curlews feed by probing with their bill then turning their head so that they can sweep an extended area under the mud for the lugworm worms and other invertebrates that they feed on. Curlews used to be a widespread breeding species in Ireland but have significantly decreased in recent years, mainly due to modern farming techniques and habitat destruction. The few remaining breeding birds probably over-winter in Ireland and are joined by large flocks from Scandinavia and further east during the winter.

Whimbel

Whimbrel, similar in appearance to Curlew but smaller, is a passage migrant in that we see occasional flocks of birds in autumn leaving their breeding areas for the warmer climes of West Africa and smaller numbers in spring returning to their breeding sites up north, but they do not hang around for the winter or summer.

Whimbrel – a transitional migrant

Snipe

Large numbers of Snipe arrive in the saltmarsh every autumn but quickly move on to the wet pasture and bog that they prefer. A few hang around Shilties Lough where they may flush with their characteristic croaking call and zigzag flight.

Snipe at Shilties Lough

Gulls

A good number of Black-headed Gulls use the lough all year round where their raucous call and squabbling can often be heard. Smaller numbers of Common Gulls are also present, along with a scattering of Herring Gulls. In winter, particularly in stormy weather, large numbers of Herring Gulls sometimes come into the lough, some of which may be of the northern argentatus race. Herring Gulls have declined significantly in the last decade (by up to 90%), partly due to the EU landfill directive which imposed new regulations in regard to the covering of rubbish in municipal dumps. This was because Herring Gulls were becoming prey to avian botulism. The population is now slowly increasing as they adapt to the new circumstances. They are nevertheless still a Red-listed species in Ireland. Lesser black backed gulls occasionally occur along with several pairs of Great Black-backed Gulls, up to 50 of which roost and loaf on the rocks between Omeath and Carlingford where they feed on fish offal left by local fishermen.

Black-headed Gull winter plumage

Grey Crow

A population of 20 to 30 Grey Crows (also known as Hooded Crows) use the mudflats where they may often be seen picking up snails and other molluscs and dropping them on the rocks to open them. Curiously a small population of Carrion Crows, a sub-species, or Carrion-Grey Crow hybrids, persist on the lough. Grey/Carrion crows are the races of the same species, the Grey being cold-adapted. In Ireland Grey Crows predominate whereas in much of Britain and the western continent, the all-black Carrion Crows are the most prevalent. Going further east, the grey race reappears. In the zones where both are present hybrids are common, but apparently do not produce robust offspring and so the populations remain separate.

Grey Crow with Carrion Crow Carlingford – these birds are paired

Other passerine species common on the mudflats are Rooks, Jackdaws, Rock Pipits, Starlings, and Pied Wagtails (in Spring and Autumn the nominate race of wagtail, the White Wagtail can be seen passing through the shore area in small numbers on migration to and from Iceland). Noteworthy are at least two pairs of Rock Pipits, a small rather smutty looking passerine, breed in the vicinity of the Carlingford shore. Several years ago a pair of this adaptable species nested on an out-of-commission fishing boat in the harbour and when the boat was put back into use, stayed with the nest while the boat went out to sea, and successfully fledged their brood.

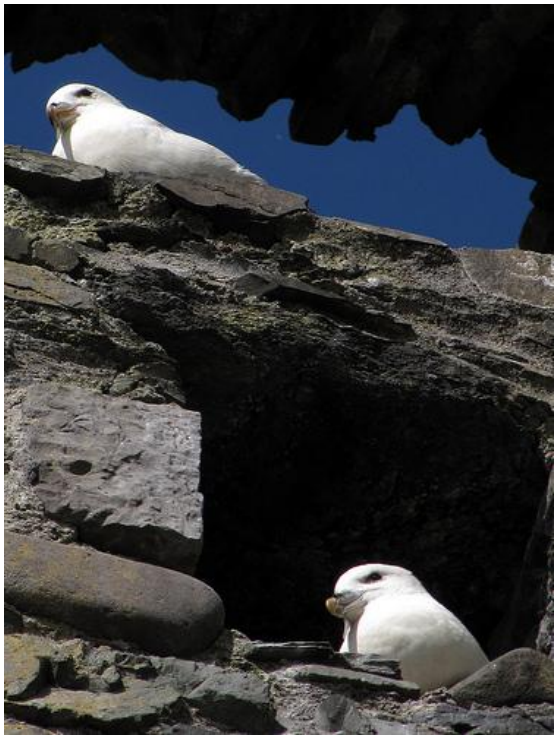
Occasionally Observed Species

In the winter months, the area is occasionally used by other wildfowl and diver species, as individuals or in small numbers. These include Eider, Long-tailed Duck, Smew, Shoveler, Whooper Swan, Pintail, Green-winged Teal, Great Northern Diver, Red-throated Diver, Red-necked Grebe, Black-throated Diver, Slavonian Grebe and Common Sandpiper.

Summering/Breeding Birds

Fulmar

Fulmars are a pelagic species ranging widely over the North Atlantic; they nest in huge colonies on sea cliffs. Belonging to the tubenose order (Procellariiformes), fulmars are only superficially like seagulls, being particularly distinguished by the fact that they can drink seawater and excrete the salt thanks to an enlarged gland at the base of their bill. A few pairs of fulmar nest every year in a few small recesses in King John's Castle. Fulmars have expanded their range significantly in recent times thanks to the expansion of the fishing industry and are particularly adapt at obtaining offal from fishing boats, though this trait may have some unintended adverse consequences as fulmars are as a result particularly susceptible to poisoning from picking up bits of plastic that resemble fish offal from the sea.



Fulmars nesting King John's Castle

Heronry

As previously mentioned a small heronry exists in the wet woodland to the south of Carlingford Liberties; a pair of Little Egrets probably nest in this area as well (adult birds seen flying in and out of the area). Little Egrets are a Mediterranean species that has been expanding its range northwards over the last 30 or so years, probably in response to global warming. If breeding in this area is confirmed, this may be the most northerly breeding pair recorded in Ireland to date.

Wildfowl

As previously mentioned Shelducks nest along the shore between Greenore and Carlingford. In addition to this a pair of mallard occasionally attempt nesting in Shilties lough. A single duckling was successfully fledged in 2009.

Waders

As previously mentioned a few pairs of Ringed Plover attempt nesting along the Carlingford shore. Other than that a few snipe nest in set areas in small wetland areas in the vicinity of Carlingford notably at "The Locra"(from Irish "Luachra" the genitive singular of "Luachair", rushes, thereby denoting a rushy place, a place of rushes). Generally a few of Oystercatchers and Redshanks as well as other waders hang around during the summer. These may be stragglers who have not yet migrated,

non-breeding birds who will not bother migrating, and early returnees who for one reason or another have failed to breed.

Black Guillemot

A small colony of five or six Black Guillemots nests on the breakwater at Greenore port and may be seen in their smart black and white summer plumage from around the harbour where they dive to hunt fish in the rocky seabed. Thanks to a project involving the Bush school woodwork class and Greenore Port, several nesting boxes for Black Guillemots were placed on the breakwater and resulted in a significant increase in Black Guillemot productivity in the area.

Black Guillemot summer plumage

Winter plumage

Terns

Four species of tern may be seen on the lough during the spring and summer months; they nest on Green Island near the mouth of the lough. Green Island is a rock and shingle island; the ground-nesting terns use it because it is inaccessible to most predators except gulls and Grey Crows, though in recent years it is suspected that a mink is predating the site. The island is also prone to erosion and high tides.

Sandwich Tern preparing to dive

Sandwich terns are the most common and up to 50 pairs nest on the island, followed by common terns, of which about 20 pairs nest. A few pairs of arctic terns are still

thought to use the site while the much rarer and red-listed roseate tern seems to have abandoned the site with the last pair nesting there in 1997. However in late August all four species may be seen in and around Carlingford Lough, these being dispersing birds from Rockabill Island off the coast of Dublin. All species migrate to West Africa to overwinter, with the exception of the arctic tern, which overwinters off the coast of antartica, making it a global migrant with a worldwide circumpolar range.

Fish

According to the Loughs Agency (2008) the primary fish species found in the freshwater elements of Carlingford area include:

Atlantic salmon	(Salmo salar L.),
Trout (Sea Trout and resident Brown Trout)	(Salmo trutta L.),
Sea Lamprey	(Petromyzon marinus),
River/Brook Lamprey	(Lampetra sp.),
European Eel	(Anguila anguila L.),
Pike	(Esox lucius),
Roach	(Rutilus rutilus),
Bream	(Abramis brama),
Roach x Bream hybrids,	
Tench	(Tinca tinca),
Perch	(Perca fluviatilis)
Rudd	(Scardinius erythrophthalmus).

European Eel, Bass, Grey Mullet, River/Brook and Sea Lamprey are important species in terms of the native fish biodiversity.

The following species were reported by the Lough Agency as being present in the Carlingford lough marine and transitional waters:

Three Bearded Rocking	Gaidropsarus vulgaris
Five Bearded Rockling	Ciliata mustela
Fifteen Spined Stickleback	Spinachia spinachia
Ballan Wrasse	Labrus bergylta
Flounder	Platichthys flesus L.
Grey Mullet	Chelon labrosus
Bass	Dicentrarchus labrax
Brill	Scophthalmus rhombus
Brown shrimp	Crangon crangon
Butterfish	Pholis gunnellus
Coalfish	Pollachius virens
Cod	Gadus morhua
Common Prawn	Palaemon serratus
Corkwing Wrasse	Symphodus melops
Dab	Limanda limanda
Dragonet	Callionymus lyra
European Flounder	Platichthys flesus
Golden Grey Mullet	Liza aurata

Greater Pipefish	Syngnathus acus
Green Crab	Carcinus maenas
Grey Gurnard	Eutrigla gurnardus
Atlantic Herring	Clupea harengus
John Dory	Zeus faber
Lesser Pipefish	Syngnathus rostellatus
Ling	Molva molva
Montagus sea snail	Liparis montagui
Common Shore Crab	Carcinus maenas
Pacific oyster	Crassostrea gigas
Plaice	Pleuronectes platessa
Pogge	Agonus cataphractus
Pollack	Pollachius pollachius
Poor cod	Trisporterus minutus
Red gurnard	Aspitrigla cuculus
Sand eel	Ammodytes tobianus
Sand goby	Pomatoschistus minutus
Sand smelt	Atherina presbyter
Scad	Trachurus trachurus
Sole	Solea solea
Thin lipped grey mullet	Liza ramada
Thornback ray	Raja clavata (ICUN Red List of Threatened Species)
Tub Gurnard	Trigla lucerna
Turbot	Scophtthalmus maximus
Witch	Glyptocephalus cynoglossus
Blue Mussel	Mytilus edulis
European Flat Oyster	Ostrea edulis (UK Biodiversity Action Plan (BAP) Species - declining)
European Flounder	Platichthys flesus
European Smelt	Osmerus eperlanus (Listed as vulnerable on IUCN Red List)
Whiting	Merlangus merlangus
Atlantic Herring	Clupea harengus
Long-Spined Sea Scorpion	Taurulus bubalis
European Sprat	Sprattus sprattus sprattus

Atlantic Salmon

Atlantic Salmon, a native migratory fish, hatches and grows in mountain streams and rivers such as the Whitewater near Carlingford before going to sea as ‘smolts’. They then mature in the north Atlantic for a few years and then return to their natal stream via Carlingford Lough.

Sea Trout

Significant numbers of sea trout are found in the lough; sea trout are the anadromous form of the brown trout meaning that they migrate to sea to feed and return to freshwater to breed - brown trout remains in freshwater for their entire life.

Grey Mullet
Grey mullet in particular can often be seen in the shallow water along the shore where it feeds mainly on benthic diatoms, epiphytic algae, small invertebrates and detritus.

Aquaculture

Extensive and intensive aquaculture continues to grow in Carlingford Lough approximately 1,800 tonnes of mussels and 415 tonnes of pacific oyster harvested in 2003. Clams and scallops are also farmed and the total area under aquaculture is about 26 hectares at eight licensed sites. In terms of the study area, a large section of the mudflats between Carlingford and Greenore are under pacific oyster cultivation. Another area nearer hospital point has apparently been abandoned. The nearest mussel fishery is just to the north of the marina several hundred metres from the harbour.

Intertidal invertebrates

The intertidal zone around Carlingford is made up of a mosaic of sand, mud, gravel and mixed sediment interspersed with rocky outcrops. The presence of large numbers of over-wintering birds, especially waders, demonstrates the presence of rich infauna in the mudflats and saltmarsh including worms, molluscs, crustaceans, insects and others.

Worms

Dense casts of lugworms (Arenicola marina), a polycheate worm, over the open mud/sand areas serve to illustrate the productivity of the area. Ragworm (Hediste diversicolor) can easily be found in the mud and along with lugworm, popular bait for fishermen. Sand Mason (Lanice conchilega) was also found in the sandier areas and keel worm casts were found on rocks and shingle while coiled tube worms Spirorbis spp was found in seaweed.

Bivalves and Gastropods

A large accumulation of intact and broken shells of bivalve and gastropod molluscs, may be found, especially around the harbour giving an idea of the biodiversity of these species in the area, though it must be borne in mind that some of these may have been moved some distance by tides and currents. Species found include Common Limpet Patella vulgate, Edible Periwinkle (Littorina littorea), Flat Periwinkle (Littorina obtusat),, Rough Periwinkle (Littorina saxatilis), Dog Whelk (Nucella lapillus), Common Mussel (Mytilus edulis) Baltic Tellin (Macoma balthica) and Edible Cockle (Cerastoderma edule). The shells of Razorshell (Ensis ensis) were also found.

Echinoderms

Echinoderms are a phylum of marine animals that includes sea urchins, sea stars, brittle stars, and others, and generally display five fold symmetry. A few examples were found on the mudlflats at low tide include sea potato Echinocardium cordatum, European edible sea urchin Echinus esculentus and Common starfish Asterias rubens. Evidence of Dead man's fingers (Alcyonium digitatum) were found on a very low

tide, along with an unidentified brittle star fish. A study of the infralittlral zone by AFESD, Department of Agriculture and Rural Development, also identified Crossaster papposus, Alcyonium digitatum, Metridium senile, Ophiothrix fragilis and Ophiocomina nigra noting that the "infralittoral zone off Carlingford is limited in its depth range due to the high turbidity of the Lough waters (high levels of suspended sediment and high plankton productivity). In the deeper cobble areas (MCS.co) there were patches of dense Ophiothrix fragilis and Ophiocomina nigra, which could be quite extensive. These habitats show a very similar biological diversity to those off the Annalong and Kilkeel coast."

Jellyfish (Cnidaria)

Both Compass Jellyfish Chrysaora hysocella and the more poisonous lion's mane jellyfish (Cyanea capillata) were found on the mudflats in the late summer. Beadlet anemones (Actinia equina) was found on the rocks on the lower littoral zone.

Crustaceans

Common Shore Crab (Cancer maenas), Green Crab (Carcinus maenas) Common Shrimp (Crangon crangon), Sandhopper (Talitrus saltator), Common Acorn Barnacle (Semibalanus balanoide)s, and Common Sea Slater (Ligia oceanica) occur on the mudflats around and under rocks, sandy areas and rocky outcrops.

Phytoplankton and Particulate Matter

A study by Brendan Ball of the Martin Ryan Marine Science Institute, University College, Galway, attempted to assess the impact of bivalve culture in Carlingford Lough, the seasonal cycles of nutrients, particulate matter, chlorophylla, and phytoplankton in the lough as far back as 1992. Chlorophyll levels were observed to increase in April, corresponding to the annual spring bloom, and levels remained relatively high (2–12 mg m−3) throughout the summer before dropping to a winter minimum by December. Diatoms dominated the phytoplankton community during the summer, with microflagellates becoming an increasing as a fraction of the biomass in autumn and winter. Dinoflagellates were only present on occasion in low numbers during the summer months. Seasonal variations in nitrate, phosphate, and silicate concentrations at all stations showed characteristic winter maxima and summer minima with nitrate concentrations undetectable level by June, at a time when the main freshwater input from the Clanrye River had dropped to <0.3 m3 s−1. Particulate organic carbon (POC) composed approximately 5% of the suspended matter, with highest values in winter due to resuspension.

The following table from the Loughs Agency summarises key lough characteristics and nutrient data:

Characteristics

Volume (millions m3)	Total area (km2)	Maximum depth (m)	Catchment area (km2)	Temperature range (ºC)	Mean salinity (days)	Flushing time	Tidal prism volume (millions m3)
460	49	25	474	Mar-20	32.5	3.17	146

Nutrients
Mean nutrient concentration (µmol l-1)

Ammonium	Nitrate	Phosphorus	Silicate
7.5	50	2	23

Nutrient load (ton year-1)

Nitrogen	Phosphorus
1 311	57

Biogenic Reefs

Possible Modiolus modiolus biogenic reef has been reported in Carlingford lough (Biogenic reefs, though details are sketchy. (Ref An overview of dynamic and sensitivity characteristics for conservation management of marine SACs (Holt et al., 1998)).

Flora of the Shore

Lichens

Lichens are composite organisms consisting of a symbiotic association of a fungus with a photosynthetic partner, consisting of algal or cyanobacterial cells. A number of interesting lichens grow luxuriantly on the rocky outcrops that remain above water at high tide. Their identification would make an ecological study all of its own and is beyond the scope of this study. Lichens are good environmental indicators, particularly in regard to air quality.

Marine Algae

The three main marine species on which the Brent geese feed are present including Enteromopha sp, Ulva sp and Eel Grass (not an alga but a flowering plant). Enteromorpha is a primitive green alga comprising a dozen species and often forming significant mats around the oyster trestles. Ulva, also known as sea lettuce, looks just like that: lettuce, occurring in clumps around the shore.

Other seaweeds (seaweed is a loose colloquial term encompassing macroscopic, multicellular, benthic marine alga including some members of the red, brown and green algae) include brown fucoid seaweeds. Two common species have been identified – Channeled and Knotted wracks. These make useful habitats for crustaceans and gastropods and other species, which is why they are constantly searched by seabirds such as Turnstones for the prey that they may conceal.

Another type of seaweed, kelp (Lamanaria sp) is also present on the littoral zone where they attach their long to rocks and outcrops. The red algae, Irish Moss (Chondrus crispus), an edible species, is found from the middle of the intertidal zone.

Flowering Plants

The sandy and mixed sand areas of the mudflats support considerable growth of Eel grass, in this case primarily Dwarf eelgrass (Zostera noltii). This species is important because it stabilises the substratum, provides food for wildfowl, and provides shelter and a surface for attachment by other species.

Three main plant communities exist on the shore at Carlingford:
• The saltmarsh plant community.
• Plants typical of rocky shores.
• Annual plants which occur on shingle above the high water mark.

These plant communities are dealt with in the flora section of this report.

Lesser trefoil Hospital Point

Terrestrial Areas

Terrestrial Mammals

Today Ireland has just 32 species of mammal including 20 terrestrial mammals, nine bats and two seal species, but once Ireland supported species such as the extinct Giant Irish Deer, Lemming, Arctic Fox, Reindeer, Brown Bear, Grey wolf and Wild Boar. These species went extinct as result of changes in climate and human activities. Our current complement of mammals was brought here by man with a few notable exceptions, these being true native species. However species that have been present for 1000 or more years may also be considered native in that they are well adapted to Ireland's biogeography, unlike for example, invasive species.

Insectivores

Pygmy Shrew

This is the smallest of our mammals, at just three grams, and are present in all suitable habitats in Ireland. Pygmy Shrews are thought to have been brought to Ireland by stone-age mariners from the north of Spain around eight thousand years ago, probably by accident. Genetic studies have shown that all Irish pygmy shrews are related to this initial pioneer population. They are generally active in the litter under hedges and other vegetation where they feed on insects and other invertebrates – several were detected in the vicinity of the stables and undergrowth at the Ghan House.

Hedgehog

Hedgehogs are present throughout Ireland in suitable habitat and were probably brought here by the Vikings, so Carlingford may be one of the first parts of Ireland where hedgehogs became established. The trail of several was observed in the dew in the fields to the east of the Ghan House and residents reported hedgehogs in gardens.

Rodents

Wood Mouse

Wood mice are also present in almost all habitats in Ireland, from dunes to blanket bogs – in Carlingford are doubtless common in the hedgerows and grassland around Carlingford. Wood mouse was the main prey species of long eared owls as evidenced by the contents of pellets found in the Mullaghattin area. Wood mice are chestnut brown with large eyes and ears – it rarely enters houses.

House Mouse

In Ireland almost always associated with human habitation living in houses, factories, shops, stores, farm outhouses etc; it may be distinguished from the wood mouse by its greyer pelage. Residents confirm its presence in Carlingford, a in most of the rest of the country.

Brown Rat

The Brown Rat has largely displaced the Black Rat in Ireland and, like other parts of Ireland, Brown Rats are just as big a pest in Carlingford as they are in other parts of the country. In times past Brown Rats would have been significant prey of Barn Owls, however for unknown reasons Barn Owls are declining in Ireland and have not been recorded on the Cooely peninsula for many years. This may be related to the secondary poisoning of the owls from rat poison.

Grey Squirrel

Grey squirrels were introduced from the USA around 1900 and several individuals were observed in the vicinity of Carlingford, notably in the upland deciduous trees to the north. As noted they out-compete red squirrels where they share habitat, however it seems that they are predated by pine martins. Grey squirrels are bigger than the red, have light brown pelage and lack the ear tufts that are characteristic of red squirrels.

Grey Squirrel – an invasive species in Ireland

Red Squirrel

Red Squirrels are thought to have been present in Ireland up until around 1600 AD when they died out, possibly due to climate change (the Little Ice Age) and deforestation. They were reintroduced around 1815 at Ravensdale from English stock, and subsequently occupied all suitably wooded habitats in Ireland. Around the turn of the century a number of Grey Squirrels, an American species, were deliberately introduced, and these have since competed with reds resulting in a reduction of the Red Squirrel population. However, possibly due to the presence of the Pine Martin, Reds seem to be holding their own in Ireland, apparently particularly successful in primarily coniferous forestry. Red Squirrels have been recorded in the forest at Ravensdale and Foye woods and are therefore probably present in the coniferous woodland on Carlingford Mountain. However they are extremely shy and elusive and so populations are hard to assess. Ironically Red Squirrels are now effectively extinct in England and it has been suggested that the current Irish stock is the last remnant of the English race (Sciurus vulgaris leucorus).

Carnivores

Red Fox

Red Fox was observed in fields and hedgerows around Carlingford and doubtless visit the town at night to forage for discarded food and rubbish. Fox scat was found in the area below Cú Chulainn Heights.

Stoat

Stoat was observed on a few occasions on Sleive Foye, particularly working the old stone walls, and is doubtless an occasional visitor to the town area where it would hunt for rodents. The Irish stoat is probably one of the few species with a legitimate claim to be native, in that genetic studies have revealed that the Irish population is distinct from the British and continental populations, and so it probably survived the last ice age in Ireland, though it would have probably sported white fur at that time, unlike its modern ancestor who is chestnut brown above and yellowish white below, with a black tip on the tail.

Otter

As previously mentioned, Otter spraints were found on a small bridge over the channel at the Ghan House and there is good evidence that otters are regular around the shores of the lough. A female is thought to maintain a holt and to breed on the islands on the ponds at Greenore golf course.

Pine Marten

The attractive Pine Martins, with its chocolate coloured pelage and creamy throat bib, is an extremely elusive and shy mammal that lives in woodland making a living by predating birds and small mammals and also feeding on berries, mushrooms, and insects. Like Hedgehogs and Red Squirrels, they may have been brought to Ireland by Vikings, either for food or for their pelt. Pine Martins have been confirmed at the Foye woods and are probably present in many woodlands in the area.

Badger

The shy and mainly nocturnal Badger is common and widespread throughout Ireland. There are very high population densities of Badger in Ireland because the permanently damp, soft soil is good for digging for worms, which are to be found lose to the surface, thereby making this country heaven for them (though earthworms may be thinker on the ground in recent times following the arrival of the New Zealsnd flatworm (Arthurdendyus triangulatus), an invasive species which is spreading in the area). Traces of badger were found around fields at the Ghan House (scat and tracks) in august, apparently foraging on blackberries, however no sett was found and given the wet character of that area, a sett is unlikely. The animals are probably coming into the study area from the Carlingford liberties. Traces of badger were also found in fields and along hedgerows to the north of Carlingford.

Lagomorphs

Irish Mountain Hare

Like the stoat, the Hare seems to have survived the Ice Age in Ireland, being genetically separated from British and European populations for 30 to 60,000 years, and as such possibly deserves full species designation. Hares are common around Carlingford both in upland areas and in the agricultural fields to the south, though none were seen in the study area itself.

A juvenile Buzzard taking on an adult Hare

Rabbit

Rabbits, originally an Iberian species, were introduced to Ireland in the 12th century by the Normans for food and fur and have since expanded to all suitable habitat in Ireland. Rabbits were not observed during the study however locals mentioned that they used to be common in the agricultural fields to the north and south but were apparently much reduced. This observation may be related to an outbreak of myxomatosis, a South American virus deliberately introduced to Europe to control rabbits and reached Ireland in 1954. However it is also possible that the rabbits are still there but have simply changed their habits in response to a newly arrived predator, the Buzzard. As described below, Buzzards returned to ireland naturally several years ago. One of their main prey species is young Rabbits, so when the predator turns up the rabbits respond by becoming more elusive and timid, and possibly switching to a more nocturnal feeding.

Deer

Various reports of deer in the vicinity of Carlingford probably refer to escapes from local deer farming.

Goat

A flock of some 20 to 30 “wild” goats used to inhabit Carlingford Mountain but these had to be shot following the outbreak of foot and mouth in 2001. There is a good

argument for restoring this flock as goats will eat pretty much any new shoot and have a high tolerance for species such as Bracken, and thus may create opportunities for species, that are currently being smothered, to come through.

Goat – Greenore Port in background

Bats

Three bat species were found, Soprano and Common Pipistrelles and Leisler's – details of the bat survey are in appendix 3.

Other Terrestrial Mammals

The three other rodent species, Greater White-toothed Shrew, Bank Vole, and Black Rat are absent from Carlingford. The Greater White-toothed Shrew was probably accidentally introduced near Limrick in recent times, though given its current rate of expansion, it will probably reach Carlingford in the next decade!

Birds – Terrestrial and Breeding Aquatic Species

Breeding Aquatic Species

Little Grebe, Mallard and Moorhen breed along the channel that separates Woods land and the Ghan House, where their young run the gauntlet of up to 20 Grey Herons who forage in this area. Coot has attempted breeding in the past but was not confirmed to have succeeded. The large sedge habitat is suitable for snipe but breeding could not be confirmed.

Grey Heron

As mentioned above, there is an active heronry near Carlingford. This may be partly due to an excellent non-marine fishing area in the large sedge marsh, where up to 20 herons may be seen hunting the same small area of about two acres.

Pheasant

Pheasants are common in the fields and hedgerows around Carlingford – at least one pair breeds in the vicinity of the upland fields to the north, where a covey of chicks was observed with a female in mid summer.

Birds of Prey

Ireland has the lowest number of raptor species in Europe, partly because several species were extirpated based on the grounds that they predated livestock and game species such as Pheasant. Some of these are remembered in place names around Carlingford, eg Eagle Rock on Carlingford Mountain.

Buzzard

Buzzards died out in Ireland due to persecution and poisoning, however coincident with the banning of strychnine (used to bait carrion to poison foxes) in the North, Buzzards started to naturally recolonise there, and following its banning in the Republic in 1991, are now present in every county in Ireland. At least three pairs breed on the Cooley peninsula including one just to the south of Carlingford. Buzzards primarily feed on carrion, young Rabbits and rats.

Buzzard

Peregrine Falcon

The Peregrine Falcon is the fastest creature alive, capable of clocking speeds in a stoop of up to 400 km/hr. Peregrines used to occur in Carlingford Lough hunting the waders on the mudflats but none were noted during the survey and the pair that used to breed at nearby Slievenaglogh have not returned – it is suspected that nest is being interfered with to deter the birds. One bird was observed hunting Carlingford Bay on one occasion during the study period.

Peregrine eating a redshank

Kestrel

The Kestrel, often referred to as Kestrel Hawks, is in fact another species of falcon, like the Peregrine – Kestrels can often be seen in the area hovering in the air to catch wood mice and other rodents.

Sparrowhawk

Sparrowhawk is a true hawk or accipitor – it can be seen regularly hunting the fields behind the Ghan House where it comes in low and fast to ambush passerines, its main prey species.

Long-eared Owl

Long-eared owls breed in the upland woodlands in the Cooley mountains – one was observed hunting over the fields at the back of the Ghan House during a bat survey. It is probably nesting somewhere in the Cooley mountains. Long-eared Owls are live mainly on small rodents – an examination of 19 pellets (these are regurgitated fur, nails, teeth and bones of the birds prey species) showed that one pair at Mullaghatin produced 18 wood mice and one other unidentified species, possibly a bird.

Other Non-passerines

Pigeons and Doves

Woodpigeons and collared doves are common around Carlingford where their characteristic cuckoo-like calls may be heard. A small flock of feral pigeons uses Taffees castle.

Cuckoo

A Cuckoo was heard in Carlingford during the period of the survey. Several males may be heard calling their characteristic two-note call in the Cooley Mountains, notably on the west side of the mountain, one of the best places along the east coast to hear its iconic call. Cuckoos are currently declining in Ireland, possibly due to a decline in one of its brood parasite species, the meadow pipit.

Swift

A flock of Swifts nest in Carlingford every year using eves of houses and crevices in Taaffe's Castle. Thirty-four birds were recorded in July 2009, corresponding to 17 pairs. They can be seen screeching around the village on summer evenings. Swifts, similar to but unrelated to Swallows, cannot perch and are doomed if grounded; they copulate, sleep and feed on the wing. In August they migrate to central Africa to overwinter.

Kingfisher

A female Kingfisher regularly over-winters around Carlingford, spending the winters of 2006 and 2007 at Shilties Lough but probably also using other suitable water bodies in the vicinity of Carlingford. The habitat is unsuitable for breeding as Kingfishers require moving water. The nearest known nesting site is along the Calstetown Cooley river. The female can be distinguished by the red colour under the bill.

Passerines

Passerines (literally perching bird, or songbird) are the species that we commonly see in gardens and include robins, thrushes, tits, hirundines, pipits, wagtails, wrens, warblers, finches, crows, larks, buntings and others. The range of passerine species observed in the study area is typical of its Irish east coast location. Notable are

Redwing and Fieldfare, thrushes from the north, using the flooded fields behind the Ghan House in winter, breeding Blackcaps in the mature trees to the north in summer, occasional Ravens from the mountain soaring overhead and landing on the ruins of the abbey, and a pair of Yellowhammer breeding on the periphery of the study area along the grove road.

Yellowhammers are declining as a breeding species

Also of note is the large rookery or colony of Rooks using the tall trees behind St Oliver's Park. In the evening the compelling spectacle of up to 300 Rooks and about 50 Jackdaws flock prior to roosting in the trees. Outside but near the study area are a few notable passerine species including Crossbills in the woodland near Carlingford, notably the Foye woods, a Grasshopper Warbler heard at the Locra, a wetland area to the south of Carlingford, and a Spotted Flycatcher was at nearby Millgrange.

Fieldfare – photo Kevin Woods

All of the passerine and other bird species which have been recorded in Carlingford and environs during 2009 are presented in the table below, indicating their status as

possible, probable or proved breeders. In the case of wintering species, their presence is indicated. Note that the breeding bird survey is based on 10 km square sections, while the study area is about 1 km square, and that the study area has inevitably been more intensively surveyed, so that comparison between the two is only indicative. Breeding status in 1988-91 figures in the fourth column. Green squares refer to species in the study area and blue to the 10km square grid in which the study area is located.

House Martins nest under the eaves of houses, hence their name

One of the reasons why Carlingford has a good variety of passerine species is that many people in Carlingford put out bird tables and feeders, particularly in winter when birds are under significant pressure.

Redpoll on bird feeder

			Study Area and environs				10km2
No	Species	Scientific name	Possible	Probable	Confirmed	Wintering	1988-91
1	Little Grebe	Tachybaptus ruficollis					
2	Great Crested Grebe	Podiceps cristatus					
3	Fulmar	Fulmarus glacialis					
4	Shag	Phalacrocorax aristotelis					
5	Cormorant	Phalacrocorax carbo					
6	Little Egret	Egretta garzetta					
7	Grey Heron	Ardea cinerea					
8	Mute Swan	Cygnus olor					
9	Whooper Swan	Cygnus cygnus				1 in 2006	
10	Pale-belliedBrent Goose	Branta bernicla hrota					
11	Shelduck	Tadorna tadorna					
12	Wigeon	Anas penelope					
13	Teal	Anas crecca					
14	Mallard	Anas platyrhynchos					
15	Goldeneye	Bucephala clangula					
16	Red-breasted Merganser	Mergus serrator					
17	Sparrowhawk	Accipiter nisus					
18	Common Buzzard	Buteo buteo					
19	Kestrel	Falco tinnunculus					
20	Peregrine	Falco peregrinus					
21	Red Grouse						68-72
22	Grey Partridge	Perdix perdix					68-72
23	Quail	Coturnix coturnix					68-72
24	Pheasant	Phasianus colchicus					
25	Moorhen	Gallinula chloropus					
26	Coot	Fulica atra					
27	Water Rail	Rallus aquaticus					
28	Corncrake	Crex crex					68-72
29	Oystercatcher	Haematopus ostralegus					
30	Ringed Plover	Charadrius hiaticula					
31	Golden Plover	Pluvialis apricaria					
32	Grey Plover	Pluvialis squatarola					
33	Lapwing	Vanellus vanellus					
34	Knot	Calidris canutus					
35	Dunlin	Calidris alpina					
36	Snipe	Gallinago gallinago					
37	Woodcock	Scolopax rusticola					
38	Black-tailed Godwit	Limosa limosa					
39	Bar-tailed Godwit	Limosa lapponica					

			Study Area and environs				10km2
No	Species	Scientific name	Possible	Probable	Confirmed	Wintering	1988-91
40	Whimbrel	Numenius phaeopus				passage	
41	Curlew	Numenius arquata					
42	Redshank	Tringa totanus					
43	Greenshank	Tringa nebularia					
44	Common Sandpiper	Actitis hypoleucos				passage	
45	Turnstone	Arenaria interpres					
46	Black-headed Gull	Larus ridibundus					
47	Common Gull	Larus canus					
48	Lesser Black-backed Gull	Larus fuscus					
49	Herring Gull	Larus argentatus					
50	Great Black-backed Gull	Larus marinus					
51	Sandwich Tern	Sterna sandvicensis					
52	Common Tern	Sterna hirundo					
53	Arctic tern	Sterna paradisaea					
54	Roseate Tern	Sterna dougallii					
55	Black Guillemot	Cepphus grylle					
56	Guillemot	Uria aalge					
57	Razorbill	Alca torda					
58	Feral Pigeon/Rock Dove	Columba livia					
59	Wood Pigeon	Columba palumbus					
60	Collared Dove	Streptopelia decaocto					
61	Cuckoo	Cuculus canorus					
62	Barn Owl	Tyto alba					68-72
63	Long-eared Owl	Asio otus					
64	Swift	Apus apus					
65	Kingfisher	Alcedo atthis					
66	Skylark	Alauda arvensis					
67	Swallow	Hirundo rustica					
68	House Martin	Delichon urbica					
69	Meadow Pipit	Anthus pratensis					
70	Rock Pipit	Anthus petrosus					
71	Grey Wagtail	Motacilla cinerea					
72	Pied Wagtail	Motacilla alba yarrellii					
73	Dipper	Cinclus cinclus					
74	Wren	Troglodytes troglodytes					
75	Dunnock	Prunella modularis					
76	Robin	Erithacus rubecula					
77	Stonechat	Saxicola torquata					
78	Wheatear	Oenanthe oenanthe					
79	Blackbird	Turdus merula					

			Study Area and environs				10km2
No	Species	Scientific name	Possible	Probable	Confirmed	Wintering	1988-91
80	Fieldfare	Turdus pilaris					
81	Song Thrush	Turdus philomelos					
82	Redwing	Turdus iliacus					
83	Mistle Thrush	Turdus viscivorous					
84	Grasshopper Warbler	Locustella naevia					
85	Sedge Warbler	Acrocephalus schoenobaenus					
86	Whitethroat	Sylvia borin					
87	Blackcap	Sylvia atricapilla					
88	Grasshopper warbler	Locustella naevia					
89	Chiffchaff	Phylloscopus collybita					
90	Reed Warbler	Acrocephalus scirpaceus					
91	Willow Warbler	Phylloscopus trochilus					
92	Goldcrest	Regulus regulus					
93	Spotted Flycatcher	Muscicapa striata					
94	Long-tailed Tit	Aegithalus caudatus					
95	Coal Tit	Parus ater					
96	Blue Tit	Parus caeruleus					
97	Great Tit	Parus major					
98	Jay	Garrulus glandarius					
99	Treecreeper	Certhia familiaris					
100	Magpie	Pica pica					
101	Jackdaw	Corvus monedula					
102	Rook	Corvus frugilegus					
103	Grey Crow	Corvus cornix					
104	Raven	Corvus corax					
105	Starling	Sturnus vulgaris					
106	House Sparrow	Passer domesticus					
107	Tree Sparrow	Passer montanus					
108	Chaffinch	Fringilla coelebs					
109	Greenfinch	Carduelis chloris					
110	Goldfinch	Carduelis carduelis					
111	Siskin	Carduelis spinus					
112	Linnet	Carduelis cannabina					
113	Lesser Redpoll	Carduelis flammea					
114	Bullfinch	Pyrrhula pyrrhula					
115	Yellowhammer	Emberiza citrinella					
116	Reed Bunting	Emberiza schoeniclus					
117	Crossbill	Carduelis flammea					

Within Study Area
Within 10km2

Reptiles

Common Lizard (Lacerta vivipara) was not found inside the study area but occur on the mountain where it may be seen sunning itself on rocks in the morning to bring its body temperature to the level where it can become active. The Irish Wildlife Trust lizard survey report one record near Grange, just outside Carlingford. A Leatherback Turtle was found on nearby Whitestown beach in the 1990s.

Amphibians

Despite the presence of suitable habitat in the wet area south of the Ghan House, Common Frogs were not found. This may be due to the slightly brackish character of the water in the channel, as well as predation by the many herons that hunt the channel and large sedge area.

Newts were observed in a small quarry pond at Millgrange to the south of Carlingford.

Smooth Newt

Common Frog

Invertebrates

A systematic survey of Lepodoptera (butterflies and moths) and Odonata (damselflies and dragonflies) was performed using the same transects as for the bird surveys. This was supplemented by careful searches in the most likely areas during the late summer.

Butterflies

In Ireland a total of thirty-three species of butterflies occur regularly, the majority of which are resident. Three species (Clouded Yellow, Red Admiral and Painted Lady) are regular summer migrants, sometimes occurring in large numbers.

Painted Lady – a migratory species

Green-veined White

Due to its locationn on the east coast, Carlingford sees significant numbers of migrants in good years. A new species has recently been found in Ireland, Real's Wood White, previously conflated with Woods White. Interestingly this species is absent from Britain and has only a patchy distribution on the continent – it may be another example of a Lusitanian species (this refers to a group of species that are present in Ireland but absent in Britain – it is now thought that these species were brought to Ireland through human agency – Lusitanian refers to a province of Spain named by the Romans, and more fancifully to a notional land mass between Ireland and Spain, about where the Lusitania went down in WWII). It is however indistinguishable from the Wood White without detailed examination of its genitalia. . Several Irish butterfly species are highly limited in range while others are widespread; no particularly rare species were found in Carlingford, though several can be found within a few miles.

Ringlet

The following species were observed during the course of the survey within the study area. Small copper was not observed but has been regularly recorded in the area.

Species	Scientific name	Date seen	Habitat	Location	Comments
Wood White sp	Leptidea sp (Wood or Real's Wood)	28-May-09	Hedgerow	Abbey	
Large White	Pieris brassicae	28-May-09	Garden	Village	
Small White	Pieris rapae	28-May-09	Garden	Village	
Green-veined White	Pieris napi	21-Aug-09	Shore	Hosp pt	40+
Orange-tip	Anthocharis cardamines	28-May-09	Shore	Hosp pt	
Common Blue	Polyommatus icarus	29-Jun-09	Marsh	C'cul Heigths	
Red Admiral	Vanessa atalanta	28-May-09	Shore	Hosp pt	
Painted Lady	Vanessa cardui	21-Aug-09	Shore	Hosp pt	60+
Small Tortoiseshell	Aglais urticae	28-May-09	Shore	Hosp Pt	
Peacock	Inachis io	28-May-09	Shore	Hosp Pt	Large influx in Aug
Speckled Wood	Pararge aegeria	28-May-09	Hedgerow	Olivers Pk	
Wall	Lasiommata megera	28-May-09	Shore	Hosp pt	
Meadow Brown	Maniola jurtina	21-Aug-09	Field	Ghan Hse	
Ringlet	Aphantopus hyperantus	29-Jun-09	Marsh	C'cul Heigths	
Holly Blue	Celastrina argiolus	21-Aug-09	Garden	Village	

In terms of butterflies with a more limited distribution, at the cutaway bog at the windy gap, Green Hairstreak butterflies have been found near the Windy Gap (D Hodgers 2008), and Dark Green Fritillary, Silver-washed Fritillary in the Sleive Foye woods (J Devlin, 2007).

Moths

A moth trap was set on two nights during August but due cold air temperature, wind and rain only a few species were caught. In terms of day-flying moths, both Cinnabar and Silver Y moths were recorded within the study area.

A further moth study would be worth undertaking.

Silver Y, a day flying moth in Woods land

Odonata

The order Odonata consists of two groups of primitive insects commonly known as dragonflies and damselflies. Adult dragonflies are amongst the largest and most spectacular insects alive. Damselflies are similar but smaller with more slender abdomens and a more fluttery flight. Like all insects possess a head, thorax (to which are attached four wings) and a long abdomen. They undergo a complex multi-stage lifecycle involving the laying of eggs in a suitable pond, the hatching and maturing of larvae over an extended time, and the eventual transformation into adult.

Common Hawker eating a cranefly – Woods garden

Species	Scientific name	Date Seen	Habitat	Location	Comments
Damselflies					
Azure Damselfly	Coenagrion puella	28-May-09	Freshwater pond	C'c Heights	copulating
Variable Damselfly	Coenagrion pulchellum	28-May-09	Freshwater pond	Grange	
Irish Damselfly	Coenagrion lunulatum				
Common Blue Damselfly	Enallagma cyathigerum	14-Jun-09	Freshwater pond	C'c Heigths	
Blue-tailed Damselfly	Ischnura elegans	28-May-09	Freshwater pond	Ghan hse	
Large Red Damselfly	Pyrrhosoma nymphula	28-May-09		Channel	Resting
Dragonflies					
Hairy Dragonfly	Brachytron prtaense	05-Jun-09		Ghan field	Feeding
Common Hawker	Aeshna juncea	11-Sep-09		Woods	Hunting cranefly
Common Darter	Sympetrum striolatum	11-Sep-09		Woods	Warming
Four-spotted Chaser	Libellula quadrimaculata	01-Jun-09		Millgrange	Outside core area

Terrestrial Flora and Vegetation

During the field survey period in 2009 effort was concentrated on the flora and vegetation of the natural and semi-natural habitats of the study area and environs. A large (and growing) proportion (c.65%) of the study area is occupied by buildings, houses and gardens. These are outside the scope of this study, being of limited ecological value. Because native species co-evolve with other native species over thousands of years, taken together they produce a complex web of interdependency. For example native Irish Willow supports over 400 invertebrate species whereas beech which is not native to Ireland but is native to Britain supports only 80 species; more exotic species don't support any invertebrate species at all but that is not to dismiss garden flowers and vegetation as worthless. On the contrary, the great diversity of species and the structure of the vegetation, make gardens particularly useful and attractive to a wide range of birds, mammals and invertebrates.

Flora of the Saltmarsh

There are several patches of saltmarsh in the more sheltered areas and in association with the rocky outcrops of the Carlingford Bay. There is a graduation of vegetation from the lowest parts, which are immersed at high tide, to the upper "splash zone" areas which are only immersed on the highest spring tides of the year.

Sea Pink or Thrift, Carlingford shore

As elsewhere along the Irish coast, much of the saltmarsh is now being colonized by the Cord Grass, Spartina Anglica, an invasive species originally from North America. This species, like other invasive species, pushes out native Irish species because of the absence of natural limiting factors such as parasites and competition. However its overall impact in Ireland is thought to be neutral since Spartina also creates habitat. Spartina also has an important flood attenuation effect.

Sea Club Rush

Species present include Sea Aster (Aster tripolium), Sea Purslane (Halimione portulacoides), Lax-flowered Sea Lavender (Limonium humile), Thrift or Sea Pink (Armeria maritime), Common Saltmarsh-grass (Puccinellia maritima), Sea Plantain (Plantago maritima). Sea Blite (Suaeda maritima), Glasswort (Salicornia sp) and others. To be found on the upper parts of the shore are Oraches (Atriplex spp.), Sea Beet (Beta vulgaris), Wild Carrot (Daucus carota), Red Fescue (Festuca rubra), Sea-milkwort (Glaux maritima), Wild Radish (Raphanus raphanistrum), Sea Spurge (Euphorbia paralias), and Sea Mayweed (Matricaria maritima). A Red Data species, Oyster Plant (Mertensia maritima), is reported in the site synopsis, but was not found in the vicinity of the study area.

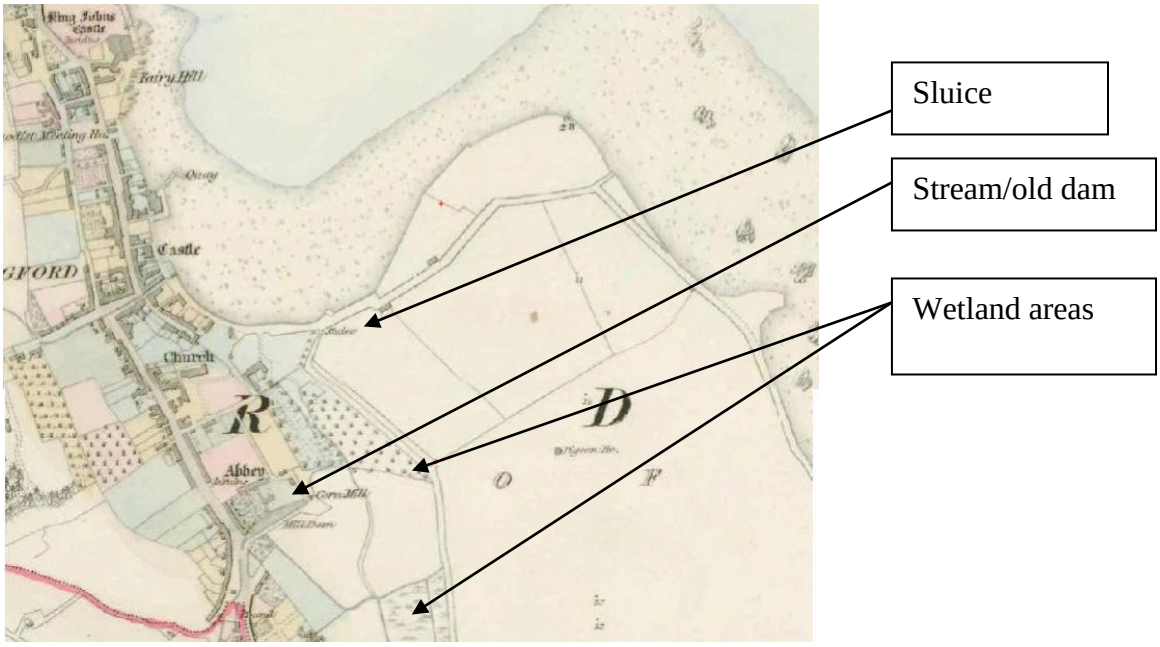
Several species of lichen occupy the rocks on the splash zone including Ramalina siliquosa, Ochrolechia parella, various Xanthoria species and Verrucaria species.

Lichens: Ramalina siliquosa, Ochrolechia parella, various Xanthoria and Verrucaria species

Flora of the Freshwater Wetlands, Streams and Ponds in the Carlingford Area

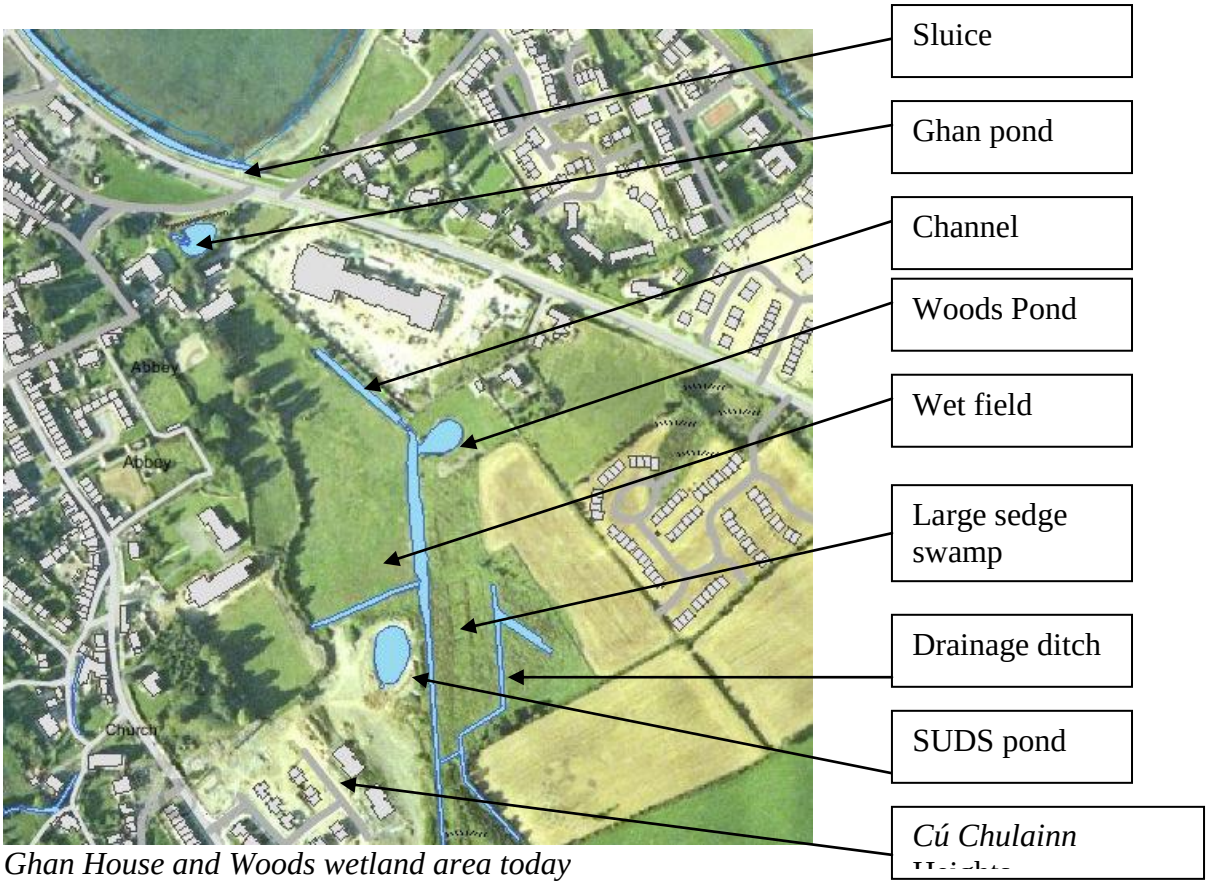
The area to the south of the Ghan House contains a mosaic of brackish and freshwater habitats including and artificial a freshwater SUDS type pond, a drainage ditch and an ancient drainage channel leading to the harbour, a large sedge swamp and a freshwater stream. In the grounds of the Ghan House is an artificial pond (fed by rainwater from the guttering around Ghan House via an underground pipe) and there are at least two streams flowing from the mountain through the village, both partly underground.

Old maps show that this area was in fact an inlet in 1824 but by 1900 it had been in-filled and a drainage channel had been put in place. One old map shows "osiery" in this area, presumably referring to a planted willow woodland area. A sluice gate prevents seawater from back flowing into the channel at high tide however the area retains a distinct brackish character. This may be due to underground seepage or occasional backflow from the sluice.



Carlingford 1824

Since then things have changed to some extent though the essential character of the area is still there. Today there is a SUDS (sustainable urban drainage system) draining water from nearby recent developments Cú Chulainn Heights housing and apartment development to the west and the Clós na Manach estate to the east. The SUDS system channels runoff into a pond and from there into the wetland from where it drains via the channel to the sea.



Ghan House and Woods wetland area today

Starting with the SUDS pond, an example of an artificial pond (FL8 per Fossitt), the pond is characterized by the pondweed, Water Milfoil, probably Myriophyllum verticillatum and possibly White Water-lilly (vegetative parts only observed – though Woods pond nearby has White Water-lily (Nymphaea alba). On the margin were Reedmace (Typha latifolia), also known as Bulrush. Common Club Rush (Scirpus lacustris), Purple-loosestrife (Lythrum salicaria), Common Spike-rush (eleocharis palustris), False Fox Sedge (Carex otrubae) Birds-foot Trefoil (Lotus corniculatus), Celery-leaved Buttercup (Ranunculus sceleratus), Jointed Rush (Juncus articulatus), Water Mint (Mentha aquatica), Redshank (Persicaria maculosa) in both red and white forms, Upright Hedge-parsley (Torilis japonica), Ragwort (Senecio jacobaea), and Willowherb (Epilobium sp). The presence of Hairy Tare (Vicia hirsute), Scarlet Pimpernel (Anagallis arvensis)) and Weld (Reseda luteola) are evidence of relatively recent disturbance in the ground.

The water from the pond drains into the channel to the east. Along this apparently more brackish water were many of the above species along with Sea Club-rush (Scirpus maritimus), Silverweed (Argentina anserina), Common Club Rush (Scirpus lacustris), Jointed Rush (Juncus articulatus) and others. The vegetation would suggest a slight graduation from fresh water to brackish in the direction of the sluice gate and the harbour.

Further to the east of the channel lies the large sedge swamp (FS1). This is on the margin of the channel and while water levels fluctuate, they are at or above ground level most of the year. This is dominated by Common-club Rush and other sedges and grasses which form large tussocks. A stand of Common Reed (Phragmites australis) is present. The broadleaved herb component is minimal (<10%) and includes Water

Mint (Mentha aquatica), Forget-me-nots (Myosotis spp.), Wild Angelica (Angelica sylvestris), and Meadowsweet (Filipendula ulmaria). Of particular note is that this swamp, less than an acre in size, often holds up to 20 Grey Herons. On several occasions these were observed feeding on young Eels (silvery, 10 - 25 cm in length) who often wrap themselves around the herons neck to avoid being swallowed and continue to visibly wriggle all the way down to the birds crop. Given the critical status of the European Eel this area may be of particular biodiversity value.

Following the channel towards the harbour we encounter a wet field bordering it and currently used form grazing by horses. This area is hard to classify but corresponds best to GS4 - Wet Grassland per Fossitt. The area is poorly drained and waterlogged in places (when it floods it attracts many waterfowl). The grass and small herbs in the field are very heavily grazed making identification difficult. Along the banks of the channel and stream area are several Jointed Rush (Juncus auriculatus) and several other small sedges along with flowering plants including Marsh Marigold (Caltha palustris), Creeping Buttercup (Ranunculus repens), Marsh Thistle (Cirsium palustre), Hedge Woundwort (Stachys sylvatica) Silverweed (Potentilla anserina), Meadowsweet (Filipendula ulmaria), Water Mint (Mentha aquatica), Common Marsh-bedstraw (Galium palustre), Russian Comfrey (Symphytum sp) and Cuckooflower (Cardamine pratensis).

Flora of Old Stonewalls

The old stonewalls around Carlingford could make an ecological study all of their own. Most use local stone the shale metasediment or limestone. On the Norman buildings the mortar apparently consists of a mixture of gravel and ground seashells, though many have been carefully pointed by the Office of Public Works over the years. These walls attract many species of flowering plant, fern, moss and lichen. Because the mortar in the wall is rich in calcium, many of the species are calcicole (lime loving). They also usually have succulent leaves for storing water, which is thin on the ground, on stonewalls.

Species observed in Carlingford include the following lichens, mosses (Bryophytes), ferns and flowering plants – the latter two are listed below, mosses and lichens being beyond the scope of the current survey.

Ferns: Common Polypody (Polypodium vulgare), Maidenhair Spleenwort (Asplenium trichomanes), hartstongue (Asplenium scolopendrium) and on the older walls, Bracken (Pteridium aquilinum), Hard Fern (Blechnum spicant), Wall Rue

Flowering plants: Ivy (Hedera helix), Wall Pennywort (Umbilicus rupestris), White Stonecrop (Sedum album), Herb- Robert Geranium robertianum, Yellow Corydalis(Pseudofumaria lutea), Ivy-leaved Toadflax (Cymbalaria muralis), Rue-leaved Saxifrange Saxifraga tridactylites and a variety of Valarian (Centranthus) species.

Pennywort

These plants do minimal damage to old walls and buildings (with the exception of Ivy) and support a variety of specialised invertebrates; in Carlingford they have been coexisting with them literally a thousand years, so it is suggested that weed killer should only be used when necessary on these attractive plants.

Flora of Woods, Fields and Hedgerows

Carlingford is surrounded by small patches of woodland and treelines, by hedgrows and by agricultural fields. In the near vicinity sheep farming predominates. A little further out there is considerable tillage (barely, wheat etc) and cattle.

Trees

The most significant area of mature woodland consists of the large trees behind St Oliver's Park, these are mainly beech. A significant rookery, as previously mentioned, occupies these trees. In other areas are small stands of Ash, Sycamore, Alder, Holly and Willow. A few large conifers (notably Scots Pine) are also in evidence. Only a few Oak and no Hazel was found. Native trees support a much greater invertebrate biodiversity than exotics, even exotics like beech, as outlined in appendix 1 and consideration should be given to planting native trees in preference to exotics wherever possible.

Fields and Hedgerows

Thanks to the fact that many of the fields in the immediate area of Carlingford are not cultivated, they have not been subject to spreading of fertilizer or spraying with weedkiller and/or insecticide, and so a relatively rich flora exists with species such as Ccommon Spotted Orchid (Dactylorhiza fuchsii), Heath Spotted Orchid (Dactylorhiza maculate) Early Purple Orchid (Orchis mascula) and Pyramidal Orchid (Anacamptis pyramidalis), turning up, the latter in front of the fire station. A large range of other plants turned up along the hedgerows and margins of old stonewalls listed below.

The hedgerows themselves were variously mature and well maintained. Both well-trimmed and grown out hedgerows are of interest in terms of biodiversity – indeed hedgerows are probably the single largest repository of biodiversity in Ireland, which lacks extensive forestry. An area that has heavily grown out and is now dominated by bramble between the Ghan fields and the Abbey, provide extensive cover and supported nesting Wood Pigeon, Robin, Blackbird, Song Thrush and Wren. As such hedgerows serve as areas for feeding and cover for insects and birds, as highways for birds and mammals, and "clutter" for bats (who need such clutter to successfully ecolocate) and, with their multiple layers, as habitats for a variety of plants. Hedergows were generally composed of Hawthorn and some Blackthorn interspersed with Elderberry, Ash and Sycamore. Bramble was the dominant understory. The following table lists the trees and shrubs recorded during the study.

Blackthorn Caarlingford hedgerow

Species	Scientific Name
Alder	Alnus glutinosa
Ash	Fraxinus excelsior
Aspen	Populus tremula
Beech	Fagus sylvatica
Blackthorn	Prunus spinosa
Broom	Cytisus scoparius
Butterfly Bush	Buddleja davidii
Elder	Sambucus nigra
Escallonia	Escallonia macrantha
Fuchsia	Fuchsia magellanica
Gorse	Ulex europaeus
Hawthorn	Crataegus monogyna
Holly	Ilex aquifolium
Horse Chestnut	Aesculus hippocastanum
Ivy	Hedera helix
Red Oak	Quercus rubra
Rowan	Sorbus aucuparia
Scots Pine	Pinus sylvestris
Sessile Oak	Quercus petraea
Silver Birch	Betula pendula
Sycamore	Acer pseudoplatanus
White Willow	Salix alba
Wild Cherry	Prunus avium
Willow sp	Salix sp
Wych Elm	Ulmus glabra
Yew	Taxus baccata`

Disturbed Ground

There are several areas of waste or disturbed ground around Carlingford, giving testimony to the fact that there was considerable development in recent years. The most interesting of these is at Hospital Point where a large variety of opportunistic species with a distinct maritime flavour have colonised the bare ground. It is suggested that part of this area be retained rather than landscaped and replanted with grass. Species include White and Red Clover (Trifolium repens and pratense), Sea and Ribwort Plantain (Plantago maritime and Plantago lanceolata), Scurvygrass (Cochlearia sp), Wild Carrot (Daucus carota), Alexanders (Smyrnium olusatrum), Stinging Nettle (Urtica dioica), Red Deadnettle (Lamium purpureum), Daisy (Bellis perennis), Creeping Buttercup (Ranunculus repens), Birds Foot Trefoil (Lotus corniculatus), Lesser Trefoil (Trifolium dubium), various docks and thistles, Forget-Me-Nots , Common Poppy (Papaver rhoeas), Scarlet Pimpernel (Anagallis arvensis, Weld, Sea and Common Bindweed (Calystegia spp, Sea Mayweed, Ragwort (Senecio jacobaea), Pineapple weed (Matricaria discoidea), Burdock (Arctium minus), Lady's Bedstraw (Galium verum) Sea Radish (Raphanus raphanistrum ssp. maritimus), Kidney Vetch (Anthyllis vulneraria), Winter Heliotrope (Petasites fragrans) Common Vetch (Vicia sativa), and Sticky Mouse-ear (Cerastium glomeratum).

A complete list of flora is provided below:

Species	Scientific Name
Meadow Buttercup	Ranunculus acris
Creeping Buttercup	Ranunculus repens
Lesser Spearwort	Rannunculus flammula
Common Poppy	Papaver rhoeas
Common Ramping-fumitory	Fumaria muralis
Common Fumitory	Fumaria officinalis
Stinging Nettle	Urtica dioica
Fat Hen	Chenopodium album
Common Orache	Atriplex patula
Sea Purslane	Atriplex portulacoides
Sea Beet	Beta vulgaris maritima
Annual Seablite	Suaeda maritima
Sea Campion	Silene uniflora
Ragged Robin	Lychnis flos-cuculi
Common Chickweed	Stellaria media
Hedge Woundwort	Stachys sylvatica
Field Madder	Sherardia arvensis
Glasswort	Salicornia sp
Lax-flowered Sea-lavender	Limonium humile
Broad-leaved Dock	Rumex obtusifolius
Curled Dock	Rumex crispus
Clustered Dock	Rumex conglomeratus
Common Sorrel	Rumex acetosa
Redshank	Persicaria maculosa
Knotgrass	Polygonum aviculare
Thrift	Armeria maritima
Common Mallow	Malva sylvestris
Common Dog Violet	Viola riviniana
Wild Turnip	Brassica rapa
Sea Radish	Raphanus raphanistrum maritimus
Watercress	Rorippa nasturtium-aquaticum
Shepherd’s Purse	Capella bursa-pastoris
Common Scurvygrass	Cochlearia officinalis
Cuckooflower	Cardamine pratensis

Species	Scientific Name
Weld	Reseda luteola
Primrose	Primula vulgaris
Cowslip	Primula veris
Common Milkwort	Polygala vulgaris
Scarlet Pimpernel	Anagallis arvensis
Purple Loosestrife	Lythrum salicaria
English Stonecrop	Sedum anglicum
Dog Rose	Rosa canina
St. Johns Wort	Hypericum sp
Bramble	Rubus fruticosus agg.
Yellow Rattle	Rhinanthus minor
Meadowsweet	Filipendula ulmaria
Silverweed	Potentilla anserina
Marsh Cinquefoil	Potentilla palustris
Creeping Cinquefoil	Potentilla reptans
Barren Strawberry	Potentilla sterilis
Common Vetch	Vicia sativa
Hairy Vetch	Vicia hirsuta
Tufted Vetch	Vicia cracca
Birdsfoot Trefoil	Lotus corniculatus
Celery-leaved Buttercup	Ranunculus sceleratus
Meadow Vetchling	Lathyrus pratensis
Black Medick	Medicago lupulina
Lesser Trefoil	Trifolium dubium
Red Clover	Trifolium pratense
White Clover	Trifolium repens
Meadowsweet	Filipendula ulmaria
Great Willowherb	Epilobium hirsutum
Rosebay willowherb	Chamerion angustifolium
Herb Robert	Geranium robertianum
Common Storksbill	Erodium cicutarium
Yarrow	Achillea millefolium
Hogweed	Heracleum sphondylium
Cow Parsley	Anthriscus sylvestris
Wild Carrot	Daucus carota
Woody Nightshade	Solanum dulcamara
Field Bindweed	Convolvulus arvensis
Hedge Bindweed	Calystegia sepium
Sea Bindweed	Calystegia soldanella
Rue-leaved Saxifrange	Saxifraga tridactylites

Species	Scientific Name
Opposite-leaved Golden Saxifrange	Chrysosplenium oppositifolium
Russian Comfrey	Symphytum x uplandicum
Field Forgetmenot	Myosotis arvensis
Red Dead-nettle	Lamium purpureum
Sticky Mousear	Cerastium glomeratum
Common Mouseear	Cerastium fontanum
Water Mint	Mentha aquatica
Foxglove	Digitalis purpurea
Thale's Cress	Arabidopsis thaliana
Common Field Speedwell	Veronica persica
Ribwort Plantain	Plantago lanceolata
Greater Plantain	Plantago major
Buckshorn Plantain	Plantago coronopus
Sea Plantain	Plantago maritima
Cleavers	Galium aparine
Lady’s Bedstraw	Galium verum
Marsh Bedstraw	Galium palustre
Hairy Tare	Vicia hirsute
Honeysuckle	Lonicera periclymenum
Red Valerian	Centranthus ruber
Wild Teasel	Dipsacus fullonum
Devilsbit Scabious	Succisa pratensis
Daisy	Bellis perennis
Ox-eye Daisy	Leucanthemum vulgare
Sea Mayweed	Tripleurospermum maritimum
Sea Aster	Aster tripolium
Upright Hedge-parsley	Torilis japonica
Common Ragwort	Senecio jacobaea
Groundsel	Senecio vulgaris
Coltsfoot	Tussilago farfara
Common Knapweed	Centaurea nigra
Lesser Burdock	Arctium minus
Creeping Thistle	Circium arvense
Spear Thistle	Cirsium vulgare
Marsh Thistle	Circium palustre
Dandelion	Taraxacum officinale
Smooth Sow-thistle	Sonchus oleracius
Corn Sow-thistle	Sonchus arvensis

Species	Scientific Name
Catsear	Hypochaeris radicata
Mouse-ear Hawkweed	Pilosella officinarum
Bluebell	Hyacinthoides non-scriptus
Ramsons	Allium ursinum
Yellow Iris	Iris pseudacorus
Common Spotted Orchid	Dactylorhiza fuchsia
Lords-and-Ladies	Arum maculatum
Bulrush	Typha latifolia
Common Cord-grass	Spartina anglica
Common Duckweed	Lemna minor
Annual Meadow-grass	Poa annua
Meadow Fescue	Festuca pratensis
Tall Fescue	Festuca arundinacea
Red Fescue Festuca rubra	Festuca rubra
Creeping Bent Agrostis stolonifera	Agrostis stolonifera
Common Reed	Phragmites australis
Common Saltmarsh Grass	Puccinellia maritima
Wild Oat	Avena fatua
Hard Rush	Juncus inflexus
Soft Rush	Juncus effusus
Sea Rush	Juncus maritimus
Marsh Foxtail	Alopecurus geniculatus
Perennial Ryegrass	Lolium perenne
Sea Club-rush	Scirpus maritimus
Jointed Rush	Juncus articulatus
Common Spike-rush	eleocharis palustris
Common Club Rush	Scirpus lacustris
Sea Couch	Elytrigia atherica
Common Sedge	Carex nigra
Cocksfoot	Dactylis glomerata
Bracken	Pteridium aquilinum
Field Horsetail	Equisetum arvense
Water Horsetail	Equisetum fluviatile
Marsh Horsetail	Equisetum palustre

Walks and Nature Trails

The existing Sli na Slante is an excellent nature walk passing mature hedgerow, a sea inlet and stream and the Carlingford mudflats. A circuit of Carlingford covering the shore area, the harbour, Trinity Hall, The Abbey and mountain road could also be set out with a map and signage. A circuit supplementing this but closing the loop by constructing a walkway/cycle path connecting Clos Na Manach with Cuchulain Heigths and St. 0liver's National School.

Interpretative Panels

There are several areas around Carlingford suitable for the positioning of educational interpretative panels illustrating flora and fauna:

1. Second panel at the existing bird watching facility near Hospital Point
2. Panel at end of north pier at the harbour illustrating seabirds seen over the Lough
3. Panel at beginning of mountain walk (Tain Way) showing mountain flora and fauna
4. Panel along new route illustrating freshwater wetlands behind Ghan House
5. Panel at Shilties Lough showing species of the inlet

Booklets/leaflets/maps

The opportunity exists to supplement the above with illustrative maps and guides in the form of small leaflets or a small booklet.

A birdwatching facility has already been constructed near Hospital Point.

Birdwatching Facility near hospital Point.

Outlying Areas

Wet Woodland in the Liberties of Carlingoford.

This area of wet woodland, which seems to have been brought about by a geological fault, corresponds to Fossitt's WN6: Wet willow-alder-ash woodland. The ground is completely saturated all year round and at times floods; access is difficult. The area is mainly willow but several taller trees (possibly Oak) support an active heronry. Willow Warblers, Chiffchaffs and Blackcaps breed here along with the usual range of woodland species. Flowering plants include Marsh Marigold (Caltha palustris), Cuckoo Flower (Cardamine pratensis) and Lords and Ladies (Arum maculatum). The area spans the Liberties and Mulatee townland.

The Locra

Also known as Botharboy Fen or Greenore Wetland. This area corresponds to Fossitt's Rich Fen and Flush (PF1) and is close to two Annex 1 habitats, "alkaline fens (7230)" and "calcareous fens with Cladium mariscus and species of the Cariciondavallianae (7210)" which are referred to in the Interpretation Manual of European Union Habitats, EU Commission, DG Environment, July 2007. The latter is a priority habitat that describes stands of species-rich alkaline fen vegetation in which Great Fen-sedge (Cladium mariscus) is dominant. While this species is present in the fen, it is not dominant.

Other species of interest in this area include Meadowsweet Filipendula ulmaria, Heath Spotted Orchid, Early Marsh Orchid Dactylorhiza incarnata sub-species pulchella, Marsh Helleborine Epipactis palustris, Bottle Sedge Carex rostrata, Hemp Agrimony Eupatorium cannabinum, Auaking Grass Briza media, Round-leaf Wintergreen Pyrola rotundifolia, Saw Sedge Cladium mariscus, Brown Sedge Carex disticha, Glaucous Sedge Carex flacca, Black Bog Rush Schoenus nigricans, Field Wood-rush Luzula campestris, Marsh Horsetail Euqisetum palustre, Bog Cotton Eriophorum angustifoliium, Red Fescue Festuca rubra and many more. The area also supports a large variety of breeding birds including Willow Warbler, Chiffchaff, Grasshopper Warbler (singing) and Snipe (drumming).

Millgrange Pond and Woodland

The main interest in this area is a quarry with a pond. It supports at least six species of dragonfly and damselfly, common frogs, newts, water crowsfoot, common lizards, a flora that is typical of the exposed rock of the quarry. A pair of Buzzards breed in the vicinity of the woodland.

Slieve Foye Woodland

This area of primarily coniferous woodland regularly hosts a roving population of Crossbills in late summer. It is possible that they breed in the area but given that crossbills can breed very early in the year, they may be coming from another area. Both Red Squirrel and Pine Martin are confirmed as being present in this woodland.

Windy Gap and Mullaghattin

Both Windy Gap and Mullaghattin (Mullach Aitinn meaning the summit (hill) of furze) are some distance from Carlingford but deserve mention because of the very rich wildlife both hold. The Windy Gap area (in fact the cutaway bog at Moneycrookroe just below the windy gap) has produced Green Hairstreak butterflies, Common Hawker Aeshna juncea, Keeled Skimmer Orthetrum coerulescens, Four-spotted Chaser Libellula quadrimaculata, Common Darter Sympetrum striolatum, Emerald Damselfly Lestes spons, Emperor Dragonfly Anax imperator and others. Interestingly Otter spraints were also fond at this location. Mullaghattin, an area combining mature conifers, immature conifers, coniferous and broadleaved scrub and upland cutaway bog has produced Long-eared Owl, Woodcock, Cuckoo and Grasshopper Warbler – with the right timing all four be heard singing/calling at the same time! The area also produces a good variety of butterflies, dragonflies and damselflies.

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Appendices

Appendix 1

Planting native plant species is important because it produces a significant collateral increase in both the population and the number of species of associated invertebrates, which in turn provides habitat and food for birds, bats and other animals.

The numbers of plant-feeding invertebrates associated with various tree species in Britain are:

Native Irish tree species
Willows 450
Native oaks 423
Birch 334
Hawthorn 209
Poplar/aspen 153
Blackthorn 153
Alder 141
Elm 124
Apple 118
Hazel 106
Ash 68
Rowan 58
Holly 10

Native to Britain, introduced to Ireland
Scots pine 172
Elm 124
Beech 98

Introduced to Britain and Ireland
Southern Beech 78
Spruce 70
Sycamore 43
Larch 38

Source: Key, R.S. (1995). Invertebrate conservation and new woodland in Britain

Appendix 2

SITE SYNOPSIS
SITE NAME: CARLINGFORD SHORE
SITE CODE: 002306

Carlingford Shore stretches for approximately 15 km along the shoreline to the LWM of Carlingford Lough which is also the estuary of the Newry River. It is flanked by glacial moraines and mountains - the Mourne Mountains to the north and Carlingford Mountain to the south-west. The underlying rock within the SAC is mainly carboniferous limestone. This outcrops over sections of the SAC in the form of bedrock shore or reefs. Granite boulders are occasionally found. Intertidal mudflats and sand/gravel banks also occur.

The site is a candidate SAC selected for perennial vegetation of stony banks and drift lines, both habitats listed on Annex I of the E.U. Habitats Directive.

The stony banks or shingle found along much of the site vary in width from less than a

meter to approximately 50 m south of Ballagan Point. The best examples are found in this area. The perennial vegetaion of the upper beach of these shingle banks is widely ranging, well developed and often stable. In places lichens encrust the stones farther back from the sea. Typical species present throughout the site include Oraches (Atriplex spp.), Sea Beet (Beta vulgaris), Wild Carrot (Daucus carota), Red Fescue (Festuca rubra), Sea-milkwort (Glaux maritima), Lyme-grass (Leymus arenarius) and Wild Radish (Raphanus raphanistrum). This grades landward into lowland dry grassland mainly though there are patches of wet grassland.

The vegetation of the stony banks is often interspersed with the vegetation occupying accumulations of drift material and gravels rich in nitrogenous organic matter. The vegetation is sparse. Species seen include Saltwort (Salsola kali), Sea Rocket (Cakile maritima), Sea Sandwort (Honkenya peploides), Sea Spurge (Euphorbia paralias), Sea Mayweed (Matricaria maritima)and Oraches. The Red Data Book Species the Oyster Plant (Mertensia maritima) is also found. This plant is protected under the Flora Protection Order 1999.

There are small patches of saltmarsh on the drier sections of outcropping reefs and at the landward edge of the site. Species present include Sea Aster (Aster tripolium), Sea Purslane (Halimione portulacoides), Lax-flowered Sea Lavender (Limonium humile), Common Saltmarsh-grass (Puccinellia maritima), Sea Arrowgrass (Triglochin maritima) and Sea Plantain (Plantago maritima). In areas which are more regularly flooded is Sea Blite (Suaeda maritima). A small brackish lake is present on the landward side of the railway line.

Relatively extensive expanse of intertidal flats - more a sand rather than mud dominant type - occur, particularly between Greenore Point and Carlingford Harbour. The flats in this area are broken by outcropping reefs and some shingle deposits and saltmarsh on the drier higher rocks. These flats are very important feeding grounds for wildfowl and waders. Patches of green algae (filamentous, Ulva sp. and Enteromorpha sp.) and Lugworm casts occur in places, while fucoid seaweeds are common on the more stony flats. Abundant Barnacle shells and Lichens are also present on many of the rocks. Eelgrass (Zostera) beds are found on the flats - the main food source for the internationally important population of Light-belliedBrent Geese at the site. Small tufts of Cord-grass (Spartina) are also found.

The threshold for internationally important numbers of birds within the site has been

exceeded in single years, by some species such as Light-belliedBrent Geese in the 80's and 94/95. The site is nationally important for a number of species such as Great Crested Grebe, Cormorant, Ringed Plover and Red-Breasted Merganser. This classification is based on species which attained interim all-Ireland importance on the basis of the three year mean maximum counts for the winters 94/95-96/97. There are a number of bird species recorded including, Golden Plover and Bar-tailed Godwit, which are listed under Annex I of the E.U. Birds Directive. The intertidal flats between Greenore and Carlingford have been designated a Special Protection Area under the EU Birds Directive.
Black Guillemots (6) were recorded in pairs nesting in wooden breakwater in Greenore and 8 birds were seen at the breakwater. A colony of Terns in Northern Ireland feed in the SPA particularly Sandwich Tern with some Common Tern.
Grey Seals also use the site. Approximately 25-30 haul out on reefs between Greenore and Carlingford. This seal is listed in Annex II under the E.U. Habitats Directive.
The principal activity in the site is recreational usage and shellfish production.
Almost the entire area at the MLWM between Carlingford Harbour and Greenore is under production of Oyster and some small amount of Clams.
Carlingford Shore has a wide diversity of habitats including very good examples of perennial vegetation of stony banks and drift lines. The presence of the Red Data Book
Species adds to the ecological interest. The wide area of mud and sand flats within the site is internationally important for birds and is designated as a Special Protection Area. Grey Seal, an Annex II species under the E.U. Habitats Directive adds to the conservation value of the site.
23.10.2002

SITE SYNOPSIS
SITE NAME: CARLINGFORD MOUNTAIN
SITE CODE: 000453
The only upland area in County Louth, the Carlingford Mountain Range consists of an inverted 'Y' shaped ridge of dolerite forming the rugged backbone of the Carlingford Peninsula. Granite, slates and gabbro also contribute to the geology of the area. The Carlingford Mountain site comprises two main blocks, one northern from Anglesey Mountain to Carnavaddy and one southern centred around Carlingford Mountain itself; the two blocks are linked at the Windy Gap.
Generally the flora is a mosaic of alpine/subalpine heath, a habitat that is listed on Annex I of the EU Habitats Directive, and grassland. The sloping acidic grassland on mineral soils is dominated by Mat-grass (Nardus stricta) with much Sheep's-fescue (Festuca ovina). Other species such as Heath-grass (Danthonia decumbens), Heath Bedstraw (Galium saxatile) and Tormentil (Potentilla erecta) tend to be more frequent on the lower slopes.
The heath is dominated by Bell Heather (Erica cinerea) with a little Ling (Calluna vulgaris) and, in the wetter areas, Cross-leaved Heath (Erica tetralix). At higher altitudes the heath grades into mountain blanket bog dominated by Hare's-tail Cottongrass (Eriophorum vaginatum) and mosses (Sphagnum spp.), but the comparatively low rainfall here is not particularly conducive to blanket peat accumulation.
Numerous flushes and small streams add to the diversity of the site with species such as Marsh Pennywort (Hydrocotyle vulgaris), Butterworts (Pinguicula spp.), Star

Sedge (Carex echinata) and Bulbous Rush (Juncus bulbosus) occurring. The presence of gabbro leads to some local base enrichment, resulting in many of the flushes being characterised by Black Bog-rush (Schoenus nigricans). In drier areas species such as Wild Thyme (Thymus praecox) and Fairy Flax (Linum catharticum) indicate this enrichment.
Three rocky habitats listed on Annex I of the EU Habitats Directive occur in the site. The rocky exposed areas of the summit ridge have a sparse cover of the species dominant in the grassland and heath found at lower levels. Species such as Heath Rush (Juncus squarrosus), Harebell (Campanula rotundifolia) and Bilberry (Vaccinium myrtillus) are also present.
A number of alpine species have been recorded from the summit ridge, which also provides an unusual location for the woodland species Wood Anemone (Anemone nemorosa) and Lady-fern (Athyrium filix-femina)
Patches of Alder (Alnus glutinosa) occur along the northern side, an area from which the Red Data Book species Parsley Fern (Cryptogramma crispa) has been recorded.
Bracken (Pteridium aquilinum) infests large areas of the lower slopes and in dense patches it grows to the virtual exclusion of other species. Further spread of this species should be prevented.
A pair of Peregrine Falcon, a species listed on Annex I of the EU Birds Directive, are resident in the area.
This site is important for the presence of four habitats listed on Annex I of the EU Habitats Directive. Moreover, Carlingford Mountain is notable for the occurrence of certain alpine plants including the rare Parsley Fern, and for the presence of Peregrine Falcon.
25.3.1998

SITE SYNOPSIS
SITE NAME: CARLINGFORD LOUGH SPA
SITE CODE: 004078
The site comprises part of the southern sector of Carlingford Lough, Co. Louth, extending from the harbour at Carlingford to Greenore Point. It includes all of the intertidal sand and mud flats to the low tide mark. Much of the shoreline is artificially embanked.
The site supports part of a nationally important population of wintering Cormorant (233 average maximum, 1995/96-1999/00). A range of other waterfowl species occurs, notably Brent Goose (175), Oystercatcher (172), Dunlin (267), Bar-tailed Godwit (25), Redshank (35) and Turnstone (19). The intertidal flats provide feeding areas for the wintering birds.
While the numbers of wintering birds are relatively low, the site does support a good range of species. The presence of Bar-tailed Godwit is of particular note as this species is listed on Annex I of the E.U. Birds Directive.
8.2.2004

Appendix 3

Bat Survey

BAT SURVEY, CARLINGFORD, CO. LOUTH

by

Dr. Tina Aughney B.Sc. Ph.D.

24th November 2009

Ulex House, Drumheel,
4049468
Lisduff, Virginia,
tinaaughney@eircom.net
County Cavan.

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TERRESTRIAL FAUNA (BATS)
RECEIVING ENVIRONMENT
Introduction
As part of the town's flora and fauna survey, the author was requested to provide a bat survey of the area. This report details the bat survey conducted on 8th, 9th and 10th September 2009, and includes an assessment of the site for bats and a series of recommended management measures.

Bats are protected species under the Wildlife Acts (1976, and Wildlife [Amendment] Act, 2000). They are also protected under the EU Habitats Directive.

Site location and access
Carlingford town is located in the north of County Louth and is a coastal town situated between Carlingford Lough and Slieve Foy. It is located on the R176/R173 regional roads and is approximately 27km north of Dundalk.

Bat survey
This report presents the results of a bat fauna study on the 8th, 9th and 10th September 2009. The bat fauna occurring on the site are described, and recommendations are provided to conserve bats within the town and adjacent habitats.

Survey methodology
The vicinity of the town was surveyed by use of bat detectors at dusk over the period of three nights. Weather conditions were favourable on the 10th September, with clear skies, breezy conditions and mild weather. There was the occasional light rain shower and strong winds on the two other survey nights.

A night-time detector survey (dusk) was carried out using a Tranquillity Time Expansion detector and the surveyor walked to various sites within the town and recorded bat activity and verification of species identification was completed by Dr Aughney by computer analysis using Bat Sound 3.0.

Bat activity is mainly bi-modal, with bats taking advantage of increased insect numbers on the wing in the periods after dusk and before dawn – and, therefore, there is usually a lull in activity in the middle of the night. This is true of 'hawking' species - bats which capture prey in the open air. However, 'gleaning' species such as brown long-eared Plecotus auritus, Natterer's bats Myotis nattereri and whiskered bats Myotis mystacinus remain active throughout the night, as prey is available on foliage for longer periods. The prime periods for detecting, therefore, are two hours after dusk and again for a shorter period before dawn.
Survey constraints
The timing of the survey for bats was ideal, as bat activity is high during the summer /early autumn months (at the time of this survey) due to the high insect activity and warm air temperatures. Summer roost sites are occupied at this time of year so that species likely to occur in the area are likely to have been present at the time of survey. Therefore, there were no survey constraints in relation to bat detector survey.

Carlingford – Potential Bat Roosts
There are a large number of medieval structures within Carlingford town which offer suitable roosting sites for bats including: King John's Castle (c. 1190); Taffe's Castle (16th Century); The Tholsel (Town Gate, 18th Century); The Mint; Dominican Friary; Town Wall, Ghan House (1727). In addition there is the Church of the Holy Trinity currently used as a heritage

centre. Many of these buildings would be suitable for roosting sites all year around with including hibernation sites for individual bats in stone crevices.

Bats usage of artificial structures is also dependent on the degree of disturbance. Hibernating bats are extremely vulnerable to disturbance so undisturbed sites are preferred. Bats, when hibernating, decrease their body temperature to that of their surrounding environment. Therefore, they are cold to touch and take time to heat up to react to disturbance. Arousal due to disturbance also uses up vital fat reserves that allow the bat to survive the winter period.

There no scope to survey these buildings as part of this very brief bat survey. However, given the array of suitable buildings, a more intensive bat survey is recommended.

Results of bat survey
Detector survey
The bat detector survey recorded three bat species commuting and/or foraging within the survey site. Recordings were completed in the following areas:
Adjacent to the harbour
Ghan House gardens
Hedgerows and treelines within the town
St. Oliver's Park

The detector was set to record for 320 ms and x10 times. This means that the detector will record for 320 ms and then will slow the sound piece down by 10 times and record this to the mini disc player. However for the duration of time it takes to record the slow down sound piece (32 seconds), the time detector is not recording. Therefore, the time expansion detector is taking a snap shot of bat activity as the surveyor is walking a designed route.

Each track was downloaded to Bat Sound™ and calls were identified to species level where possible. Species that can be identified accurately using this method are the common and soprano pipistrelles (Pipistrellus pipistrellus and P. pygmaeus). Pipistrelle calls with a peak in echolocation between 48kHz and 52kHz were recorded as 'Pipistrelle unknown' because they could be either common or soprano pipistrelles. Leisler's bat (Nyctalus leisleri), a low frequency echolocating species, can also be easily identified using this method. Each time an echolocation call of a species is recorded within one 320 ms sound piece, this is noted as a bat pass.

Common pipistrelles Pipistrellus pipistrellus was the most frequently encountered bat and was recorded foraging/commuting in all four areas surveyed. A total of 46 bat passes of this species was recorded: 16 bat passes in vicinity of the harbour, 1 bat pass at Ghan House, 25 bat passes along hedgerows/treelines within the town and 4 bat passes in St. Oliver's Park. Soprano pipistrelle Pipistrellus pygmeaus was the second most recorded species foraging along the hedgerows/treelines (3 bat passes) and in vicinity of the harbour (5 bat passes). Leisler's bat Nyctalus leisleri were recorded only in vicinity of Ghan House (2 bat passes) and in St. Oliver's Park (2 bat passes). Pipistrelle species (not identified to species level) was recorded in vicinity of Ghan House (2 bat passes) and in St. Oliver's Park (3 bat passes).

ASSESSMENT OF INTEREST OF SITE FOR BATS
This brief survey only entailed a walkabout survey at dusk using a bat detector. There is a much greater scope to survey particular buildings within the town (such as those listed in 1.1.4.).

Descriptions of the bat species identified on or potential on site are given in the Appendices.

In summary, the management plans need to consider the following:
Bats and their bat roosts are protected by Irish (Wildlife Act 1976 and 2000 Amendment) which make it an offence to wilfully interfere with or destroy the breeding or resting place of these species. All species of bats are listed in Schedule 5 of the 1976 Act and therefore are subject to the provisions of Section 23.
The EU Habitats Regulations Directive 1992 seeks to protect rare and vulnerable species, including all species of bats. All ten species of bat are protected with the lesser horseshoe bat listed as an Annex II species while all other bats (commonly known as vesper bats) are listed as Annex IV species.
Local Planning Authorities are required to give consideration to nature conservation interests under the guidance of the SEA Directive 2001/42/EC. This directive states that the protected status afforded to bats means that planning authorities must consider their presence in order to reduce the impact of developments through mitigation measures.
The National Biodiversity Plan confers general responsibilities on all participants in the development process to take into account of protected species. "The overall objective is to secure the conservation, and where possible the enhancement, and sustainable use of biological diversity in Ireland and contribute to conservation and sustainable use of biodiversity globally".

NPWS Conservation Status Assessment report for each of the species recorded is presented in a summary below the species list:
Leisler's bat Nyctalus leisleri (Species Code 1331)
Common pipistrelle Pipistrellus pipistrellus (Species Code 1309)
Soprano pipistrelle Pipistrellus pygmaeus (Species Code 1309)

All Irish bat species are given a Favourable Status in Republic of Ireland. The principal pressures on Irish bat species are as follows:

urbanized areas (e.g. light pollution)
bridge/viaduct repairs
pesticides usage
removal of hedges, scrub, forestry
water pollution
other pollution and human impacts (e.g. renovation of dwellings with roosts)
infillings of ditches, dykes, ponds, pools and marshes
management of aquatic and bank vegetation for drainage purposes
abandonment of pastoral systems
spieleology and vandalism
communication routes: roads
forestry management

For this ecological assessment, the habitats within the town may be considered in terms of extent, diversity, naturalness, rarity, fragility, typicalness, recorded history, position, potential value and intrinsic appeal (Regini, 2000). The potential of these habitats for bat fauna is considered in this framework also.

i Bats may use trees with heavy ivy growth as occasional roosts, a small number of which are located within the survey area.

ii Bats may use mature trees with tree holes etc., as roosting sites all year around. Large mature trees are rare in the landscape around the proposed route.

iii Foraging and commuting areas are available to bats within the survey area principally along the watercourses, lake shore and laneways with hedgerows and treelines.

iv An extensive array of buildings are located within the survey area, some of which were recorded as bat roosts during this bat survey.

The listed habitats were assessed in relation to their importance for bat fauna. In consideration of the data collated during the three bat surveys, an assessment of the listed habitats is given:

improved/amentiy grasslands.
This habitat type can provides foraging areas for common bat species especially common pipistrelle and Leisler's bat. This habitat type would have low ecological value for bats.

hedgerow and treeline boundaries.
This linear habitat feature is important for bats as they provide commuting routes and foraging habitats in the landscape around the proposed route. Bat roosts may be present in mature trees or larger ivy-covered trees. However, these linear habitats are essential for commuting bats; the majority of commuting routes recorded were along this habitat type. This habitat type would have high local value for commuting and foraging bats.

3 areas of scrub.
This habitat type provides foraging areas for bats. This habitat type would have high local value for commuting and foraging bats.

4 rivers and streams.
The river and linking habitats (grasslands, treelines, hedgerows, scrub and woodland) all create an area of high ecological value for roosting, commuting and foraging bats.

5 Buildings
A number of historical buildings are would have a high ecological value for bats.

Legal status - bats
All Irish bat species are protected under the Wildlife Act (1976) and Wildlife Amendment Act (2000). Across Europe, they are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries. The Irish government has ratified both these conventions. Also, the EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive 1992), seeks to protect rare species, including bats, and their habitats and requires that appropriate monitoring of populations be undertaken.

Mitigation measures
Mitigation measures to offset disturbance to roosts, and loss of roosts are detailed below.
Measure 1 — Buildings

Securing access points: Roost sites in buildings are reduced when access points are blocked and cavity walls are filled with insulation. Retiling and under felting of old buildings can also result in the exclusion of colonies. Access points to the attic space of specified buildings should be provided for after renovation works are complete. Only small gaps are required for access for the bats species recorded in this survey. Therefore, there is no worry about other animals such as birds gaining access to spaces. Possible access means are as follows:
Open ventilators (or remove the internal mesh/plastic moulds)
Slits (15mm wide and 20mm long) by using ridge ventilators or a lead saddle in place of a slate.
The 'Morris' Bat slate is another option (See Appendix A for diagrams).
Windows: gaps (15mm wide and 20mm long) in the stone work around existing windows frames.

The 'Morris' Bat Slate: Technical advice in relation to the Morris Bat Slate can be received from Colin Morris at 01258 454572 / 01258 454341

Health & Safety: Roosting bats do not pose a health and safety threat if all water tanks are securely covered and sealed. Bats will not pose a nuisance to residents if attics are fully sealed to prevent bats (usually juveniles) from entering the living space.

Ventilation slits or moulded lead flashing (1.5 x 2cm) will be used at, at least, four points. Two access points for each end of the roof to coincide with attic chambers.

Measure 2 – re-pointing of stone work
At present, there are a number of crevices used in the stone work of historical buildings. Re-pointing works should be avoided where possible. In circumstances where required, this work should not be undertaken during cold weather (At air temperature less than 10 oC as bats will be in a torpor state and can be difficult to detect if roosting in a crevice. Bats tend to travel deep into crevices/walls under such cold conditions). An endoscope is required to examine crevices prior to such works. In areas where bats have been recorded, employ a bat specialist to examine crevices prior to works and to mark suitable crevices for retention.

Crevices in stonework are often used as temporary roosts especially by Myotis spp. Retain a number of crevices within stonework of external and internal walls of buildings. Care should be taken not to entomb bats within the crevices. It is important to listen for bats and observe for any signs of dropping or urine stains to ensure that no bats are present.

In a situation where a bat is found during construction etc., stop work and contact a bat specialist or NPWS local conservation ranger for advice. Any bats found during re-roofing, stop work to allow bats to exit themselves safely. If bats are in danger of being harmed, remove carefully with gloves and store in a cardboard box till sunset. Release adjacent to a woodland during calm weather conditions.

Measure 4 – timber treatment
If required, use bat-friendly remedial timber treatment chemicals –
Insecticides: Pyrethroid-based products (permethrin and cypermethrin)
Fungicides: borester 7, zinc octoate, acypetaczinc and copper/zinc napthenate

Completely avoid the use of the following chemicals: Lindane (gamma HCH and gamma BHC), DDT, Dieldrin, pentachlorophenol (PCP), pentachloropehnal laurate (PCPL) and tributyl tin oxide (TBTO), as they are lethal to bats

The contractor should ensure that any pre-treated timber used is treated with bat-friendly chemicals. Any timber treated on site should be done so with bat friendly chemicals also.

No timber treatment should be carried out from the beginning of May to the end of September and it is wise to avoid the key hibernation period of January and February. However, if Bats are hibernating in the buildings, undertake timber treatment in March and April when bats are active enough to leave the building during timber treatment and when there are generally enough insects for them to feed on.

Measure 5 - Landscape features

Linear landscape features such as treelines and hedgerows and scrub habitats should be retained, or planted where possible, to offer continuous corridors for bats and other wildlife to commute across the site. These should connect to existing linear features to ensure continuity. Native plant species should be used throughout (native species provide more insect life than foreign varieties).

Measure 6 – bat box scheme

Provide alternative roosting sites: these are in the form of bat boxes (many designs available – timber, concrete and concrete/sawdust). Consult the following publication: Bat Boxes: A guide to the history, function, construction and use in the conservation of bats by R. E. Stebbings and S. T. Walsh (The Bat Conservation Trust, 1991). The bat box design 1FF or 2FN is generally considered to be the most suitable for bats.

Suppliers of artificial bat roost units:

Schwegler Bat Boxes, Jacobi, Jayne & Co., Hawthorn Cottage, Maypole Hoath, Cantebury, Kent CT3 4LW, England. Phone: 01227 860521.

Alana Ecology Ltd., The Old Primary School, Church Street, Bishop's Castle, Shropshire, SY9 5AE. Phone: 01588 630173.

Marshall Clay Products, Howley Park, Quarry Lane, Woodkirk, Dewsbury, West Yorkshire, WF12 7JJ. Phone: 01132 203555.

Measure 7 - Removal of ivy

It is recommended that any removal of ivy from stonework (external walls) is limited to where necessary and if needed should only be undertaken in the autumn months of October and November or the spring months of March and April. However, sections of the ivy can be removed in August/September. Ivy removed should be left to lie on the ground for 24 hours after cutting to allow any bats beneath the cover to escape. Ivy should be removed by hand off stonewalls.

Measure 8 - Lighting

Lighting should be avoided where possible as it has been shown to deter some bat species from foraging. There are numerous types of lighting in use. The following is the range of lighting available:

Low pressure sodium lamps (SOX)

This is typically the orange lamps located along roadsides. Light is emitted at one wavelength, contains no ultraviolet (UV) light and has a low attractant to insects.

High pressure sodium lamps (SON)

This is typically pinkish-yellow lamps and more commonly used as street lights. Light is emitted over a moderate band of wavelengths including a small component of UV. Therefore there are some attraction to insect due to the brighter lights and more directionally than the low pressure sodium lights.

Mercury lamps (MBF)
This is a typical bluish-white lamps and are emitted over a moderate spectrum including a larger component of UV light to which insects are particularly sensitive to. They are rarely used nowadays.
White SON
This light source is whiter than high pressure sodium and has a larger component of UV light.
Metal Halide
This light type is similar to Mercury lamps but emits less UV light. It is generally a small lamps, more directional but with more UV than high pressure sodium light. It comes in three forms:
Quartz arc tube (HQI)
Ceramic arc tube (CDM-T)
Cosmo ceramic
Light Emitting Diodes (LEDS)
Increasing used light source which is more directional than metal halide and high pressure sodium. The light is produced in a narrow beam.
Tungsten Halogen
Used more often for security lighting than street or amenity lighting.
Compact Fluorescent
Often used in residential street lighting which produces white light that does not include UV light. Can be used at a low wattage and therefore achieve an output of low lux level.

In summary, low pressure sodium lights have the least impact on bats while the whiter lights such as metal halide is the greatest impact on bats. However, a factor to consider is the housing required for the lamp and the control on the light (direction). Low pressure sodium lights typically have a large luminaries housing and the light emitted is hard to control resulting in large amount of light spilling away from the task area (area where light is directed to). High pressure lamps are smaller, more directional but light efficiency is low. But the use of reflectors can reduce light spillage from the task area. While metal halides are also compact and easier to control but lamp and lamp life is lower compared to sodium lights.

To reduce light spillage from luminaries, lights are designed not to emit light at angles greater than 70o from the vertical plane. Consequently a flat glass protector is often used. Other methods to control light spillage:
Shields: these can be mounted on lamps to control direction of the light
Masking: part of the luminaries is painted to block light to control the direction of the light
Louvres: either as internal or external slates organized in rows or at angles depending on the direction of light control.

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APPENDICES

Bat ecology

The bat is the only mammal that is capable of true flight. There are c. 1010 species worldwide, representing almost a quarter of all mammal species. There are thirty-five species in Europe and in Ireland, nine species of bat are currently known to exist. These nine species are classified into two families, the Rhinolophidae (Horseshoe bats) and the Vespertilionidae (Common bats).

Prey

Bats range greatly in size and food requirements. Those in Europe and Ireland are insectivores and therefore feed exclusively on insects. All European bats generally weigh less than 30g with a wingspan of about 350mm. A Pipistrelle, weighing only 4 to 8 grammes, will eat up to 3000 insects every night, ensuring a build up of fat in the bat's body to allow it to survive the winter deep in hibernation.

Breeding and longevity

Irish bats can produce one young per year but, more usually, only one young is born every two years (Boyd & Stebbings, 1989). This slow rate of reproduction inhibits repopulation in areas of rapid decline. Although bats have been known to live for twenty or more years, this is rare as many die in their first year while the average lifespan, in the wild, is four years.

Bats are social animals and most species form temporary maternity colonies during the breeding seasons. These colonies are mostly breeding females but non-breeding females and males may visit the roost.

Threats

All bat species are in decline as they face many threats to their highly developed and specialised lifestyles. In general, their dependence on insects have left them vulnerable to habitat destruction, land drainage, agricultural intensification and increase use of pesticides. Their reliance on buildings has also made them vulnerable to repairs and use of timber treatment chemicals.

Many bats succumb to poisons used as woodworm treatments within their roosting sites (Racey, P. A. & Swift, S., 1986). Agricultural intensification, with the loss of hedgerows, treelines, woodlands and species-rich grasslands have impacted bat species also. Habitual roosting or hibernation sites in caves, mines, trees and disused buildings are also often lost to development. Summer roosts are prone to disturbance from vandals. Agricultural pesticides accumulate in their prey, reaching lethal doses (Jefferies, D. J., 1972). Chemical treatments in cattle production sterilise dung thus ensuring that no insects can breed within it to be fed upon by bats. Likewise, river pollution, from agricultural runoff, reduces the abundance of aquatic insects. Road building, with the resultant loss of foraging and roosting sites is a significant cause in the reduction of bat populations across Europe.

In Ireland, two bat species are of international importance: Lesser horseshoe bat and Leisler's bat. The Whiskered bat and Natterer's bat are stated as indeterminate populations in the Irish Red Data Book for Vertebrates due to the paucity of data on their population numbers (Whilde, 1993).

Description of bat species known or expected on site
Common pipistrelle Pipistrellus pipistrellus

This species was only recently separated from its sibling, the soprano or brown pipistrelle Pipistrellus pygmaeus, which is detailed below (Barratt, E. M., Deauville, R. Burland, T. M., Bruford, M. W., Jones, G., Racey, P. A. & Wayne, R. K., 1997). The common pipistrelle's echolocation calls peak at 45 kHz. The species forages along linear landscape features such as hedgerows and treelines as well as within woodland.

Soprano pipistrelle Pipistrellus pygmaeus

The soprano pipistrelle's echolocation calls peak at 55 kHz, which distinguishes it readily from the common pipistrelle. The pipistrelles are the smallest and most often seen of our bats, flying at head height and taking small prey such as midges and small moths. Summer roost sites are usually in buildings but tree holes and heavy ivy are also used. Roost numbers can exceed 1500 animals in mid-summer.

Leisler's bat Nyctalus leisleri

Leisler's are Ireland's largest bat. Due to its wide distribution in numerous numbers across Ireland and of its dramatic worldwide decline, the Irish population is considered to be very important. According to O'Sullivan (1994) Ireland now holds the largest population of this species. Their echolocation calls are around 23 kHz and they emerge early in the evening, flying high. Leisler's prefer to roost in trees and buildings and during the autumn, males establish colonies in tree holes or buildings to attract females. They feed on non-biting midges and moths / beetles later in the season.

The species is considered as Internationally Important.

List of night-scented plant species

Bedding plants

Nottingham catchfly (Silene nutans)
Night-scented catchfly (Silene noctiflora)
Bladder campion (Silene vulgaris)
Night-scented stock (Matthiola bicornis)
Sweet rocket (Hesperis natronalis)
Evening primrose (Oenothera biennis)
Tobacco plant (Nicotiana affinis)
Cherry pie (Heliotropun x hybridum)
Soapwort (Saponaria officinalis)

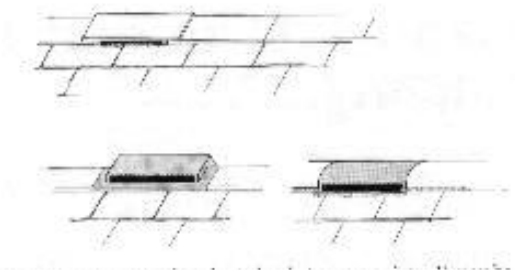
Scented herbs

Chives
Borage
Lemon balm
Marjoram
Mint

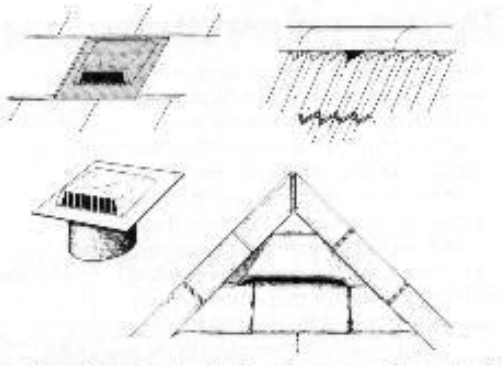
Climbers

European honeysuckle (Lonicera caprifolium)
Italian honeysuckle (Lonicera etrusca superba)
Japanese honeysuckle (Lonicera japonica halliana)
Native honeysuckle (Lonicera periclymenum)
White jasmine (Jasminium officinale)
Dogrose (Rosa canina)
Sweetbriar (Rosa rubiginosa)
Fieldrose (Rosa arvensis)
Ivy (Hedera helix)
Bramble (Rubus fruticosus agg.)

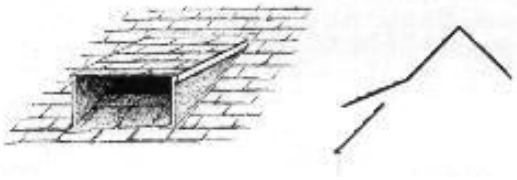
Bat access holes



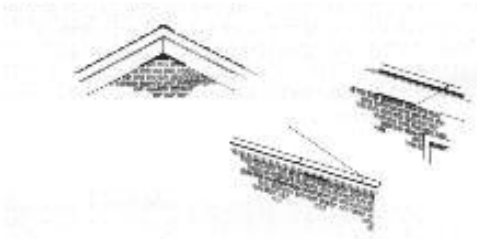
Ridge ventilators can be adapted as bat access points



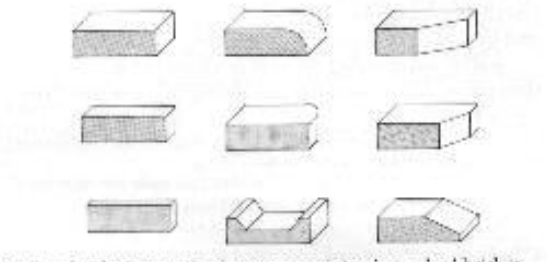
Lead Saddle in place of slate to allow access to roof or ridge void. Lead flashings can also be moulded for access.



Dormer entrance, only needed for Lesser horseshoe bats.



Access slits in soffits



Walling bricks for creating bat access points. Series of brick types shown.

Source: Bat Worker's Manual

Appendix 4

MONTHLY AND ANNUAL RAINFALL AVERAGES (mm) 1961 - 1990

name	grid ref.	ht.(m)	opened	closed	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	annual
Co. Louth																	
ARDEE (BOHARNAMOE)	*N941902*	*31*	*1968*		87	61	63	55	60	58	53	74	70	81	75	82	819
ARDEE (ST.BRIGID'S HOSP.)	*N957904*	*32*	*1952*		81	56	57	49	56	52	49	66	64	72	69	74	744
ARDEE O.P.W.	*N958912*	*29*	*1970*		88	62	62	54	61	59	53	74	71	82	76	84	825
CARLINGFORD G.S.	*J187118*	*14*	*1951*	*1990*	118	81	87	70	72	74	67	92	98	102	99	108	1067
CLOGHERHEAD G.S.	*O164839*	*23*	*1943*	*1983*	79	56	56	48	56	55	50	65	69	71	70	75	751
COLLON G.S.	*O000820*	*128*	*1943*	*1990*	96	67	75	65	72	65	63	84	86	92	86	95	945
DROGHEDA (KILLINEER)	*O067778*	*58*	*1970*		79	57	59	56	62	57	55	73	72	79	74	79	800
DUNDALK (CASTLETOWN MT.)	*J031082*	*46*	*1967*	*1991*	93	63	67	54	57	61	53	74	72	83	80	83	839
DUNDALK(ANNASKEAGH W.W.)	*J080128*	*61*	*1914*		105	71	77	64	65	68	61	83	83	93	90	97	956
DUNLEER G.S.	*O057878*	*38*	*1951*	*1990*	93	65	67	59	61	61	56	74	75	83	81	88	864
HACKBALLSCROSS G.S.	*H967102*	*69*	*1951*	*1984*	95	64	67	57	63	62	57	78	75	87	81	88	871
LOUTH G.S.	*H961014*	*37*	*1943*	*1990*	84	58	60	50	57	54	51	69	65	77	71	79	774
M.DUNDALK (BALLYMAKELLETT)	*J106125*	*232*	*1915*		113	78	80	70	68	73	62	92	91	96	95	99	1017
MELLIFONT ABBEY	*O003832*	*183*	*1975*		101	71	75	66	70	67	64	87	85	93	89	95	962
OMEATH G.S.	*J142166*	*12*	*1943*		131	89	96	71	75	72	64	89	93	108	103	113	1102