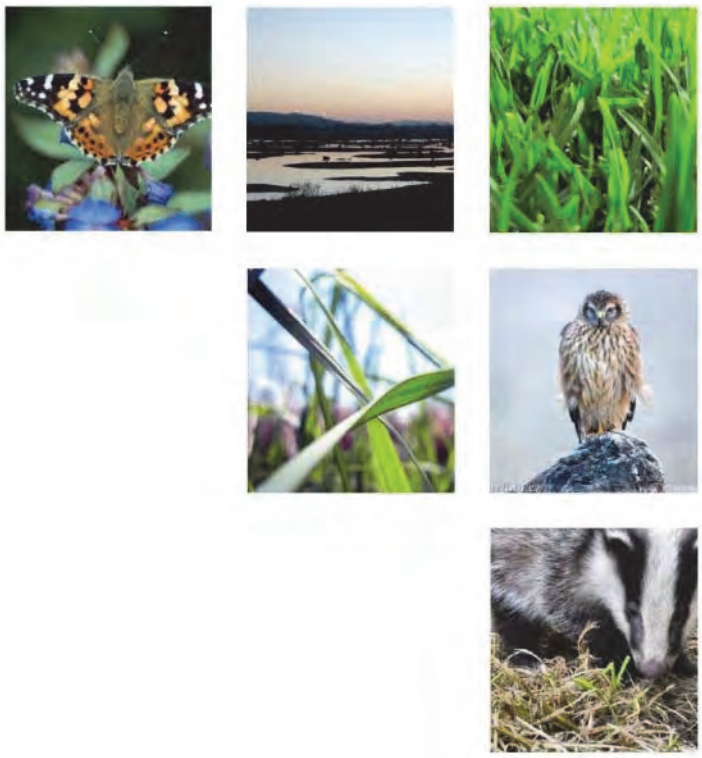

APPENDIX 11.3

SYNOPSIS OF DESIGNATED SITES

SITE NAME: SANTRY DEMESNE
SITE CODE: 000178

This site is located immediately north of old Santry village.

The site comprises the remnants of a former demesne woodland. The remaining woods are of generally good quality and include Beech (*Fagus sylvatica*), Wych Elm (*Ulmus glabra*), Ash (*Fraxinus excelsior*), Sycamore (*Acer pseudoplatanus*), Hawthorn (*Crataegus monogyna*) and Scot's Pine (*Pinus sylvatica*).

A wide range of herbaceous species were recorded, including Wood Speedwell (*Veronica montana*), Sanicle (*Sanicula europaea*), Ramsons (*Allium ursinum*), Early Dog-violet (*Viola reichenbachiana*), Goldilocks Buttercup (*Ranunculus auricomus*), Giant Fescue (*Festuca gigantea*) and False Brome (*Brachypodium sylvaticum*).

A species legally protected under the Flora Protection Order 1987, Hairy St.John's Wort (*Hypericum hirsutum*), was recorded here in 1991. This downy-leaved perennial of river banks and shady places has been recorded from only five counties in eastern Ireland, concentrated in the River Liffey valley.

The primary importance of this site is that it contains a legally protected plant species. The woodland, however, is of general ecological interest as it occurs in an area where little has survived of the original vegetation.

SITE NAME : NORTH DUBLIN BAY

SITE CODE : 000206

This site covers the inner part of north Dublin Bay, the seaward boundary extending from the Bull Wall lighthouse across to the Martello Tower at Howth Head. The North Bull Island is the focal point of this site. The island is a sandy spit which formed after the building of the South Wall and Bull Wall in the 18th and 19th centuries. It now extends for about 5 km in length and is up to 1 km wide in places. A well-developed and dynamic dune system stretches along the seaward side of the island. Various types of dunes occur, from fixed dune grassland to pioneer communities on foredunes. Marram Grass (*Ammophila arenaria*) is dominant on the outer dune ridges, with Lyme Grass (*Leymus arenarius*) and Sea Couchgrass (*Elymus farctus*) on the foredunes. Behind the first dune ridge, plant diversity increases with the appearance of such species as Wild Pansy (*Viola tricolor)*, Kidney Vetch (*Anthyllis vulneraria*), Bird's-foot Trefoil (*Lotus corniculatus*), Rest Harrow (*Ononis repens*), Yellow Rattle (*Rhinanthus minor*) and Pyramidal Orchid (*Anacamptis pyramidalis*). In these grassy areas and slacks, the scarce Bee Orchid (*Ophrys apifera*) occurs.

About 1 km from the tip of the island, a large dune slack with a rich flora occurs, usually referred to as the 'Alder Marsh' because of the presence of Alder trees (*Alnus* spp). The water table is very near the surface and is only slightly brackish. Saltmarsh Rush (*Juncus maritimus*) is the dominant species, with Meadow Sweet (*Filipendula ulmaria*) and Devil'sbit (*Succisa pratensis*) being frequent. The orchid flora is notable and includes Marsh Helleborine (*Epipactis palustris*), Common Twayblade (*Listera ovata*), Autumn Lady'stresses (*Spiranthes spiralis*) and Marsh orchids (*Dactylorhiza* spp.)

Saltmarsh extends along the length of the landward side of the island. The edge of the marsh is marked by an eroding edge which varies from 20 cm to 60 cm high. The marsh can be zoned into different levels according to the vegetation types present. On the lower marsh, Glasswort (*Salicornia europaea*), Saltmarsh Grass (*Puccinellia maritima*), Annual Sea-blite (*Suaeda maritima*) and Greater Sea-spurrey (*Spergularia media*) are the main species. Higher up in the middle marsh Sea Plantain (*Plantago maritima*), Sea Aster (*Aster tripolium*), Sea Arrowgrass (*Triglochin maritima*) and Sea Pink (*Armeria maritima*) appear.

Above the mark of the normal high tide, species such as Scurvy Grass (*Cochlearia officinalis*) and Sea Milkwort (*Glaux maritima*) are found, while on the extreme upper marsh, Sea Rushes (*Juncus maritimus* and *J. gerardii*) are dominant. Towards the tip of the island, the saltmarsh grades naturally into fixed dune vegetation. The island shelters two intertidal

lagoons which are divided by a solid causeway. The sediments of the lagoons are mainly sands with a small and varying mixture of silt and clay. The north lagoon has an area known as the "*Salicornia* flat", which is dominated by *Salicornia dolichostachya*, a pioneer Glasswort species, and covers about 25 ha. Tassel Weed (*Ruppia maritima)* occurs in this area, along with some Eelgrass (*Zostera angustifolia*). Eelgrass (*Z. noltii*) also occurs in Sutton Creek. Cordgrass (*Spartina anglica*) occurs in places but its growth is controlled by management. Green algal mats (*Enteromorpha* spp., *Ulva lactuca*) cover large areas of the flats during summer. These sediments have a rich macrofauna, with high densities of Lugworms (*Arenicola marina*) in parts of the north lagoon. Mussels (*Mytilus edulis*) occur in places, along with bivalves such as *Cerastoderma edule*, *Macoma balthica* and *Scrobicularia plana*. The small gastropod *Hydrobia ulvae* occurs in high densities in places, while the crustaceans *Corophium volutator* and *Carcinus maenas* are common. The sediments on the seaward side of North Bull Island are mostly sands. The site extends below the low spring tide mark to include an area of the sublittoral zone.

Three Rare plant species legally protected under the Flora Protection Order 1987 have been recorded on the North Bull Island. These are Lesser Centaury (*Centaurium pulchellum*), Hemp Nettle (*Galeopsis angustifolia*) and Meadow Saxifrage (*Saxifraga granulata*). Two further species listed as threatened in the Red Data Book, Wild Sage (*Salvia verbenaca*) and Spring Vetch (*Vicia lathyroides*), have also been recorded. A rare liverwort, *Petalophyllum ralfsii,* was first recorded from the North Bull Island in 1874 and has recently been confirmed as being still present there. This species is of high conservation value as it is listed on Annex II of the E.U. Habitats Directive. The North Bull is the only known extant site for the species in Ireland away from the western seaboard.

North Dublin Bay is of international importance for waterfowl. During the 1994/95 to 1996/97 period the following species occurred in internationally important numbers (figures are average maxima): Brent Geese 2,333; Knot 4,423; Bar-tailed Godwit 1,586. A further 14 species occurred in nationally important concentrations - Shelduck 1505; Wigeon 1,166; Teal 1,512; Pintail 334; Shoveler 239; Oystercatcher 2,190; Ringed Plover 346; Grey Plover 816; Sanderling 357; Dunlin 6,238; Black-tailed Godwit 156; Curlew 1,193; Turnstone 197 and Redshank 1,175. Some of these species frequent South Dublin Bay and the River Tolka Estuary for feeding and/or roosting purposes (mostly Brent Goose, Oystercatcher, Ringed Plover, Sanderling, Dunlin).

The tip of the North Bull Island is a traditional nesting site for Little Tern. A high total of 88 pairs nested in 1987. However, nesting attempts have not been successful since the early 1990s. Ringed Plover, Shelduck, Mallard, Skylark, Meadow Pipit and Stonechat also nest. A well-known population of Irish Hare is resident on the island. The invertebrates of the North Bull Island have been studied and the island has been shown to contain at least seven species of regional or national importance in Ireland (Orders Diptera, Hymenoptera, Hemiptera).

The main landuses of this site are amenity activities and nature conservation. The North Bull Island is the main recreational beach in Co Dublin and is used throughout the year. Much of the land surface of the island is taken up by two golf courses. Two separate Statutory Nature Reserves cover much of the island east of the Bull Wall and the surrrounding intertidal flats. The site is used regularly for educational purposes. North Bull Island has been designated a Special Protection Area under the E.U. Birds Directive and it is also a statutory Wildfowl Sanctuary, a Ramsar Convention site, a Biogenetic Reserve, a Biosphere Reserve and a Special Area Amenity Order site. This site is an excellent example of a coastal site with all the main habitats represented.

The holds good examples of ten habitats that are listed on Annex I of the E.U. Habitats Directive; one of these is listed with priority status. Several of the wintering bird species have populations of international importance, while some of the invertebrates are of national importance. The site contains a numbers of rare and scarce plants including some which are legally protected. Its proximity to the capital city makes North Dublin Bay an excellent site for educational studies and research.

SITE NAME: ROYAL CANAL

SITE CODE: 002103

The Royal Canal is a man-made waterway linking the River Liffey at Dublin to the River Shannon near Tarmonbarry. There is a branch line from Kilashee to Longford Town. The canal NHA comprises the central channel and the banks on either side of it. The main water supply is from Lough Owel (also an NHA) via a feeder channel into the canal at Mullingar. The Royal Canal was closed to navigation in 1961. The section of canal west of Mullingar was allowed to dry out, and the eastern section silted up and became overgrown. Restoration began in 1988, and is still in progress.

A number of different habitats are found within the canal boundaries - hedgerow, tall herbs, calcareous grassland, reed fringe, open water, scrub and woodland. The hedgerow, although diverse, is dominated by Hawthorn (*Crataegus monogyna*). On the limestone soils of the midlands Spindle (*Euonymus europaeus*) and Guelder-rose (*Viburnum opulus*) are present. The vegetation of the towpath is usually dominated by grass species. Crested Dog's-tail (*Cynosurus cristatus*), Quaking Grass (*Briza media*) and Sweet Vernal-grass (*Anthoxanthum odoratum*) are typical species of the calcareous grasslands of the midlands. Where the canal was built through a bog, soil (usually calcareous) was brought in to make the banks. The contrast between the calcicolous species of the towpath and the calcifuge species of the bog is very striking. Otter spraints are found along the towpath, particularly where the canal passes over a river or stream.

The Rare and legally protected Opposite-leaved Pondweed (*Groenlandia densa*) (Flora Protection Order 1987) is present at one site in Dublin, between Locks 4 and 5. *Tolypella intricata* (a stonewort listed in the Red Data Book as being Vulnerable) is also in the Royal Canal in Dublin, the only site in Ireland where it is now found. The ecological value of the canal lies more in the diversity of species it supports along its linear habitats than in the presence of rare species. It crosses through agricultural land and therefore provides a refuge for species threatened by modern farming methods.

SITE NAME: GRAND CANAL
SITE CODE: 002104

The Grand Canal is a man-made waterway linking the River Liffey at Dublin with the Shannon at Shannon Harbour and the Barrow at Athy. The Grand Canal Natural Heritage Area (NHA) comprises the canal channel and the banks on either side of it. The canal system is made up of a number of branches - the Main Line from Dublin to the Shannon, the Barrow Line from Lowtown to Athy, the Edenderry Branch, the Naas and Corbally Branch and the Milltown Feeder. The Kilbeggan Branch is dry at present, but it is hoped to restore it in the near future. Water is fed into the summit level of the canal at Lowtown from Pollardstown Fen, itself an NHA.

A number of different habitats are found within the canal boundaries - hedgerow, tall herbs, calcareous grassland, reed fringe, open water, scrub and woodland. The hedgerow, although diverse, is dominated by Hawthorn (*Crataegus monogyna*). On the limestone soils of the midlands Spindle (*Euonymus europaeus*) and Guelder-rose (*Viburnum opulus*) are present. The vegetation of the towpath is usually dominated by grass species. Where the canal was built through a bog, soil (usually calcareous) was brought in to make the banks. The contrast between the calcicolous species of the towpath and the calcifuge species of the bog is very striking. The diversity of the water channel is particularly high in the eastern section of the Main Line - between the Summit level at Lowtown and Inchicore. Arrowhead (*Sagittaria sagittifolia*) and Watercress (*Nasturtium officinale*) are more common in this stretch than on the rest of the system. All sites for Hemlock Water-dropwort (*Oenanthe crocata*) on the Grand Canal system are within this stretch. The aquatic flora of the Corbally Extension of the Naas Branch of the canal is also very diverse, with a similar range of species to the eastern Main Line. Otter spraints are found along the towpath, particularly where the canal passes over a river or stream.

The Common Newt breeds in the ponds on the bank at Gollierstown in Co. Dublin. The Rare and legally protected Opposite-leaved Pondweed (*Groenlandia densa*) (Flora Protection

Order 1987) is present at a number of sites in the eastern section of the Main Line, between Lowtown and Ringsend Basin in Dublin. The ecological value of the canal lies more in the diversity of species it supports along its linear habitats than in the presence of rare species. It crosses through agricultural land and therefore provides a refuge for species threatened by modern farming methods.

SITE NAME: DOLPHINS, DUBLIN DOCKS

SITE CODE: 000201

This tern breeding site is situated at the entrance to Dublin port just off the old sewage works at Ringsend. The site comprises two moorings used by Common and Arctic Terns. One of these is derelict and consists of two sections linked by a timber bridge, one section being constructed of concrete, and the other of timber. In June 1994 this dolphin contained 33 tern nests. The other dolphin, with 17 tern nests, is a modern one made entirely of concrete, the deck of which is edged with timber beams and galvanized steel railings. This site is an important tern colony, especially for Arctic Tern which is a scarce nester on the east coast. With some management both dolphins could be enhanced to attract more terns. A pair of Kittiwakes attempted to nest on the derelict dolphin in 1994, and Cormorants use it as a roost.

SITE NAME: SOUTH DUBLIN BAY AND RIVER TOLKA ESTUARY SPA

SITE CODE: 004024

The South Dublin Bay and River Tolka Estuary SPA comprises a substantial part of Dublin Bay. It includes the intertidal area between the River Liffey and Dun Laoghaire, and the estuary of the River Tolka to the north of the River Liffey, as well as Booterstown Marsh. A portion of the shallow marine waters of the bay is also included.

In the south bay, the intertidal flats extend for almost 3 km at their widest. The sediments are predominantly well-aerated sands. Several permanent channels exist, the largest being Cockle Lake. A small sandy beach occurs at Merrion Gates, while some bedrock shore occurs near Dun Laoghaire. The landward boundary is now almost entirely artificially embanked. There is a bed of Dwarf Eelgrass (*Zostera noltii*) below Merrion Gates which is the largest stand on the east coast. Green algae (*Enteromorpha* spp. and *Ulva lactuca*) are distributed throughout the area at a low density. The macro-invertebrate fauna is well-developed, and is characterised by annelids such as Lugworm (*Arenicola marina*), *Nephthys* spp. and Sand Mason (*Lanice conchilega*), and bivalves, especially Cockle (*Cerastoderma edule*) and Baltic Tellin (*Macoma balthica*). The small gastropod Spire Shell (*Hydrobia ulvae*) occurs on the muddy sands off Merrion Gates, along with the crustacean *Corophium volutator*. Sediments in the Tolka Estuary vary from soft thixotrophic muds with a high organic content in the inner estuary to exposed, well-aerated sands off the Bull Wall. The site includes Booterstown Marsh, an enclosed area of saltmarsh and muds that is cut off from the sea by the Dublin/Wexford railway line, being linked only by a channel to the east, the Nutley stream. Sea water incursions into the marsh occur along this stream at high tide. An area of grassland at Poolbeg, north of Irishtown Nature Park, is also included in the site.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Light-bellied Brent Goose, Oystercatcher, Ringed Plover, Golden Plover, Grey Plover, Knot, Sanderling, Dunlin, Bar-tailed Godwit, Redshank, Black-headed Gull, Roseate Tern, Common Tern and Arctic Tern. The E.U. Birds Directive pays particular attention to wetlands, and as these form part of the SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The site is an important site for wintering waterfowl, being an integral part of the internationally important Dublin Bay complex – all counts for wintering Waterbirds are mean peaks for the five year period 1995/96-99/2000. Although birds regularly commute between the south bay and the north bay, recent studies have shown that certain populations which occur in the south bay spend most of their time there. An internationally important population of Light-bellied Brent Goose (525) occurs regularly and newly arrived birds in the autumn feed on the Eelgrass bed at Merrion. Light-bellied Brent Goose is also known to feed

on the grassland at Poolbeg. The site supports nationally important numbers of a further nine species: Oystercatcher (1,263), Ringed Plover (161), Golden Plover (1,452), Grey Plover (183), Knot (1,151), Sanderling (349), Dunlin (2,753), Bar-tailed Godwit (866) and Redshank (713). Other species occurring in smaller numbers include Great Crested Grebe (21), Curlew (397) and Turnstone (75).

South Dublin Bay is a significant site for wintering gulls, especially Black-headed Gull (3,040), but also Common Gull (330) and Herring Gull (348). Mediterranean Gull is also recorded from here, occurring through much of the year, but especially in late winter/spring and again in late summer into winter.

Both Common Tern and Arctic Tern breed in Dublin Docks, on a man-made mooring structure known as the E.S.B. dolphin – this is included within the site. Small numbers of Common Tern and Arctic Tern were recorded nesting on this dolphin in the 1980s.
A survey of the dolphin in 1999 recorded Common Tern nesting here in nationally important numbers (194 pairs). This increase was largely due to the ongoing management of the site for breeding terns. More recent data highlights this site as one of the most important Common Tern sites in the country with over 400 pairs recorded here in 2007.

The south bay is an important tern roost in the autumn (mostly late July to September). Birds also use the Dalkey Islands to the south. The origin of many of the birds is likely to be the Dublin breeding sites (Rockabill and the Dublin Docks) though numbers suggest that the site is also used by birds from other sites, perhaps outside the state. More than 10,000 terns have been recorded, consisting of Common, Arctic and Roseate terns.

The wintering birds within this site are now well-monitored. More survey, however, is required on the wintering gulls and the autumn terns.

Booterstown Marsh supports an important population of Borrer's Saltmarsh-grass (*Puccinellia fasciculata*), a rare, Red Data Book species that is listed on the Flora (Protection) Order, 1999.

The South Dublin Bay and River Tolka Estuary SPA is of international importance for Light-bellied Brent Goose and of national importance for nine other waterfowl species. As an autumn tern roost, it is also of international importance. Furthermore, the site supports a nationally important colony of Common Tern. All of the tern species using the site are listed on Annex I of the E.U. Birds Directive, as are Bartailed Godwit and Mediterranean Gull.

SITE NAME: NORTH BULL ISLAND SPA
SITE CODE: 004006

This site covers all of the inner part of north Dublin Bay, with the seaward boundary extending from the Bull Wall lighthouse across to Drumleck Point at Howth Head. The North Bull Island sand spit is a relatively recent depositional feature, formed as a result of improvements to Dublin Port during the 18th and 19th centuries. It is almost 5 km long and 1 km wide and runs parallel to the coast between Clontarf and Sutton. Part of the interior of the island has been converted to golf courses.

A well-developed and dynamic dune system stretches along the seaward side of the island. Various types of dunes occur, from fixed dune grassland to pioneer communities on foredunes. Marram Grass (*Ammophila arenaria*) is dominant on the outer dune ridges. Species of the fixed dunes include Wild Pansy (*Viola tricolor*), Kidney Vetch (*Anthyllis vulneraria*), Bird's-foot Trefoil (*Lotus corniculatus*), Pyramidal Orchid (*Anacamptis pyramidalis*) and, in places, the scarce Bee Orchid (*Ophrys apifera*). A feature of the dune system is a large dune slack with a rich flora, usually referred to as the 'Alder Marsh' because of the presence of Alder (*Alnus glutinosa*) trees. The water table is very near the surface and is only slightly brackish. Sea Rush (*Juncus maritimus*) is the dominant species, with Meadowsweet (*Filipendula ulmaria*) and Devil's-bit Scabious (*Succisa pratensis*) being frequent. The orchid flora is notably diverse in this area.

Saltmarsh extends along the length of the landward side of the island and provides the main roost site for wintering birds in Dublin Bay. On the lower marsh, Glasswort (*Salicornia*

europaea), Common Saltmarsh-grass (*Puccinellia maritima*), Annual Seablite (*Suaeda maritima*) and Greater Sea-spurrey (*Spergularia media*) are the main species. Higher up in the middle marsh Sea Plantain (*Plantago maritima*), Sea Aster (*Aster tripolium*), Sea Arrowgrass (*Triglochin maritima*) and Thrift (*Armeria maritima*) appear. Above the mark of the normal high tide, species such as Common Scurvygrass (*Cochlearia officinalis*) and Sea Milkwort (*Glaux maritima*) are found, while on the extreme upper marsh, Sea Rush and Saltmarsh Rush (*Juncus gerardi*) are dominant.

The island shelters two intertidal lagoons which are divided by a solid causeway. These lagoons provide the main feeding grounds for the wintering waterfowl. The sediments of the lagoons are mainly sands with a small and varying mixture of silt and clay. Tasselweed (*Ruppia maritima*) and small amounts of Eelgrass (*Zostera* spp.) are found in the lagoons. Common Cord-grass (*Spartina anglica*) occurs in places. Green algal mats (*Enteromorpha* spp., *Ulva lactuca*) are a feature of the flats during summer. These sediments have a rich macro-invertebrate fauna, with high densities of Lugworm (*Arenicola marina*) and Ragworm (*Hediste diversicolor*). Mussels (*Mytilus edulis*) occur in places, along with bivalves such as *Cerastoderma edule*, *Macoma balthica* and *Scrobicularia plana*. The small gastropod *Hydrobia ulvae* occurs in high densities in places, while the crustaceans *Corophium volutator* and *Carcinus maenas* are common. The sediments on the seaward side of North Bull Island are mostly sands and support species such as Lugworm and the Sand Mason (*Lanice conchilega*). The site includes a substantial area of the shallow marine bay waters.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Light-bellied Brent Goose, Shelduck, Teal, Pintail, Shoveler, Oystercatcher, Ringed Plover, Golden Plover, Grey Plover, Knot, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Turnstone and Black-headed Gull. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The North Bull Island SPA is of international importance for waterfowl on the basis that it regularly supports in excess of 20,000 waterfowl. It also qualifies for international importance as the numbers of three species exceed the international threshold – Light-bellied Brent Goose (1,548), Black-tailed Godwit (367) and Bartailed Godwit (1,529) (all waterfowl figures given are average maxima for the five winters 1995/96 to 1999/00). The site is the top site in the country for both of these species. A further 14 species have populations of national importance – Shelduck (1,259), Teal (953), Pintail (233), Shoveler (141), Oystercatcher (1,784), Ringed Plover (139), Golden Plover (1,741), Grey Plover (517), Knot (2,623), Sanderling (141), Dunlin (3,926), Curlew (937), Redshank (1,431) and Turnstone (157). The populations of Pintail and Knot are of particular note as they comprise more than 10% of the respective national totals. Species such as Grey Heron, Cormorant, Wigeon, Goldeneye, Red-breasted Merganser and Greenshank are regular in winter in numbers of regional or local importance. Gulls are a feature of the site during winter, especially Black-headed Gull (2,196). Common Gull (332) and Herring Gull (331) also occur here. While some of the birds also frequent South Dublin Bay and the River Tolka Estuary for feeding and/or roosting purposes, the majority remain within the site for much of the winter. The wintering bird populations have been monitored more or less continuously since the late 1960s and the site is now surveyed each winter as part of the larger Dublin Bay complex.

The North Bull Island SPA is a regular site for passage waders, especially Ruff, Curlew Sandpiper and Spotted Redshank. These are mostly observed in single figures in autumn but occasionally in spring or winter.

The site formerly had an important colony of Little Tern but breeding has not occurred in recent years. Several pairs of Ringed Plover breed, along with Shelduck in some years. Breeding passerines include Skylark, Meadow Pipit, Stonechat and Reed Bunting. The island is a regular wintering site for Short-eared Owl, with up to 5 present in some winters.

The site has five Red Data Book vascular plant species, four rare bryophyte species, and is nationally important for three insect species. The rare liverwort, *Petalophyllum ralfsii*, was first recorded from the North Bull Island in 1874 and its presence here has recently been re-

confirmed. This species is of high conservation value as it is listed on Annex II of the E.U. Habitats Directive. A well-known population of Irish Hare is resident on the island

The main landuses of this site are amenity activities and nature conservation. The North Bull Island is one of the main recreational beaches in Co. Dublin and is used throughout the year. Two separate Statutory Nature Reserves cover much of the island east of the Bull Wall and the surrounding intertidal flats. North Bull Island is also a Wildfowl Sanctuary, a Ramsar Convention site, a Biogenetic Reserve, a Biosphere Reserve and a Special Area Amenity Order site. Much of the SPA is also a candidate Special Area of Conservation. The site is used regularly for educational purposes and there is a manned interpretative centre on the island.

The North Bull Island SPA is an excellent example of an estuarine complex and is one of the top sites in Ireland for wintering waterfowl. It is of international importance on account of both the total number of waterfowl and the individual populations of Lightbellied Brent Goose, Black-tailed Godwit and Bar-tailed Godwit that use it. Also of significance is the regular presence of several species that are listed on Annex I of the E.U. Birds Directive, notably Golden Plover and Bar-tailed Godwit, but also Ruff and Short-eared Owl.

SITE NAME: BOOTERSTOWN MARSH

SITE CODE: 001205

Booterstown Marsh lies approximately 3 miles south of Dublin City. It is separated from Merrion Strand to the east by an embankment which carries the Dublin to Wexford railway, and to the west it is bounded by the road from Dublin to Blackrock. The marsh overlies glacial tills which in turn lie on Black Limestone.

Two streams run through the site; the Trimelston stream runs along the northern edge of the site and is culverted, although there is some seepage into the marsh which helps prevent the marsh drying out. The Nutley stream runs parallel to the railway along the eastern side of the site. Sea water incursions into the marsh occur along this stream at high tide.

Almost the entire marsh may be flooded at irregular intervals and salinity fluctuates throughout the site under the influence of rainfall and tidal cycles. Consequently, the site shows an interesting gradient from freshwater plant communities in the north-west to a more saline-tolerant flora in the south-east. Water Cress (*Nasturtium officinale*), Water Horsetail (*Equisetum fluviatile*), Amphibious Bistort (*Polygonum amphibium*) and Fool's Water-cress (*Apium nodiflorum*), are typical in the west of the site. Seaward, a fuller saltmarsh flora is found with Creeping Bent (*Agrostis stolonifera*), Sea Club-rush (*Scirpus maritimus*), Saltmarsh Rush (*Juncus gerardi*), Common Saltmarsh-grass (*Puccinellia maritima*), Sea-milkwort (*Glaux maritima*) and Sea Aster (*Aster tripolium*). The protected plant Borrer's Saltmarsh-grass (*Puccinellia fasciculata*), known only from a few locations in Ireland, is found here.

Booterstown Marsh is a site of local/regional ornithological importance. Of particular interest are the high concentrations of Snipe which occur in winter - numbers up to 100 are normal, but as many as 400 (Jan. 1988) have been recorded. The marsh is also used as a high-tide roost by a variety of waders and gulls - regular species are Oystercatcher
(100+), Redshank (100+) and Black-headed Gull (several hundreds). Up to 50 Mallard and 40 Teal are regularly seen in autumn and winter. Other species which frequent the marsh include Kingfisher (1-2 birds), an Annex I species under the Birds Directive, and Grey Heron (5-8 birds). Rarer birds of coastal marshes have been recorded, notably Little Egret and Yellow Wagtail.

Booterstown Marsh is the only saltmarsh in south Dublin and, despite some concerns about the increasing salinity of the site, it remains a valuable habitat for many birds as well as containing a diverse flora including the protected plant Borrer's Saltmarsh-grass (*Puccinellia fasciculata*).

SITE NAME: SLUICE RIVER MARSH

SITE CODE: 001763

This site is located about 1 km west of Portmarnock village. The Sluice River flows into Baldoyle Estuary, less than 1 km away. The marsh backs onto the east side of the railway embankment.

The wettest parts of the marsh have Yellow Flag (*Iris pseudacorus*), Bulrush (*Typha latifolia*), Water Horsetail (*Equisitum fluviatile*), Common Club-rush (*Scirpus lacustris*), Starwort (*Callitriche* spp.), Thread-leaved Water-crowfoot (*Ranunculus tricophyllus*), the uncommon Brackish Water-crowfoot (*Ranunculus baudotii*), Lesser Marshwort (*Apiumninundatum*) and Duckweed (*Lemna* spp.).

In the somewhat drier marsh areas the typical plant species are Marsh Bedstraw (*Galium palustre*), Creeping Cinquefoil (*Potentilla reptans*), Meadowsweet (*Filipendula ulmaria*), Water Mint (*Mentha aquatica*), Angelica (*Angelica sylvestris*), Water Plantain (*Alisma plantago-aquatica*) and the sedges *Carex disticha* and *Carex nigra*.

Wet grassland occurs around the marsh, and includes such species as Silverweed (*Potentilla anserina*), Lady's Smock (*Cardamine pratensis*), Meadow Vetchling (*Lathyrus pratensis*), Soft Rush (*Juncus effusus*), Creeping bent-grass (*Agrostis stolonifera*) and buttercups (*Ranunculus repens* and *R. acris*).

Some wet woodland and scrub occurs on the west side of the site, mostly comprised of willows (*Salix* spp.), Alder (*Alnus glutinosa*) and Downy Birch (*Betula pubescens*), as well as some Hazel (*Corylus avellana*).

Mallard, Snipe, Grey Heron, Moorhen and Reed Bunting have been recorded from the marsh. The herons nest nearby. Some waterfowl from Baldoyle Estuary may use the marsh on occasions. Horses graze the site and there is probably some shooting in winter. Malahide golf course is situated on the other side of the Sluice River. This site is of importance as a relatively intact freshwater marsh, a habitat that is now rare
in County Dublin.

SITE NAME: SLUICE RIVER MARSH

SITE CODE: 001763

This site is located about 1 km west of Portmarnock village. The Sluice River flows into Baldoyle Estuary, less than 1 km away. The marsh backs onto the east side of the railway embankment.

The wettest parts of the marsh have Yellow Flag (*Iris pseudacorus*), Bulrush (*Typha latifolia*), Water Horsetail (*Equisitum fluviatile*), Common Club-rush (*Scirpus lacustris*), Starwort (*Callitriche* spp.), Thread-leaved Water-crowfoot (*Ranunculus tricophyllus*), the uncommon Brackish Water-crowfoot (*Ranunculus baudotii*), Lesser Marshwort (*Apium inundatum*) and Duckweed (*Lemna* spp.).

In the somewhat drier marsh areas the typical plant species are Marsh Bedstraw (*Galium palustre*), Creeping Cinquefoil (*Potentilla reptans*), Meadowsweet (*Filipendula ulmaria*), Water Mint (*Mentha aquatica*), Angelica (*Angelica sylvestris*), Water Plantain (*Alisma plantago-aquatica*) and the sedges *Carex disticha* and *Carex nigra*.

Wet grassland occurs around the marsh, and includes such species as Silverweed (*Potentilla anserina*), Lady's Smock (*Cardamine pratensis*), Meadow Vetchling (*Lathyrus pratensis*), Soft Rush (*Juncus effusus*), Creeping bent-grass (*Agrostis stolonifera*) and buttercups (*Ranunculus repens* and *R. acris*).

Some wet woodland and scrub occurs on the west side of the site, mostly comprised of willows (*Salix* spp.), Alder (*Alnus glutinosa*) and Downy Birch (*Betula pubescens*), as well as some Hazel (*Corylus avellana*).
Mallard, Snipe, Grey Heron, Moorhen and Reed Bunting have been recorded from the marsh. The herons nest nearby. Some waterfowl from Baldoyle Estuary may use the marsh on occasions. Horses graze the site and there is probably some shooting in winter. Malahide golf course is situated on the other side of the Sluice River. This site is of importance as a relatively intact freshwater marsh, a habitat that is now rare

in County Dublin.

SITE NAME: BALDOYLE BAY SPA
SITE CODE: 004016

Baldoyle Bay extends from just below Portmarnock village to the west pier at Howth, Co. Dublin. It is a tidal estuarine bay protected from the open sea by a large sand-dune system. Two small rivers, the Mayne and the Sluice, flow into the inner part of the estuary.

Large areas of intertidal flats are exposed at low tide. These are mostly sands but grade to muds in the inner sheltered parts of the estuary. Extensive areas of Common Cord-grass (*Spartina anglica*) occur in the inner estuary. Both the Narrow-leaved Eelgrass (*Zostera angustifolia*) and the Dwarf Eelgrass (*Z. noltii*) are also found here. During summer, the sandflats of the sheltered areas are covered by mats of green algae (*Enteromorpha* spp. and *Ulva lactuca*). The sediments have a typical macrofauna, with Lugworm (*Arenicola marina*) dominating the sandy flats. The tubeworm *Lanice conchilega* is present in high densities at the low tide mark and the small gastropod Laver Spire-shell (*Hydrobia ulvae*) occurs in the muddy areas, along with the crustacean *Corophium volutator*. Areas of saltmarsh occur near Portmarnock Bridge and at Portmarnock Point, with narrow strips along other parts of the estuary. Species such as Glasswort (*Salicornia* spp.), Sea-purslane (*Halimione portulacoides*), Sea Plantain (*Plantago maritima*) and Sea Rush (*Juncus maritimus*) are found here.

Baldoyle Bay is of high ornithological importance for wintering waterfowl, providing good quality feeding areas and roost sites for an excellent diversity of waterfowl species. It supports an internationally important population of Pale-bellied Brent Geese (726), and has a further seven species with nationally important populations (all figures are average peaks for the five winters 1995/96 to 1999/2000): Great Crested Grebe (42), Shelduck (147), Pintail (22), Ringed Plover (221), Golden Plover (1810), Grey Plover (200) and Bar-tailed Godwit (353). The occurrence of Golden Plover and Bar-tailed Godwit is of particular note as these species are listed on Annex I of the Regular breeding birds include Shelduck, Mallard and Ringed Plover. In autumn, passage migrants such as Curlew Sandpiper, Spotted Redshank and Green Sandpiper are regular in small numbers.

Regular breeding birds include Shelduck, Mallard and Ringed Plover. In autumn, passage migrants such as Curlew Sandpiper, Spotted Redshank and Green Sandpiper are regular in small numbers.

Baldoyle Bay SPA is of high conservation importance, with an internationally important population of Brent Geese and nationally important populations of a further seven species, including two which are listed on Annex I of the E.U. Birds Directive. The inner estuarine section is a Statutory Nature Reserve and is also designated as a wetland of international importance under the Ramsar Convention. The site is a candidate Special Area of Conservation under the E.U. Habitats Directive. The main threat to the birds is disturbance as it is located in a densely populated area.

SITE NAME: DALKEY COASTAL ZONE AND KILLINEY HILL

SITE CODE: 001206

This site includes the coastal stretch from Scotman's Bay to south of White Rock, the Dalkey Island group and Dalkey Sound, and Killiney Hill. Killiney Hill is at the edge of the Wicklow mountain intrusion and so it is formed of a mixture of granite and mica schist. It provides one of the best exposed junctions of these rock types, on the beach at White Rock, at which minerization has taken place due to contact metamorphism. The minerals include biotite, andelusite and garnet, with aplite and pegmatite veins also exposed. The
seaward parts of Killiney Hill have in addition a covering of calareous glacial drift. The rocky shore is mainly of granite.

Dalkey Sound and its environs have been highly regarded as a valuable marine collecting area for many years. The Sound is especially noteworthy for the occurrence of west and south coast invertebrates. Species taken include Squat Lobsters (*Galathea* spp.), Swimming Crabs (*Portunus* spp.) and the Crawfish (*Palinurus vulgaris*). The area is also noted for the

occurrence of gymnoblastic hydroids, with the rate Antedon bifida being taken regularly. Some rare European species which occur are members of the Order Nudibrachia and the Spiny Starfish (*Marthasterias glacialis*). Dalkey Island lies c. 400m off Sorrento Point. The island is low-lying, the highest point at c.15m is dominated by a Martello Tower. Soil cover consists mainly of a thin peaty layer, though in a few places there are boulder clay deposits. Vegetation cover is low, consisting mainly of grasses. No woody plants have become established, probably due to constant grazing by goats. Dense patches of bracken (*Pteridium aquilinum*) and Hogweed (*Heracleun sphondylium*) occur in places.
Lamb Island lies to the north of Dalkey Island, attached at low-tide by a line of rocks. It has a thin soil cover and some vegetation, mainly grasses, Nettles (*Urtica dioica*) and Hogweed (*Heracleum sphondylium*). Further north lies Mainden's Rock, a bare angular granite rock up to 5m high. There is no vegetation cover. Muglins, a small granite rock, lies about 1km north-east of Dalkey Island. A small lighthouse is on the rock.

Herring Gulls nest on Dalkey Island (17 pairs in 1986), Lamb Island (29 pairs in 1986) and Muglins (207 nests in 1982). Great Black-backed Gull nests on Dalkey Island (maximum 62 nests in 1982-88), and two pairs of Lesser Black-backed Gull nested there in 1981. Common Terns breed annually on Maiden's Rock, with a maximum of 54 nests between 1980 and 1986. One pair of Arctic Tern bred on Mainden's Rock in several years and in 1986 two pairs of Roseate Terns nested but were unsuccessful. Manx Shearwater is suspected of breeding on Dalkey Island. Sheluck, Mallard and Oystercatcher nest on Dalkey and Lamb Island. Meadow and Rock Pipits breed on Dalkey Island. Maiden's Rock is an important autumn roosting site for up to 2,000 terns, including Roseates from the Rockabill colony. In autumn and winter Dalkey Island is an evening roosting site for Cormorants, Shags, Curlew and large gulls. Up to 50 Turnstones and 15 Purple Sandpipers occur in winter. Killiney Hill is a complex of coastal heath and mixed woodland. The woods are mostly planted and include Sycamore (*Acer pseudoplatanus*), Horse Chestnut (*Aesculus hipposcastanum*), some Oak (*Quercus* spp.), Ash (*Fraxinus excelsior*) and Holly (*Ilex aquilinum*). The ground flora is mainly Ivy (*Hedera helix*) and Brambles (*Rubus* spp.) but there are some areas with more typical woodland species such as Wood Sorrel (*Oxalis acetosella*) and Herb Robert (*Geranium robertianum*).

Many of the rock surfaces on the open and bushy areas on the east side of the summit of the hill are roches mountonnes while near the summit spodumene is found in a small scarp exposure. This results in an interesting flora, with Wood Vetch (*Vicia sylvatica*), Yellow Fumitory (*Corydalis claiculata*) and Madder (*Rubis peregrina*) growing amongst the Gorse (Ulex europaeus). The shallow soils overlying the rock support a community of winter annuals and early flowering perennials such as Spring Squill (*Scilla verna*) and Crow Garlic (*Allium vineale*). The drift banks above and below the railway have warm shallow soils. Here grow scarce plants such as Bloody Cranesbill (*Geranium sanguineum*), Bee Orchid (*Ophrys apifera*), Sea Storksbill (*Erodium maritimum*) and Clovers (*Trifolium ornithopodioides, T. striatum* and *T. scabrum*). The naturalized Silver ragwort (*Senecio cineraria*) is widespread. Up to five pairs of Fulmar breed on the cliffs below the railway line. Kestrel breeds in the area, as well as Stonechat. This site represents a fine example of a coastal system with habitats ranging from the sublittoral to coastal heath. The flora is well developed and includes some scarce species. The islands are important bird sites. The site also has geological importance.

SITE NAME: MALAHIDE ESTUARY SPA
SITE CODE: 004025

Malahide Estuary is situated in north Co. Dublin, between the towns of Malahide and Swords. The site encompasses the estuary, saltmarsh habitats and shallow subtidal areas at the mouth of the estuary. A railway viaduct, built in the 1800s, crosses the site and has led to the inner estuary becoming lagoonal in character and only partly tidal. Much of the outer part of the estuary is well-sheltered from the sea by a large sand spit, known as "The Island". This spit is now mostly converted to golf-course. The outer part empties almost completely at low tide and there are extensive intertidal flats exposed. Substantial stands of eelgrass (both *Zostera noltii* and *Z. angustifolia*) occur in the sheltered part of the outer estuary, along with Tasselweed (*Ruppia maritima*). Green algae, mostly *Ulva* spp., are frequent on the sheltered flats. Common Cord-grass (*Spartina anglica*) is well established in the outer estuary and also in the innermost part of the site. The intertidal flats support a typical macro-invertebrate fauna, with polychaete worms (*Arenicola marina* and *Hediste diversicolor*), bivalves such as *Cerastoderma edule*, *Macoma balthica* and *Scrobicularia plana*, the small gastropod *Hydrobia ulvae* and the crustacean *Corophium volutator*. Salt marshes, which provide important roosts during high tide, occur in parts of the outer estuary and in the extreme inner part of the inner estuary. These are characterised by such species as Sea Purslane (*Halimione portulacoides*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea Arrowgrass (*Triglochin maritima*) and Common Saltmarsh-grass (*Puccinellia maritima*).

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Great Crested Grebe, Light-bellied Brent Goose, Shelduck, Pintail, Goldeneye, Red-breasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit and Redshank. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

This site is of high importance for wintering waterfowl and supports a particularly good diversity of species. It has internationally important populations of Light-bellied Brent Goose (1,104 individuals or 5% of the all-Ireland total) and Black-tailed Godwit (409 individuals or 2.9% of the all-Ireland total) - figures given here and below are mean peaks for the five winters 1995/96-1999/2000. Furthermore, the site supports nationally important populations of an additional 12 species: Great Crested Grebe (63), Shelduck (439), Pintail (58), Goldeneye (215), Red-breasted Merganser (99), Oystercatcher (1,360), Golden Plover (1,843), Grey Plover (201), Knot (915), Dunlin (1,594), Bar-tailed Godwit (156) and Redshank (581). The high numbers of diving ducks reflects the lagoon-type nature of the inner estuary, and this is one of the few sites in eastern Ireland where substantial numbers of Goldeneye can be found.

A range of other species occurs, including Mute Swan (37), Pochard (36), Ringed Plover (86), Lapwing (1,542), Curlew (548), Greenshank (38) and Turnstone (112).

The estuary also attracts other migrant wader species such as Ruff, Curlew Sandpiper, Spotted Redshank and Little Stint. These occur mainly in autumn, though occasionally in spring and winter.

Breeding birds of the site include Ringed Plover, Shelduck and Mallard. Up to the 1950s there was a major tern colony at the southern end of Malahide Island. Grey Herons breed nearby and feed regularly within the site.

Malahide Estuary SPA is a fine example of an estuarine system, providing both feeding and roosting areas for a range of wintering waterfowl. The lagoonal nature of the inner estuary is of particular value as it increases the diversity of birds which occur. The site is of high conservation importance, with internationally important populations of Light-bellied Brent Goose and Black-tailed Godwit, and nationally important populations of a further 12 species. Two of the species which occur regularly (Golden Plover and Bar-tailed Godwit) are listed on Annex I of the E.U. Birds Directive. Malahide Estuary (also known as Broadmeadow Estuary) is a Ramsar Convention site.

SITE NAME: BROADMEADOW / SWORDS ESTUARY SPA
SITE CODE: 004025

This site is situated in north Co. Dublin, between the towns of Malahide and Swords. It is the estuary of the River Broadmeadow, a substantial river which drains a mainly agricultural, though increasingly urbanised, catchment. A railway viaduct, built in the 1800s, crosses the site and has led to the inner estuary becoming lagoonal in character and only partly tidal. Much of the outer part of the estuary is well-sheltered from the sea by a large sand spit, known as "The Island". This spit is now mostly converted to golf-course. The outer part empties almost completely at low tide and there are extensive intertidal flats exposed. The site extends eastwards to the rocky shore at Robswalls.

Substantial stands of eelgrass (both *Zostera noltii* and *Z. angustifolia*) occur in the sheltered part of the outer estuary, along with Tasselweed (*Ruppia maritima*). Green algae, mostly *Enteromorpha* spp. and *Ulva lactuca*, are frequent on the sheltered flats. Common Cord-grass (*Spartina anglica*) is well established in the outer estuary and also in the innermost part of the site. The intertidal flats support a typical macroinvertebrate fauna, with polychaete worms (*Arenicola marina* and *Hediste diversicolor*), bivalves such as *Cerastoderma edule*, *Macoma balthica* and *Scrobicularia plana,* the small gastropod *Hydrobia ulvae* and the crustacean
Corophium volutator.

Salt marshes, which provide important roosts during high tide, occur in parts of the outer estuary and in the extreme inner part of the inner estuary. These are characterised by such species as Sea Purslane (*Halimione portulacoides*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea Arrowgrass (*Triglochin maritima*) and Common Saltmarsh-grass (*Puccinellia maritima*).

This site is of high importance for wintering waterfowl and supports a particularly good diversity of species. It has an internationally important population of Brent Goose (956) or 4.8% of the national total (figures given here and below are average maximum counts for the five winters 1995/96-1999/00) and nationally important populations of a further 12 species as follows: Shelduck (439), Pintail (58), Goldeneye (215), Red-breasted Merganser (105), Oystercatcher (1,493), Golden Plover (1,843), Grey Plover (201), Knot (915), Dunlin (1,594), Black-tailed Godwit (409), Redshank (581) and Greenshank (38). A range of other species occur in numbers of regional importance, including Great Crested Grebe, Mute Swan, Pochard, Ringed Plover, Lapwing, Bar-tailed Godwit, Curlew and Turnstone. The high numbers of diving ducks reflects the lagoon-type nature of the inner estuary, and this is one of the few sites in eastern Ireland where substantial numbers of Goldeneye can be found. The estuary also attracts on a regular basis migrant wader species such as Ruff, Curlew Sandpiper, Spotted Redshank, Green Sandpiper and Little Stint. These occur mainly in autumn, though occasionally in spring and winter.

Breeding birds of the site include Ringed Plover, Shelduck and Mallard. Up to the 1950s there was a major tern colony at the southern end of Malahide Island. Grey Herons breed nearby and feed regularly within the site.

The inner part of the estuary is heavily used for water sports, which causes disturbance to the bird populations. A section of the outer estuary has recently been in-filled for a marina and housing development.

Broadmeadow/Swords Estuary SPA is a fine example of an estuarine system, providing both feeding and roosting areas for a range of wintering waterfowl. The lagoonal nature of the inner estuary is of particular value as it increases the diversity of birds which occur. The site is of high conservation importance, with an internationally important population of Brent Goose and nationally important populations of a further 12 species. Three of the species which occur regularly (Golden Plover, Bar-tailed Godwit and Ruff) are listed on Annex I of the E.U. Birds Directive.

SITE NAME: IRELAND'S EYE SPA

SITE CODE: 004117

Ireland's Eye is an uninhabited island located about 1.5 km north of Howth in Co. Dublin. The island has an area of c.24 ha above the high tide mark. The underlying geology is Cambrian greywhackes and quartzites. These rocks form impressive near-vertical cliffs, reaching 69 m, along the northern and eastern sides of the island, with scattered exposures elsewhere on the island and especially in the high northern half. A tall stack, which is completely cut off from the main island at mid to high tide, occurs at the eastern side of the cliffs. A sandy beach, backed by low sand hills, occurs at Carrigeen Bay on the western shore, while a shingle beach extends from Carrigeen to Thulla Rocks. Elsewhere the island is covered by glacial drift. A low-lying, sparsely vegetated islet, known as Thulla, occurs a little to the south of the island, and an extensive area of bedrock shore (heavily covered by brown seaweeds) is exposed at low tide between Thulla and the main island. There are no watercourses or springs on the island, though two small rainwater ponds form during winter in the north-west and north-east sectors. A substantial area of the sea to the north and east of the island, where seabirds socialise and feed, is included in the site.

The drift soils support a plant community of Bracken (*Pteridium aquilinum*) and various grasses, especially Red Fescue (*Festuca rubra*), along with Bluebells (*Hyacinthoides non-scripta*), Common Dog-violet (*Viola riviniana*) and Pennywort (*Umbilicus rupestris*). The localised Spring Squill (*Scilla verna*) is a feature of the flora. The cliff maritime flora includes Rock Spurrey (*Spergularia rupicola*), Sea Stork's-bill (*Erodium maritimum*), Rock Samphire (*Crithmum martimum*), Golden Samphire (*Inula crithmoides*) and Sea Lavender (*Limonium binervosum).* The small area of shingle vegetation supports two Red Data Book plant species, Sea Kale (*Crambe maritima*) and Henbane (*Hyoscyamus niger*). The seabird populations exercise a strong influence on the vegetation over much of the island and in places only those plants which can survive liberal spraying with guano manage to survive. Hogweed (*Heracleum sphondylium),* Nettles (*Urtica dioica)* and Slender Thistle (*Carduus tenuiflorus)* are common in such areas.

Ireland's Eye has important populations of breeding seabirds. In 1999 the following were counted: Fulmar 70 pairs; Gannet 142 pairs, Cormorant 306 pairs; Shag 32 pairs, Lesser Black-backed Gull 1 pair; Herring Gull c.250 pairs; Great Black-backed Gull c.100 pairs; Kittiwake 941 pairs; Guillemot 2,191 individuals; Razorbill 522 individuals. In 2001 the following were counted: Gannet 202 pairs; Cormorant 438 pairs; Shag 39 pairs; Great Black-backed Gull 110 pairs; Kittiwake 1024 pairs; Guillemot 2948 individuals; Razorbill 686+ individuals. Puffin was formerly common, but nowadays not more than 20 individuals occur. Black Guillemot also breeds, with 15 individuals recorded in 1998. Manx Shearwater has bred in the past. The Gannet, Cormorant, Herring Gull, Great Black-backed Gull, Kittiwake, Guillemot and Razorbill populations are of national importance. When the Cormorant population is considered as part of a larger grouping with the colonies on nearby Lambay and St. Patrick's Island, this population is of international importance. The Gannet colony is of particular note as it is one of five in the country and the only one on the east coast. It is also notable that it has only been established as recently as the late 1980s.

Several pairs each of Shelduck, Oystercatcher and Ringed Plover breed, while the island is a traditional site for Peregrine Falcon, a species listed on Annex I of the EU Birds Directive. In winter small numbers of Greylag and Pale-bellied Brent Geese graze on the island and it is used as a roost site by gulls and some waders.

Ireland's Eye is now one of the best monitored sites in the country, with the breeding seabirds having been systematically censused using standard methods almost annually since 1990 (and also in 1986). Prior to that, census data are available for 1969/70 from the Operation Seafarer project. The present status of most of the breeding seabirds on Ireland's Eye appears favourable. The principal direct threat to the nesting birds is potential disturbance from visitors to the island. While the present level of disturbance does not appear to be having adverse impacts on the majority of the breeding birds (most of which are on relatively inaccessible cliffs), regulation and management of visitors to the island may be necessary in the future. Brown rats are long established on the island but their recent status is not well known. It is likely, however, that the presence of rats may be a factor in keeping the Puffin population at a low level.

This relatively small island is of high ornithological importance, with seven seabird species having populations of national importance. The regular presence of a breeding pair of Peregrine Falcon is also of note.

SITE NAME: DODDER VALLEY

SITE CODE: 000991

This stretch of the River Dodder extends for about 2 kilometres between Firhouse bridge and Oldbawn bridge in the south-west of Dublin city. The vegetation consists of woodland scrub mainly of Willow (*Salix* spp.), but up to 13 species of tree have been recorded. Understorey vegetation contains Early Purple Orchid (*Orchis mascula*) and Bugle (*Ajuga reptans*). Along the banks there are wild flower meadows with a good diversity of plant species. There is also a pond in the river bed at Firville which has flourished greatly since the floods of 1986. Forty-eight species of bird have been recorded recently in the area including Little Grebe, Kingfisher, Dipper and Grey Wagtail. Part of the river bank supports a Sand Martin colony of up to 100 pairs. This site represents the last remaining stretch of natural river bank vegetation of the Dodder in the built up Greater Dublin Area.

SITE NAME: PORTRAINE SHORE

SITE CODE: 001215

This site is located about 3 km east of Donabate. The site is mostly a stretch of rocky shore, with some intertidal sands at the south end. A narrow strip of coastal vegetation above the rocky shore is included. Geologically the rocky shore is an inlier, i.e. a structure in which older rock is surrounded by rock of younger age. The northern end is an area of volcanic rocks with limestones, shales and grits to the south. The grit series apparently forms the younger part of the exposure and the volcanics the older. The flora and fauna of the rocky shore is typical of such a habitat, with brown, green and red algae, and marine invertebrates. Turnstones, Oystercatchers and Curlew feed along the shore. Above the rocky shore the following plant species were recorded: Sea Pink (*Armeria maritima*), Sea Campion (*Silene maritima*), Sea Beet (*Beta vulgaris*), Kidney Vetch (*Anthyllis vulneraria*), Sea Mayweed (*Matricaria maritima*), Spurge (*Euphorbia* spp.), Scurvy Grass (*Cochlearia* spp.), Hoary Cress (*Cardaria draba*) and Tree-mallow (*Lavatera arborea*). Spring Squill (*Scilla verna*) was recorded along the cliff path. The narrow cliffpath is used regularly by walkers. This site is a good example of a rocky bedrock shore with a typical flora and fauna. The grassy vegetation above the shore adds habitat diversity. The site is also an important geological site.

SITE NAME: HOWTH HEAD SPA
SITE CODE: 004113

Howth Head is a rocky headland situated on the northern side of Dublin Bay. The peninsula is composed of Cambrian rock of the Bray Group, the most conspicuous component being quartzite. The site comprises the sea cliffs extending from just east of the Nose of Howth to the tip of the Bailey Lighthouse peninsula. The marine area to a distance of 500 m from the cliff base, where seabirds socialise and feed, is included within the site.

The cliffs vary from between about 60 m and 90 m in height, and in places comprise fairly sheer, exposed rock face. Here plants such as Rock Sea-spurrey (*Spergularia rupicola*), Navelwort (*Umbilicus rupestris*), Rock Samphire (*Crithmum maritimum*), English Stonecrop (*Sedum anglicum*) and Biting Stonecrop (*Sedum acre*) are found, along with a good diversity of lichen species. Where the gradient allows, shallow glacial drift supports a typical maritime flora, with such conspicuous species as Thrift (*Armeria maritima*), Sea Campion (*Silene vulgaris* subsp. *maritima*), Common Scurvygrass (*Cochlearia officinalis*), Sea Plantain (*Plantago maritima*), Sea Mayweed (*Matricaria maritima*) and Sea Beet (*Beta vulgaris*). Spring Squill (*Scilla verna*), Bloody Crane's-bill (*Geranium sanguineum*), Sea Stork's-bill (*Erodium maritimum*) and Golden-samphire (*Inula crithmoides*) are notable species of the cliff flora.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for Kittiwake.

Howth Head has important colonies of breeding seabirds. A census in 1999 recorded the following species: Fulmar (33 pairs), Shag (12 pairs), Herring Gull (17 pairs), Great Black-backed Gull (5 pairs), Kittiwake (2,269 pairs), Guillemot (990 individuals) and Razorbill (416 individuals). In addition, 39 individual Black Guillemot were counted within the site in May 1998. The populations of Kittiwake and Black Guillemot are of national importance, while the Razorbill, Guillemot and Fulmar populations are of regional importance. The cliffs also support a breeding pair of Peregrine Falcon, a species listed on Annex I of the E.U. Birds Directive. The seabird colony at Howth Head has been monitored at intervals since the Operation Seafarer project in 1969/70. The Kittiwake, Guillemot and Razorbill populations have increased in recent years. The seabirds within the site are not under significant threat at present.

This site is of high ornithological importance, with four seabird species having populations of national importance. It is also a traditional nesting site for Peregrine Falcon. The site is easily accessible and has important amenity and educational value due to its proximity to Dublin City.

SITE NAME: ROGERSTOWN ESTUARY SPA
SITE CODE: 004015

Rogerstown estuary is situated about 2 km north of Donabate in north County Dublin. It is a relatively small, funnel shaped estuary separated from the sea by a sand and shingle peninsula and extending eastwards beyond the low water mark to include an area of shallow marine water. The estuary receives the waters of the Ballyboghil and Ballough rivers, both of which flow through intensive agricultural catchments. The estuary has a wide salinity range, from near full sea water to near full fresh water. The estuary is divided by a causeway and narrow bridge, built in the 1840s to carry the Dublin-Belfast railway line. The site contains good examples of a number of estuarine and coastal habitats listed on Annex I of the E.U. Habitats Directive.

At low tide extensive intertidal sand and mud flats are exposed and these provide the main food resource for the wintering waterfowl. The intertidal flats of the estuary are mainly of sands, with soft muds in the north-west sector and along the southern shore. Associated with these muds are stands of Common Cord-grass (*Spartina anglica*). Green algae (mainly *Enteromorpha* spp. and *Ulva lactuca*) are widespread and form dense mats in the more sheltered areas. The intertidal vascular plant Beaked Tasselweed *(Ruppia maritima*) grows profusely in places beneath the algal mats and is grazed by herbivorous waterfowl (notably Brent Geese and Wigeon). The Lugworm (*Arenicola marina*) is common in the outer estuary and large Mussel beds (*Mytilus edulis*) occur at the outlet to the sea.

Salt marsh fringes parts of the estuary, especially its southern shores. Common plant species of the saltmarsh include Sea Rush (*Juncus maritimus*), Sea Purslane (*Halimione portulacoides*) and Common Saltmarsh-grass (*Puccinellia maritima*).

Rogerstown Estuary is an important winter waterfowl site and supports a population of Pale-bellied Brent Goose of international importance (1194 - all counts given are average peaks over the five winters 1996/97 – 2000/01). A further 14 species have populations of national importance as follows: Greylag Goose 87, Shelduck 78, Shoveler 72, Oystercatcher 1794, Ringed Plover 188, Grey Plover 343, Knot 2159, Sanderling 89, Dunlin 3128, Redshank 674, Lapwing 2166, Black-tailed Godwit 212, Greenshank 26 and Turnstone 188. The Greylag Geese are part of a larger population which spends most of the winter on Lambay Island. Other species which occur regularly in significant numbers include Wigeon 411, Teal 379, Mallard 267, Red-breasted Merganser 22, Golden Plover 159 and Curlew 245. The numbers of Golden Plover and Lapwing can at times be considerably higher than the averages given above. The presence of Golden Plover is of note as this species is listed on Annex I of the E.U. Birds Directive. Large numbers of gulls, mostly Herring, Great Black-backed and Black-headed, are attracted to the area, partly due to the presence of an adjacent local authority landfill site.

Some of the wader species also occur on passage, notably Black-tailed Godwit with numbers often exceeding 300 in April. The estuary is a regular staging post for scarce migrants, especially in autumn when Green Sandpiper, Ruff, Little Stint, Curlew Sandpiper and Spotted Redshank may be seen. Shelduck breed within the site.

Rogerstown Estuary is an important link in the chain of estuaries on the east coast. It supports an internationally important population of Brent Goose and a further 14 species in numbers of national importance. Bird populations have been well-monitored since the 1980s and the site is counted at monthly intervals each winter (September to March) as part of the Irish Wetland Bird Survey (I-WeBS). The site is a statutory Nature Reserve and a candidate Special Area of Conservation under the E.U. Habitats Directive.

SITE NAME: SOUTH DUBLIN BAY SAC

SITE CODE: 000210

This site lies south of the River Liffey and extends from the South Wall to the west pier at Dun Laoghaire. It is an intertidal site with extensive areas of sand and mudflats, a habitat listed on Annex I of the E.U. Habitats Directive. The sediments are predominantly sands but grade to sandy muds near the shore at Merrion gates. The main channel which drains the area is Cockle Lake.

There is a bed of Eelgrass (*Zostera noltii*) below Merrion Gates which is the largest stand on the east coast. Green algae (*Enteromorpha* spp. and *Ulva lactuca*) are distributed throughout the area at a low density. Fucoid algae occur on the rocky shore in the Maretimo to Dún Laoghaire area. Species include *Fucus spiralis, F. vesiculosus, F. serratus, Ascophyllum nodosum* and *Pelvetia canaliculata.*

Several small, sandy beaches with incipient dune formation occur in the northern and western sectors of the site, notably at Poolbeg, Irishtown and Merrion/Booterstown. The formation at Booterstown is very recent. Driftline vegetation occurs in association with the embryonic and incipient fore dunes. Typically drift lines occur in a band approximately 5 m wide, though at Booterstown this zone is wider in places. The habitat occurs just above the High Water Mark and below the area of embryonic dune. Species pesent are Sea Rocket (*Cakile maritima*), Frosted *Orache (Atriplex laciniata*), Spear-leaved Orache (*A. prostrata*), Prickly Saltwort (*Salsola kali*) and Fat Hen (*Chenopodium album*). Also occurring is Sea Sandwort (*Honkenya peploides*), Sea Beet (*Beta vulgaris*) and Annual Sea-blithe (*Suaeda maritima*). A small area of pioneer salt marsh now occurs in the lee of an embryonic sand dune just north of Booterstown Station. This early stage of salt marsh development is here characterised by the presence of pioneer stands of Glasswort (*Salicornia* spp.) occurring below an area of drift line vegetation. As this is of very recent origin, it covers a small area but ample areas of substrate and shelter are available for the further development of this habitat.

Lugworm (*Arenicola marina*) and Cockles (*Cerastoderma edule*) and other annelids and bivalves are frequent throughout the site. The small gastropod *Hydrobia ulvae* occurs on the muddy sands off Merrion Gates.

South Dublin Bay is an important site for waterfowl. Although birds regularly commute between the south bay and the north bay, recent studies have shown that certain populations which occur in the south bay spend most of their time there. The principal species are Oystercatcher (1215), Ringed Plover (120), Sanderling (344) and Dunlin (2628), Redshank (356) (average winter peaks 1996/97 and 1997/98). Up to 100 Turnstones are usual in the south bay during winter. Brent Geese regularly occur in numbers of international importance (average peak 299). Bar-tailed Godwit (565), a species listed on Annex I of the EU Birds Directive, also occur.

Large numbers of gulls roost in South Dublin Bay, e.g. 4,500 Black-headed Gulls in February 1990; 500 Common Gulls in February 1991. It is also an important tern roost in the autumn, regularly holding 2000-3000 terns including Roseate Terns, a species listed on Annex I of the E.U. Birds Directive. South Dublin Bay is largely protected as a Special Protection Area.

At low tide the inner parts of the south bay are used for amenity purposes. Bait-digging is a regular activity on the sandy flats. At high tide some areas have wind-surfing and jet-skiing.
This site is a fine example of a coastal system with extensive sand and mudflats, a habitat listed on Annex I of the E.U. Habitats Directive. South Dublin Bay is also an internationally important bird site.

SITE NAME : NORTH DUBLIN BAY SAC

SITE CODE : 000206

This site covers the inner part of north Dublin Bay, the seaward boundary extending from the Bull Wall lighthouse across to the Martello Tower at Howth Head.

The North Bull Island is the focal point of this site. The island is a sandy spit which formed after the building of the South Wall and Bull Wall in the 18th and 19th centuries. It now extends for about 5 km in length and is up to 1 km wide in places. A well-developed and dynamic dune system stretches along the seaward side of the island. Various types of dunes occur, from fixed dune grassland to pioneer communities on foredunes. Marram Grass (*Ammophila arenaria*) is dominant on the outer dune ridges, with Lyme Grass (*Leymus arenarius*) and Sea Couchgrass (*Elymus farctus*) on the foredunes. Behind the first dune ridge, plant diversity increases with the appearance of such species as Wild Pansy (*Viola tricolor)*, Kidney Vetch (*Anthyllis vulneraria*), Bird's-foot Trefoil (*Lotus corniculatus*), Rest Harrow (*Ononis repens*), Yellow Rattle (*Rhinanthus minor*) and Pyramidal Orchid (*Anacamptis pyramidalis*). In these grassy areas and slacks, the scarce Bee Orchid (*Ophrys apifera*) occurs.

About 1 km from the tip of the island, a large dune slack with a rich flora occurs, usually referred to as the 'Alder Marsh' because of the presence of Alder trees (*Alnus* spp). The water table is very near the surface and is only slightly brackish. Saltmarsh Rush (*Juncus maritimus*) is the dominant species, with Meadow Sweet (*Filipendula ulmaria*) and Devil's-bit (*Succisa pratensis*) being frequent. The orchid flora is notable and includes Marsh Helleborine (*Epipactis palustris*), Common Twayblade (*Listera ovata*), Autumn Lady's-tresses (*Spiranthes spiralis*) and Marsh orchids (*Dactylorhiza* spp.)

Saltmarsh extends along the length of the landward side of the island. The edge of the marsh is marked by an eroding edge which varies from 20 cm to 60 cm high. The marsh can be zoned into different levels according to the vegetation types present. On the lower marsh, Glasswort (*Salicornia europaea*), Saltmarsh Grass (*Puccinellia maritima*), Annual Sea-blite (*Suaeda maritima*) and Greater Sea-spurrey (*Spergularia media*) are the main species. Higher up in the middle marsh Sea Plantain (*Plantago maritima*), Sea Aster (*Aster tripolium*), Sea Arrowgrass (*Triglochin maritima*) and Sea Pink (*Armeria maritima*) appear. Above the mark of the normal high tide, species such as Scurvy Grass (*Cochlearia officinalis*) and Sea Milkwort (*Glaux maritima*) are found, while on the extreme upper marsh, Sea Rushes (*Juncus maritimus* and *J. gerardii*) are dominant. Towards the tip of the island, the saltmarsh grades naturally into fixed dune vegetation.

The island shelters two intertidal lagoons which are divided by a solid causeway. The sediments of the lagoons are mainly sands with a small and varying mixture of silt and clay. The north lagoon has an area known as the "*Salicornia* flat", which is dominated by *Salicornia dolichostachya*, a pioneer Glasswort species, and covers about 25 ha. Tassel Weed (*Ruppia maritima)* occurs in this area, along with some Eelgrass (*Zostera angustifolia*). Eelgrass (*Z. noltii*) also occurs in Sutton Creek. Cordgrass (*Spartina anglica*) occurs in places but its growth is controlled by management. Green algal mats (*Enteromorpha* spp., *Ulva lactuca*) cover large areas of the flats during summer. These sediments have a rich macrofauna, with high densities of Lugworms (*Arenicola marina*) in parts of the north lagoon. Mussels (*Mytilus edulis*) occur in places, along with bivalves such as *Cerastoderma edule*, *Macoma balthica* and *Scrobicularia plana*. The small gastropod *Hydrobia ulvae* occurs in high densities in places, while the crustaceans *Corophium volutator* and *Carcinus maenas* are common. The sediments on the seaward side of North Bull Island are mostly sands. The site extends below the low spring tide mark to include an area of the sublittoral zone.

Three Rare plant species legally protected under the Flora Protection Order 1987 have been recorded on the North Bull Island. These are Lesser Centaury (*Centaurium pulchellum*), Hemp Nettle (*Galeopsis angustifolia*) and Meadow Saxifrage (*Saxifraga granulata*). Two further species listed as threatened in the Red Data Book, Wild Sage (*Salvia verbenaca*) and Spring Vetch (*Vicia lathyroides*), have also been recorded. A rare liverwort, *Petalophyllum ralfsii,* was first recorded from the North Bull Island in 1874 and has recently been confirmed as being still present there. This species is of high conservation value as it is listed on Annex II of the E.U. Habitats Directive. The North Bull is the only known extant site for the species in Ireland away from the western seaboard.

North Dublin Bay is of international importance for waterfowl. During the 1994/95 to 1996/97 period the following species occurred in internationally important numbers (figures are average maxima): Brent Geese 2,333; Knot 4,423; Bar-tailed Godwit 1,586. A further 14 species occurred in nationally important concentrations - Shelduck 1505; Wigeon 1,166; Teal 1,512; Pintail 334; Shoveler 239; Oystercatcher 2,190; Ringed Plover 346; Grey Plover 816; Sanderling 357; Dunlin 6,238; Black-tailed Godwit 156; Curlew 1,193; Turnstone 197 and Redshank 1,175. Some of these species frequent South Dublin Bay and the River Tolka Estuary for feeding and/or roosting purposes (mostly Brent Goose, Oystercatcher, Ringed Plover, Sanderling, Dunlin).

The tip of the North Bull Island is a traditional nesting site for Little Tern. A high total of 88 pairs nested in 1987. However, nesting attempts have not been successful since the early 1990s. Ringed Plover, Shelduck, Mallard, Skylark, Meadow Pipit and Stonechat also nest. A well-known population of Irish Hare is resident on the island

The invertebrates of the North Bull Island have been studied and the island has been shown to contain at least seven species of regional or national importance in Ireland (Orders Diptera, Hymenoptera, Hemiptera).

The main landuses of this site are amenity activities and nature conservation. The North Bull Island is the main recreational beach in Co Dublin and is used throughout the year. Much of the land surface of the island is taken up by two golf courses. Two separate Statutory Nature Reserves cover much of the island east of the Bull Wall and the surrrounding intertidal flats. The site is used regularly for educational purposes. North Bull Island has been designated a Special Protection Area under the E.U. Birds Directive and it is also a statutory Wildfowl Sanctuary, a Ramsar Convention site, a Biogenetic Reserve, a Biosphere Reserve and a Special Area Amenity Order site.

This site is an excellent example of a coastal site with all the main habitats represented. The holds good examples of ten habitats that are listed on Annex I of the E.U. Habitats Directive; one of these is listed with priority status.

Several of the wintering bird species have populations of international importance, while some of the invertebrates are of national importance. The site contains a numbers of rare and scarce plants including some which are legally protected. Its proximity to the capital city makes North Dublin Bay an excellent site for educational studies and research.

SITE NAME: BALDOYLE BAY SAC
SITE CODE: 000199

Baldoyle Bay extends from just below Portmarnock village to the west pier at Howth, Co. Dublin. It is a tidal estuarine bay protected from the open sea by a large sand-dune system. Two small rivers, the Mayne and the Sluice, flow into the bay. The site contains four habitats listed on Annex I of the EU Habitats directive: *Salicornia* mud, Mediterranean salt meadows, Atlantic salt meadows and Tidal mudflats.

Large areas of intertidal flats are exposed at low tide. These are mostly sands but grade to muds in the inner sheltered parts of the estuary. Extensive areas of Common Cord-grass (*Spartina anglica*) occur in the inner estuary. Both the Narrow-leaved Eelgrass (*Zostera angustifolia*) and the Dwarf Eelgrass (*Z. noltii*) are also found here. During summer, the sandflats of the sheltered areas are covered by mats of green algae (*Enteromorpha* spp. and *Ulva lactuca*).

The sediments have a typical macrofauna, with Lugworm (*Arenicola marina*) dominating the sandy flats. The tubeworm *Lanice conchilega* is present in high densities at the low tide mark and the small gastropod *Hydrobia ulvae* occurs in the muddy areas, along with the crustacean *Corophium volutator*.

Areas of saltmarsh occur near Portmarnock Bridge and at Portmarnock Point, with narrow strips along other parts of the estuary. Species such as Glasswort (*Salicornia* spp.), Sea-purslane (*Halimione portulacoides*), Sea Plantain (*Plantago maritima*) and Sea Rush (*Juncus maritimus*) are found here. Portmarnock Spit formerly had a well-developed sand dune system but this has been largely replaced by golf courses and is mostly excluded from the site. A few dune hills are still intact at Portmarnock Point, and there are small dune hills east of Cush Point and below the Claremont Hotel. These are mostly dominated by Marram (*Ammophila arenaria*), though Lyme-grass (*Leymus arenarius*) is also found.

The site includes a brackish marsh along the Mayne River. Soils here have a high organic content and are poorly drained, and some pools occur. Rushes (*Juncus* spp.) and salt tolerant species such as Common Scurvygrass (*Cochleria officinalis*) and Greater Sea-spurrey (*Spergularia media*) are typical of this area. Knotted Hedge-parsley (*Torilis nodosa*), a scarce plant in eastern Ireland, has been recorded here, along with Brackish Water-crowfoot (*Ranunculus baudotti*), a species of brackish pools and ditches which has declined in most places due to habitat loss.

Two plant species, legally protected under the Flora (Protection) Order, 1999, occur in the Mayne marsh: Borrer's Saltmarsh-grass (*Puccinellia fasciculata*) and Meadow Barley (*Hordeum secalinum*).

Baldoyle Bay is an important bird site for wintering waterfowl and the inner part of the estuary is a Special Protection Area under the EU Birds Directive as well as being a Statutory Nature Reserve. Internationally important numbers of Pale-bellied Brent Geese (418) and nationally important numbers of two Annex I Birds Directive species - Golden Pover (1,900) and Bar-tailed Godwit (283) - have been recorded. Four other species also reached nationally important numbers: Shelduck (147), Pintail (26), Grey Plover (148) and Ringed Plover (218) - all figures are average peaks for four winters 1994/95 to 1997/1998. Breeding wetland birds at the site include Shelduck, Mallard and Ringed Plover. Small numbers of Little Tern, a species listed on Annex I of the EU Birds Directive, have bred on a few occasions at Portmarnock Point but not since 1991.

Because the area surrounding Baldoyle Bay is densely populated, the main threats to the site include visitor pressure, disturbance to wildfowl and dumping. In particular, the dumping of spoil onto the foreshore presents a threat to the value of the site.

Baldoyle Bay is a fine example of an estuarine system. It contains four habitats listed on Annex I of the EU Habitats Directive and has two legally protected plant species. The site is also an important bird area and part of it is a Special Protection Area under the EU Birds Directive, as well as being a Statutory Nature Reserve. It supports internationally important numbers of Brent Geese and nationally important numbers of six other species including two Annex I Birds Directive species.

SITE NAME: MALAHIDE ESTUARY SAC

SITE CODE: 000205

Malahide Estuary is situated immediately north of Malahide and east of Swords. It is the estuary of the River Broadmeadow. The site is divided by a railway viaduct built in the 1800s.

The outer part of the estuary is mostly cut off from the sea by a large sand spit, known as "the island". The outer estuary drains almost completely at low tide, exposing sand and mud flats. There is a large bed of Eelgrass (*Zostera noltii* and *Z. angustifolium*) in the north section of the outer estuary, along with Tassel Weed (*Ruppia maritima*) and extensive mats of green algae (*Enteromorpha* spp., *Ulva lactuca*). Cordgrass (*Spartina anglica*) is also widespread in this sheltered part of the estuary.

The dune spit has a well developed outer dune ridge dominated by Marram Grass (*Ammophila arenaria*). The dry areas of the stabilised dunes have a dense covering of Burnet Rose (*Rosa pimpinellifolia*), Red Fescue (*Festuca rubra*) and species such as Yellow Wort (*Blackstonia perfoliata*), Field Gentian (*Gentianella amarella*), Hound's Tongue (*Cynoglossum officinale*), Carline Thistle (*Carlina vulgaris*) and Pyramidal Orchid (*Anacamptis pyramidalis*). Much of the interior of the spit is taken up by a golf course. The inner stony shore has frequent Sea-holly (*Eryngium maritimum*). Well-developed saltmarshes occur at the tip of the spit. Atlantic salt meadow is the principle type and is characterised by species such as Sea Purslane (*Halimoine portulacoides*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea Arrowgrass (*Triglochin maritima*) and Common Saltmarsh-grass (*Puccinellia maritima*). Elsewhere in the outer estuary, a small area of Mediterranean salt meadow occurs which is characterised by the presence of Sea Rush (*Juncus maritimus*). Below the salt marshes there are good examples of pioneering Glasswort swards and other annual species, typified by *Salicornia dolichostachya* and Annual Sea-blite *(Suaeda maritima*).

The inner estuary does not drain at low tide apart from the extreme inner part. Here, patches of saltmarsh and salt meadows occur, with Sea Aster, Sea Plantain (*Plantago maritima*) and Sea Clubrush (*Scirpus maritimus*). Tassel Weed (*Ruppia maritima*) occurs in one of the channels.

The site includes a fine area of rocky shore south-east of Malahide and extending towards Portmarnock. This represents the only continuous section through the fossiliferous Lower Carboniferous rocks in the Dublin Basin, and is the type locality for several species of fossil coral.

The estuary is an important wintering bird site and holds an internationally important population of Brent Geese and nationally important populations of a further 15 species. Average maximum counts during the 1995/96-1997/98 period were Brent Geese 1217; Great Crested Grebe 52; Mute Swan 106; Shelduck 471; Pochard 200; Goldeneye 333; Red-breasted Merganser 116; Oystercatcher 1228; Golden Plover 2123; Grey Plover 190; Redshank 454; Wigeon 50; Teal 78; Ringed Plover 106; Knot 858; Dunlin 1474; Greenshank 38; Pintail 53; Black-tailed Godwit 345; Bar-tailed Godwit 99. The high numbers of diving birds reflects the lagoon-type nature of the inner estuary.

The estuary also attracts migrant species such as Ruff, Curlew Sandpiper, Spotted Redshank and Little Stint. Breeding birds of the site include Ringed Plover, Shelduck and Mallard. Up to the 1950s there was a major tern colony at the southern end of the island and the habitat remains suitable for these birds.

The inner part of the estuary is heavily used for water sports. A section of the outer estuary has recently been infilled for a marina and housing development.

This site is a fine example of an estuarine system with all the main habitats represented. The site is important ornithologically, with a population of Brent Geese of international significance.

SITE NAME: IRELAND'S EYE SAC

SITE CODE: 002195

Ireland's Eye is located about 1.5 km north of Howth in Co. Dublin. It is a Cambrian island with quartzite which forms spectacular cliffs on the north-east side. Elsewhere much of the area is covered by drift. There is a Martello tower at the west end of the island and an ancient ruined church in the middle.

The drift soils support a plant community of Bracken (*Pteridium aquilinum*) and various grasses, especially Red Fescue (*Festuca rubra*), along with Bluebells (*Hyacinthoides non-scripta*), Common Dog-violet (*Viola riviniana*) and Pennywort (*Umbilicus rupestris*). The thinner soils have some interesting species, including Spring Squill (*Scilla verna*), Knotted

Clover (*Trifolium striatum*) and Field Mouse-ear (*Cerastium arvense*). Bloody Cranesbill (*Geranium sanguineum*) has also been recorded from here.

The cliff maritime flora includes Rock Spurrey (*Spergularia rupicola*), Sea Stork'sbill (*Erodium maritimum*), Rock Samphire (*Crithmum martimum*), Golden Samphire (*Inula crithmoides*), Sea Lavender (*Limonium binervosum*), Meadow Rue (*Thalictrum minor*), Portland Spurge (*Euphorbia portlandica*) and Tree Mallow (*Lavatera arborea*). A small area of shingle vegetation occurs above the sandy beach at Carrigeen Bay on the western side of the island. This habitat is listed on Annex I of the EU Habitats Directive. Species such as Curled Dock (*Rumex crispus*), Silverweed (*Potentilla anserina*) and Spear-leaved Orache (*Atriplex prostrata*) occur, while the rare Sea Kale (*Crambe maritima*), a very characteristic species of this habitat, has been known from this site since 1894 and was recorded as recently as 1981. Sea Kale is listed as threatened in the Irish Red Data Book. Also occurring on the sandy/shingle beach is the Red Data Book species Henbane (*Hyoscyamus niger*).

Irelands's Eye is of national importance for breeding seabirds. In 1999 the following were counted: Fulmar 70 pairs; Cormorant 306 pairs; Shag 32 pairs; Lesser Black-backed Gull 1 pair; Herring Gull c.250 pairs; Great Black-backed Gull c.100 pairs; Kittiwake 941 pairs; Guillemot 2191 individuals; Razorbill 522 individuals. A Gannet colony was established on the stack at the east end of the island in the late 1980s, and in 1999 142 pairs bred. Puffin was formerly common, but nowadays not more than 20 individuals occur. Black Guillemot also breeds, with 15 individuals recorded in 1998. Several pairs each of Oystercatcher and Ringed Plover breed, while the island is a traditional site for Peregrine Falcon.

In winter small numbers of Greylag and Pale bellied Brent Geese graze on the island.

This uninhabited marine island has a well developed maritime flora, with two habitats (sea cliffs and shingle) listed on Annex II of the EU Habitats Directive, and nationally important seabird colonies. Owing to its easy access and proximity to Dublin it has great educational and amenity value.

SITE NAME: ROCKABILL TO DALKEY ISLAND SAC

SITE CODE: 003000

This site includes a range of dynamic inshore and coastal waters in the western Irish Sea. These include sandy and muddy seabed, reefs, sandbanks and islands. This site extends southwards, in a strip approximately 7 km wide and 40 km in length, from Rockabill, running adjacent to Howth Head, and crosses Dublin Bay to Frazer Bank in south county Dublin. The site encompasses Dalkey, Muglins and Rockabill islands.

The area selected for designation represents a key habitat for the Annex II species harbour porpoise, within the Irish Sea. Population survey data show that porpoise occurrence within the site boundary meets suitable reference values for other designated sites in Ireland. The species occurs year-round within the site and comparatively high group sizes have been recorded. Porpoises with young (i.e. calves) are observed at favourable, typical reference values for the species. Casual and effort-related sighting rates from coastal observation stations are significant for the east coast of Ireland and the latter appear to be relatively stable across all seasons. The selected site contains a wide array of habitats believed to be important for harbour porpoise including inshore shallow sand and mud-banks and rocky reefs scoured by strong current flow. The site also supports Harbour seal (*Phoca vitulina*) and Grey seal (*Halichoerus grypus*), for which terrestrial haul-out sites occur in immediate proximity to the site. Bottlenose dolphin (*Tursiops truncatus*) has also occasionally been recorded in the area. A number of other marine mammals have been recorded in this area including minke, fin and killer whales and Risso's and common dolphins.

Reef habitat is uncommon along the eastern seaboard of Ireland due to prevailing geology and hydrographical conditions. Expansive surveys of the Irish coast have indicated that the greatest resource of this habitat within the Irish Sea is found fringing offshore islands which are concentrated along the Dublin coast. A detailed survey of selected suitable islands has shown areas with typical biodiversity for this habitat both intertidally and subtidally. Species recorded in the intertidal included *Fucus spiralis*, *Fucus serratus*, *Pelvetia canaliculata*,

Ascophyllum nodosum, *Semibalanus balanoides* and *Necora puber*. Subtidally, a wide range of species include *Laminaria hyperborea*, *Flustra folicacea*, *Alaria esculenta*, *Halidrys siliquosa*, *Pomatocereos triqueter*, *Alcyonium digitatum*, *Metridium senile*, *Caryophyllia smithii*, *Tubularia indivisa*, *Mytilus edulis*, *Gibbula umbilcalis*, *Asterias rubens*, and *Echinus esculentus*. These Reefs are subject to strong tidal currents with an abundant supply of suspended matter resulting in good representation of filter feeding fauna such as sponges, anemones and echinoderms.

This site is of conservation importance for reefs, listed on Annex I, and Harbour Porpoise, listed on Annex II, of the E.U. Habitats Directive.

SITE NAME: HOWTH HEAD SAC

SITE CODE: 000202

Howth Head is a rocky headland situated on the northern side of Dublin Bay. The peninsula is composed of Cambrian slates and quartzites, joined to the mainland by a post-glacial raised beach. Limestone occurs on the north-west side while glacial drift is deposited against the cliffs in places.

A mosaic of heathland vegetation occurs on the slopes above the sea cliffs and in the area of the summit. This is dominated by Western Gorse (*Ulex gallii*), Heather (*Calluna vulgaris*), Bell Heather (*Erica cinerea*) and localised patches of Bracken (*Pteridium aquilinum*). In more open areas species such as English Stonecrop (*Sedum anglicum*), Wood Sage (*Teucrium scorodonia*) and Navelwort (*Umbilicus rupestris*) occur, along with some areas of bare rock.

The heath merges into dry grassland in places, with bent grasses (*Agrostis* spp.), Red Fescue (*Festuca rubra*), Cock's-foot (*Dactylis glomerata*), Yorkshire-fog (*Holcus lanatus*), Sweet Vernal-grass (*Anthoxanthum odoratum*), Lady's Bedstraw (*Galium verum*), Ribwort Plantain (*Plantago lanceolata*) and Yellow-wort (*Blackstonia perfoliata*). In the summit area there are a few wet flushes and small bogs, with typical bog species such as Bog Asphodel (*Narthecium ossifragum*) and sundews (*Drosera* spp.). Patches of scrub, mostly Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Willow (*Salix* spp.) and Downy Birch (*Betula pubescens*), occur in places.

The maritime flora is of particular interest as a number of scarce and local plants have been recorded, including Golden-samphire (*Inula crithmoides*), Sea Wormwood (*Artemisia maritima*), Grass-leaved Orache (*Atriplex littoralis*), Frosted Orache (*Atriplex laciniata*), Sea Spleenwort (*Asplenium marinum*), Bloody Crane's-bill (*Geranium sanguineum*), Spring Squill (*Scilla verna*), Sea Stork's-bill (*Erodium maritimum*) and three uncommon clover species: Knotted Clover (*Trifolium striatum*), Bird's-foot Clover (*T. ornithopodioides*) and Western Clover (*T. occidentalis*).

Rock outcrops which are important for lichens are distributed widely around Howth Head. The richest area for lichens appears to be around Balscadden quarries. In addition, the Earlscliffe area is of national importance for lichens and is the type locality for the black, yellow and grey lichen zonation.

A number of Red Data Book plant species, the latter five of which are legally protected under the Flora (Protection) Order, 1999, have been recorded at this site - Green-winged Orchid (*Orchis morio*), Bird's-foot (*Ornithopus perpusillus*), Hairy Violet (*Viola hirta*), Rough Poppy (*Papaver hybridum*), Pennyroyal (*Mentha pulegium*), Heath Cudweed (*Omalotheca sylvatica*) and Betony (*Stachys officinalis*).

Curved Hard-grass (*Parapholis incurva*), a species which had not previously been recognized as occurring in Ireland, was found at Red Rock in 1979.

The site is of national importance for breeding seabirds. A census in 1985-87 recorded the following numbers: Fulmar (105 pairs), Shags (25 pairs), Herring Gulls (70 pairs), Kittiwake (*c.* 1,700 pairs), Guillemot (585 birds), Razorbill (280 birds). In 1990, 21 pairs of Black Guillemot were counted.

A number of rare invertebrates have been recorded from the site: the fly *Phaonia exoleta* (Order Diptera) occurs in the woods at the back of Deerpark and has not been seen anywhere else in Ireland, while the ground beetle *Trechus rubens* (Order Coleoptera) is found on storm beaches on the eastern cliffs. A hoverfly, known from only a few Irish locations, *Sphaerophoria batava* (Order Diptera), is present in the heathland habitat within the site.

The main land use within the area is recreation, mostly walking and horse-riding, and this has led to some erosion within the site. Fires also pose a danger to the site. There may also be a threat in some areas from further housing development.

Howth Head displays a fine range of natural habitats, including two Annex I habitats, within surprisingly close proximity to Dublin city. The site is also of scientific importance for its seabird colonies, invertebrates and lichens. It also supports populations of at least two legally protected plant species and several other scarce plants.

SITE NAME: ROGERSTOWN ESTUARY SAC

SITE CODE: 000208

Rogerstown estuary is situated about 2 km north of Donabate. It is a relatively small, narrow estuary separated from the sea by a sand and shingle bar. The estuary is divided by a causeway and narrow bridge, built in the 1840s to carry the Dublin-Belfast railway line. The site contains good examples of a number of habitats listed on Annex I of the EU Habitats Directive.

The estuary drains almost completely at low tide. The intertidal flats of the outer estuary are mainly of sands, with soft muds in the north-west sector and along the southern shore. Associated with these muds are stands of Cordgrass (*Spartina anglica*). Green algae (mainly *Enteromorpha* spp. and *Ulva lactuca*) are widespread and form dense mats in the more sheltered areas. The intertidal angiosperm, Beaked Tasselweed *(Ruppia maritima*), grows profusely in places beneath the algal mats. The Lugworm (*Arenicola marina*) is common in the outer estuary and large Mussel beds (*Mytilus edulis*) occur at the outlet to the sea.

The area of intertidal flats in the inner estuary is reduced as a result of the local authority refuse tip on the north shore. The sediments are mostly muds, which are very soft in places. Cordgrass (*Spartina anglica*) is widespread in parts, and in summer, dense green algal mats grow on the muds. In the extreme inner part, the estuary narrows to a tidal river.

Saltmarsh fringes parts of the estuary, especially the southern shores and parts of the outer sand spit. Common plant species of the saltmarsh include Sea Rush (*Juncus maritimus*), Sea Purslane (*Halimione portulacoides*) and Common Saltmarsh-grass (*Puccinellia maritima*). Salt meadows and wet brackish fields occur along the tidal river. Low sand hills occur on the outer spit, including some small areas of fixed dunes and *Ammophila* dunes. Fine sandy beaches and intertidal sandflats occur at the outer part of the estuary.

Two plant species, which are legally protected under the Flora (Protection) Order, 1999, occur within the site: Hairy Violet (*Viola hirta*) occurs on the sand spit and Meadow Barley (*Hordeum secalinum*) occurs in the saline fields of the inner estuary. This species has declined apparently due to reclamation and embankment of lands fringing estuaries. Another rare species, Green-veined Orchid (*Orchis morio*), occurs in the sandy areas of the outer estuary.

Rogerstown Estuary is an important waterfowl site, with Brent Geese having a population of international importance (1176). A further 16 species have populations of national importance: Greylag Goose (186), Shelduck (785), Teal (584), Pintail (30), Shoveler (69), Oystercatcher (1028), Ringed Plover (152), Golden Plover (1813), Grey Plover (245), Lapwing (4056), Knot (2076), Dunlin (2625), Sanderling (57), Black-tailed Godwit (272), Curlew (1549), Redshank (732) and Greenshank (22) (All counts are average peaks over four winters 1994/95 - 1997/98). The presence of a significant population of Golden Plover is of note and this species is listed on Annex I of the EU Birds Directive. The estuary is a regular staging post for autumn migrants, especially Green Sandpiper, Ruff, Little Stint, Curlew Sandpiper and Spotted Redshank.

Little Tern has bred at the outer sand spit, but much of the nesting area has now been washed away as a result of erosion. The maximum number of pairs recorded was 17 in 1991. Ringed Plover breed in the same area.

The outer part of the estuary has been designated a statutory Nature Reserve and a Special Protection Area under the EU Birds Directive. The inner estuary has been damaged by the refuse tip which covers 40 hectares of mudflat.

This site is a good example of an estuarine system, with all typical habitats represented, including several listed on Annex I of the EU Habitats Directive. Rogerstown is an internationally important waterfowl site and has been a breeding site for Little Terns. The presence within the site of three rare plant species adds to its importance.