



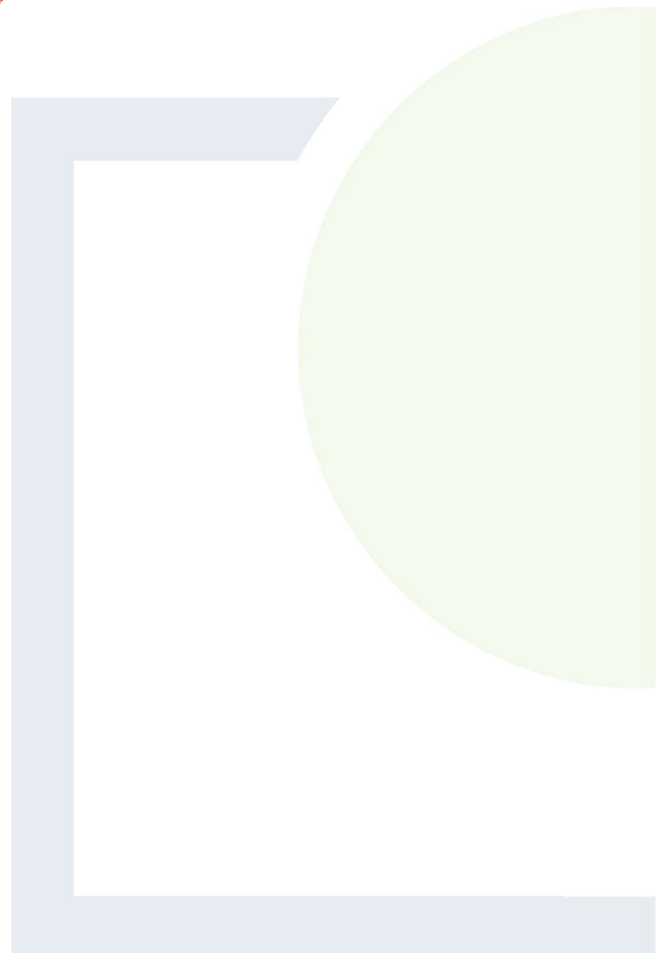
**FEHILY
TIMONEY**

**CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE & PLANNING**

APPENDIX 4

European Site Synopses

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SITE SYNOPSIS

SITE NAME: STACK'S TO MULLAGHAREIRK MOUNTAINS, WEST LIMERICK HILLS AND MOUNT EAGLE SPA

SITE CODE: 004161

The Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA is a very large site centred on the borders between the counties of Cork, Kerry and Limerick. The site is skirted by the towns of Newcastle West, Ballydesmond, Castleisland, Tralee and Abbeyfeale. The mountain peaks included in the site are not notably high or indeed pronounced, the highest being at Knockfeha (451 m). Other mountains included are Mount Eagle, Knockanefune, Garraunbaun, Taur, Rock Hill, Knockacummer, Mullaghmuish, Knight's Mt, Ballincollig Hill, Beennageeha Mt, Sugar Hill, Knockanimpuba and Knockathea, amongst others. Many rivers rise within the site, notably the Blackwater, Owentaraglin, Owenkeal, Glenlara, Feale, Clydagh, Allaghaun, Allow, Oolagh, Galey and Smerlagh.

The site consists of a variety of upland habitats, though almost half is afforested. The coniferous forests include first and second rotation plantations, with both pre-thicket and post-thicket stands present. Substantial areas of clear-fell are also present at any one time. The principal tree species present are Sitka Spruce (*Picea sitchensis*) and Lodgepole Pine (*Pinus contorta*). A substantial part (28%) of the site is unplanted blanket bog and heath, with both wet and dry heath present. The vegetation of these habitats is characterised by such species as Ling Heather (*Calluna vulgaris*), Bilberry (*Vaccinium myrtillus*), Common Cottongrass (*Eriophorum angustifolium*), Hare's-tail Cottongrass (*Eriophorum vaginatum*), Deergrass (*Scirpus cespitosus*) and Purple Moor-grass (*Molinia caerulea*). The remainder of the site is mostly rough grassland that is used for hill farming. This varies in composition and includes some wet areas with rushes (*Juncus* spp.) and some areas subject to scrub encroachment.

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

This SPA is a stronghold for Hen Harrier and supports the largest concentration of the species in the country. A survey in 2005 recorded 45 pairs, which represents over 20% of the all-Ireland total. A similar number of pairs had been recorded in the 1998-2000 period. The mix of forestry and open areas provides optimum habitat conditions for this rare bird, which is listed on Annex I of the E.U. Birds Directive. The early stages of new and second-rotation conifer plantations are the most frequently used nesting sites, though some pairs may still nest in tall heather of unplanted bogs and heath. Hen Harriers will forage up to c. 5 km from the nest site, utilising open bog and moorland, young conifer plantations and hill farmland that is not too rank. Birds will often forage in openings and gaps within forests. In Ireland, small birds and small mammals appear to be the most frequently taken prey.

Short-eared Owl, a very rare species in Ireland, has been known to breed within the site. Nesting certainly occurred in the late 1970s and birds have been recorded intermittently since. The owls are considered to favour this site due to the presence of Bank Voles, a favoured prey item. Merlin also breed within the site but the size of the population is not known. Red Grouse is found on some of the unplanted areas of bog and heath – this is a species that has declined in Ireland and is now Red-listed.

The Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA is of ornithological importance because it provides excellent nesting and foraging habitat for breeding Hen Harrier and is one the top sites in the country for the species. The presence of three species, Hen Harrier, Merlin and Short-eared Owl, which are listed on Annex I of the E.U. Birds Directive is of note.

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20.1.2015

Site Name: Lower River Shannon SAC

Site Code: 002165

This very large site stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head/ Kerry Head, a distance of some 120 km. The site thus encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. Rivers within the sub-catchment of the Feale include the Galey, Smearlagh, Oolagh, Allaughaun, Owveg, Clydagh, Caher, Breanagh and Glenacarne. Rivers within the sub-catchment of the Mulkear include the Killeenagarriff, Annagh, Newport, the Dead River, the Bilboa, Glashacloonaraveela, Gortnageragh and Cahernahallia.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

- [1110] Sandbanks
- [1130] Estuaries
- [1140] Tidal Mudflats and Sandflats
- [1150] Coastal Lagoons*
- [1160] Large Shallow Inlets and Bays
- [1170] Reefs
- [1220] Perennial Vegetation of Stony Banks
- [1230] Vegetated Sea Cliffs
- [1310] *Salicornia* Mud
- [1330] Atlantic Salt Meadows
- [1410] Mediterranean Salt Meadows
- [3260] Floating River Vegetation
- [6410] *Molinia* Meadows
- [91E0] Alluvial Forests*
- [1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)
- [1095] Sea Lamprey (*Petromyzon marinus*)
- [1096] Brook Lamprey (*Lampetra planeri*)
- [1099] River Lamprey (*Lampetra fluviatilis*)
- [1106] Atlantic Salmon (*Salmo salar*)
- [1349] Bottle-nosed Dolphin (*Tursiops truncatus*)
- [1355] Otter (*Lutra lutra*)

The Shannon and Fergus Rivers flow through Carboniferous limestone as far as Foynes, but west of Foynes Namurian shales and flagstones predominate (except at Kerry Head, which is formed from Old Red Sandstone). The eastern sections of the Feale catchment flow through Namurian rocks and the western stretches through Carboniferous limestone. The Mulkear flows through Lower Palaeozoic rocks in the upper reaches before passing through Namurian rocks, followed by Lower Carboniferous shales and Carboniferous limestone. The Mulkear River itself, immediately north of Pallas Green, passes through an area of Rhyolites, Tuffs and Agglomerates.

The Shannon and Fergus Estuaries form the largest estuarine complex in Ireland. They form a unit stretching from the upper tidal limits of the Shannon and Fergus Rivers to the mouth of the Shannon Estuary (considered to be a line across the narrow strait between Kilcredaun Point and Kilconly Point). Within this main unit there are several tributaries with their own 'sub-estuaries' e.g. the Deel River, Mulkear River, and Maigue River. To the west of Foynes, a number of small estuaries form indentations in the predominantly hard coastline, namely Poulnasherry Bay, Ballylongford Bay, Clonderalaw Bay and the Feale or Cashen River estuary.

Both the Fergus and inner Shannon Estuaries feature vast expanses of intertidal mudflats, often fringed with saltmarsh vegetation. The smaller estuaries also feature mudflats, but have their own unique characteristics, e.g. Poulnasherry Bay is stony and unusually rich in species and biotopes. Plant species are typically scarce on the mudflats, although there are some eelgrass (*Zostera* spp.) beds and patches of green algae (e.g. *Ulva* sp. and *Enteromorpha* sp.). The main macro-invertebrate community which has been noted from the inner Shannon and Fergus estuaries is a *Macoma-Scrobicularia-Nereis* community.

In the transition zone between mudflats and saltmarsh, specialised colonisers of mud predominate. For example, swards of Common Cord-grass (*Spartina anglica*) frequently occur in the upper parts of the estuaries. Less common are swards of Glasswort (*Salicornia europaea* agg.). In the innermost parts of the estuaries, the tidal channels or creeks are fringed with species such as Common Reed (*Phragmites australis*) and club-rushes (*Scirpus maritimus*, *S. tabernaemontani* and *S. triquetrus*). In addition to the nationally rare Triangular Club-rush (*Scirpus triqueter*), two scarce species are found in some of these creeks (e.g. Ballinacurra Creek): Lesser Bulrush (*Typha angustifolia*) and Summer Snowflake (*Leucojum aestivum*).

Saltmarsh vegetation frequently fringes the mudflats. Over twenty areas of estuarine saltmarsh have been identified within the site, the most important of which are around the Fergus estuary and at Ringmoylan Quay. The dominant type of saltmarsh present is Atlantic salt meadow occurring over mud. Characteristic species occurring include Common Saltmarsh-grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea-milkwort (*Glaux maritima*), Sea Plantain (*Plantago maritima*), Red Fescue (*Festuca rubra*), Creeping Bent (*Agrostis stolonifera*), Saltmarsh Rush (*Juncus gerardi*), Long-bracted Sedge (*Carex extensa*), Lesser Sea-spurrey

(*Spergularia marina*) and Sea Arrowgrass (*Triglochin maritima*). Areas of Mediterranean salt meadows, characterised by clumps of Sea Rush (*Juncus maritimus*) occur occasionally. Two scarce species are found on saltmarshes in the vicinity of the Fergus estuary: a type of robust saltmarsh-grass (*Puccinellia foucaudii*), sometimes placed within the species Common Saltmarsh-grass (*P. maritima*) and Hard-grass (*Parapholis strigosa*).

Saltmarsh vegetation also occurs around a number of lagoons within the site, two of which have been surveyed as part of a National Inventory of Lagoons. Cloonconeen Pool (4-5 ha) is a natural sedimentary lagoon impounded by a low cobble barrier. Seawater enters by percolation through the barrier and by overwash. This lagoon represents a type which may be unique to Ireland since the substrate is composed almost entirely of peat. The adjacent shore features one of the best examples of a drowned forest in Ireland. Aquatic vegetation in the lagoon includes typical species such as Beaked Tasselweed (*Ruppia maritima*) and green algae (*Cladophora* sp.). The fauna is not diverse, but is typical of a high salinity lagoon and includes six lagoon specialists (*Hydrobia ventrosa*, *Cerastoderma glaucum*, *Lekanesphaera hookeri*, *Palaemonetes varians*, *Sigara stagnalis* and *Enochrus bicolor*). In contrast, Shannon Airport Lagoon (2 ha) is an artificial saline lake with an artificial barrier and sluiced outlet. However, it supports two Red Data Book species of stonewort (*Chara canescens* and *Chara* cf. *connivens*).

Most of the site west of Kilcredaun Point/Kilconely Point is bounded by high rocky sea cliffs. The cliffs in the outer part of the site are sparsely vegetated with lichens, Red Fescue, Sea Beet (*Beta vulgaris* subsp. *maritima*), Sea Campion (*Silene vulgaris* subsp. *maritima*), Thrift and plantains (*Plantago* spp.). A rare endemic type of sea-lavender, *Limonium recurvum* subsp. *pseudotranswallianum*, occurs on cliffs near Loop Head. Cliff-top vegetation usually consists of either grassland or maritime heath. The boulder clay cliffs further up the estuary tend to be more densely vegetated, with swards of Red Fescue and species such as Kidney Vetch (*Anthyllis vulneraria*) and Common Bird's-foot-trefoil (*Lotus corniculatus*).

The site supports an excellent example of a large shallow inlet and bay. Littoral sediment communities in the mouth of the Shannon Estuary occur in areas that are exposed to wave action and also in areas extremely sheltered from wave action. Characteristically, exposed sediment communities are composed of coarse sand and have a sparse fauna. Species richness increases as conditions become more sheltered. All shores in the site have a zone of sand hoppers at the top, and below this each of the shores has different characteristic species giving a range of different shore types.

The intertidal reefs in the Shannon Estuary are exposed or moderately exposed to wave action and subject to moderate tidal streams. Known sites are steeply sloping and show a good zonation down the shore. Well developed lichen zones and littoral reef communities offering a high species richness in the sublittoral fringe and strong populations of the Purple Sea Urchin *Paracentrotus lividus* are found. The communities found are tolerant to sand scour and tidal streams. The infralittoral reefs range from sloping platforms with some vertical steps, to ridged bedrock with

gullies of sand between the ridges, to ridged bedrock with boulders or a mixture of cobbles, gravel and sand. Kelp is very common to about 18 m. Below this it becomes rare and the community is characterised by coralline crusts and red foliose algae.

Other coastal habitats that occur within the site include stony beaches and bedrock shores (these support a typical zonation of seaweeds such as *Fucus* spp., *Ascophyllum nodosum* and kelps), shingle beaches (with species such as Sea Beet, Sea Mayweed - *Matricaria maritima*, Sea Campion and Curled Dock - *Rumex crispus*), sandbanks which are slightly covered by sea water at all times (e.g. in the area from Kerry Head to Beal Head) and sand dunes (a small area occurs at Beal Point, where Marram - *Ammophila arenaria* is the dominant species).

Freshwater rivers have been included in the site, most notably the Feale and Mulkear catchments, the Shannon from Killaloe to Limerick (along with some of its tributaries, including a short stretch of the Kilmastulla River), the Fergus up as far as Ennis, and the Cloon River. These systems are very different in character: the Shannon is broad, generally slow flowing and naturally eutrophic; the Fergus is smaller and alkaline; while the narrow, fast flowing Cloon is acid in nature. The Feale and Mulkear catchments exhibit all the aspects of a river from source to mouth. Semi-natural habitats, such as wet grassland, wet woodland and marsh occur by the rivers, but improved grassland is the most common habitat type. One grassland type of particular conservation significance, *Molinia* meadows, occurs in several parts of the site and the examples at Worldsend on the River Shannon are especially noteworthy. Here are found areas of wet meadow dominated by rushes (*Juncus* spp.) and sedges (*Carex* spp.), and supporting a diverse and species-rich vegetation, including such uncommon species as Blue-eyed Grass (*Sisyrinchium bermudiana*) and Pale Sedge (*C. pallescens*).

Floating river vegetation characterised by species of water-crowfoot (*Ranunculus* spp.), pondweeds (*Potamogeton* spp.) and the moss *Fontinalis antipyretica* are present throughout the major river systems within the site. The rivers contain an interesting bryoflora with *Schistidium alpicola* var. *alpicola* recorded from in-stream boulders on the Bilboa, new to Co. Limerick.

Alluvial woodland occurs on the banks of the Shannon and on islands in the vicinity of the University of Limerick. The woodland is up to 50 m wide on the banks and somewhat wider on the largest island. The most prominent woodland type is gallery woodland where White Willow (*Salix alba*) dominates the tree layer with occasional Alder (*Alnus glutinosa*). The shrub layer consists of various willow species with Rusty Willow (*Salix cinerea* ssp. *oleifolia*) and what appear to be hybrids of *S. alba* x *S. viminalis*. The herbaceous layer consists of tall perennial herbs. A fringe of bulrush (*Typha* sp.) occurs on the river side of the woodland. On slightly higher ground above the wet woodland and on the raised embankment remnants of mixed oak-ash-alder woodland occur. These are poorly developed and contain numerous exotic species but locally there are signs that it is invading open grassland. Alder is the principal tree species, with occasional Pedunculate Oak (*Quercus robur*), elm (*Ulmus glabra* and *U. procera*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and

the shrubs Guelder-rose (*Viburnum opulus*) and willows. The ground flora is species-rich.

While woodland is infrequent within the site, however Cahiracon Wood contains a strip of old oak woodland. Sessile Oak (*Q. petraea*) forms the canopy, with an understorey of Hazel and Holly (*Ilex aquifolium*). Great Wood-rush (*Luzula sylvatica*) dominates the ground flora. Less common species present include Great Horsetail (*Equisetum telmateia*) and Pendulous Sedge (*Carex pendula*).

In the low hills to the south of the Slievefelim Mountains, the Cahernahallia River cuts a valley through the Upper Silurian rocks. For approximately 2 km south of Cappagh Bridge at Knockanavar, the valley sides are wooded. The woodland consists of birch (*Betula* spp.), Hazel, oak, Rowan (*Sorbus aucuparia*), some Ash (*Fraxinus excelsior*) and willow (*Salix* spp.). Most of the valley is not grazed by stock, and as a result the trees are regenerating well. The ground flora features prominent Great wood-rush and Bilberry (*Vaccinium myrtillus*), along with a typical range of woodland herbs. Bracken (*Pteridium aquilinum*) is a feature in areas where there is more light available.

The valley sides of the Bilboa and Gortnageragh Rivers on higher ground north-east of Cappamore, support patches of semi-natural broadleaf woodland dominated by Ash, Hazel, oak and birch. There is a good scrub layer with Hawthorn, willow, Holly and Blackthorn (*Prunus spinosa*) common. The herb layer in these woodlands is often open, with a typically rich mixture of woodland herbs and ferns. Moss species diversity is high. The woodlands are ungrazed. The Hazel is actively coppiced in places.

There is a small area of actively regenerating cut-away raised bog at Ballyrorheen. It is situated approximately 5 km north-west of Cappamore in Co. Limerick. The bog contains some wet areas with good cover of bog mosses (*Sphagnum* spp.). Species of particular interest include Cranberry (*Vaccinium oxycoccos*) and White Sedge (*Carex curta*), along with two regionally rare mosses, including the bog moss *S. fimbriatum*. The site is being invaded by Downy Birch (*Betula pubescens*) scrub woodland. Both commercial forestry and the spread of Rhododendron (*Rhododendron ponticum*) has greatly reduced the overall value of the site.

A number of plant species that are listed in the Irish Red Data Book occur within the site, and several of these are protected under the Flora (Protection) Order, 1999. These include Triangular Club-rush (*Scirpus triquetrus*), a species which is only found in Ireland only in the Shannon Estuary, where it borders creeks in the inner estuary. Opposite-leaved Pondweed (*Groenlandia densa*) is found in the Shannon where it passes through Limerick City, while Meadow Barley (*Hordeum secalinum*) is abundant in saltmarshes at Ringmoylan and Mantlehill. Hairy Violet (*Viola hirta*) occurs in the Askeaton/Foynes area. Golden Dock (*Rumex maritimus*) is noted as occurring in the River Fergus estuary. Finally, Bearded Stonewort (*Chara canescens*), a brackish water specialist, and Convergent Stonewort (*Chara connivens*) are both found in Shannon Airport Lagoon.

Overall, the Shannon and Fergus Estuaries support the largest numbers of wintering waterfowl in Ireland. The highest count in 1995-96 was 51,423 while in 1994-95 it was 62,701. Species listed on Annex I of the E.U. Birds Directive which contributed to these totals include: Great Northern Diver (3; 1994/95), Whooper Swan (201; 1995/96), Pale-bellied Brent Goose (246; 1995/96), Golden Plover (11,067; 1994/95) and Bar-tailed Godwit (476; 1995/96). In the past, three separate flocks of Greenland White-fronted Goose were regularly found, but none were seen in 1993/94.

Other wintering waders and wildfowl present include Greylag Goose (216; 1995/96), Shelduck (1,060; 1995/96), Wigeon (5,976; 1995/96), Teal (2,319; 1995-96), Mallard (528; 1995/96), Pintail (45; 1995/96), Shoveler (84; 1995/96), Tufted Duck (272; 1995/96), Scaup (121; 1995/96), Ringed Plover (240; 1995/96), Grey Plover (750; 1995/96), Lapwing (24,581; 1995/96), Knot (800; 1995/96), Dunlin (20,100; 1995/96), Snipe (719; 1995/96), Black-tailed Godwit (1,062; 1995/96), Curlew (1,504; 1995/96), Redshank (3,228; 1995/96), Greenshank (36; 1995/96) and Turnstone (107; 1995/96). A number of wintering gulls are also present, including Black-headed Gull (2,216; 1995/96), Common Gull (366; 1995/96) and Lesser Black-backed Gull (100; 1994/95). This is the most important coastal site in Ireland for a number of the waders including Lapwing, Dunlin, Snipe and Redshank. It also provides an important staging ground for species such as Black-tailed Godwit and Greenshank.

A number of species listed on Annex I of the E.U. Birds Directive breed within the site. These include Peregrine Falcon (2-3 pairs), Sandwich Tern (34 pairs on Rat Island, 1995), Common Tern (15 pairs: 2 on Sturamus Island and 13 on Rat Island, 1995), Chough (14-41 pairs, 1992) and Kingfisher. Other breeding birds of note include Kittiwake (690 pairs at Loop Head, 1987) and Guillemot (4,010 individuals at Loop Head, 1987).

There is a resident population of Bottle-nosed Dolphin in the Shannon Estuary. This is the only known resident population of this E.U. Habitats Directive Annex II species in Ireland. The population is estimated (in 2006) to be 140 ± 12 individuals. Otter, a species also listed on Annex II of this Directive, is commonly found on the site.

Five species of fish listed on Annex II of the E.U. Habitats Directive are found within the site. These are Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey (*Lampetra fluviatilis*), Twaite Shad (*Allosa fallax fallax*) and Salmon (*Salmo salar*). The three lampreys and Salmon have all been observed spawning in the lower Shannon or its tributaries. The Fergus is important in its lower reaches for spring salmon, while the Mulkear catchment excels as a grilse fishery, though spring fish are caught on the actual Mulkear River. The Feale is important for both types. Twaite Shad is not thought to spawn within the site. There are few other river systems in Ireland which contain all three species of lamprey.

Two additional fish species of note, listed in the Irish Red Data Book, also occur, namely Smelt (*Osmerus eperlanus*) and Pollan (*Coregonus autumnalis pollan*). Only the former has been observed spawning in the Shannon.

Freshwater Pearl Mussel (*Margaritifera margaritifera*), a species listed on Annex II of the E.U. Habitats Directive, occurs abundantly in parts of the Cloon River.

There is a wide range of land uses within the site. The most common use of the terrestrial parts is grazing by cattle, and some areas have been damaged through over-grazing and poaching. Much of the land adjacent to the rivers and estuaries has been improved or reclaimed and is protected by embankments (especially along the Fergus estuary). Further, reclamation continues to pose a threat, as do flood relief works (e.g. dredging of rivers). Gravel extraction poses a major threat on the Feale.

In the past, cord-grass (*Spartina* sp.) was planted to assist in land reclamation. This has spread widely, and may oust less vigorous colonisers of mud and may also reduce the area of mudflat available to feeding birds.

Domestic and industrial wastes are discharged into the Shannon, but water quality is generally satisfactory, except in the upper estuary where it reflects the sewage load from Limerick City. Analyses for trace metals suggest a relatively clean estuary with no influences of industrial discharges apparent. Further industrial development along the Shannon and water polluting operations are potential threats.

Fishing is a main tourist attraction on the Shannon and there are a large number of angler associations, some with a number of beats. Fishing stands and styles have been erected in places. The River Feale is a designated Salmonid Water under the E.U. Freshwater Fish Directive. Other uses of the site include commercial angling, oyster farming, boating (including dolphin-watching trips) and shooting. Some of these may pose threats to the birds and dolphins through disturbance. Specific threats to the dolphins include underwater acoustic disturbance, entanglement in fishing gear and collisions with fast moving craft.

This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitats lagoon and alluvial woodland, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. A good number of Red Data Book species are also present, perhaps most notably the thriving populations of Triangular Club-rush. A number of species listed on Annex I of the E.U. Birds Directive are also present, either wintering or breeding. Indeed, the Shannon and Fergus Estuaries form the largest estuarine complex in Ireland and support more wintering wildfowl and waders than any other site in the country. Most of the estuarine part of the site has been designated a Special Protection Area (SPA), under the E.U. Birds Directive, primarily to protect the large numbers of migratory birds present in winter.

Site Name: Ballyseedy Wood SAC

Site Code: 002112

Ballyseedy Wood lies south of the River Lee, some 2 km south-east of Tralee, Co. Kerry. Most of the wood is situated in the floodplain of the River Lee on sticky, gleyed clay.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[91E0] Alluvial Forests*

The woodland at the site is dominated by native tree species: Ash (*Fraxinus excelsior*), Alder (*Alnus glutinosa*), Rusty Willow (*Salix cinerea* subsp. *oleifolia*) and Hazel (*Corylus avellana*), with oak (*Quercus* spp.), Yew (*Taxus baccata*), elm (*Ulmus* sp.) and Spindle (*Euonymus europaeus*) also occurring. Non-native tree species found include Sycamore (*Acer pseudoplatanus*), Horse-chestnut (*Aesculus hippocastanum*), poplar (*Populus* sp.), Beech (*Fagus sylvatica*) and Hornbeam (*Carpinus betulus*). Three semi-natural woodland types are represented - areas dominated by Alder and Ash (following and adjacent to the River Lee); areas dominated by Ash and Hazel (on sloping, better-drained soil, mostly in the western half of the site); and areas dominated by Alder and Rusty Willow (on level sections further removed from the river).

The Alder/Ash-dominated woodland is a high canopy wood. The very large Alder trees present were probably planted, but much of the secondary regeneration is also very mature, being up to 100 years old. Sycamore, Horse-chestnut, poplar and Beech can also be found here. In the understorey species such as Hawthorn (*Crataegus monogyna*), Holly (*Ilex aquifolium*), elm, Spindle and Guelder-rose (*Viburnum opulus*) are found. The Alder/Ash-dominated woodland conforms well with the woodland type 'Alluvial Forest', listed with priority status on Annex I of the E.U. Habitats Directive.

The Ash/Hazel-dominated woodland is also mature, with Sycamore, Hornbeam and Beech also present. Hazel is frequent in the sub-canopy, with Hawthorn and the occasional elm also occurring.

The Alder/willow woodland stands are, for the most part, dominated by Alder, with Rusty Willow occurring as scattered trees.

The ground flora is represented by Wild Angelica (*Angelica sylvestris*), Meadowsweet (*Filipendula ulmaria*), Golden-saxifrage (*Chrysosplenium oppositifolium*), Enchanter's-nightshade (*Circaea lutetiana*), Soft Shield-fern (*Polystichum setiferum*), Broad Buckler-fern (*Dryopteris dilatata*), Scaly Male-fern (*Dryopteris affinis*), Thin-spiked Wood-sedge (*Carex strigosa*), Remote Sedge (*C. remota*) and Pendulous Sedge (*C. pendula*).

Several plant species which are nationally or locally scarce are found on the site, including Rough Horsetail (*Equisetum hyemale*), Thin-spiked Wood-sedge, Dark-leaved Willow (*S. myrsinifolia*) and Wood Horsetail (*E. sylvaticum*). The rare moss *Pylaisia polyantha*, a species known in Ireland only from Counties Donegal, Kerry and Mayo, has also been recorded from the site.

Ballyseedy Wood is a nesting site for Long-eared Owl, and the river is frequented by Otters, a species listed on Annex II of the E.U. Habitats Directive.

The site is undisturbed and apparently infrequently visited by man. Non-native tree species are present within the site but account for less than 30% of the woodland. Exotic and potentially invasive species present include Rhododendron (*Rhododendron ponticum*), Snowberry (*Symphoricarpos albus*), Cherry Laurel (*Prunus laurocerasus*), Japanese Knotweed (*Reynovtria japonica*) and Bamboo. These are, however, localised within the site and are not found throughout the woodland. In fact, some stands of woodland are remarkable for the complete absence of exotic species.

Ballyseedy Wood is of prime importance for its Alder/Ash-dominated woodland stands, a habitat type that is rare and threatened in Europe. The site is also of significance for several rare or scarce plant species that occur there. The scarcity of woodlands in north Kerry adds to the importance of the site.

Site Name: Castlemaine Harbour SAC

Site Code: 000343

This is a large site located on the south-east corner of the Dingle Peninsula, Co. Kerry. It consists of the whole inner section of Dingle Bay, i.e. Castlemaine Harbour, the spits of Inch and White Strand/Rosbehy and a little of the coastline to the west. The River Maine, almost to Castlemaine, and much of the River Laune catchment, including the Gaddagh, Gweestion, Glanooragh, Cottoner's River and the River Loe, are also included within the site.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

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| <p>[1130] Estuaries</p> <p>[1140] Tidal Mudflats and Sandflats</p> <p>[1210] Annual Vegetation of Drift Lines</p> <p>[1220] Perennial Vegetation of Stony Banks</p> <p>[1230] Vegetated sea cliffs of the Atlantic and Baltic coasts</p> <p>[1310] <i>Salicornia</i> Mud</p> <p>[1330] Atlantic Salt Meadows</p> <p>[1410] Mediterranean Salt Meadows</p> <p>[2110] Embryonic Shifting Dunes</p> <p>[2120] Marram Dunes (White Dunes)</p> <p>[2130] Fixed Dunes (Grey Dunes)*</p> <p>[2170] Dunes with Creeping Willow</p> <p>[2190] Humid Dune Slacks</p> <p>[91E0] Alluvial Forests*</p>
<p>[1095] Sea Lamprey (<i>Petromyzon marinus</i>)</p> <p>[1099] River Lamprey (<i>Lampetra fluviatilis</i>)</p> <p>[1106] Atlantic Salmon (<i>Salmo salar</i>)</p> <p>[1355] Otter (<i>Lutra lutra</i>)</p> <p>[1395] Petalwort (<i>Petalophyllum ralfsii</i>)</p> |
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Inch Spit holds a fine sand dune system. It is one of the largest and best remaining dune systems in the country. Fore dunes are found on the western side of Rosbehy and Inch. In these younger, mobile dunes, Marram (*Ammophila arenaria*) is common, with Groundsel (*Senecio vulgaris*), Sea Rocket (*Cakile maritima*) and Dandelion

(*Taraxacum* agg.) also present. Other characteristic species include Sand Couch (*Elymus farctus*), Lyme-grass (*Leymus arenarius*) and Sea Spurge (*Euphorbia paralias*). Fixed dune, a priority habitat under the E.U. Habitats Directive, is well-represented at the site, and in particular towards the tip of Inch Spit. Such areas support species such as Lady's Bedstraw (*Galium verum*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Wild Thyme (*Thymus praecox*), Kidney Vetch (*Anthyllis vulneraria*), Wild Pansy (*Viola tricolor*), Biting Stonecrop (*Sedum acre*), Common Centaury (*Centaureum erythraea*), Thyme-leaved Sandwort (*Arenaria serpyllifolia*) and Common Whitlowgrass (*Erophila verna*), among others. There is also a rich lichen and bryophyte flora. The slightly damper conditions which prevail in dune slacks support Creeping Bent (*Agrostis stolonifera*), Crested Dog's-tail (*Cynosurus cristatus*), Glaucous Sedge (*Carex flacca*), Creeping Willow (*Salix repens*) and Jointed Rush (*Juncus articulatus*). The rare bryophyte Petalwort (*Petalophyllum ralfsii*), which is listed on Annex II of the E.U. Habitats Directive, has been recorded in this system. A smaller spit, with a similar diversity of dune types, occurs at Rosbehy on the southern shore, from where Yellow Centaury (*Cicendia filiformis*) and Knotted Pearlwort (*Sagina nodosa*) have been recorded from a dune slack along with other, more common, species.

The sand spits, and also the Coomore peninsula, are underlain by shingle and in places the shingle is exposed and supports a characteristic flora. Species present include Lyme-grass and Sea Sandwort (*Honkenya peploides*). Strandline communities are well-developed along Inch spit, with the exception of the north-western end where recreational pressure is high. Typical species of the strandline include Prickly Saltwort (*Salsola kali*), Sea Rocket, oraches (*Atriplex* spp.) and Sea Sandwort. Two Red Data Book plants, Sea Pea (*Lathyrus japonicus* subsp. *maritimus*) and Sea-kale (*Crambe maritima*), are found associated with the shingle and strandline communities.

The coastline is fringed in many places by saltmarsh. The vegetation here includes Thrift (*Armeria maritima*), Common Saltmarsh-grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Sea Rush (*Juncus maritimus*) and Sea Plantain (*Plantago maritima*). Upper saltmarsh communities extend inland, along estuarine channels, where they are mixed with freshwater communities. Sea Club-rush (*Scirpus maritimus*) and Common Reed (*Phragmites australis*) occur at these locations. Common Cord-grass (*Spartina anglica*) has colonised the lower part of the saltmarsh at Inch and extends out onto the open mudflat. Glassworts (*Salicornia* spp.) occur in association with saltmarsh.

West of Inch, cliffs of glacial drift occur, which support such plants as Ivy (*Hedera helix*), Red Fescue (*Festuca rubra*), Heather (*Calluna vulgaris*), Thrift, Sea Plantain, Sea Mayweed (*Matricaria maritima*), Kidney Vetch and Honeysuckle (*Lonicera periclymenum*). Along the cliff-tops there is coastal grassland with species such as Sweet Vernal-grass (*Anthoxanthum odoratum*), Cock's-foot (*Dactylis glomerata*) and Wood Sage (*Teucrium scorodonia*).

Much of the site consists of intertidal sand and mudflats, supporting a number of soft sediment communities, including beds of eelgrass (mostly *Zostera noltii*) in some

places. A subtidal mixed sediment community complex is also present in the channel between Rossbehy Point and Inch Point.

The rivers and their associated habitats also make up a considerable portion of the site. These associated habitats include wet grassland, woodland, scrub and bog/heath. In the valley up-river of Killorglin, is an interesting area of alluvial wet woodland, dominated by Alder (*Alnus glutinosa*) and willows (*Salix* spp.). The vegetation is quite diverse, and there are spectacular tussocks of Greater Tussock-sedge (*Carex paniculata*). Other species which occur include Ash (*Fraxinus excelsior*), Wild Angelica (*Angelica sylvestris*), Cuckooflower (*Cardamine pratensis*), Meadowsweet (*Filipendula ulmaria*), Common Nettle (*Urtica dioica*), Remote Sedge (*Carex remota*) and a range of bryophytes. While small in area, this is one of the few examples in Ireland of woodland on riverine alluvium dominated by native tree species.

Five plants listed in the Irish Red Data Book have been recorded at this site: Sea-kale, Corn Cockle (*Agrostemma githago*), Sea Pea, Pennyroyal (*Mentha pulegium*) and Irish Lady's-tresses (*Spiranthes romanzoffiana*). The three last-named are legally protected under the Flora (Protection) Order, 1999, as is the rare bryophyte, Petalwort. Other scarce species which occur here are Yellow Bartsia (*Pareutocellia viscosa*), Lax-flowered Sea-lavender (*Limonium humile*) and Blue-eyed-grass (*Sisyrinchium bermudiana*).

The vicinity of Castlemaine Harbour is also important as one of few areas in Ireland (all of which are in Co. Kerry) where the Natterjack Toad naturally occurs. This amphibian is listed in the Irish Red Data Book and on Annex IV of the E.U. Habitats Directive.

The site also supports a small colony of Common Seal, while two Lamprey species have been recorded in the Laune river catchment. The Laune catchment is used by Otter and is also an important Salmon system with nurseries, riffles pools and glides.

Castlemaine Harbour is a very important site for passage and wintering waterfowl. The following figures are derived from counts between 1994/5 and 1996/7. One species occurs here in internationally important numbers - Brent Goose (734) - with 16 species having populations of national importance: Cormorant (215), Shelduck (129), Pintail (167), Scaup (138), Wigeon (3,513), Red-breasted Merganser (51), Oystercatcher (1,539), Ringed Plover (330), Golden Plover (1,940), Grey Plover (122), Knot (347), Sanderling (207), Dunlin (1,360), Redshank (299), Greenshank (26) and Turnstone (296).

Castlemaine Harbour is of major ecological importance. It contains a range of coastal habitats of excellent quality, including many that are listed on Annex I of the E.U. Habitats Directive, and two which are listed with priority status (fixed dunes and alluvial forests). It also includes long stretches of river and stream which are excellent habitats for Salmon, Lamprey and Otter. Inch dunes are recognised as among the finest in the country, with particularly well-developed dune slacks. The

site supports internationally important waterfowl populations, rare plant species, the rare Natterjack Toad, as well as populations of several animal species that are listed on Annex II of the E.U. Habitats Directive. Part of the site is designated a Special Protection Area (SPA) and is listed as a site under the Ramsar Convention. Part of Castlemaine Harbour is a Statutory Nature Reserve, while Inch and Rosbehy are Wildfowl Sanctuaries.

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Site Name: Slieve Mish Mountains SAC

Site Code: 002185

The Slieve Mish Mountains form the backbone of the eastern half of the Dingle Peninsula in Co. Kerry. The highest peak is Baurtregaum (851 m). The range is composed predominantly of Old Red Sandstone.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[4010] Wet Heath
[4030] Dry Heath
[4060] Alpine and Subalpine Heaths
[8110] Siliceous Scree
[8210] Calcareous Rocky Slopes
[8220] Siliceous Rocky Slopes
[1421] Killarney Fern (*Trichomanes speciosum*)

The dominant habitat within Slieve Mish Mountains SAC is heath. Wet heath, dry heath and acid grassland occur in mosaics on the lower slopes of the mountains, while dry heath tends to dominate the upper, steeper slopes. Typical species of the wet heath include Purple Moor-grass (*Molinia caerulea*), Cross-leaved Heath (*Erica tetralix*), Common Cottongrass (*Eriophorum angustifolium*) and Deergrass (*Scirpus cespitosus*). The dry heath is dominated by Heather (*Calluna vulgaris*), with grasses (e.g. *Agrostis capillaris*, *A. canina* and *Festuca ovina*) and mosses. Some alpine heath occurs on the highest ridges; this supports a number of locally scarce species, including Dwarf Willow (*Salix herbacea*), Stiff Sedge (*Carex bigelowii*), Thrift (*Armeria maritima*) and Crowberry (*Empetrum nigrum*).

The site is intersected, particularly on its northern flank, by several steep-sided glaciated river valleys or glens. The head of Derrymore Glen features a classic oligotrophic corrie lake which is surrounded by steep cliffs. Steep cliffs, scree and rocky ridges are features of the site above 650 m. Cliffs within the site support a number of rare bryophytes, i.e. *Bazzania pearsonii*, *Daltonia splachnoides*, *Dumortiera hirsute*, *Mastigophora woodsii*, *Moerckia hibernica*, *Paraleptodontium recurvifolium*, *Radula carringtonii* and *Scapania ornithopodioides*, along with several relatively scarce vascular plant taxa typical of high-altitude inland cliffs, i.e. Starry Saxifrage (*Saxifraga stellaris*), Roseroot (*Rhodiola rosea*), Alpine Scurvygrass (*Cochlearia officinalis* subsp. *alpina*), Alpine Hair-grass (*Deschampsia cespitosa* subsp. *alpina*), Mountain Everlasting (*Antennaria dioica*), Mountain Sorrel (*Oxyria digyna*), Brittle Bladder-fern (*Cystopteris*

fragilis) and Irish Saxifrage (*Saxifraga rosacea*). The cliffs also support Kidney Saxifrage (*Saxifraga hirsuta*), St Patrick's-cabbage (*Saxifraga spathularis*) and the hybrid between these two species.

The site includes a small area of dry deciduous woodland, supporting species such as Sessile Oak (*Quercus petraea*), Ash (*Fraxinus excelsior*) and Holly (*Ilex aquifolium*).

The site contains a good population of Killarney Fern (*Trichomanes speciosum*), a species that is listed on Annex II of the E.U. Habitats Directive. Two other plants that are also listed in the Irish Red Data Book occur, namely Betony (*Stachys officinalis*) and Cornish Moneywort (*Sibthorpia europaea*). In Ireland, the latter species is confined to the Dingle Peninsula - its most easterly known station lies within the site. Other notable plant species recorded from the site include Whorled Caraway (*Carum verticillatum*), Lemon-scented Fern (*Oreopteris limbosperma*) and Ivy-leaved Bellflower (*Wahlenbergia hederacea*). Killarney Fern (*Trichomanes speciosum*) and Betony are protected under the Flora (Protection) Order, 2015.

Peregrine Falcons breed on cliffs within the site, and Chough are known to feed in the area. Both of these species are listed on Annex I of the E.U. Birds Directive.

Most of the site is grazed by sheep, with a smaller area being grazed by cattle. Over-grazing on parts of the site has led to some habitat degradation, particularly of the wet heath covering the lower slopes. Most of the blanket bog within the site has been extensively cut for turf and some of the turbarry is still active. The lack of forestry within the Slieve Mish range is notable.

Overall, the site is of considerable conservation significance, particularly for the presence of several habitats and species that are listed on Annexes I and II of the E.U. Habitats Directive. The presence of two bird species that are listed on Annex I of the E.U. Birds Directive and the populations of several rare or scarce plant species adds to the importance of the site.

Site Name: Blackwater River (Cork/Waterford) SAC

Site Code: 002170

The River Blackwater is one of the largest rivers in Ireland, draining a major part of Co. Cork and five ranges of mountains. In times of heavy rainfall the levels can fluctuate widely by more than 12 feet on the gauge at Careysville. The peaty nature of the terrain in the upper reaches and of some of the tributaries gives the water a pronounced dark colour. The site consists of the freshwater stretches of the River Blackwater as far upstream as Ballydesmond, the tidal stretches as far as Youghal Harbour and many tributaries, the larger of which include the Licky, Bride, Flesk, Chimneyfield, Finisk, Araglin, Awbeg (Buttevant), Clyda, Glen, Allow, Dalua, Brogeen, Rathcool, Finnow, Owentaraglin and Awnaskirtaun. The portions of the Blackwater and its tributaries that fall within this SAC flow through the counties of Kerry, Cork, Limerick, Tipperary and Waterford. Nearby towns include Rathmore, Millstreet, Kanturk, Banteer, Mallow, Buttevant, Doneraile, Castletownroche, Fermoy, Ballyduff, Rathcormac, Tallow, Lismore, Cappoquin and Youghal.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes).

- [1130] Estuaries
- [1140] Tidal Mudflats and Sandflats
- [1220] Perennial Vegetation of Stony Banks
- [1310] *Salicornia* Mud
- [1330] Atlantic Salt Meadows
- [1410] Mediterranean Salt Meadows
- [3260] Floating River Vegetation
- [91A0] Old Oak Woodlands
- [91E0] Alluvial Forests*
- [1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)
- [1092] White-clawed Crayfish (*Austropotamobius pallipes*)
- [1095] Sea Lamprey (*Petromyzon marinus*)
- [1096] Brook Lamprey (*Lampetra planeri*)
- [1099] River Lamprey (*Lampetra fluviatilis*)
- [1103] Twaite Shad (*Alosa fallax*)
- [1106] Atlantic Salmon (*Salmo salar*)
- [1355] Otter (*Lutra lutra*)
- [1421] Killarney Fern (*Trichomanes speciosum*)

The Blackwater rises in boggy land in east Kerry, where Namurian grits and shales build the low heather-covered plateaux. Near Kanturk the plateaux enclose a basin of productive Coal Measures. On leaving the Namurian rocks the Blackwater turns eastwards along the northern slopes of the Boggeragh Mountains before entering the narrow limestone strike vale at Mallow. The valley deepens as first the Nagles Mountains and then the Knockmealdowns impinge upon it. Interesting geological features along this stretch of the Blackwater Valley include limestone cliffs and caves near the villages and small towns of Killavullen and Ballyhooly; the Killavullen caves contain fossil material from the end of the glacial period. The associated basic soils in this area support the growth of plant communities which are rare in Cork because in general the county's rocks are acidic. At Cappoquin the river suddenly turns south and cuts through high ridges of Old Red Sandstone. The Araglin valley is predominantly underlain by sandstone, with limestone occurring in the lower reaches near Fermoy.

Wet woodlands are found where river embankments have broken down and channel edges are subject to daily inundation. This is particularly evident in the steep-sided valley of the River Bride, between Cappoquin and Youghal. The river side of the embankments was often used for willow growing in the past (most recently at Cappoquin) so that the channel is lined by narrow woods of White and Almond-leaved Willow (*Salix alba* and *S. triandra*), with isolated Crack Willow (*S. fragilis*) and Osier (*S. viminalis*). Rusty Willow (*S. cinerea* subsp. *oleifolia*) spreads naturally into the sites and occasionally, as at Villierstown on the Blackwater and Sapperton on the Bride, forms woods with a distinctive mix of woodland and marsh plants, including Gypsywort (*Lycopus europaeus*), Guelder rose (*Viburnum opulus*), Bittersweet (*Solanum dulcamara*) and various mosses and algae. These wet woodlands form one of the most extensive tracts of the wet woodland habitat in the country.

A small stand of Yew (*Taxus baccata*) woodland occurs within the site. This is on a limestone ridge at Dromana, near Villierstown. While there are some patches of the wood with a canopy of Yew and some very old trees, the quality is generally poor due to the dominance of non-native and invasive species such as Sycamore (*Acer pseudoplatanus*), Beech (*Fagus sylvatica*) and Douglas Fir (*Pseudotsuga menziesii*). However, it does have the potential to develop into a Yew dominated stand in the long term and the site should continue to be monitored.

Marshes and reedbeds cover most of the flat areas beside the rivers and often occur in mosaic with the wet woodland. Common Reed (*Phragmites australis*) is ubiquitous and is harvested for thatching. There is also much Marsh-marigold (*Caltha palustris*) and, at the edges of the reeds, the Greater and Lesser Pond-sedge (*Carex riparia* and *C. acutiformis*). Hemlock Water-dropwort (*Oenanthe crocata*), Wild Angelica (*Angelica sylvestris*), Reed Canary-grass (*Phalaris arundinacea*), Meadowsweet (*Filipendula ulmaria*), Common Nettle (*Urtica dioica*), Purple Loosestrife (*Lythrum salicaria*), Common Valerian (*Valeriana officinalis*), Water Mint (*Mentha aquatica*) and Water Forget-me-not (*Myosotis scorpioides*) are all also found.

At Banteer there are a number of hollows in the sediments of the floodplain where subsidence and subterranean drainage have created isolated wetlands, sunk below the level of the surrounding fields. The water rises and falls in these holes depending on the water table and several different communities have developed on the acidic or neutral sediments. Many of the ponds are ringed with Rusty Willow, rooted in the mineral soils but sometimes collapsed into the water. Beneath the densest stands are woodland herbs like Yellow Pimpernel (*Lysimachia nemorum*), with locally abundant Common Water-starwort (*Callitriche stagnalis*) and Marsh Ragwort (*Senecio aquaticus*). One of the depressions has Silver Birch (*Betula pendula*), Ash (*Fraxinus excelsior*), Crab Apple (*Malus sylvestris*) and a little Pedunculate Oak (*Quercus robur*) in addition to the willows.

Floating river vegetation is found along much of the freshwater stretches within the site. The species list is quite extensive, with species such as water-crowfoots, including Pond Water-crowfoot (*Ranunculus peltatus*), Canadian Pondweed (*Elodea canadensis*), pondweed species, including Broad-leaved Pondweed (*Potamogeton natans*), water-milfoil species (*Myriophyllum* spp.), Common Club-rush (*Scirpus lacustris*), water-starwort species (*Callitriche* spp.), Lesser Water-parsnip (*Berula erecta*) particularly on the Awbeg, Water-cress (*Nasturtium officinale*), Hemlock Water-dropwort, Fine-leaved Water-dropwort (*O. aquatica*), Common Duckweed (*Lemna minor*), Yellow Water-lily (*Nuphar lutea*), Unbranched Bur-reed (*Sparganium emersum*) and the moss *Fontinalis antipyretica* all occurring.

The grasslands adjacent to the rivers of the site are generally heavily improved, although liable to flooding in many places. However, fields of more species-rich wet grassland with species such as Yellow Iris (*Iris pseudacorus*), Meadowsweet, Meadow Buttercup (*Ranunculus acris*) and rushes (*Juncus* spp.) occur occasionally. Extensive fields of wet grassland also occur at Annagh Bog on the Awbeg. These fields are dominated by Tufted Hair-grass (*Deschampsia cespitosa*) and rushes.

The Blackwater Valley has a number of dry woodlands; these have mostly been managed by the estates in which they occur, frequently with the introduction of Beech and a few conifers, and sometimes of the invasive species Rhododendron (*Rhododendron ponticum*) and Cherry Laurel (*Prunus laurocerasus*). Oak woodland is well developed on sandstone about Ballinatray, with the acid oak woodland community of Holly (*Ilex aquifolium*), Bilberry (*Vaccinium myrtillus*), Great Wood-rush (*Luzula sylvatica*) and the ferns *Dryopteris affinis* and *D. aemula* occurring in one place. Irish Spurge (*Euphorbia hyberna*) continues eastwards on acid rocks from its headquarters to the west, but there are also many plants of richer soils, for example Wood Violet (*Viola reichenbachiana*), Goldilocks Buttercup (*Ranunculus auricomus*), Broad-leaved Helleborine (*Epipactis helleborine*) and Red Campion (*Silene dioica*). Oak woodland is also found in Rincrew, Carrigane, Glendine, Newport and Dromana. The spread of Rhododendron is locally a problem, as is over-grazing. A few limestone rocks stand over the river in places showing traces of a less acidic woodland type with Ash, False Brome (*Brachypodium sylvaticum*) and Early-purple Orchid (*Orchis mascula*).

In the vicinity of Lismore, two deep valleys cut in Old Red Sandstone join to form the Owenashad River before flowing into the Blackwater at Lismore. These valleys retain something close to their original cover of oak with Downy Birch (*Betula pubescens*), Holly and Hazel (*Corylus avellana*) also occurring. There has been much planting of Beech (as well as some of coniferous species) among the oak on the shallower slopes and here both Rhododendron and Cherry Laurel have invaded the woodland.

The oak wood community in the Lismore and Glenmore valleys is of the classic upland type, in which some Rowan (*Sorbus aucuparia*) and Downy Birch occur. Honeysuckle (*Lonicera periclymenum*) and Ivy (*Hedera helix*) cover many of the trees while Great Wood-rush, Bluebell (*Hyacinthoides non-scripta*), Wood-sorrel (*Oxalis acetosella*) and, locally, Bilberry dominate the ground flora. Ferns present on the site include Hard Fern (*Blechnum spicant*), Male Fern (*Dryopteris filix-mas*), the buckler-ferns *D. dilatata* and *D. aemula*, and Lady Fern (*Athyrium filix-femina*). There are many mosses present and large species such as *Rhytidiadelphus* spp., *Polytrichum formosum*, *Mnium hornum* and *Dicranum* spp. are noticeable. The lichen flora is important and includes 'old forest' species which imply a continuity of woodland here since ancient times. Tree Lungwort (*Lobaria* spp.) is the most conspicuous and is widespread.

The Araglin valley consists predominantly of broadleaved woodland. Oak and Beech are joined by Hazel, Wild Cherry (*Prunus avium*) and Goat Willow (*Salix caprea*). The ground flora is relatively rich, with Pignut (*Conopodium majus*), Ramsons (*Allium ursinum*), Garlic Mustard (*Alliaria petiolata*) and Wild Strawberry (*Fragaria vesca*). The presence of Ivy Broomrape (*Orobanche hederaceae*), a local species within Ireland, suggests that the woodland, along with its attendant Ivy, is long established.

Along the lower reaches of the Awdag River, the valley sides are generally cloaked with mixed deciduous woodland of estate origin. The dominant species is Beech, although a range of other species are also present, e.g. Sycamore, Ash and Horsechestnut (*Aesculus hippocastanum*). In places the alien invasive species Cherry Laurel dominates the understorey. Parts of the woodlands are more semi-natural in composition, being dominated by Ash, with Hawthorn (*Crataegus monogyna*) and Spindle (*Euonymus europaea*) also present. However, the most natural areas of woodland appear to be the wet areas dominated by Alder and willows (*Salix* spp.). The ground flora of the dry woodland areas features species such as Pignut, Wood Avens (*Geum urbanum*), Ivy and Soft Shield-fern (*Polystichum setiferum*), while the ground flora of the wet woodland areas contains characteristic species such as Remote Sedge (*Carex remota*) and Opposite-leaved Golden-saxifrage (*Chrysosplenium oppositifolium*).

In places along the upper Bride, scrubby, semi-natural deciduous woodland of willow, oak and Rowan occurs, with abundant Great Wood-rush in the ground flora.

The Bunaglanna River passes down a very steep valley, flowing in a north-south direction to meet the Bride River. It flows through blanket bog to heath and then scattered woodland. The higher levels of moisture here enable a vigorous moss and

fern community to flourish, along with a well-developed epiphyte community on the tree trunks and branches.

At Banteer a type of wetland occurs near the railway line which offers a complete contrast to the others. Old turf banks are colonised by Royal Fern (*Osmunda regalis*) and Eared Willow (*Salix aurita*), and between them there is a sheet of Bottle Sedge (*Carex rostrata*), Marsh Cinquefoil (*Potentilla palustris*), Bogbean (*Menyanthes trifoliata*), Marsh St. John's-wort (*Hypericum elodes*) and the mosses *Sphagnum auriculatum* and *Aulacomnium palustre*. The cover is a scraw (i.e. floating vegetation) with characteristic species like Marsh Willowherb (*Epilobium palustre*) and Early Marsh-orchid (*Dactylorhiza incarnata*).

The soil high up the Lismore valleys and in rocky places is poor in nutrients but it becomes richer where streams enter and also along the valley bottoms. In such sites Wood Speedwell (*Veronica montana*), Wood Anemone (*Anemone nemorosa*), Enchanter's-nightshade (*Circaea lutetiana*), Barren Strawberry (*Potentilla sterilis*) and shield-fern (*Polystichum* sp.) occur. There is some Ramsons, Three-nerved Sandwort (*Moehringia trinervia*) and Early-purple Orchid (*Orchis mascula*) locally, with Opposite-leaved Golden-saxifrage, Meadowsweet and Bugle (*Ajuga reptans*) in wet places. A stand of Hazel woodland at the base of the Glenakeeffe valley shows this community well.

The area has been subject to much tree felling in the recent past and re-sprouting stumps have given rise to areas of bushy Hazel, Holly, Rusty Willow and Downy Birch. The ground in the clearings is heathy with Heather (*Calluna vulgaris*), Slender St John's-wort (*Hypericum pulchrum*) and the occasional Broom (*Cytisus scoparius*) occurring.

The estuary and the habitats within and associated with it form a large component of the site. Very extensive areas of intertidal flats, comprised of substrates ranging from fine, silty mud to coarse sand with pebbles/stones are present. The main expanses occur at the southern end of the site, with the best examples at Kinsalebeg in Co. Waterford, and between Youghal and the main bridge north of it across the river in Co. Cork. Other areas occur along the tributaries of the Licky in east Co. Waterford, and Glendine, Newport, Bride and Killahaly Rivers in Waterford west of the Blackwater. There are also large tracts along the Tourig River in Co. Cork. There are narrow bands of intertidal flats along the main river as far north as Camphire Island. Patches of green filamentous algae (*Ulva* sp. and *Enteromorpha* sp.) occur in places, while furoid algae are common on the more stony flats, even as high upstream as Glenassy or Coneen.

The area of saltmarsh within the site is small. The best examples occur at the mouths of the tributaries and in the townlands of Foxhole and Blackbog. Those found are generally characteristic of Atlantic salt meadows. The species list at Foxhole consists of Common Saltmarsh-grass (*Puccinellia maritima*), small amounts of Greater Sea-spurrey (*Spergularia media*), glasswort (*Salicornia* sp.), Sea Arrowgrass (*Triglochin maritima*), Annual Sea-blite (*Suaeda maritima*) and Sea Purslane (*Halimione*

portulacoides) - the latter a very recent coloniser. Some Sea Aster (*Aster tripolium*) occurs, generally with Creeping Bent (*Agrostis stolonifera*). Sea Couch (*Elymus pycnanthus*) and small isolated clumps of Sea Club-rush (*Scirpus maritimus*) are also seen. On the Tourig River additional saltmarsh species found include sea-lavenders (*Limonium* spp.), Thrift (*Armeria maritima*), Red Fescue (*Festuca rubra*), Common Scurvygrass (*Cochlearia officinalis*) and Sea Plantain (*Plantago maritima*). Oraches (*Atriplex* spp.) are found on channel edges. Species such as Saltmarsh Rush (*Juncus gerardi*) and Sea Rush (*J. maritimus*) are found in places in this site also, and are indicative of Mediterranean salt meadows. Areas of *Salicornia* mud are found at the eastern side of the townland of Foxbole above Youghal, at Blackbog, along the Tourig and Kinsalebeg estuaries.

The shingle spit at Ferrypoint supports a good example of perennial vegetation of stony banks. The spit is composed of small stones and cobbles and has a well developed and diverse flora. At the lowest part, Sea Beet (*Beta vulgaris* subsp. *maritima*), Curled Dock (*Rumex crispus*) and Yellow Horned-poppy (*Glaucium flavum*) occur, while at a slightly higher level Sea Mayweed (*Matricaria maritima*), Cleavers (*Galium aparine*), Rock Samphire (*Crithmum maritimum*), Sea Sandwort (*Honkenya peploides*), Spear-leaved Orache (*Atriplex prostrata*) and Babington's Orache (*A. glabriuscula*). Other species present include Sea Rocket (*Cakile maritima*), Herb-Robert (*Geranium robertianum*), Red Fescue and Kidney Vetch (*Anthyllis vulneraria*). The top of the spit is more vegetated and supports lichens and bryophytes, including *Tortula ruraliformis* and *Rhytidiadelphus squarrosus*.

The site supports several Red Data Book plant species, i.e. Starved Wood-sedge (*Carex depauperata*), Killarney Fern (*Trichomanes speciosum*), Pennyroyal (*Mentha pulegium*), Bird's-nest Orchid (*Neottia nidus-avis*), Golden Dock (*Rumex maritimus*) and Bird Cherry (*Prunus padus*). The first three of these are also protected under the Flora (Protection) Order, 2015, while the Killarney Fern is also listed on Annex II of the E.U. Habitats Directive. The following plants, relatively rare nationally, are also found within the site: Toothwort (*Lathraea squamaria*) - associated with woodlands on the Awbeg and Blackwater; Summer Snowflake (*Leucojum aestivum*) and Flowering Rush (*Butomus umbellatus*) on the Blackwater; Common Calamint (*Calamintha ascendens*), Red Campion, Sand Leek (*Allium scorodoprasum*) and Wood Club-rush (*Scirpus sylvaticus*) on the Awbeg.

The site is also important for the presence of several E.U. Habitats Directive Annex II animal species, including Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey (*L. fluviatilis*), Twaites Shad (*Alosa fallax fallax*), Freshwater Pearl Mussel (*Margaritifera margaritifera*), Otter (*Lutra lutra*) and Salmon (*Salmo salar*). The Awbeg supports a population of White-clawed Crayfish (*Austropotamobius pallipes*). This threatened species has been recorded from a number of locations and its remains are also frequently found in Otter spraints, particularly in the lower reaches of the river. The freshwater stretches of the Blackwater and Bride Rivers are designated salmonid rivers. The Blackwater is noted for its enormous run of salmon over the years. The river is characterised by significant pools, streams, glides, and generally, a good push of water coming through except in

very low water. Spring salmon fishing can be carried out as far upstream as Fermoy and is highly regarded especially at Careysville. The Bride, main Blackwater upstream of Fermoy, and some of the tributaries are more associated with grilse fishing.

The site supports many of the mammal species occurring in Ireland. Those which are listed in the Irish Red Data Book include Pine Marten, Badger and Irish Hare. The bat species Natterer's Bat, Daubenton's Bat, Whiskered Bat, Brown Long-eared Bat and Pipistrelle, can be seen feeding along the river, roosting under the old bridges and in old buildings.

Common Frog, a Red Data Book species that is also legally protected (Wildlife Act, 1976), occurs throughout the site. The rare bush cricket *Metrioptera roselii* (Order Orthoptera) has been recorded in the reed/willow vegetation of the river embankment on the Lower Blackwater River. The Swan Mussel (*Anodonta cygnea*), a scarce species nationally, occurs at a few sites along the freshwater stretches of the Blackwater.

Several bird species listed on Annex I of the E.U. Birds Directive are found on the site. Some use it as a staging area, others are vagrants, while others use it more regularly. Internationally important numbers of Whooper Swan (average peak 174, 1994/95-95/96) and nationally important numbers Bewick's Swan (average peak 5, 1996/97-2000/01) use the Blackwater Callows. Golden Plover occur in regionally important numbers on the Blackwater estuary (average peak 885, 1984/85-86/87) and on the River Bride (absolute maximum 2141, 1994/95). Staging Terns visit the site annually, with >300 Sandwich Tern and >200 Arctic/Common Tern (average peak 1974-1994). The site also supports populations of the following: Red Throated Diver, Great Northern Diver, Barnacle Goose, Ruff, Wood Sandpiper and Greenland White-fronted Goose. Three breeding territories for Peregrine Falcon are known along the Blackwater Valley. This, the Awbeg and the Bride River are also thought to support at least 30 pairs of Kingfisher. Little Egret breed at the site (12 pairs in 1997, 19 pairs in 1998).

The site holds important numbers of wintering waterfowl. Both the Blackwater Callows and the Blackwater Estuary Special Protection Areas (SPAs) hold internationally important numbers of Black-tailed Godwit (average peak 847, 1994/95-95/96 on the callows, average peak 845, 1974/75-93/94 in the estuary). The Blackwater Callows also hold Wigeon (average peak 2,752), Teal (average peak 1,316), Mallard (average peak 427), Shoveler (average peak 28), Lapwing (average peak 880), Curlew (average peak 416) and Black-headed Gull (average peak 396) (counts from 1994/95-95/96). Numbers of birds using the Blackwater Estuary, given as the mean of the highest monthly maxima over 20 years (1974-94), are Shelduck (137 +10 breeding pairs), Wigeon (780), Teal (280), Mallard (320 + 10 breeding pairs), Goldeneye (11-97), Oystercatcher (340), Ringed Plover (50 + 4 breeding pairs), Grey Plover (36), Lapwing (1,680), Knot (150), Dunlin (2,293), Snipe (272), Black-tailed Godwit (845), Bar-tailed Godwit (130), Curlew (920), Redshank (340), Turnstone (130), Black-headed Gull (4,000) and Lesser Black-backed Gull (172). The greatest

numbers (75%) of the wintering waterfowl of the estuary are located in the Kinsalebeg area on the east of the estuary in Co. Waterford. The remainder are concentrated along the Tourig estuary on the Co. Cork side.

The river and river margins also support many Heron, non-breeding Cormorant and Mute Swan (average peak 53, 1994/95-95/96 in the Blackwater Callows). Heron occurs all along the Bride and Blackwater Rivers: 2 or 3 pairs at Dromana Rock; approximately 25 pairs in the woodland opposite; 8 pairs at Ardsallagh Wood and around 20 pairs at Rincrew Wood have been recorded. Some of these are quite large and significant heronries. Significant numbers of Cormorant are found north of the bridge at Youghal and there are some important roosts present at Ardsallagh Wood, downstream of Strancally Castle and at the mouth of the Newport River. Of note are the high numbers of wintering Pochard (e.g. 275 individuals in 1997) found at Ballyhay quarry on the Awbeg, the best site for Pochard in Co. Cork.

Other important species found within the site include Long-eared Owl, which occurs all along the Blackwater River, and Barn Owl, a Red Data Book species, which is found in some old buildings and in Castlehyde, west of Fermoy. Reed Warbler, a scarce breeding species in Ireland, was found for the first time in the site in 1998 at two locations. It is not known whether or not this species breeds on the site, although it breeds nearby to the south of Youghal. Dipper occurs on the rivers.

Land use at the site is mainly centred on agricultural activities. The banks of much of the site and the callows, which extend almost from Fermoy to Cappoquin, are dominated by improved grasslands which are drained and heavily fertilised. These areas are grazed and used for silage production. Slurry is spread over much of this area. Arable crops are also grown. The spreading of slurry and fertiliser poses a threat to the water quality of this salmonid river and to the populations of E.U. Habitats Directive Annex II animal species within it. Many of the woodlands along the rivers belong to old estates and support many non-native species. Little active woodland management occurs. Fishing is a main tourist attraction along stretches of the Blackwater and its tributaries, and there are a number of angler associations, some with a number of beats. Fishing stands and styles have been erected in places. Both commercial and leisure fishing takes place on the rivers. Other recreational activities such as boating, golfing and walking are also popular. Water skiing is carried out at Villierstown. Parts of Doneraile Park and Anne's Grove are included in the site: both areas are primarily managed for amenity purposes. There is some hunting of game birds and Mink within the site. Ballyhay quarry is still actively quarried for sand and gravel. Several industrial developments, which discharge into the river, border the site.

The main threats to the site and current damaging activities include high inputs of nutrients into the river system from agricultural run-off and several sewage plants, dredging of the upper reaches of the Awbeg, over-grazing within the woodland areas, and invasion by non-native species, for example Rhododendron and Cherry Laurel.

Overall, the River Blackwater is of considerable conservation significance for the occurrence of good examples of habitats and populations of plant and animal species that are listed on Annexes I and II of the E.U. Habitats Directive respectively. Furthermore it is of high conservation value for the populations of bird species that use it. Two Special Protection Areas, designated under the E.U. Birds Directive, are also located within the site - Blackwater Callows and Blackwater Estuary. Additionally, the importance of the site is enhanced by the presence of a suite of uncommon plant species.

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Site Name: Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC

Site Code: 000365

This very large site encompasses the mountains, rivers and lakes of the Iveragh Peninsula, and the Paps Mountains which stretch eastward from Killarney towards Millstreet. The majority of the site is in Co. Kerry, with a small portion in Co. Cork. This is the most mountainous region in Ireland and includes Carrauntoohil, the highest peak in the country at 1,039 m. The underlying geology is almost entirely Old Red Sandstone, although Carboniferous limestone occurs on the eastern shores of Lough Leane, and rhyolitic lavas occur above Lough Guitane. The dramatic sandstone ridges and valleys have been shaped by glacial processes and many of the lakes are impounded by glacial moraines. Located close to the Atlantic in the south-west of Ireland, the site is subject to strong oceanic influences. Generally, Lusitanian flora and fauna is well-represented, while the high peaks and cliffs support arctic-alpine relicts.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes).

- [3110] Oligotrophic Waters containing very few minerals
- [3130] Oligotrophic to Mesotrophic Standing Waters
- [3260] Floating River Vegetation
- [4010] Wet Heath
- [4030] Dry Heath
- [4060] Alpine and Subalpine Heaths
- [5130] Juniper Scrub
- [6130] Calaminarian Grassland
- [6410] *Molinia* Meadows
- [7130] Blanket Bogs (Active)*
- [7150] Rhynchosporion Vegetation
- [91A0] Old Oak Woodlands
- [91E0] Alluvial Forests*
- [91J0] Yew Woodlands*

- [1024] Kerry Slug (*Geomalacus maculosus*)
- [1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)
- [1065] Marsh Fritillary (*Euphydryas aurinia*)
- [1095] Sea Lamprey (*Petromyzon marinus*)

- [1096] Brook Lamprey (*Lampetra planeri*)
- [1099] River Lamprey (*Lampetra fluviatilis*)
- [1103] Twaite Shad (*Alosa fallax*)
- [1106] Atlantic Salmon (*Salmo salar*)
- [1303] Lesser Horseshoe Bat (*Rhinolophus hipposideros*)
- [1355] Otter (*Lutra lutra*)
- [1421] Killarney Fern (*Trichomanes speciosum*)
- [1833] Slender Naiad (*Najas flexilis*)

The Oak woodlands, occurring mostly around the Killarney lakes, are the habitat for which the area is perhaps best known. They form the most extensive area of native woodland remaining in Ireland and include Derrycunihy Wood, described as perhaps the most natural Sessile Oak (*Quercus petraea*) wood in the country. The woods are typically dominated by Sessile Oak, with an understorey of Holly (*Ilex aquifolium*). The Strawberry-tree (*Arbutus unedo*) is a notable component of the woods and there are scattered areas of Yew (*Taxus baccata*). The herb layer is not particularly species-rich, but the woods support perhaps the best developed Atlantic bryophyte community in Europe. Several rare species are present including *Lejeunea flava*, *Cyclodictyon laetivirens*, *Daltonia splachnoides*, *Sematophyllum demissum* and *Radula carringtonii*.

The only sizeable Yew woodland in Ireland is found on the limestone of the Muckross peninsula. Here, some of the trees are up to 200 years old. The dense shade beneath the tree results in few herbs in the ground flora, but the bryophyte layer is well-developed and almost continuous.

Wet woodland, or carr, occurring on the low-lying limestone areas within the floodplain of Lough Leane, forms one of the most extensive areas of this woodland type in Ireland. The dominant canopy species are Alder (*Alnus glutinosa*), willows (*Salix* spp.), Ash (*Fraxinus excelsior*) and Downy Birch (*Betula pubescens*), while the field layer is dominated by Remote Sedge (*Carex remota*) and Creeping Bent (*Agrostis stolonifera*).

Adding to the diversity of the woodland component of this site are a number of mixed woodlands, including those of Ross Island which support one of the richest herb layers of the Killarney woods.

The most common habitat types within the overall site are blanket bog, heath and upland grassland. The heath and grassland generally occur on areas with shallow peat and on the mineral soils of the steep mountain sides, while the blanket bog occurs on the more gentle slopes, plateaux and other level ground. Often the habitats occur in a mosaic, with exposed rock frequently occurring.

A variety of blanket bog types are represented from lowland valley to mountain blanket bog. Some of the best include: Cumeragh River Bog Nature Reserve, a

domed bog which is perhaps the most southern intact blanket bog in the country; Ballygisheen, which contains one of the most extensive areas of intact lowland blanket bog in Co. Kerry; Coomacheo/Caherbarnagh, which combine to form the largest mountain blanket bog in the south-west; Eirk Bog Nature Reserve, a classic example of a bog intermediate between a raised and blanket bog; Mangerton Bog, an upland bog which grades into an unusual lichen heath seen at no other site; and Oolagh East, a quaking basin mire. Generally, the bogs have a characteristic flora. The Lusitanian species, Large-flowered Butterwort (*Pinguicula grandiflora*), is common. The bogs also support a number of unusual species, including mosses (*Sphagnum pulchrum*, *S. fuscum*, *S. platyphyllum*, *S. strictum*, *S. contortum* and *Calliergon stramineum*), liverworts (*Cladopodiella francisci* and *Calypogeia azurea*) and lichens (*Cladonia mediterranea*, *C. macilenta*, *C. rangiferina*, *C. arbuscula* and *Cetraria islandica*).

Rhynchosporion vegetation is confined to wet areas within the lowland blanket bogs, with one of the best areas for the habitat being to the north-east of the Ballygisheen Pass. On a portion of this bog there is an extensive area of quaking flats and pools dominated by the bog mosses *Sphagnum cuspidatum* and *S. auriculatum*. These areas have a typically species-poor flora which includes Bogbean (*Menyanthes trifoliata*), White Beak-sedge (*Rhynchospora alba*), Bog Asphodel (*Narthecium ossifragum*), Common Cottongrass (*Eriophorum angustifolium*) and Great Sundew (*Drosera anglica*). Brown Beak-sedge (*R. fusca*), a locally rare plant of wet bog pools, is occasional within the site. Although the habitat is best developed in very wet areas of intact bog, it may also occur in wet areas of regenerating cutover blanket bog.

Wet heath often occurs in association with blanket bog and features Cross-leaved Heath (*Erica tetralix*). Dry heath is more frequent in this site, and is dominated by Heather (*Calluna vulgaris*), Bell Heather (*Erica cinerea*) and Western Gorse (*Ulex gallii*), with occasional Bilberry (*Vaccinium myrtillus*). This habitat is well-developed on the Paps Mountains. Elsewhere it is often over-grazed, with upland grassland becoming more frequent. Some of the highest ridges support alpine heath (referable to the *Lycopodium alpinum* - *Racomitrium lanuginosum* association). Widespread plant species of the alpine heath include Bog-myrtle (*Vaccinium myrtillus*), Crowberry (*Empetrum nigrum*) and Fir Clubmoss (*Huperzia selago*), while species such as Juniper (*Juniperus communis* subsp. *nana*) and Dwarf Willow (*Salix herbacea*) have a much more restricted distribution.

The site contains many lakes, but these can be broadly divided into two types: small upland corrie lakes and larger lowland lakes. Examples of the first type are Lough Murtagh and Lough Gortavehy in the Paps Mountains. They are oligotrophic and typically species-poor, with Quillwort (*Isoetes lacustris*), Water Lobelia (*Lobelia dortmanna*) and Shoreweed (*Littorella uniflora*) occurring most commonly. The lowland lakes are mostly oligotrophic, although Lough Leane, the largest freshwater body in the region, has become somewhat mesotrophic as a result of pollution from Killarney town. These lowland lakes tend to be more species-rich than those at higher altitudes, with additional species such as Awlwort (*Subularia aquatica*), Six-stamened Waterwort (*Elatine hexandra*) and Alternate Water-milfoil (*Myriophyllum*

alterniflorum). Good examples include Lough Caragh, Upper Lake and Muckcross Lake.

The rivers associated with these lakes are also of importance. The Caragh is relatively unpolluted from headwater to estuary, a rare phenomenon in Europe. The Flesk runs over Old Red Sandstone in its upper reaches and limestone as it nears Lough Leane. Both rivers support floating and submerged vegetation and rare invertebrates. Rocks around the smaller mountain streams often support a lush vegetation of ferns and bryophytes, most notably at Torc Waterfall.

Other habitats of note include: Juniper scrub found on islands in the Upper Lake and on dry ridges in nearby Newfoundland Bog; damp meadows, with Purple Moor-grass (*Molinia caerulea*), supporting scarce species such as Whorled Caraway (*Carum verticillatum*) and Ivy-leaved Bellflower (*Wahlenbergia hederacea*); and Calaminarian grasslands, associated with the old copper mines on Ross Island, with species such as Sea Campion (*Silene vulgaris* subsp. *maritima*) and Thrift (*Armeria maritima*).

A large number of plant and animal species of interest occur within the site. For example, two plant species listed on Annex II of the E.U. Habitats Directive occur. Slender Naiad (*Najas flexilis*) is found in some of the lakes at the site. The Killarney Fern (*Trichomanes speciosum*) is another listed and well-known rarity. An additional twenty-two Red Data Book plant species have been recorded, but only twelve of these have been seen recently. These are Pillwort (*Pilularia globulifera*), Kerry Lily (*Simethis planifolia*), Irish Lady's-tresses (*Spiranthes romanzoffiana*), Slender Cottongrass (*Eriophorum gracile*), Small Cudweed (*Logfia minima*), Betony (*Stachys officinalis*), Heath Cudweed (*Omalotheca sylvatica*), Alder Buckthorn (*Frangula alnus*), Alpine Saw-wort (*Saussurea alpina*), Hoary Whitlowgrass (*Draba incana*), Smooth Brome (*Bromus racemosus*) and Holly Fern (*Polystichum lonchitis*). The first seven of these species are legally protected under the Flora (Protection) Order, 1999, as are Slender Naiad and Killarney Fern.

Additional plant species of interest include a fern (*Dryopteris affinis* subsp. *stilluppensis*) and a Whitebeam (*Sorbus anglica*), both at their only Irish locations.

The site is very important for oceanic bryophytes, particularly the woodland species. It also contains good representative examples of the Northern Atlantic Hepatic Mat community and other oceanic montane communities. Killarney Oak woods and mountains have been nominated as a site of international importance for bryophytes.

The Killarney Woods are notable for the number of rare species of Myxomycete fungus that have been recorded, namely *Collaria arcyryonema*, *Craterium muscorum*, *Cribraria microcarpa* (only known Irish site), *C. rufa*, *C. violacea*, *Diderma chondrioderma*, *D. lucidum*, *D. ochraceum*, *Fuligo muscorum* and *Licea marginata*.

The site has six bird species which are listed on Annex I of the E.U. Birds Directive. A small flock of Greenland White-fronted Goose, which winters on the boglands within the National Park, is now the only regular flock in the south-west. The site has one of

the highest concentrations of breeding Peregrines in the country, as well as some breeding Merlin. Chough is found both in the coastal and inland areas of the site, with possibly up to 30 pairs breeding. Kingfisher is a species associated with the lakes and rivers, especially in the National Park and probably breeds. Finally, a few pairs of Common Tern breed within the site.

The woodlands provide habitat for a variety of breeding birds, most notably Garden Warbler, Blackcap, and probably a few pairs each of the rare Redstart and Wood Warbler. Lough Leane is a site for wintering wildfowl with the following average counts for the two winters 1995/96 and 1996/97: Teal (208), Mallard (350), Pochard (81), Tufted Duck (323) and Coot (169).

The site supports most of the Irish mammal species. Of particular note is the occurrence of two E.U. Habitats Directive Annex II species: Lesser Horseshoe Bat, with a total population of about 300 individuals distributed at several locations, including both nursery and hibernation sites, and Otter. Perhaps the best known mammals of the Killarney National Park are the Red Deer, which form the only remaining native herd in Ireland, comprised of around 600 animals. Sika Deer also occur. Pine Marten is another notable species.

The site is valuable for its rare fish species, five of which are listed on Annex II of the E.U. Habitats Directive: Brook Lamprey (*Lampetra planeri*), River Lamprey (*Lampetra fluviatilis*), Sea Lamprey (*Petromyzon marinus*), Atlantic Salmon (*Salmo salar*) and Killarney Shad (*Alosa fallax killarnensis*). The Killarney Shad is a unique land-locked subspecies confined to the Killarney lakes. Also of note is the glacial relict, Arctic Char (*Salvelinus alpinus*), a Red Data Book species, a unique form of which is found in Lough Coomasaharn.

There are numerous rare invertebrates within the site. These include three E.U. Habitats Directive Annex II species: Kerry Slug (*Geomalacus maculosus*), the Freshwater Pearl Mussel (*Margaritifera margaritifera*) and the Marsh Fritillary (*Euphydryas aurinia*). The Kerry Slug and Pearl Mussel populations are of particular importance in a national context. Other species of note include: three chironomids of international importance found in the River Flesk; a wood ant (*Formica lugubris*) at one of only four Irish sites; a snail (*Limnaea involuta*), in Lough Crincaum, at its only known location; two dragonflies (*Cordulea aenea* and *Somatochlora arctica*), the former at one of only two known sites in Ireland and the latter at its only known Irish location; and several other aquatic and woodland species at their only known Irish locations.

The main land use within the site is grazing by sheep. In and around the National Park deer grazing is also common. The extensive grazing has caused damage to many of the terrestrial habitats, resulting in degradation of heath and blanket bogs and prevention of woodland regeneration. In the upland habitats the erosion caused by grazing is exacerbated by the exposed nature of the terrain. Apart from grazing, the woodlands are particularly threatened by Rhododendron (*Rhododendron ponticum*) invasion: approximately two thirds of the Oak woodlands are affected,

although a Rhododendron removal programme is underway in the National Park. The Yew wood has been adversely affected by heavy grazing for many years, but it is intended to control this in the near future by erection of a deer fence. The bogs are sensitive to grazing and are also threatened by turbary, burning and afforestation. Most of the lakes are very acid-sensitive and therefore vulnerable to afforestation within the catchment areas. Lough Leane has been subject to some eutrophication, although water quality appears to have improved since phosphates were removed from the sewage in 1985.

A management plan was drawn up for the Killarney National Park in 1991. The park is managed primarily for conservation purposes although recreation is also provided for.

Overall, the site is of high ecological value because of the diversity, quality and extensiveness of many of the habitats, and impressive list of rare species of flora and fauna. In recognition of its importance the Killarney National Park has been designated a World Biosphere Reserve.

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