Northern Ireland Habitat Action Plan
Coastal Sand Dunes
March 2005

1. Current Status

1.1 Physical and biological status

1.1.1 Sand dunes are highly diverse coastal habitats, with a range of physical forms and associated plant communities. They develop when there is a suitable supply of sand (sediment within the size range 0.2 to 2.0 mm) and prevalent onshore winds. The form of the dune depends on the amount of available sediment supplied by eroding coastlines and the seabed, and the ease with which it can be moved by the wind. A critical factor is the presence of a sufficiently large beach plain, onto which the sands are deposited and whose surface dries out between high tides. A breeze of just over 4.5 m/s will start moving dry sand and the dune grows as the sand comes to rest in sheltered areas in the lee of debris on the beach. Pioneer plant species such as sea rocket C*akile maritima* and sand couch grass *Elytrigia juncea* colonise these areas of trapped windblown sand; however foredune and mobile dune communities are dominated by marram grass *Ammophila arenaria*, the key species in dune formation in the UK. The accumulating sand begins to form ridges, which initially lie parallel to the direction of the prevailing winds. Over time these ridges may break up and a more irregular arrangement of hills (dunes) and hollows (dune-slacks) form. Further less specialist plants then gradually colonise, until ungrazed dune grassland becomes scrub and eventually woodland.

1.1.2 The irregularity of dunes is exacerbated by wind and sea erosion. Blow outs result where wind blows away sand on un-vegetated sections of the dune, forming concave features that can further erode to dune slacks. Erosion by the sea can 'bite off' portions of dune systems closest to the shore. The vegetation communities that occur through development from colonisation by the first pioneer plants, to the climax dune vegetation can vary by region, but the typical stages of succession for northwest Europe include all of the more important communities, from strandline to mobile (yellow) and fixed (grey) dunes, dune grassland, heath, scrub and woodland. Grazing or trampling can arrest or even reverse this succession.

1.1.3 The formation of sand dunes is not continuous; those around the Northern Ireland coast were formed thousands of years ago and little or no new dune formation takes place now. The area between Lough Foyle and the Bann Estuary has some of the oldest recorded dunes in Ireland, dated around 5000 years BP (Carter & Wilson, 1991). At Murlough in Co. Down, sand deposition is known to have occurred prior to 5000 years BP and continued until around 2000 years BP. The continued existence of sand dunes is dependent upon a constant supply of sand from offshore.

1.1.4 The dune habitat is nutrient poor and water deficient and this has led to a high diversity of specialised plants in sand dune communities. The age of the dune system and its calcium

carbonate content are also reflected in the type of vegetation present. The presence of these highly specialised plant species and communities is a key factor in the determination of dune systems of national or European importance.

1.1.5 Yellow dunes (also known as foredunes) are an early stage of succession, where dune mobility is of overriding importance. Such dunes are dominated by marram grass, sand couch grass and sea lyme-grass *Leymus arenaria* as they can withstand burial by sand along with the other stresses, such as poor water availability. These embryonic dunes are transient and will either be replaced by more marram-dominated vegetation, or washed away by storms.

1.1.6 Grey dunes occur where a more stable or 'fixed' form of dune develops. The decreasing input of sand leads to a reduction in marram grass, new shoots are less frequent and individual clumps become more sparsely dispersed. Although there may still be some bare patches of sand the majority of these fixed dunes have a continuous vegetation cover. Red fescue *Festuca rubra* is the dominant species present in the grassland. The formation of such grasslands is accelerated under domestic grazing regimes.

1.1.7 Low lying flat areas within a dune system are referred to as slacks. Slacks occur in hollows between dune ridges where the water table is near to the surface of the sand. Plant diversity can be high, particularly on open and low-growing dune slacks communities with calcareous sand. A number of rare or local vascular plants and bryophyte species can occur. The vegetation cover in dune slacks is almost complete and a soil starts to develop. Some slacks may become dominated by low growing species such as creeping willow *Salix repens* or with lower grazing, taller wetland plants such as common reed *Phragmites australis* can occur. Wet woodland can also result.

1.1.8 Vegetation cover on dunes is heavily influenced by the calcium content of the sand which is itself determined by the silica content and shell fragments within the sand. Where the original sand retains its high calcium carbonate content the result is species-rich calcareous dune grassland, with a wide range of plants tolerant of the high pH conditions such as lady's bedstraw *Gallium verum*, bird's foot trefoil *Lotus corniculatus* and fairy flax *Linum catharticum*.

1.1.9 Leaching of fixed dunes leads to a reduction in the calcium carbonate in the sand and eventually more acid conditions develop. Acid dune grassland and dune heath (see below) develop on these acidic fixed dunes. Characteristic species of acid dune grassland include sand sedge *Carex arenaria* and abundant mosses and lichens. Acidic dunes include dunes that are heavily grazed by rabbits and may support lichen communities.

1.1.10 Dune heath or 'brown' dunes have a low content of calcium carbonate in the soil and are normally dominated by heathers such as ling *Calluna vulgaris* or Bell heather *Erica cinerea*. On most dune systems there is not a sharp transition between mobile (yellow) dunes and fixed (grey) dunes, but rather a transition zone, which can be extensive. One 'habitat type' may blend into another over some gradient which is often related to aspect, hydrology or soil parameters.

1.1.11 Further succession and colonisation by less specialised plant species such as gorse *Ulex europeaus*, blackthorn *Prunus spinosa* and the invasive sea buckthorn *Elaeagnus rhamnoides*, leads to the formation of dune scrub which is a component of the fixed dune landscape. Primary dune woodland is the climax community of sand dune systems but it is not considered to be present any longer in the UK. Primary dune woodland would have been present in the past, but has disappeared due to clearance by settlers, grazing, erosion disturbance and development of the more stable landward dune areas. However, sand dunes have areas of secondary woodland with typical woodland development e.g. Murlough, Co. Down.

1.1.12 Most of the basic habitat types described above are common to most large dune systems; however, sand dunes can form in a variety of coastal environments, all of which are in relatively exposed locations. The most common types are bay dunes, where a limited supply of sand becomes trapped between the shelter of two headlands; spit dunes, which form as sandy promontories at the mouths of estuaries and sometimes form a fan-like series of dune ridges and slacks; and hind shore dunes, which occur in the most exposed locations where there is a shallow offshore system, strong onshore winds and where large quantities of sand are driven inland, over a low-lying hinterland. In addition, the ongoing inward passage of sand can leave behind areas eroded down to the water table. This last type forms the largest dune systems in the UK.

1.1.13 There are also a number of less common sand dune types. Ness/foreshore dunes build out from an open coast where there is a super-abundance of sediment or where an area receives longshore drift from two directions at once. Dunes on offshore islands are often superimposed on a base of other material such as shingle; these will be long and thin and tend to grow in the dominant direction of longshore drift. Climbing dunes form where sand is blown up on to high ground adjacent to the beach. Tombolos form where a neck of sand is deposited between two islands or between a promontory and an island.

1.1.14 In Northern Ireland, the largest dune systems are located along the north and south-east coasts. They are highly concentrated in a few large areas, notably at Magilligan Point, Portstewart and the Bann Estuary and White Park Bay along the north coast, and at Dundrum Bay (Ballykinler and Murlough Dunes), Kilkeel Bay and at Killard Point in Co. Down. Other dune systems are widely dispersed around the coast, occurring particularly in north Co. Antrim and South Down. Many of these are either very small or highly modified, both in physiography and vegetation, often because they are managed as golf courses.

1.1.15 Magilligan is one of the largest calcareous dune systems in the UK with largely undisturbed dune ridges (fixed dunes) and well-developed dune slack communities. The Murlough/Dundrum Inner Bay dunes are important for their dune heath and are distinctive because of their development over predominantly acid sands. It contains the only extensive areas of dune heath in Northern Ireland. Murlough also contains examples of communities which generally occur in the British Isles much farther south, and all of the systems contain a range of plant species that are scarce in Northern Ireland. Some of the dunes at Bann Estuary (Grangemore) are considerably older than others in NI and have floristic significance.

1.1.16 There are estimated to be approximately 3000 ha of dunes in Northern Ireland; however the area of sand dunes with sand dune vegetation is estimated to be between 1300 and 1500 ha (EHS, unpublished).

1.1.17 As part of a study of coastline plant communities, Cooper *et al*., (1992) surveyed the main sand dune systems of Northern Ireland. Ten dune vegetation communities were recorded, based on the National Vegetation Classification (Rodwell, 2000). Foredune habitat was recognised as SD4 *Elymus farctus ssp. boreali-atlanticus* community (NB *Elymus farctus* is now known as *Elytrigia juncea)*), mobile dune systems were listed as SD6 *Ammophila arenariae* marram grass community and semi-fixed dunes as SD7 *Ammophila arenariae - Festuca rubra* community. Dune grassland communities recorded included SD8 *Festuca rubra - Galium verum* and SD9 *Ammophila arenariae - Arrhenatherum elatius*. Sand sedge dunes were recorded as SD10 *Carex arenaria* community. SD14 *Salix repens – Campylium stellatum*, SD16 *Salix repens - Holcus lanatus* and SD17 *Potentilla anserina – Carex nigra* common sedge communities represented the main dune slack communities. The Sea buckthorn *Elaeagus (Hippophae) rhamnoides* scrub (SD18) community was also recorded.

1.1.18 Although these plant communities have all been found on sand dunes in Northern Ireland, conditions are not ideal and in many areas the vegetation has become too rank and dominated by scrub invasion. This has led to a lack of bare ground among the dunes causing stabilisation where the dunes would ideally still be mobile. One of the main causes of this rank growth is a lack of grazing on the sand dune systems which would keep the scrub to an acceptable level.

1.1.19 In Northern Ireland a number of rare or notable plant species occur within sand dune systems. The 'Red List' plant smooth cat's ear *Hypochoeris glabra* occurs on dunes at Magilligan, Castlerock, Grangemore, Portstewart and White Park Bay. Other species protected under the *Wildlife (Northern Ireland) Order 1985* include the bee orchid *Ophrys apifera* in dry calcareous sites and marsh helleborine *Epipactis palustris* in dune slacks. A number of other rare or notable species are found on dune systems in the region, including shepherd's cress *Teesdalia nudicaulis* which is found at both Murlough and the Bann Estuary. Hoary whitlow grass *Draba incana* (a Red List species) is found at Magilligan. Other Red List species include Scots lovage *Ligusticum scoticum* and dwarf spring vetch *Vicia lathyroides* which are found at Portstewart and at Murlough respectively. The only Irish site of seaside centaury *Centaurium littorale* is Portstewart at the Bann Estuary.

1.1.20 Sand dunes are also important for several species of bryophytes. Humid dune slacks at Magilligan support populations of petalwort *Petalophyllum ralfsii*, a liverwort listed on the EC Habitats & Species Directive; the moss *Rhytidium rugosum*, which is a scheduled species under the Wildlife Order (NI) 1985; and the provisional Irish Red Data Book moss species *Thuidium abietinum*, which is also found at Umbra. *Rhytidium rugosum* has not been found anywhere else in Ireland, yet thrives in Ballymaclary/Magilligan and is present in small quantities in nearby Binevenagh.

1.1.21 Sand dunes also support a large proportion of the butterfly, moth, bee, ant and wasp fauna of Northern Ireland. Twenty-one butterfly species have been recorded, including the

grayling *Hipparchia semele*, the dark green fritillary *Argynnis aglaja* and the marsh fritillary *Euphydryas aurinia*; a species listed for protection under the EC Habitats & Species Directive. The heath and dune vegetation at Murlough Dunes supports 55 species of bee, ant and wasp (which equates to 33% of Irish fauna), 213 species of moth (48% of Northern Irish fauna) and 21 species of butterfly, roughly 71% of Northern Irish butterfly fauna. The Murlough Dunes include one of the largest populations of marsh fritillary butterfly in Northern Ireland, a selection feature for the Murlough candidate Special Area of Conservation (cSAC). Marsh fritillary generally require low grazing rates, as their only food plant, devil's-bit scabious *Succisa pratensis* is vulnerable to heavy grazing. The rare UK BAP priority species, the colletes mining bee *Colletes floralis* was thought to be extinct in Ireland until it was rediscovered by the RSPB in the dunes of Portstewart, White Park Bay, Bushfoot Strand and Ballymaclary National Nature Reserve (NNR). The carabid beetle *Amara bifrons* is confined to coastal sand dunes and is considered rare but widespread (Anderson, 1996).

1.1.22 A range of vertebrate species occur on dunes in Northern Ireland and these include the common lizard *Lacerta vivipara* and the smooth newt *Triturus vulgaris*. Also, once stabilized by plant growth, dunes provide nesting habitats for breeding birds. When the stabilising vegetation is diverse, the habitat is both more attractive and supports a greater variety of species. Skylark *Alauda arvensis* and meadow pipit *Anthus pratensis* are early colonizers of fixed sand dune systems in this region.

1.2 Links with other action plans

1.2.1 This coastal sand dune Habitat Action Plan identifies targets and actions required to deliver Northern Ireland's contribution to the UK Biodiversity Action Plan. (UK Biodiversity Steering Group, 1999).

1.2.2 Sand dunes occur adjacent to a range of habitats. The overlap of this Habitat Action Plan with the Habitat Action Plans for seagrass beds, saltmarshes, mudflats and coastal vegetated shingle must be taken into account when delivery of this action plan is being considered.

1.2.3 Within Northern Ireland, sand dune habitat is important for a number of UK priority species identified as part of the UK Biodiversity Action Plan programme. These include marsh fritillary *Euphydryas aurinia*, colletes mining bee *Colletes floralis*, a petalwort *Petalophyllum ralfsii*, skylark *Alauda arvensis* and long-leaved thread moss *Bryum neodamense* although this is possibly now extinct in Northern Ireland. The requirements of these species should be taken into account during the implementation of this plan.

1.2.4 In addition a number of Northern Ireland priority species are associated with sand dunes including the Irish hare *Lepus timidus hibernicus*, wall brown *Lasiommata megera*, the mosses *Drepanocladus lycopodioides* and *Rhytidium rogosum*, seaside centaury *Centurium littorale*, smooth cat's-ear *Hypochaeris glabra* and shepherd's cress *Teesdalia nudicaulis*. The requirements of Northern Ireland priority species should be taken into account during the implementation of this plan.

1.2.5 An all-Ireland Species Action Plan has been published for the Irish hare.

1.2.6 Relevant published Northern Ireland Species Action Plans include the Irish hare, chough *Pyrrhocorax pyrrhocorax* and marsh fritillary *Eurodryas aurinia*.

2. Current Factors Affecting the Habitat

2.1 Erosion/accretion/sediment availability - unless artificially constrained, the seaward edges of sand dunes can be a highly mobile feature, though there is a natural trend to greater stability further inland. Very few dune systems are in overall equilibrium, and a majority of those in the UK demonstrate net erosion rather than net accretion; insufficient sand supply is frequently the underlying cause. There is potential for dredging and marine aggregate extraction, through the disruption of coastal processes, to have cumulative and long-term effects on sand dunes.

2.2 Water tables - in some dune systems, a long term fall in the water table can lead to loss of the specialist slack flora and invasion by coarse vegetation and scrub. While unusually dry summers may contribute to this problem, the long-term causes are believed to be local extraction of water and/or drainage of adjacent land used for agriculture or housing.

2.3 Grazing - continued grazing is normally necessary to maintain the typical fixed dune communities, but over-grazing, particularly when combined with the provision of imported feedstuffs, can have damaging effects by affecting the nature of the vegetation and therefore the stability of the dunes. A more widespread problem is under-grazing, leading to invasion by coarse grasses and scrub, though rabbits are locally effective in maintaining a short turf. Grazing by rabbits preserves the dune vegetation by preventing the encroachment of trees and bushes.

2.4 General recreation - is a major land use on sand dunes. Many dune systems are used extensively by holiday-makers, mostly on foot but also for parking cars and in some cases for driving four-wheel-drive vehicles or motorcycles. Moderate pressure by pedestrians may cause little damage, and may even help to counteract the effects of abandonment of grazing. However, excessive pedestrian use, as on routes between car parks and beaches, and vehicular use in particular, have caused unacceptable erosion on many dune sites through 'trampling' pressures. Another problem associated with recreation is the eutrophication of the dune systems due to excessive dog faeces.

2.5 Golf courses - many dune systems also support one or more golf courses. Here much of the original vegetation may be retained in the rough, but the communities of the fairways, and particularly the greens and tees, are often severely modified by mowing, fertilising and re-seeding. Fragmentation of dune systems by golf courses makes grazing management much more difficult, and strict control on rabbit populations has led to rapid successional change and widespread loss of dune grassland to mesotrophic swards. Some sand hill and small dune systems along the Outer Ards Peninsula have been levelled to create recreation areas and prevent sand blowing over the coast road.

2.6 Coastal sea defence - many dune systems are affected by the construction of sea defence works or artificial stabilisation measures such as sand fencing and marram planting. Hard sea defences can lead to fossilization of dunes behind sea walls. While carefully applied dune management measures can help to counteract severe erosion which may threaten the existence of a dune, engineered defence systems usually reduce the biodiversity inherent in the natural dynamism of dune systems, and may cause sediment starvation.

2.7 Beach management - on some heavily used beaches the pressure of pedestrian or vehicular traffic, or beach cleaning using mechanical methods, can prevent the establishment of embryo dunes through the removal of driftline vegetation or debris. These factors may remove the minor obstacles which would catch the sand initially, or destroy the embryo dunes at an early stage in their formation.

2.8 Military use – during the Second World War the majority of dune systems were used for the construction of defensive installations, for military training or both. The resultant widespread erosion had a severe effect on dune vegetation which has since been reversed by protective measures and natural recovery. Military use can be beneficial in restricting other activities or developments.

2.9 Development - sand dunes have also been affected in the past by housing developments, industrial development, waste disposal and fly tipping.

2.10 Sand removal - small-scale removal of sand from dunes has been recognised as a problem in Northern Ireland. In some areas, the traditional rights of farmers to remove sand and shell grit still exist.

2.11 Coastal squeeze – some sand dunes are being squeezed between an eroding seaward edge and fixed flood defence walls. This erosional process is being intensified by a reduced supply of sediment in some locations.

2.12 Alien species - such as sea buckthorn *Elaeagnus rhamnoides*, a native of eastern England, was widely planted to stabilize sand dunes and resulted in the considerable loss of dune grassland at Portstewart, Ballykinler and Murlough Dunes. At Portstewart and Murlough Dunes the National Trust has undertaken control measures. At both sites, erosional pressures on sand dunes around 1900 led to the introduction of sea buckthorn to control the mobile sand. Over time this has led to the loss of open dune habitat and important dune grassland communities including rare plants and animals. The encroachment of gorse *Ulex europaeus*, and other scrub and rank grasses at Murlough Dunes has been reversed by the reintroduction of rabbits and winter grazing by sheep, rare breed cattle and ponies.

3. Current Action

3.1 Legal status

3.1.1 Statutory site designation plays an important part in the conservation of sand dunes. In 1992, the EC adopted the *Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna*, known as the 'Habitats Directive'. The Habitats Directive requires member states to designate and manage Special Areas of Conservation (SAC's) for habitats (listed in Annex 1 of the Directive) and species (listed in Annex 2). A small proportion of these habitats and species, which are considered to be most in need of conservation at a European level, are given priority status. Annex 1 contains *Embryonic shifting dunes* (H2110), *Shifting dunes along the shoreline with A. arenaria (white dunes)* (H2120), *Dunes with Salix repens spp. Argentea (Salicion arenariae)* (H2170), *Humid dune slacks* (H2190), *Fixed dunes with herbaceous vegetation (grey dunes)* (H2130) and *EU-Atlantic decalcified fixed dunes (Calluno-Ulicetea)* (H2150). These are found in four sites, the Bann Estuary, the North Antrim Coast, Murlough and Magilligan candidate SACs (c SACs).

3.1.2 The *Conservation (Nature Habitats, etc.) Regulations (Northern Ireland) 1995* and *The Conservation (Natural Habitats, etc.) (Amendment) Regulations (Northern Ireland) 2004* (The Habitat Regulations) require competent authorities, when considering a plan or project not directly connected with the management of a European site e.g. an SAC or SPA, to undertake an Article 6 assessment. This assessment will determine if the plan or project, either alone or in combination with other plans or projects, is likely to have a significant impact on the site. In the case of a negative or undetermined assessment, a competent authority may only agree to the plan or project where it is satisfied that there are no alternative solutions and that the plan or project must be carried out for imperative reasons of overriding public interest, which may be of a social or economic nature. However, if the site hosts a priority habitat or species then the plan or project may only be approved for: a) reasons of human health, public safety, beneficial consequences of primary importance to the environment, or b) other reasons which the Department (DOE), having considered the opinion of the European Commission (EC), determines are imperative reasons of overriding public interest.

3.1.3 Under the terms of the Habitat Regulations, the above Article 6 assessment by the competent authority is required for plans or projects e.g. land reclamation, which are outside European sites but may still have an impact on the site.

3.1.4 Guidance to help competent authorities and others to interpret the Habitat Regulations has been published (EHS, 2002).

3.1.5 Guidance on the completion of an Article 6 assessment has also been published (European Commission, 2000).

3.1.6 There are seven Areas of Special Scientific Interest (ASSIs) in Northern Ireland which include sand dunes as a selection feature. ASSIs are identified and declared under the *Nature Conservation and Amenity Lands (Northern Ireland) Order* 1985, by the Department of the Environment (DOE) through the Environment and Heritage Service (EHS). Around 1100ha of dune are covered by this designation, which include the two major sand dune areas at Murlough and Magilligan with several existing NNRs (Murlough, Ballymaclary).

3.1.7 In 2000, the Northern Ireland Biodiversity Group (NIBG) made its Recommendations to Government (NIBG, 2000). These were largely accepted by the Northern Ireland Executive in 2002, with the publication of the *Northern Ireland Biodiversity Strategy* (DoE, 2002). *The Regional Development Strategy 2025* (DRD, 2001) is underpinned by the sustainable approach and includes Strategic Planning Guidelines (SPGs) on the protection of the environment which bring together a comprehensive collection of natural heritage and built heritage strategic guidance that includes sustaining and enhancing biodiversity.

3.1.8 Regional Planning and Transportation Division within DRD is responsible for co-ordinating the implementation of the *Regional Development Strategy (RDS) for Northern Ireland 2025* (DRD, 2001). The RDS contains a Spatial Development Strategy and related Strategic Planning Guidelines (SPGs). The emphasis in the SPGs is on competitiveness, sustainable development and tackling social exclusion and division. Operational policies to give effect to the SPGs are contained in Planning Policy Statements (PPSs). Some of these policies have a direct or indirect bearing on the prevention of adverse impacts on priority habitats and species.

3.1.9 *PPS2 Planning and Nature Conservation* (DOE, 1997) (under review) contains planning policy for the hierarchy of sites of nature conservation importance. It also addresses trees and woodlands, protection of species and peatlands.

3.1.10 *PPS15 Planning and Floodrisk* is currently out to public consultation. It embodies the Government's commitment to sustainable development and the conservation of biodiversity and adopts a precautionary approach to decision making that takes account of climate change.

3.1.11 *PPS14 Sustainable Development in the Countryside* is due to be published by the end of 2005.

3.1.12 Site protection policies are included in Development Plans. Sites of Local Nature Conservation Importance (SLNCIs) are being identified for consideration by Planning Service and will be formally included in Development Plans. Where such sites are confirmed in adopted plans, specific planning policies will be applied to development proposals on those sites. The SLNCI network will include a number of mixed ashwood sites of substantive nature conservation interest, which are not designated as ASSIs or NNRs.

3.1.13 Semi-natural areas, which are likely to be of particular environmental importance, are protected through the *Environmental Impact Assessment (Uncultivated Land and semi-Natural Areas) Regulations (Northern Ireland) 2001.* These regulations, which came into operation in Northern Ireland in February 2002, are administered by DARD and seek to ensure that agricultural development of uncultivated land or semi-natural areas must first be assessed for environmental significance. This would also include cases where the landuse changes are aimed at restoring or enhancing sand dunes.

3.1.14 The UK Woodland Assurance Standard (UKWAS Steering Group, 2000), a voluntary certification standard, requires that valuable semi-natural habitats are being treated in a manner that does not lead to further loss of biodiversity. Forest Service is certified against this standard and is undertaking a survey of its lands to identify valuable semi-natural habitats.

3.1.15 *The Environmental Impact Assessment (Forestry) Regulations (Northern Ireland) 2000* require anyone who wishes to carry out a project including afforestation, deforestation, forest road works or forest quarry works that is likely to have significant effects on the environment to obtain consent for the work from the Department of Agriculture and Rural Development.

3.1.16 Forest Service acquisition policy is outlined in *Afforestation – the DANI Statement on Environmental Policy* (DANI, 1993). It states that there should be a presumption against afforestation of botanically rich sites, which have undergone little disturbance for many years.

3.2 Management, research and guidance

3.2.1 EHS, as part of the requirements of the Habitats Directive, has prepared conservation objectives for those sites submitted as cSACs. Where sand dunes occur on cSACs and ASSIs, they are protected by control of potentially damaging operations and by the application of targeted conservation objectives.

3.2.2 Common standards monitoring protocols are also being established across the UK to assess the extent and condition of sand dune within designated sites. This programme will be extended to include all sand dunes ASSIs. However, standards for assessing favourable condition of the habitat in the wider countryside have not yet been agreed. Advice on undesignated areas will depend on the detection of a habitat that is often difficult to differentiate from adjacent habitats and communities.

3.2.3 The Management of Sensitive Sites scheme (MOSS), launched in 2002 by EHS, is a voluntary scheme designed to ensure the positive management of ASSIs. Under the scheme, landowners can receive payment for carrying out conservation work within the framework of a written agreement. MOSS covers issues such as agricultural improvement, grazing and the control of invasive scrub species. One-off payments for works such as fencing and scrub clearance to assist grazing can be made. The MOSS scheme covers coastal areas including sand dunes where annual payments can be received

for correct levels of grazing, non-use of fertilisers and other positive management prescriptions.

3.2.4 The UK Government has set out its commitment to sustainable management of the coast in a number of publications. *Planning Strategy for Rural Northern Ireland* (DOE 1993) has provisions relating to development, access and conservation of the coast.

3.2.5 The conservation of the coastline of Northern Ireland took a step forward with the publication in 1995 of a consultation paper on coastal zone management (DOE, 1995). Currently an Integrated Coastal Zone Management strategy is being developed for Northern Ireland and is due for completion by 2006. This will help provide a strategic context for the implementation of this action plan.

3.2.6 DARD, through its Countryside Management Branch (CMB), has developed a series of agri-environment schemes including the Environmentally Sensitive Areas (ESA) Scheme (revised in 2000) and the Countryside Management Scheme (CMS). A further revision to both the ESA and CMS has recently been approved under the current Northern Ireland Rural Development Programme (2000-2006). Their objective is to protect and enhance semi-natural habitats by encouraging more sensitive management practices. Both these schemes have similar management provisions, are voluntary and apply to the whole farm.

3.2.7 The Habitat Improvement Scheme (HIS) aims to help farmers protect, enhance and establish habitats which are considered to have major conservation value. This is achieved by taking land out of agicultural production or by entering into a 10 year agreement which involves extensive grazing based on non-application of fertilizers and pesticides to the land. No new applications for the HIS are being accepted as the scheme closed in mid-1999. The scheme has been replaced by the Countryside Management Scheme (CMS).

3.2.8 The CMS, launched in 1999, was developed with the primary aim of maintaining and enhancing biodiversity and is open to application from all farmers and landowners outside ESAs. As funding is limited, entry into the scheme is competitive, being based on who can offer the greatest environmental benefits. DARD can provide area-based payments on blocks of > 0.1 ha in area within the farm unit, where it meets clearly defined criteria. The priority habitat must be brought under agreement and managed according to the specific objectives and prescriptions of the agri-environment scheme. A range of habitats are under long-term monitoring by QUB's Agri-environment Monitoring Unit (QUB, 2004b).

3.2.9 DARD has developed the Entry Level Countryside Management Scheme (ELCMS) which is due to open mid 2005. ELCMS has been designed to be easily accessible and to deliver a range of basic agri-environment improvements. Participants in the scheme will be required to undertake a field boundary management module, one of 3 possible water quality modules and one of 5 further biodiversity modules. The scheme will complement the existing agri-environment programme.

3.2.10 Other relevant information is gathered through specialist biological recording groups, Non-Governmental Organisations (NGOs), universities and government bodies.

Biological records are currently stored at the National Museums and Galleries of Northern Ireland (MAGNI) and at the Centre for Environmental Data and Recording (CEDaR). CEDaR was established in 1995 in partnership with EHS, MAGNI and the biological recording community. There are currently over 1.4 million records held by CEDaR and there are developments underway to make these records more accessible through the Internet. This will be achieved through the National Biodiversity Network, a union of organisations throughout the UK working together to create an information network of biological data providing an accessible data source for biodiversity information.

3.2.11 The *Northern Ireland Countryside Survey* (NICS), is a sample survey of Northern Ireland vegetation communities used to estimate the extent and distribution of broad habitats across the Northern Ireland countryside. Repeat surveys are used to assess land-use change. The first phase in the process was *A land classification and landscape ecological study of Northern Ireland* carried out in the early 1990s (Murray *et al.*, 1992). The *NICS 2000* (Cooper & McCann, 2001) repeated the survey in 1998.

3.2.12 Over 700 miles of coastline are owned and protected by the National Trust; 125 miles of which are in Northern Ireland including sand dunes at Murlough NNR, Portstewart, Grangemore and White Park Bay. The National Trust is actively involved in reinstating grazing on many of their properties. Other non-governmental organisations, such as the Ulster Wildlife Trust also manage an important sand dune sites in at the Umbra, Northern Ireland. These owned or managed areas often have the benefit of a warden/ranger service that encourages appropriate management and control of damaging activities and provides interpretative and educational services. They all contribute to coastal zone management initiatives in Northern Ireland.

3.2.13 The Strangford Lough Management Scheme was formally launched on the 8th October 2001, with a new version currently being developed. It is intended to safeguard the conservation status of those features for which Strangford Lough has been selected as a candidate Special Area of Conservation (SAC) and classified as a Special Protection Area (SPA). The scheme sets the framework through which activities will be managed so as to achieve the conservation objectives of the European marine site.

3.2.14 The European Union for Coastal Conservation and Eurosite have helped to promote a number of international conferences and field meetings on dune management in recent years, resulting in valuable exchanges of views and experience among dune managers from maritime nations. The European Golf Association Ecology Unit has promoted sympathetic management of dune golf links.

3.2.15 Many NNRs and ASSIs with fixed dune vegetation are managed by grazing with domestic livestock. Prominent examples include White Park Bay, the Bann Estuary including Portstewart, and Murlough Dunes in Northern Ireland. Many of the larger and/or more heavily visited dune sites are managed as nature reserves or country parks.

3.2.16 Environmental impact assessment is a statutory requirement for certain proposed developments where there is likely to be a significant effect on the environment.

3.2.17 The EU LIFE programme; *Implementing strategies in Irish beach and dune management: involvement in sustainable coastal development* (Power *et al.*, 2000) forms part of the EU demonstration programme on integrated coastal zone management.

3.2.18 The development of Local Biodiversity Action Plans (LBAPs) based on District Council areas and/or discrete landscape areas, and the appointment of Local Biodiversity Officers will help to build on the SLNCI network and encourage, co-ordinate and inform local biodiversity action.

4. Action Plan Targets

4.1 Maintain the current extent of sand dunes at 1500ha.

4.2 Maintain the area of sand dunes in favourable condition at 300ha.

4.3 By 2015, restore to favourable condition an area of sand dune in unfavourable condition (1150ha.)

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5. Proposed Actions with Lead Agencies

5.1 Policy and legislation

5.1.1 By 2005, initiate discussions with other government departments to ensure that appropriate consultation mechanisms exist for proposed changes in land-use.
(ACTION: DOE, DARD, Planning Service, EHS)

5.1.2 By 2006, review *Planning Policy Statement 2 (*PPS2*) – Planning and Nature Conservation*, to include policies relating to the conservation of priority habitat and species.
(ACTION: Planning Service, EHS)

5.1.3 By 2006, produce *Planning Policy Statement (*PPS15) on *Planning and Flood Risk*. This includes an objective to promote an integrated sustainable approach to the management of development and flood risk that, among other matters, will contribute to the conservation and enhancement of the biodiversity of Northern Ireland.
(ACTION: Planning service, EHS)

5.1.4 By 2005, produce *Planning Policy Statement* (PPS14) on *Sustainable Development in the Countryside* which includes objectives to minimise the impact of housing development on the environmental resources of habitat, water quality and biodiversity of the rural area, thereby contributing to the conservation of biodiversity in Northern Ireland.
(ACTION: DRD, EHS, Planning Service)

5.1.5 By 2005, produce a Planning Policy Statement (PPS) on the coast to manage coastal development in a sustainable manner and protect the natural character and landscape of the coast.
(ACTION: DRD)

5.1.6 Identify further examples of sand dunes as SLNCIs for consideration for adoption into appropriate Development Plans.
(ACTION: EHS, Planning Service)

5.1.7 Ensure that important coastal sand dune sites not already identified e.g. as SLNCIs, are recognised and, where appropriate, site protection policies are included in Development Plans and other strategic plans such as Local Biodiversity Action Plans (LBAPs) and coastal zone management strategies.
(ACTION: Planning Service, EHS, DARD, District Councils, Forest Service)

5.1.8 In the preparation of Planning Policy Statements, the promotion of biodiversity will be taken into account where appropriate.
(ACTION: Planningservice, DRD, EHS)

5.1.9 By 2006, develop and promote policies and procedures which will aim to prevent losses of sand dune habitat to development and exploitation through for example, development schemes, flood and coastal defence works, dredging operations.
(ACTION: Planning Service, DARD, Rivers Agency, EHS, DETI, Harbour Authorities)

5.1.10 By 2006, explore options for using statutory measures, aside from those specifically designed for nature conservation, to protect sand dunes.
(ACTION: DOE, DARD, DCAL, DRD).

5.1.11 By 2006, develop and promote agri-environment schemes which will encourage restoration and sustainable management of dune habitats.
(ACTION: DARD)

5.1.12 By 2006, consider the implications of enabling agricultural land to be made available for coastal habitat creation, for example through awareness of agri-environment schemes, the development of appropriate management mechanisms and the incorporation of the non-use value of sand dunes into cost/benefit analysis for flood defence schemes.
(ACTION: EHS, DARD, DOE, District Councils)

5.1.13 By 2006, develop and promote incentives to encourage the management and restoration of landward transitional dune habitats and where appropriate allow landward movement of dunes, especially where there are seaward losses due to sea level rise.
(ACTION: EHS, DARD)

5.1.14 By 2007, ensure that agri-environment scheme prescriptions relevant/appropriate to coastal sand dunes are contributing to maintaining and enhancing the habitat across Northern Ireland.
(ACTION: DARD, EHS)

5.1.15 By 2006, develop and promote coastal zone management policies which allow the maximum possible free movement of coastal sediment and pay full regard to the conservation of sand dunes.
(ACTION: DOE)

5.1.16 By 2006, prepare an Integrated Coastal Zone Management Strategy for Northern Ireland.
(ACTION: DOE, EHS)

5.1.17 By 2007, establish a Northern Ireland cross-sectoral steering group, to take forward the requirements of the coastal habitat action plans.
(ACTION: EHS, DARD).

5.1.18 By 2007, consider the use of Shoreline Management Plans in the delivery of this plan.
(ACTION: EHS)

5.1.19 Ensure that designated sand dune sites are properly recognised within River Basin Management Plans by 2009 as required by the Water Framework Directive.
(ACTION: EHS)

5.1.20 By 2007, give consideration to how planning policy might discourage new built development within appropriate buffer zones in the vicinity of sand dunes.
(ACTION: DOE, EHS, District Councils)

5.1.21 By 2005, ensure that the importance of sand dunes and offshore sediment resources is recognised in flood and coastal defence strategies and, where appropriate, encourage such strategies to contribute to the objectives and targets of this plan.
(ACTION: DOE)

5.1.22 By 2005, ensure conservation management requirements for sand dunes are included in the development and implementation of coastal zone management plans and ensure that they are not managed in isolation from other habitats and communities in these areas.
(ACTION: DOE, EHS)

5.1.23 By 2010, look into the feasibility of developing provisions within the planning systems to encourage the re-siting of developments which are vulnerable to coastal erosion.
(ACTION: DOE)

5.2 Site safeguard and management

5.2.1 By 2006, determine the extent and quality of the sand dune resource which falls within protected areas and notify further sites, if required, to fill significant gaps. In particular, ensure that there is adequate representation of the full range of variation in sand dune communities found around Northern Ireland.
(ACTION: EHS)

5.2.2 By 2005, identify sand dunes that have been damaged or degraded by, for example, coastal defences, drainage schemes, recreation, tourism development, agricultural management, land reclamation and invasive species.
(ACTION: EHS)

5.2.3 By 2006, prioritise areas, timescales and targets based on designation status and restoration potential, for the conservation and improvement of sand dune habitat.
(ACTION: EHS, DARD)

5.2.4 By 2007, where feasible, initiate remedial action to restore damaged or degraded sand dunes to favourable condition.
(ACTION: EHS)

5.2.5 By 2006, produce conservation objectives for all statutory sites that incorporate coastal sand dune habitats ensuring that the objectives do not conflict with the requirements of sand dunes.
(ACTION: EHS)

5.2.6 By 2007, establish uptake and management agreements, including MOSS, with landowners and occupiers on statutory designated sites aimed at creating or maintaining the favourable condition of sand dunes.
(ACTION: EHS, DARD, District Councils)

5.2.7 By 2008, encourage golf course management policies and practices which are sympathetic to the flora and fauna of coastal ecosystems.
(ACTION: EHS, District Councils)

5.2.8 By 2008 encourage military activities and policies which are sympathetic to the flora and fauna of sand dune systems.
(ACTION: MOD, EHS)

5.2.9 By 2007, promote and encourage the restoration of dune vegetation on dune systems used for arable farming or agriculturally improved grassland.
(ACTION: DARD, EHS)

5.2.10 By 2007, monitor and regulate water abstraction and land drainage schemes which might affect water tables in sand dune systems, and promote remedial action where necessary.
(ACTION: DARD, EHS)

5.2.11 Continue to discourage unnecessary stabilisation of all dunes, and where appropriate promote managed destabilisation measures on over-stabilised dunes.
(ACTION: EHS)

5.2.12 By 2008, support beach management strategies which encourage the protection of the seaward fronts of dune systems from unsustainable pressure by pedestrian or vehicular traffic, and discourage the use of mechanical beach cleaning close to dune fronts.
(ACTION: EHS, District Councils)

5.2.13 By 2006, ensure that there are adequate control programmes for *Alaeagus (Hypophae) rhaminoides* and other invasive species on all sites where there is a threat to the favourable condition of the habitat.
(ACTION: EHS)

5.2.14 By 2008, encourage the increased use of soft e.g. foreshore recharge, rather than hard engineering techniques where some degree of coastal stabilisation is essential.
(ACTION: DARD, DOE, District Councils)

5.3 Advisory

5.3.1 By 2006, provide information to landowners on the conservation and importance of sand dune habitat through production, promotion and dissemination of literature.
(ACTION: EHS, DARD)

5.3.2 By 2006, make use of potential provided by coastal partnerships in taking forward the actions of this plan.
(ACTION: EHS, District Councils)

5.3.3 By 2006, develop guidelines that identify those circumstances under which restoration of degraded sand dune should be encouraged.
(ACTION: EHS, DARD)

5.3.4 By 2007, develop and promote awareness and training programmes on the conservation, management and restoration of sand dunes through key organisations/individuals involved in the delivery of advice to farmers and land managers.
(ACTION: EHS, DARD)

5.3.5 By 2006, promote and develop demonstration sites for the restoration of dune vegetation on dune systems.
(ACTION: EHS, DARD)

5.3.6 By 2006, encourage applications from potential partners to obtain funding to bring sand dune habitat into favourable management.
(ACTION: EHS, DARD, District Councils)

5.4 International

5.4.1 By 2006, develop further links with Great Britain, the Republic of Ireland and other European and international organisations and programmes such as the European Environment Agency and the European Centre for Nature Conservation, to promote the exchange of information on sand dune ecology and management, and experience in research, management techniques, education, and conservation strategies.
(ACTION: EHS)

5.4.2 By 2008, liaise with research institutes in Europe and elsewhere to exchange data and information on the conservation of sand dunes.
(ACTION: EHS)

5.5 Monitoring and research

5.5.1 Assess and report on the need for research on natural and anthropogenic impacts on coastal dynamics in relation to sand dunes.
(ACTION: EHS)

5.5.2 By 2006, initiate an assessment of land management practices on sand dunes including grazing.
(ACTION: EHS)

5.5.3 By 2005, set standards for assessing favourable condition of sand dunes throughout Northern Ireland.
(ACTION: EHS).

5.5.4 By 2006, compile an inventory of all sand dune systems in Northern Ireland.
(ACTION: EHS)

5.5.5 By 2007, prioritise those sites which are suitable for improving condition, for restoration and for enhancement.
(ACTION: EHS)

5.5.6 By 2006, carry out an assessment of how the conservation interest of sand dunes may be affected by nitrogen deposition, climate change and sea level rise and promote research needs accordingly.
(ACTION: EHS)

5.5.7 By 2006, commission a study to identify possible coastal and sea defence strategies that may be more sympathetic to the nature conservation interests of sand dunes, and identify stretches of coastline where such sympathetic modifications are feasible.
(ACTION: DOE, EHS, DETI, DRD, DARD)

5.5.8 By 2006, if required, promote research into the causes of falling water tables in sand dune systems.
(ACTION: EHS)

5.5.9 By 2006, ensure that all relevant information gathered in surveys is passed to the Centre for Environmental Data and Recording (CEDaR) based at the Ulster Museum and to other relevant centres. Encourage access to, and exchange of these records, by contributing to the National Biodiversity Network web-based catalogue of environmental information.
(ACTION: EHS)

5.5.10 By 2007, initiate monitoring programmes to establish the effectiveness of government funded schemes and management methods in achieving the targets of this plan.
(ACTION: EHS, DARD)

5.5.11 By 2010, monitor sand dune restoration sites so that management resources can be focused on areas most likely to show a positive response.
(ACTION: EHS)

5.5.12 By 2007, assess the likely medium to long-term demand for offshore sediment in order to maintain the current sand dune structures and their associated habitats.
(ACTION: CEC, DoE, DRD)

5.5.13 By 2006, set in place a reporting and monitoring structure to encourage progress towards the delivery of the targets and the completion of actions identified in this plan.
(ACTION: EHS)

5.6 Communications and publicity

5.6.1 By 2006, raise public awareness of sand dunes and the value for a variety of interests including coastal processes, flood defence, fisheries, nature conservation, amenity and recreation.
(ACTION: EHS)

5.6.2 By 2005, devise a strategy for ensuring effective distribution of existing advisory material to managers and farmers and if gaps are identified, produce and disseminate appropriate material to fill these.
(ACTION: EHS, DARD)

5.6.3 By 2006, encourage appropriate access as well as interpretative and educational provisions on sand dunes to increase enjoyment and public awareness of this habitat.
(ACTION: EHS, District Councils)

5.6.4 By 2008, facilitate production of information such as a simple web-site, an attractive booklet and CD-ROM for the public and schools which explains the conservation importance of sand dunes in Northern Ireland.
(ACTION: EHS, Department of Education, DARD)

5.6.5 By 2008, implement at appropriate venues such as the Ulster Museum, the Exploris Aquarium and coastal EHS Countryside Centres, 'flagship' programmes for achieving education, increased public awareness and appreciation of sand dunes in Northern Ireland.
(ACTION: EHS)

6. Costings

6.1 A table showing the global costs for this and other HAPs is available on the EHS/Biodiversity web page.

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List of Useful Acronyms

ASSI	Area of Special Scientific Interest
BAP	Biodiversity Action Plan
CEDaR	Centre for Environmental Data and Recording
CMD	Countryside Management Division
CMS	Countryside Management Scheme
DARD	Department of Agricultural and Rural Development
DCAL	Department of Culture, Arts and Leisure
DETI	Department of Enterprise, Trade and Industry
DOE	Department of the Environment
DRD	Department for Regional Development
EHS	Environment and Heritage Service
ESA	Environmentally Sensitive Area
ESCRs	Earth Science Conservation Review Site
HAP	Habitat Action Plan
JNCC	Joint Nature Conservation Committee
MAGNI	The National Museums and Galleries of Northern Ireland
NIBG	Northern Ireland Biodiversity Group
NICS	Northern Ireland Countryside Survey
NNR	National Nature Reserve
PPG	Planning Policy Guideline
PPS	Planning Policy Statement
RA	Rivers Agency
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SAP	Species Action Plan
SLNCI	Sites of Local Nature Conservation Importance
SoCC	Species of Conservation Concern
SPA	Special Protection Area
WFD	Water Framework Directive
WWT	Wildfowl and Wetlands Trust