

Northern Ireland Habitat Action Plan
Marl lakes
March 2005

1 Current Status

1.1 Physical and chemical status

- 1.1.1 Most standing water bodies are broadly classified as eutrophic (high), mesotrophic (medium) or oligotrophic (low), based on the nutrient status of their waters. Nutrient concentrations usually characterise the water body type, but seasonal biotic effects on the water body chemistry may extend the nutrient status of a particular body beyond its normal range. As a consequence, it is more accurate to say that trophic state is a continuum between oligotrophic and eutrophic status. Marl lakes are differentiated from other lakes by their high alkalinity. Several proposed trophic state indices have been devised but none widely adopted (Wolfe-Murphy *et al.*, 1992), resulting in some taxonomic confusion between workers.
- 1.1.2 The trophic status of a lake can change gradually over time. A currently mesotrophic or eutrophic lake may have originated from the anthropogenic enrichment of a previously oligotrophic lake. In some cases a lake may become less fertile over time as it infills (Jones *et al.*, 2003).
- 1.1.3 In spite of the difficulties in defining trophic status outlined above marl lakes are considered to fall within the low nutrient oligotrophic end of the oligotrophic to eutrophic continuum, with a typical total phosphorus concentration of the marl lakes of northern and western UK of $25 \mu\text{g l}^{-1}$ or less. Marl lakes also typically have an alkalinity $>100 \text{ mg l}^{-1}$ of calcium carbonate and a $\text{pH} >7.5$.
- 1.1.4 Marl lake water bodies are characterised by very clear water and low nutrient status. They are chemically buffered from phosphorus enrichment to a degree, as phosphorus is immobilised by marl formation, but phosphorus is still stored and may be released if the buffering mechanism is disrupted and the lake 'switches' to a eutrophic state. This increases the vulnerability of these lakes as the early stages of phosphorus accumulation are disguised. The unique aquatic plant and animal communities of marl lakes will include at least some vascular plants or charophytes intolerant of elevated nutrient-enriched conditions particularly to compounds of nitrogen and phosphorus and it is therefore these species that are the most vulnerable to eutrophication.
- 1.1.5 The partial pressure of carbon dioxide in water strongly influences the balance between carbonate and the insoluble bicarbonate. When carbon dioxide is removed by photosynthesis the consequence is a shift in the balance in these lakes towards carbonate, which is then precipitated out as white clayey marl. The precipitation process also removes highly insoluble apatite minerals of phosphorus and any organic detritus from the water column, resulting in clear, calcareous and base-rich but oligotrophic waters, in which phytoplankton productivity is very low but macrophyte productivity is high due to high water transparency.

- 1.1.6 However, the use of nutrient levels as a defining parameter simplifies the complex interactions that occur between plant nutrients and the hydrological and physical characteristics of individual lakes (for instance, virtually all available nutrients are 'locked up' in algae during the growing season), but it serves to show the sensitivity of the mesotrophic state to artificially increased levels of nitrogen and phosphorus. Lake scientists are now working on a wider range of biological, chemical and physical parameters to define and classify Ecological Status. This will include trophic status. Guidance on classification and lake status will be supplied by the UK Lake Habitat Action Plan Steering Group. Many lowland water bodies in the UK are now highly enriched, mainly due to the input of nutrients from point and diffuse sources, with nutrient concentrations far in excess of their natural levels, although there is some geographical variation in the pattern of this enrichment.
- 1.1.7 The majority of Northern Ireland lakes (72%) are less than 2 ha in surface area but represent only 1.2% of the total water surface in Northern Ireland. The five largest lakes represent less than 0.3% of the total lake numbers but between them contribute 89% of the total surface area. The total surface area of all lakes represents about 4.5% of the total surface area of Northern Ireland, four times the value of the rest of the UK. The average number of lakes per km² is only one third that of the rest of the UK due to a much greater average size of lake in Northern Ireland. Over 60% of Northern Ireland's lakes occur at altitudes of less than 100m (Wolfe-Murphy *et al.*, 1992). All marl lakes are low altitude natural lakes. Many lie in inter-drumlin basins receiving water as runoff from the drumlin slopes and sometimes are also fed by springs and seepage zones, or by inflowing streams.

1.2 Biological status

- 1.2.1 The trophic status of a waterbody dictates which species of plants are likely to be found, the species-richness in a lake and its overall biological productivity. Apart from the chemical composition of the water, which greatly influences the plant and animal communities, other key factors governing aquatic life are the amount of dissolved oxygen, the speed of water movement and temperature levels (Cabot, 1999). Marl lake plant communities are indicative of the calcareous and base-rich nature of the waters while others reflect the general low levels of nutrients.
- 1.2.2 The distribution and condition of Northern Ireland's lakes has been assessed through a combination of commissioned research and surveys carried out by Environment and Heritage Service staff. Smith *et al.*, (1991) carried out an annotated inventory of Northern Ireland lakes. This was followed by the comprehensive Northern Ireland Lake Survey (NILS) (Wolfe-Murphy *et al.*, 1992). The vegetation and water chemistry of 617 lakes of all trophic statuses between 1 ha and 100 ha in size were surveyed and the data used to classify natural and artificial lakes on the basis of their assemblages of aquatic macrophytes and water chemistries. This enabled an assessment of the nature conservation value of each lake to be made, with a view to designating a range of sites as Areas of Special Scientific Interest (ASSIs) in order to safeguard the representation of this variation in Northern Ireland. In 1991, the aquatic, wetland and shore vegetation of the eight lakes larger than 100 ha, were surveyed.
- 1.2.3 Some NILS lakes with aquatic community types 15 *Nuphar-Elodea* lakes (*Chara*-algae type) & 16 *Nuphar-Elodea* lakes (*Hippuris* type) are considered to be

characteristic of natural marl lakes especially where stoneworts and *Chara* spp. Are frequent. The NILS identified a number of lakes with these characteristics and several have been selected as marl lake ASSIs. Some ASSIs have been selected largely for marl lakes, while other sites have been selected for other features but may include marl lakes within the site boundary. Two marl lakes are solely designated as ASSIs (i.e. ASSIs but not cSACs), namely Tullybrick Lough (2 ha) and Kiltubbrid Loughs (4.5 ha). Both are in Co. Armagh outside the main concentration of marl lakes. The ASSI designation process is not complete with a number of marl lakes assessed during the marl lake survey still to be formally designated as ASSIs.

- 1.2.4 It is important to note that the trophic status of a number of the lakes classified using NILS data may have changed over the intervening years since the survey was completed. However, the data provides a useful baseline for future lake classification work. A synoptic lake survey of 112 lakes was conducted in 2002 (Gibson and Jordan, 2002). As a requirement of the Water Framework Directive (WFD), a second survey was undertaken in 2003 (Charlesworth *et. al.*, 2003) looking at 140 lakes, with 48 lakes common to both surveys. In 2004, the Water Management Unit (WMU) of EHS carried out a screening exercise to identify significant pressures and impacts on water bodies. Twenty lakes, with an area of greater than 50 ha, were subjected to this pressure and impacts screening to identify water bodies at risk of failing to achieve Good Ecological Status. As a further requirement of the WFD, 10 lakes in Northern Ireland will be subject to monitoring during 2004/2005 to fulfil the conditions of the Intercalibration Exercise. The results will be used to establish values for the high/good and good/moderate class boundaries of ecological status.
- 1.2.5 Marl lakes are mainly distributed in the west and north of Britain and Ireland, with a major concentration in SE Fermanagh. In part the rarity of the habitat type is due to the fact that since calcareous rocks are free-draining, water bodies occur infrequently on the surface of these rocks. In addition, marl lakes are characterised by very clear water and low nutrient status. They are therefore largely restricted to situations where the catchment or aquifer from which they are fed remains relatively unaffected by intensive land-use or other sources of nutrients. Most sites selected for designation are lakes on limestone, but one machair loch site and one serpentine site have also been selected to cover the range of ecological variation.
- 1.2.6 Between 1992 and 1994 a marl lake survey in the Finn Lacky catchment was carried out by the Environment and Heritage Service (EHS, 1995). The aim of this survey was to assess the lakes for their scientific value as marl lakes and as wetland systems in their own right with a view to selecting the best representative examples for designation as Areas of Special Scientific Interest (ASSI). Criteria used to assess the conservation importance of a site included water quality as deduced by the physical and chemical properties of the water, species diversity (particularly of stoneworts), and presence of rare species and communities.
- 1.2.7 Northern Ireland marl lakes are relatively small, averaging about 2.5 ha in the marl lake survey, the largest being 13 ha (Lough Inver, Co. Fermanagh). Most of the lakes surveyed lie solely in Co. Fermanagh but several straddle the border with RoI, mainly into Co. Monaghan and some into Co. Cavan e.g. Garrow Lough. Outlier sites occur in Co. Armagh e.g. Kiltubbrid Loughs and Tullybrick Lough.

- 1.2.8 Marginal habitats of marl lakes are highly dependent on the adjacent open water body in terms of lake water levels and the nutrient status of the water. Beds of common reed *Phragmites australis* may fringe the open water, with saw-sedge *Cladium mariscus* swamp in deeper oligotrophic water and tufted sedge *Carex elata* in shallower, more mesotrophic water. Swamps merge locally with fen communities that often have a high trophic tolerance, but where there are locally strong calcareous and base-rich conditions, calcicoles such as grass-of-parnassus *Parnassia palustris*, fen bedstraw *Galium uliginosum* and marsh helleborine *Epipactis palustris* become more frequent.
- 1.2.9 Calcareous flush communities that occur around the margins of marl lakes vary in their associated bryophyte component depending on substrate type and the presence of surface water movement, e.g. where calcium and base-rich water emerges from broad seepage lines or localised springheads at the base of the drumlins adjacent to the lakes. Maintaining these transitional habitats between open water and dry land in favourable condition is an important part of maintaining the interest of these lakes in that they can have an indirect beneficial effect on water quality within the main body of surface water by preventing diffuse sources of pollution from entering the water.
- 1.2.10 Charophytes or stoneworts *Chara* spp. often form extensive carpets on the bottom of unpolluted marl lakes e.g. at Drumacrittin Lough, Co. Fermanagh. Floating aquatic macrophytes may include white water-lily *Nymphaea alba*, yellow water-lily *Nuphar lutea*, pondweeds *Potamogeton* spp., and bladderworts *Utricularia* spp.. Some inter-drumlin marl lakes are regionally important for the diversity of their pondweeds including rare species like fen pondweed *Potamogeton coloratus*. Of the marl lakes, Kiltubrid Lough, Co. Armagh, contains the highest diversity of pondweeds, supporting seven species, followed by Drumbarrow, Co. Fermanagh, with five pondweed species.
- 1.2.11 Plants with a restricted distribution in Northern Ireland occur in marl lakes, including the Northern Ireland Priority Species and Species of Conservation Concern (SOCC) lesser bearded stonewort *Chara curta* and pointed stonewort *Nitella mucronata*. The site with the greatest diversity in the EHS marl lake survey (EHS, 1995) was Knockballymore followed by Annachullion and Summerhill. All three sites are located in Co. Fermanagh.
- 1.2.12 Marginal habitats of marl lakes may support breeding wader and wildfowl populations, including snipe *Gallinago gallinago*, lapwing *Vanellus vanellus*, and curlew *Numenius arquata*.
- 1.2.13 The freshwater cray fish *Austropotamobius pallipes* (an Annex II species under the EU Habitats Directive) is commonly found in alkaline streams, rivers and small lakes where the levels of calcium carbonate derived from the underlying limestone rocks are high, relying on this chemical to build up its exoskeleton. It requires waters with a pH range of 7.2-8.4, an alkalinity of 34-356 mg per litre and hardness of 47-402 mg per litre, and it rarely occurs in lakes over 1000 hectares. These conditions are often provided in marl lakes and therefore these may support large populations of this species.
- 1.2.14 Macro invertebrates are well represented in the peripheral wetland habitats of marl lakes, particularly important groups being dragonflies as well as water beetles,

stoneflies and mayflies. Rare invertebrates include the hemipteran *Gerris lateris*, a pondskater found in shaded pools and fen, and the beetles *Hydroporus scalesianus* and *Laccornis oblongus*, both found in mossy fen and marsh (EHS, 1995).

1.3 Links with Other Action Plans

- 1.3.1 Marl lakes exhibit a natural succession from open water to some UK priority habitats that are the subjects of UK HAPs e.g. fen, reedbed, wet woodland, purple moor grass & rush pasture, and coastal and floodplain grazing marsh. These habitats may be dependent on the adjacent open water body in terms of lake water levels and the nutrient status of the water. The requirements of these habitats should be taken into account during the implementation of this plan.
- 1.3.2 Northern Ireland marl lakes provide the habitat requirements of UK priority species occurring in Northern Ireland such as otter *Lutra lutra*, white-clawed crayfish *Austropotamobius pallipes* (for which the habitat is particularly important) and lesser bearded stonewort *Chara curta*.

2 Current Factors Affecting the Habitat

- 2.1 There are many pressures upon the aquatic environment resulting from industry, agriculture, forestry, mining and other human activity. These cause environmental impacts which in turn determine the quality of any particular part of the aquatic environment. One of or more of the following specific threats may cause a reduction in biodiversity in lakes if not regulated and controlled. Some threats indirectly affect the water quality and quantity of lakes by impacting on rivers and streams that discharge into the standing waterbodies. Some impacts such as eutrophication may be great while others of only local significance. In addition the specific impact of each factor may vary between lake types.
- 2.1.1 **Eutrophication** is considered to be the biggest threat to water quality in Northern Ireland mainly due to the release of nutrients from point and diffuse sources of pollution. In freshwater systems phosphorus is usually the limiting nutrient to phytoplankton growth. Phosphorus enrichment may stimulate growth of phytoplankton and hence make the water more cloudy, the underwater climate becoming unfavourable for many submerged macrophytes which gradually become excluded. The increased growth of phytoplankton may also deplete the water of dissolved oxygen.
- 2.1.2 **Agricultural activities** may cause point and diffuse pollution of water bodies through poor waste storage facilities and inadequate separation of contaminated yard water and clean water. Inappropriate application of slurry and inorganic fertilisers e.g. during adverse weather conditions, on steeply sloping land, or over-application can result in loss of phosphorus to waterways.
- 2.1.3 **Discharges** from waste water treatment works (WWTW), industrial sites and septic tanks can be a point source of nutrient enrichment of lakes. Contaminated groundwater sources that feed surface waters can also contribute to the nutrient loadings of lakes.

- 2.1.4 **Fish farms** on rivers usually abstract water from the watercourse and then release effluent back to the same watercourse. The temperature, pH and chemical composition of fish farm effluents may differ from that of natural stream water and may contain waste and partly decomposed food, and the metabolic products of fish. This can lead to increased oxygen demand (and hence a low oxygen concentration in the water), increased suspended solids, and enrichment of the receiving waters.
- 2.1.5 **Changes in landuse**, e.g. ploughing up of grassland and other habitats surrounding lakes, under-drainage and overgrazing can all increase the possibility of soil erosion with a consequent increase in water-borne sediments. Settled sediments may continue to introduce nutrients into the water column. Sediments in suspension cause turbidity and the resulting light attenuation may inhibit the growth of rooted aquatic plants in the spring, increasing the changes of algal dominance.
- 2.1.6 **Water abstraction**. Sand extraction, commercial fisheries, angling, farming and horticulture, water supply, wetland conservation, water sports, bird watching, wildfowling and flood control all rely on the maintenance of an adequate water supply in some of Northern Ireland's largest lakes. If water is low during the spring salmon run, fish cannot get into rivers to spawn. All fish movements and migrations depend on adequate flows. Low water levels can also cause important wetland habitats, such as marshes and wet woodlands, to dry out.
- 2.1.7 **Drainage**, through arterial drainage schemes, has had an effect of the hydrological balance of some lakes. Drainage schemes are still ongoing but are much reduced in scale and effect. Not only do drainage schemes directly affect lake water levels but they indirectly affect peripheral wetland habitats such as fens, reedbeds and floodplain grazing marsh and their associated rare wetland flora and fauna. Excessive water abstraction from aquifers has resulted in dried up or reduced spring line flows, and generally lowered the high water tables on which some marl lakes depend. Although Rivers Agency (DARD) only maintain the current land drainage function of designated watercourses, riparian drainage works are not controlled through the Agency and could have a detrimental effect on this habitat type.
- 2.1.8 **Dredging** and the clearance of bankside vegetation as a result of flood control works can also affect downstream water quality by increasing suspended sediment loads and nutrient concentrations. Groundwater sources that feed surface waterbodies can be affected by mineral extraction if the workings intercept the aquifer.
- 2.1.9 **Afforestation** can be a major influence on the physical and chemical characteristics of watercourses within a catchment. In the early stages of afforestation, there can be significant changes in stream and river flows that discharge into lakes, with increased runoff, and sharper storm hydrographs. As canopy closure progresses, fish resources may be affected by excessive shading. Contamination of water resources with nutrients can also occur from aerial fertiliser application if not properly controlled and managed. Clear-felling also has an impact on run-off intensity and patterns and is likely to cause greater quantities of detritus and humic compounds to reach freshwater. Peat-cutting on moorland catchments can have a similar effect.

- 2.1.10 **Invasive species.** Deliberately or accidentally introduced species e.g. Zebra mussel *Dreissena polymorpha*, can potentially have a deleterious effect on the native flora and fauna of mesotrophic lakes due to the direct effects of competition or indirectly by altering the natural habitat of native species. Introduced Zebra mussels are able to attach to and form large colonies on any submerged hard surface. Fouling growths can swamp the spawning grounds of lake spawning salmonids. They are very effective filter feeders and can virtually strip the water column of zooplankton and phytoplankton leading to improved water clarity, although this does not result in a net loss of nutrients from the system. Mussel plankton grazing may remove food from larval fish, give sight feeding predatory fish an increased competitive edge over their prey, and shift the bulk of biological systems from pelagic to benthic systems associated with mussel beds. Mussel plankton grazing may also clarify water to the point where algal populations change and where species formerly at a disadvantage are favoured and increase macrophyte growth around lake margins including nuisance carpeting growths of attached algae such as *Cladophora* spp..
- 2.1.11 **Fish introductions** can significantly alter the food web in lakes which can impact on the overall ecological status of lakes. In addition, fish introductions can have specific impacts on genetic integrity of established fish populations such as native populations of brown trout *Salmo trutta*. The threats from introduced species are very complex.
- 2.1.12 **Climate change.** Predictions for climate change include increased summer temperatures and milder, wetter winters. These changes may result in drier summer conditions, with extended growth periods during the winter. It is unclear how Northern Ireland marl lakes will respond to such changes.
- 2.1.13 **Litter.** Large quantities of flotsam, including plastics, cans, bottles and fallen animals are deposited each year all around the shores of Northern Ireland's waterbodies and along the watercourses that discharge into them. This is the result of a combination of deliberate and negligent actions. Flotsam can be aesthetically unpleasant, pose a hazard to watercraft, be a source of infection and disease and a direct hazard to wildlife and livestock.
- 2.1.14 **Recreation.** Northern Ireland's lakes have an important visual and aesthetic value and can also have considerable amenity value including bathing, fishing, shooting, boating and other water sports. Water-borne traffic can damage aquatic plants at the point of launch, or through bank-side wave erosion, passage through strands of vegetation, or the cutting action of propellers.

3 Current Action

3.1 Legal status

- 3.1.1 Statutory site designation plays an important part in the conservation of marl lakes. 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, which was transposed into Northern Ireland law through the *Conservation (Natural habitats etc) Regulations (Northern Ireland) 1995*, requires member states to designate and manage Special Areas of Conservation (SACs) for habitats (listed in

Annex I of the Directive) and species (listed in Annex II). 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 I contains (7210) *calcareous fens with Cladium mariscus and species of the Caricion davallianae* and (3140) *hard oligo-mesotrophic waters with benthic vegetation of Chara spp.* which equate to marl lakes. In addition (7320) *alkaline fens* often occur in association with marl lakes.

- 3.1.2 The Magheraveely Lake cluster is the only cSAC in Northern Ireland designated for marl lakes containing the annexed habitat '*hard oligo-mesotrophic waters with benthic vegetation of Chara spp.*' as a selection feature. This cSAC covers 58.8 ha taking in six ASSIs in the River Finn catchment namely Kilroosky Lough, Burdautien Lough, Knockballymore Lough, Drumacrittin Lough, Annachullion Lough, and Summerhill Lough.
- 3.1.3 Where a section of a lake and its adjacent wetland has been designated on one side of the border between Northern Ireland and the Republic of Ireland, there should be a corresponding designation on the other side. This has nearly been achieved, with the corresponding Kilroosky Lough cluster (cSAC) located 2 km north-west of Clones, Co. Monaghan designated in the Republic of Ireland. The lakes are surrounded by an inundation zone containing significant stands of alkaline fen vegetation including the EU Habitats Directive (92/43/EEC) annexed habitat 7210 *Calcareous fens with Cladium mariscus and species of the Caricion davallianae*. Kilroosky Lough Cluster is one of 18 cSACs in RoI with the annexed habitat '*hard oligo-mesotrophic waters with benthic vegetation of Chara spp. (3140)*' as a selection feature.
- 3.1.4 In the Republic of Ireland marl lakes are characteristic of limestone areas in central and western Ireland. Lough Carra Co. Mayo cSAC, (1500 ha), is the largest marl lake in Ireland. It is one of the few remaining wild brown trout calcareous lakes in Europe. Lough Carra is also of National and International importance for birds. Other large lakes in Western Ireland have marl deposits, notably Lough Corrib, and Lough Mask, Co. Galway/Mayo.
- 3.1.5 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.

- 3.1.6 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.
- 3.1.7 Guidance to help competent authorities and others to interpret the Habitat Regulations has been published (EHS, 2002).
- 3.1.8 Guidance on the completion of an Article 6 assessment has also been published (European Commission, 2000)
- 3.1.9 Under the *Nature Conservation and Amenity Lands (Northern Ireland) Order 1985*, and more recently under *The Environment (Northern Ireland) Order 2002* Areas of Special Scientific Interest (ASSIs) are identified and declared by the Department of the Environment (DOE) through the Environment and Heritage Service (EHS). The *Nature Conservation and Amenity Lands (Northern Ireland) Order 1985* also legislates for National Nature Reserves (NNRs), Marine Nature Reserves (MNRs) and Local Nature Reserves (LNRs). *The Environment (Northern Ireland) Order 2002*, strengthened the protection of ASSIs, recognising the importance of working in partnership with owners and occupiers and facilitating the positive management of these sites. All cSACs are designated as ASSIs prior to designation as cSACs.
- 3.1.10 The ASSI network includes a number of very small sites, in addition to a number of Northern Ireland's largest lakes. Selection features are aligned with BAP priority habitats, so that the ASSI programme can be fully integrated into wider biodiversity action, producing a more coherent strategy for conservation action, and facilitating reporting procedures.
- 3.1.11 EC Directive 2000/60/EC, *Establishing a Framework for Community Action in the Field of Water Policy* or the Water Framework Directive (WFD), was transposed into Northern Ireland law by the *Water Environment (WFD) Regulations (Northern Ireland) 2003*. The WFD sets a framework for comprehensive management of water resources in the European Community, within a common approach and with common objectives, principles and basic measures. It will be the driving force behind the setting of acceptable water quality standards on which all naturally occurring standing waters depend for the maintenance of their ecological integrity.
- 3.1.12 The WFD aims to determine baseline ecological states for all surface and groundwaters. The description of Ecological Status will include trophic status. Reference conditions will be agreed to define Good Ecological Status. Under the WFD, member states must ensure that all waterbodies [excluding Artificial Waterbodies, (e.g. Northern Ireland canals) and Heavily Modified Waterbodies (e.g. some Northern Ireland reservoirs)] must be at least of Good Ecological Status by 2015. Artificial and heavily modified waterbodies must attain Good Ecological Potential by this date.
- 3.1.13 There is a requirement under Article 6 of the WFD to create a register of all areas which have been designated as requiring special protection under specific European Community legislation for the protection of their surface water and groundwater or for the conservation of habitats and species directly depending on water. Northern Ireland must achieve compliance with the WFD standards and objectives relating to these

protected areas by December 2015. There is an onus on the UK government under the WFD to ensure that any changes in water quantity and quality do not adversely affect sites of international importance.

- 3.1.14 The *Water (Northern Ireland) Order 1999* repealed and re-enacted, with amendments, the *Water Act (Northern Ireland) 1972*. The *Water (Northern Ireland) Order 1999* widens existing powers to license water abstraction to enable controls to be introduced, if necessary, to protect the aquatic environment in specific catchments or to control particular uses or industrial abstractions.
- 3.1.15 *Council Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances* was aimed mainly at the control of discharges of specified substances to groundwater. The impact of the Directive has been limited because a) only a restricted range of substances is controlled, b) it does not address either diffuse pollution or the essential links to the management of abstraction and c) it does not establish a comprehensive system for the monitoring of groundwater.
- 3.1.16 *Policy and Practice for the Protection of Groundwater in Northern Ireland* (EHS, 2001) sets out DOE strategies to protect the groundwater resource from polluting activities from waste disposal, agriculture and industry including creation of land surface zoning, protection zoning around key abstractions through the production of policy statements on the control of groundwater quality and abstractions.
- 3.1.17 *Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources* (the Nitrates Directive) seeks to reduce or prevent the pollution of water caused by the application and storage of inorganic fertiliser and manure on farmland. It is designed to safeguard drinking water supplies and to prevent wider ecological damage in the form of the eutrophication of freshwater and marine waters generally.
- 3.1.18 Article 4 of the Nitrates Directive refers to the establishment and implementation of a Code of Good Agricultural Practice (CoGAP), together with the provision of training and information for farmers promoting the application of the CoGAP on a voluntary basis.
- 3.1.19 Article 5 requires Member States to implement an Action Programme of mandatory measures in respect of designated Nitrate Vulnerable Zones (NVZs) or their total territory. Regulations establishing Northern Ireland as the territory to which an action programme under the Nitrates Directive will apply came into operation on 29th October 2004. An Action Programme is currently being developed for the Total Territory of Northern Ireland and will be issued for public consultation early in 2005. The Action Programme will also include measures to control phosphorus from agricultural sources.
- 3.1.20 As a transition measure, the farms in the existing 7 groundwater NVZs will continue to be subject to the existing Action Programme (*the Action Programme for Nitrate Vulnerable Zones Regulations (Northern Ireland) 1999, SR No.156*).
- 3.1.21 The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) (Northern Ireland) Regulations 2003(SR 2003/319) (SSAFO Regulations) are designed to help prevent

water pollution from agricultural sources and reinforce much of the advice in DARD's Code of Good Agricultural Practice for the Prevention of Water Pollution. These Regulations set legal requirements for new and substantially reconstructed or enlarged stores being brought into use after 1st December 2003.

- 3.1.22 *Council Directive (91/271/EEC) concerning urban waste water treatment* (the Urban Waste Water Treatment (UWWT) Directive) requires member states to identify as sensitive areas freshwaters and marine water which are found to be eutrophic or may become eutrophic and to formally review existing designations at 4 year intervals. Larger WWTWs (those treating waste from 10000 population equivalent or more) within sensitive areas are required by the Directive to remove nitrate and/or phosphate from the wastewater streams.
- 3.1.23 The Code of practice for agricultural use of sewage sludge has been prepared by the Department of the Environment to complement the Sludge (Use in Agriculture) Regulations 1989 covering Great Britain and the Sludge (use in Agriculture) Regulations (Northern Ireland) 1990 which enforce the provisions of *EC Directive 86/278/EEC on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture*.
- 3.1.24 The *EC Directive (78/659/EEC) on fresh waters needing protection or improvement in order to support fish life* (the Freshwater Fish Directive) was transposed into law in Northern Ireland under the *Surface Waters (Fishlife) (Classification) (Northern Ireland) Regulations SR 1997* (as amended 2003). The Directive requires member states to designate freshwaters needing protection or improvement in order to support fishlife, and have a duty to produce Pollution Reduction Programmes to ensure compliance with these standards. The EU *Freshwater Fish Directive* will be repealed in 2013 when its provisions will be superseded and catered for by the EU Water Framework Directive.
- 3.1.25 The Industrial Pollution and Radiochemical Inspectorate (IPRI) of EHS is responsible for enforcing environmental legislation that controls pollution from prescribed industrial processes and controls the use and disposal of radioactive materials. Industrial pollution control in Northern Ireland is currently governed by the Industrial Pollution Control (Northern Ireland) Order 1997. Under this order processes with the greatest potential to cause pollution are subject to a system of integrated pollution control i.e. the capacity to pollute air, water and land is taken into account. The Pollution Prevention and Control Regulations (Northern Ireland) 2003, which will eventually replace the IPC Order 1997, implement the *EC Directive 96/61/EC on Integrated Pollution Prevention and Control*. The PPC Regulations apply a similar integrated approach to pollution control, while extending the range of issues that must be considered.
- 3.1.26 The Rivers Agency, as an executive agency within the Department of Agriculture and Rural Development, is responsible for maintenance of the effective drainage function of designated watercourses under the *Drainage (Northern Ireland) Order 1973*.
- 3.1.27 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.

- 3.1.28 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.
- 3.1.29 *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.
- 3.1.30 *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.
- 3.1.31 *PPS8 Open Space, Sport and Outdoor Recreation* (DOE, 2004) sets out the Department’s planning policies for the protection of open space, the provision of new areas of open space in association with residential development and the use of land for sport and outdoor recreation, and advises on the treatment of these issues in development plans.
- 3.1.32 *PPS14 Sustainable Development in the Countryside* is due to be published by the end of 2005
- 3.1.33 At a local planning level, policies to protect and enhance biodiversity are being included as part of new development plans. These include the identification of Sites of Local Nature Conservation Importance (SLNCIs) for Planning Service. Planning Service is currently considering which SLNCIs will be formally identified in Development Plans. Where such sites are confirmed in adopted plans, specific planning policies will be applied to development proposals on those sites.
- 3.1.34 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.
- 3.1.35 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.

- 3.1.36 The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 1999 primarily describe an extended range of development types that will require or are likely to require environmental impact assessment. This includes projects located within Northern Ireland that are likely to have significant environmental effects on the environment of another Member State or where projects in another Member State are likely to affect Northern Ireland.
- 3.1.37 The *Environmental Impact Assessment (Forestry) Regulations (Northern Ireland) 2000* require anyone who wishes to carry out a relevant project, i.e. 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 Forest Service. The Regulations define thresholds above which the opinion of Forest Service is required. These thresholds take into consideration sensitive areas, which include Areas of Outstanding Natural Beauty (AONBs), ASSIs, National Parks, Nature Reserves, World Heritage Sites, Scheduled Historic Monuments and European sites. If consent for work is required, the applicant must provide an Environmental Statement in support of the application and where consent is granted, Forest Service may stipulate conditions to which the work is subject.
- 3.1.38 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 which include grasslands.
- 3.1.39 *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.
- 3.1.40 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.
- 3.1.41 *Forests and Water Guidelines* (Forestry Commission, 2003), sets out water protection and riparian management standards with which forest managers are required to comply in relation to forest design planning and management of forestry operations which might effect water bodies
- 3.1.42 The relevant Republic of Ireland legislation governing water pollution control and water quality management in RoI is provided by the *Local Government (Water Pollution) Acts 1977 and 1990* together with the *Local Government (Water Pollution) Regulations 1978 and 1992*. Anti-pollution provisions are also contained in sections 171 and 172 of the *Fisheries (Consolidation) Act, 1959*. The *Environmental Protection Act, 1992* and associated regulations also makes provision for the

protection of the environment, the control of pollution and the establishment of the Environmental Protection Agency (EPA) which is also responsible for monitoring and may initiate prosecutions for pollution offences.

3.2 Management, research and guidance

- 3.2.1 The Department of the Environment (DOE) has a duty to control discharges and emissions to surface and ground waters, including tidal waters out to the three-mile limit. Environment and Heritage Service (EHS), an agency within the Department of the Environment, takes the lead in advising on and in implementing the Government's environmental policy and strategy in Northern Ireland.
- 3.2.2 To meet the requirements of the Habitats Directive, the Natural Heritage (NH) Directorate of EHS has prepared conservation objectives for sites submitted as cSACs. Where marl lakes occur on cSACs and ASSIs, they are protected by control of potentially damaging operations and by the application of targeted conservation objectives.
- 3.2.3 Common standards monitoring protocols are being established across the UK to assess the extent and condition of marl lakes within designated sites. This programme will be extended to include all ASSIs with marl lakes as a selection feature. Standards for assessing favourable condition of the habitat in the wider countryside have not yet been agreed.
- 3.2.4 The Management of Sensitive Sites Scheme (MOSS), launched in 2002 by EHS, is a voluntary scheme designed to ensure the positive management of the site features to maintain their extent and favourable condition, such as marl lakes within ASSIs. Under the scheme, landowners can receive payment for carrying out conservation work within the framework of a written agreement. MOSS covers issues that have relevance to marl lakes conservation including dumping, grazing and control of invasive species. EHS has negotiated several management agreements on ASSIs to help secure sympathetic marl lake management through the MOSS scheme.
- 3.2.5 The Environmental Protection Directorate (EPD) of EHS is responsible for the enforcement of legislation and a range of supporting activities to monitor and report on discharges and emissions to surface and ground waters, to establish the impacts of pollution, to set standards and to issue consent licenses and authorisations.
- 3.2.6 Within the EPD, Water Management Unit (WMU) is responsible for chemical and biological monitoring of lakes. The emphasis has been on monitoring the larger lakes. Lough Neagh and Lough Erne are sampled as part of the UK Environmental Change Network. Accounts of the regional chemistry of Northern Ireland's lakes have been produced as a series of county studies (Gibson, 1986, 1988, 1989, 1991; Gibson *et al.*, 1992). A synoptic survey of Northern Ireland's lakes was conducted in 2002 (Gibson and Jordan, 2002) followed by a second survey in 2003 (Charlesworth *et al.*, 2003) predominantly chosen with the Water Framework, Freshwater Fish and Habitats Directives in mind.
- 3.2.7 Under the Water (Northern Ireland) Order 1999, all effluent discharges from both domestic and non-domestic premises which are not connected to the public sewerage

system require consent from DOE, where discharge to a water way or the underground stratum is proposed.

- 3.2.8 WMU has the role of implementing the WFD. A screening exercise to identify significant pressures and impacts on water bodies and the identification of water bodies at risk of failing to achieve Good Ecological Status has been completed and reported to DEFRA as part of the Characteristics of River Basins. The results will contribute to the Report of Significant Issues in 2007 and will be the basis for River Basin Management Plans to be consulted on in 2008. WMU has carried this out for all lakes greater than 50 ha in size.
- 3.2.9 The WFD requires the establishment of International River Basin Districts (IRBDs), where a river basin straddles the border between two EU states. Seventy percent of Northern Ireland falls within the three IRBDs agreed by Northern Ireland and Republic of Ireland. The United Kingdom Technical Advisory Group (UKTAG) was established in 2001 and, at a UK level, coordinates research and development and all technical matters with regard to the implementation of the WFD. It is a partnership of the UK environment and conservation agencies and has representation from Republic of Ireland. On the island of Ireland, the North South Technical Advisory Group (NSTAG) coordinates research and development and technical matters relating to the implementation of the WFD. WMU is a lead partner in NSTAG.
- 3.2.10 WMU is conducting research into lake typology with the aim of establishing reference conditions for each lake type. The research is coordinated with the RoI through the North South SHARE project, supervised by NSTAG. WMU also funds short, medium and long-term research related to the implementation of the WFD directly by contract or through SNIFFER (Scotland and Northern Ireland Forum For Environmental Research) and QUESTOR (Queen's University Environmental Science and Technology Research Centre). SNIFFER is supporting research into pollution, hindcasting methodologies and target-setting.
- 3.2.11 A groundwater monitoring strategy for Northern Ireland (EHS, 2000) and a policy document on groundwater protection (EHS, 2001) have been produced. WMU monitors groundwater for a number of chemical and microbiological parameters to assess compliance with EC Directives and to assess general groundwater quality.
- 3.2.12 WMU have produced a series of Pollution Reduction Programmes (PRPs) throughout the country. These plans are developed specifically to tackle non-compliance or potential non-compliance with the parameters stated in the Freshwater Fish Directive. They provide relevant information for tackling water pollution in a broader context. Twenty lakes are designated under the Freshwater Fish Directive as salmonid waters.
- 3.2.13 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.

- 3.2.14 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 agricultural 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).
- 3.2.15 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, 2004). The CMS has a voluntary option to create a habitat along watercourses/standing waters, by leaving margins either grazed or not grazed. This will help minimise the nutrient enrichment. Within agri-environment schemes (CMS and ESA) responsible farm waste management is an integral component of the scheme requirements.
- 3.2.16 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.
- 3.2.17 The Action Programme measures developed under the Nitrates Directive will be a major force in tackling diffuse pollution from agriculture. A booklet called "Guidelines for farmers in Nitrate Vulnerable Zones" has been co-produced by EHS and DARD. Other actions carried out by the Countryside Management Branch to address nutrient enrichment have included initiatives targeting catchments, pollution referrals and responsible phosphate management; nutrient management planning in the Lough Erne and Lough Neagh catchments; introduction of Codes of Good Agricultural Practice (CoGAP) for the protection of water and introduction of Competence Development.
- 3.2.18 Cross-compliance between EC environmental directives and payment of subsidies under Common Agricultural Policy (CAP) reform will increase the environmental sustainability of agriculture and the environmental performance of individual farmers. This will potentially reduce diffuse pollution levels. In return for a single payment, farmers must keep their land in good agricultural and environmental condition.
- 3.2.19 The Farm Nutrient Management Scheme (Northern Ireland) 2004 is promoted by DARD and may aid the control of agricultural runoff to all water bodies. The scheme provides financial assistance to farmers who are installing or improving slurry storage facilities in order to assist compliance with Action Programme measures throughout

the total territory of Northern Ireland and with the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil (Northern Ireland) Regulations 2003 (SSAFO Regulations).

- 3.2.20 DARD has developed a Grassland Fertiliser computer programme which provides farmers with fertiliser recommendations that meet soil and crop requirements without over supplying nutrients.
- 3.2.21 The *Environmental Impact Assessment (Forestry) Regulations (Northern Ireland) 2000* require anyone who wishes to carry out a relevant project, i.e. 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 Forest Service. The Regulations define thresholds above which the opinion of Forest Service is required. These thresholds take into consideration sensitive areas, which include Areas of Outstanding Natural Beauty (AONBs), ASSIs, National Parks, Nature Reserves, World Heritage Sites, Scheduled Historic Monuments and European sites. If consent for work is required, the applicant must provide an Environmental Statement in support of the application and where consent is granted, Forest Service may stipulate conditions to which the work is subject.
- 3.2.22 The Agricultural and Environmental Sciences Division (AESD) of DARD has undertaken research into the interactions between land-use and the dynamics of nutrients and plankton in several lakes including Lough Melvin, Lough Erne, Lough Neagh and White Lough. Estimates were made of the nutrient loadings to the loughs from the surrounding catchments, focusing on eutrophication from agriculture and forestry, and water quality
- 3.2.23 Forestry research projects currently underway to assist forest management particularly in acid sensitive catchments are co-funded by DARD and the Council for Research and Development (COFORD). In addition to these large-scale projects, are a number of smaller projects which include ecological assessments of lakes and impacts on groundwater
- 3.2.24 In Northern Ireland, under the Fisheries Act (Northern Ireland) 1966 (as amended), the Department of Culture, Arts and Leisure has overall policy responsibility for the supervision and protection of salmon and inland fisheries, and for the establishment and development of fisheries. The Department exercises the functions conferred on it by the 1966 Act to meet those responsibilities. Under section 25 of the 1966 Act, the Fisheries Conservancy Board for Northern Ireland (a Non Departmental Public Body) is responsible for the conservation and protection of the salmon and inland fisheries of Northern Ireland, other than those in the Foyle and Newry areas which are the responsibility of the Loughs Agency of the Foyle, Carlingford and Irish Lights Commission (FCILC). The FCILC is a cross-border implementation body established by international agreement between the Government of the United Kingdom and the Government of Ireland. Included in its functions is the conservation, protection, management and development of inland fisheries in the Foyle and Carlingford Areas. In Northern Ireland, the work of the FCILC is supported by the Department of Agriculture and Rural Development.
- 3.2.25 Waterways Ireland, within Northern Ireland, has responsibility for navigation in Upper and Lower Lough Erne, the Northern Ireland component of the Shannon-Erne

Waterway and the Lower Bann. They are involved with work relating to the general maintenance of navigation channels including weed cutting and the maintenance of jetties.

- 3.2.26 A number of non-governmental nature conservations organisations in Northern Ireland, including RSPB, Ulster Wildlife Trust, and National Trust, have land holdings that contain marl lakes.
- 3.2.27 Roads Service has produced an Environmental Handbook (DOE, 1998) (under review) as guidance to road contractors to minimise the impact of roads from the design stage through to construction including the protection of wetland species and habitats inside or outside designated areas.
- 3.2.28 Relevant information relating to the flora and fauna is gathered through specialist biological recording groups, Non-Governmental Organisations (NGOs), universities and other government bodies. Biological records are stored in the Museum and Galleries of Northern Ireland (MAGNI) at the Centre for Environmental Data and Recording (CEDaR). CEDaR was established in 1995 in partnership with EHS, MAGNI and the biological recording community. Over 1.4 million records are 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.

4 Action Plan Targets

- 4.1 Restore to Good Ecological Status all marl lakes by 2015, in line with the WFD.

5 Proposed Actions with Lead Agencies

5.1 Policy and legislation

- 5.1.1 Ensure that marl lakes are properly recognised within River Basin Management Plans by 2009 as required by the Water Framework Directive.
(ACTION: EHS)
- 5.1.2 Review and align policies to support diffuse pollution control at an interdepartmental level.
(ACTION: DOE, DARD, DCAL)
- 5.1.3 By 2008 review the effectiveness of the revised Action Programme under the *EC Nitrates Directive (91/676/EEC)* across all of Northern Ireland.
(ACTION: EHS, DARD)

- 5.1.4 By 2007, ensure that agri-environment scheme prescriptions relating to diffuse pollution and improved farm waste management are contributing, where appropriate, to maintaining or enhancing marl lakes across Northern Ireland.
(ACTION: EHS, DARD)
- 5.1.5 By 2006, ensure that all farmers receiving agri-environment scheme payments and LFA Compensatory Allowance Payments are complying with GFP.
(ACTION: DARD, EHS)
- 5.1.6 Consider a review of Countryside Management Scheme and Environmentally Sensitive Areas Scheme to include streamlining of habitats/options to 'fit' with Biodiversity Action Plan habitat definitions if there is to be a review of agri-environment schemes under the new Rural Development Programme (2007 – 2013)
(ACTION: DARD)
- 5.1.7 Work to support the full implementation of the *EC Urban Waste Water Treatment Directive (91/271/EEC)*.
(ACTION: EHS, Water Service)
- 5.1.8 By 2005, implement an effective policy for assessing septic tank installations and discharges.
(ACTION: EHS)
- 5.1.9 By 2005 identify those ASSI/cSAC marl lakes which have been impacted by fisheries related activities and initiate and implement site management plans for restoration of identified sites by 2010.
(ACTION: EHS, DCAL, FCB, Loughs Agency)
- 5.1.10 Ensure that the delivery of this action plan is fully compatible with relevant aspects of forest policy.
(ACTION: EHS, Forest Service)
- 5.1.11 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)
- 5.1.12 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)
- 5.1.13 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)

- 5.1.14 Identify further examples of marl lakes as SLNCIs for consideration for adoption into appropriate Development Plans.
(ACTION: EHS, Planning Service)
- 5.1.15 Ensure that important marl lakes not already identified e.g. as SLNCIs, are recognised and, where appropriate, site protection policies are included in Development Plans and other strategic plans including Local Biodiversity Action Plans (LBAPs).
(ACTION: Planning Service, EHS, DARD, District Councils, Forest Service)
- 5.1.16 In the preparation of Planning Policy Statements, the promotion of biodiversity will be taken into account where appropriate.
(ACTION: Planning service, DRD, EHS)
- 5.1.17 When reviewing bylaws, management rules and codes of conduct relating to recreational activities and navigation ensure that the needs of marl lakes and the ecological requirements of associated plant and animal communities are considered.
(ACTION: DCAL, EHS, Waterways Ireland, District Councils)

5.2 Site safeguard and management

- 5.2.1 By 2007, determine the extent and quality of the marl lake resource which falls within protected areas and notify further sites, if required, to fill significant gaps.
(ACTION: EHS)
- 5.2.2 By 2007, produce conservation objectives for all designated sites that incorporate marl lake habitats ensuring that the objectives do not conflict with the requirements of marl lakes.
(ACTION: EHS)
- 5.2.3 Establish the Water Quality Objectives consistent with both Good Ecological Status and the conservation objectives of marl lakes, by 2008.
(ACTION: EHS)
- 5.2.4 As required by WFD deliver the above Water Quality Objectives by 2015.
(ACTION: EHS)
- 5.2.5 By 2007 agree an initial priority list of marl lakes that require further investigation to establish measures necessary for remediation.
(ACTION: EHS)
- 5.2.6 By 2009, produce local nutrient control plans, involving all stakeholders, within the framework of river basin management plans.
(ACTION: DARD, EHS)
- 5.2.7 By 2005, review all registered standards for all wastewater treatment works.
(ACTION: EHS)
- 5.2.8 By 2005, carry out a review of sensitive areas (as specified in the *EC UWWT Directive*) and make further appropriate designations as required.
(ACTION: EHS)

5.2.9 By 2006, determine a methodology to review discharge consents for designated sites to ensure that they are contributing to an adequate level of water quality.
(ACTION: EHS)

5.2.10 Encourage the use of Sustainable Urban Drainage Systems (SuDS) where appropriate, to reduce diffuse pollution and reduce nutrient threat to marl lakes.
(ACTION: Water Service, EHS, Rivers Agency, Planning Service)

5.3 Advisory

5.3.1 Promote the use of best practice nutrient management techniques and, for polluted lakes, restoration measures amongst all stakeholders through established channels.
(ACTION: DOE, DARD, DCAL)

5.3.2 By 2006, provide information to landowners and occupiers on the status and conservation importance of marl lakes through the production, promotion and dissemination of literature.
(ACTION: EHS, DARD)

5.3.3 Continue to promote agri-environmental schemes, and associated CoGAP including nutrient planning, establishment of buffer zones and controlled grazing to reduce the impact of eutrophication on marl lakes.
(ACTION: EHS, DARD)

5.4 International

5.4.1 Continue to work with the Republic of Ireland (RoI) through North-South Technical Advisory Group and appropriate working groups to promote the exchange of information and experience in lake research, management techniques, education and conservation strategies.
(ACTION: EHS)

5.4.2 By 2004, fully contribute to effective implementation of WFD in cross-border catchments through North-South SHARE by ensuring co-ordination of activities, monitoring methodologies, sampling frequencies and timing.
(ACTION: EHS)

5.4.3 By 2009, prepare River Basin Management Plans for the Northern Ireland component of cross-border catchments, working closely with the Republic of Ireland.
(ACTION: EHS)

5.5 Monitoring and research

5.5.1 By 2007, establish agreed criteria to identify Tier 1, Tier 2 and Tier 3 marl lakes.
(ACTION: EHS)

5.5.2 By 2007, undertake an updated comprehensive inventory of marl lakes across Northern Ireland identifying Tier 1, Tier 2 and Tier 3 lakes.
(ACTION: EHS)

- 5.5.3 By 2009, ensure that the results of the WFD monitoring programme carried out for the status of protected areas are fully integrated into river basin management plans.
(ACTION: EHS)
- 5.5.4 Continue to monitor and maintain the flow and water quality of rivers that drain into designated marl lakes.
(ACTION: Rivers Agency)
- 5.5.5 Continue to review the required network of hydrometric stations so as to increase understanding of natural and artificial flow regimes.
(ACTION: Rivers Agency).
- 5.5.6 By 2007, review impact of abstraction on ecological status of lakes.
(ACTION: EHS)
- 5.5.7 By 2007, instigate cross border monitoring mechanisms between the relevant fisheries authorities to monitor population trends and raise awareness of the threat of introductions of non-indigenous salmonids or coarse fish indigenous salmonid populations.
(ACTION: DCAL)
- 5.5.8 Continue to monitor the potential impact of acid rain through the UK Acid Waters Monitoring Network.
(ACTION: EHS)
- 5.5.9 Continue research into the ecology of notable lake species, particularly in relation to water quality, water quantity and management requirements.
(ACTION: EHS)
- 5.5.10 Promote research on internal lake processes to clarify the impact of benthic disturbance on ecological status.
(ACTION: EHS, DARD)
- 5.5.11 Promote research into the role and transport of phosphorus and nitrogen in fresh waters and into the quantification of risks posed by diffuse pollution.
(ACTION: DARD, EHS)
- 5.5.12 Continue experimental work on the most cost-effective remedial action for nutrient-enriched standing waters and monitor the results of procedures already taken.
(ACTION: EHS)
- 5.5.13 Continue to explore methods that will further reduce the risk of water contamination, resulting from forestry operations such as ground preparation, aerial fertilisation and timber harvesting.
(ACTION: Forest Service, DARD, EHS)
- 5.5.14 By 2007, investigate the impact of introduced species on marl lakes and develop strategies to mitigate their effects.
(ACTION: EHS)

5.5.15 By 2007 carry out an inventory of existing and potential land and water based recreation on all marl lakes and on their inflowing rivers in Northern Ireland.
(ACTION: EHS)

5.5.16 By 2006, review research requirements on the effects of pollution and climate changes on marl lakes and their associated notable flora and fauna communities and promote research needs accordingly.
(ACTION: DARD, EHS)

5.5.17 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, prioritise the production of educational information in line with available resources and appropriate media e.g. the setting up of a Northern Ireland wetlands web-site, an illustrated non-technical guide to marl lakes to increase an understanding of the habitat.
(ACTION: EHS)

5.6.2 Continue to run training course for farmers in nutrient management planning as part of an overall eutrophication control strategy.
(ACTION: DARD)

5.6.3 By 2009, raise awareness of the importance of the WFD by undertaking a public information campaign using publications, seminars, exhibitions and workshops, promoting the importance of water of good ecological status to the proper functioning and ecological integrity of wetlands to encourage public participation in the take up of solutions.
(ACTION: EHS)

5.6.4 By 2008, raise awareness of the threat of invasive species in marl lakes and provide advice on their control through the use of appropriate and targeted media.
(ACTION: EHS, DARD, DCAL)

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
LA	Local Authority
MAGNI	The National Museums and Galleries of Northern Ireland
NESA	New Environmentally Sensitive Area
NIBG	Northern Ireland Biodiversity Group
NICS	Northern Ireland Countryside Survey
NNR	National Nature Reserves
PPG	Planning Policy Guideline
PPS	Planning Policy Statement
RA	Rivers Agency
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SLNCI	Sites of Local Nature Conservation Importance
SoCC	Species of Conservation Concern
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
WFD	Water Framework Directive
WWT	Wildfowl and Wetlands Trust