

WETLAND AND WATER HABITATS

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WETLAND AND WATER INTRODUCTION:

Water is defined as including all permanent, open water bodies; essentially the lochs, rivers and burns located within the Cairngorms. Wetlands are seasonally or permanently flooded vegetated areas and would have once been more numerous and extensive in the Cairngorms than they are today. Less than 0.5% of the Cairngorms is classified as wetland. Nevertheless, there are still a great variety of healthy wetland and water habitats in the area. The Cairngorms rivers and lochs are of great importance locally, nationally and internationally. They have numerous national and international conservation designations for their biodiversity and high quality of freshwater habitats. Compared to other water bodies in the UK, the freshwaters of the Cairngorms have a high degree of 'naturalness' and are largely in good condition. Most of the area's water is considered to be of excellent quality, and many of these freshwater areas are internationally recognised for their important habitats and species and are used as a bench mark against which others are judged.

There is continual transport of water through the wetlands, burns, rivers and lochs of the area and none of the wetland habitats tend to exist in isolation from one another. Typically, burns flow into rivers, which on flat ground have wetlands. These often drain into large standing waters, such as lochs. The natural basis of all wetlands is the catchment and it is upon this that the ideas in this section have been formulated. Whilst some of the catchments lie fully within the Cairngorms Partnership area, the lower catchments of others lie outwith the Cairngorms Partnership boundary area and it is important to link these plans with those in the relevant lower catchments in adjacent LBAP areas.

The biodiversity associated with water and wetland habitats does not usually recognise sharp administrative boundaries. Therefore, the links between wetland and water habitats and other habitats is extremely important for many species. The habitat mosaics that exist in the Cairngorms result in the high populations of several species that use more than one habitat as well as being important for some species that particularly use edge habitats. Therefore, it is important to understand and consider the biological links between adjacent habitats and different Habitat Action Plans. For example, water and woodland mosaics favour Grey wagtail, Osprey and Goldeneye and water/wetland and farmland mosaics favour Water voles and breeding waders.

It is the purpose of this chapter to:

- *Identify, where possible, the biodiversity issues and opportunities to maintain and enhance the important Cairngorms wetland and water habitats and species through the actions of local people and partners.*

OPPORTUNITIES FOR ACTION IN THE CAIRNGORMS:

The Cairngorms Rivers Forum was established by the Cairngorms Partnership to take an overview of the economic, social and environmental pressures on the freshwaters in the Cairngorms area, with a view to developing an integrated strategy for their future management. Following a lengthy consultation period, a report listing the key issues and opportunities for enhanced management of the rivers and other freshwaters in the area was produced (Cairngorms River Project – Phase 1 Report, 2000).

It is recognised that the Cairngorms Partnership area has entire catchments of smaller water bodies, but does not include the lower catchments of any of the main rivers. Consequently, this plan focuses on the headwaters and upper catchments of the major river systems in the Cairngorms. As upper catchments exert such a strong influence on the hydrology and ecology

of downstream areas, it is believed that a consistent approach to the sustainable management of upper catchments will help to ensure the favourable management of river catchments within the area. Two major river Catchment Management Plans (CMPs) are now under development (the rivers Spey and Dee), but currently there are no immediate plans to develop CMPs for the other Cairngorms rivers at this stage.

The Cairngorms Rivers Project identified a need for a more integrated and inclusive approach to managing the Cairngorms rivers, and their catchments. A major impetus for this is the forthcoming EU Water Framework Directive. It is expected that this will require a common approach to protecting surface and groundwater across Europe. It is likely to place integrated catchment management in a statutory framework requiring a multi-sectoral approach to managing water quality, quantity and physical habitats in the Cairngorms and beyond.

The Cairngorms rivers, burns and lochs provide water resources for a wide variety of direct uses. The principle users of the water are for drinking water, hydro-electric production, food and drink (whisky) and in some places irrigation. These water abstractions are not currently controlled by a single authority or set of legislation. Methods are currently being developed to assess the ecological needs of river catchments to inform the licensing of new abstractions as part of the Water Framework Directive. Human demand for water in the Cairngorms is expected to increase in the future and this is one important area where all people can help influence its use (see the section '**How you can help make a difference**').

It is important that an integrated approach is adopted between all these plans to foster sustainable management across and throughout all catchments. One of the main areas of concern for the partners of the Cairngorms Rivers Project was the conservation and enhancement of wetland and water habitats and species in the Cairngorms. It is the purpose of this plan to identify the main strategic habitat and species issues associated with wetlands and water in the area and, where possible, make suggestions on how to carry these forward amongst partners.

There are many strategic and practical delivery mechanisms for action on wetland and water habitats and species in the Cairngorms and the following list identifies some of the most important policy and funding opportunities for the area:

- Agri-environment schemes. The Environmentally Sensitive Area's (ESA) scheme and its successor, the Rural Stewardship Scheme (RSS) can help specific riparian management and general catchment landuse management.
- There is currently a wide variety of river initiatives underway, variously based on whole river catchments, site specific reaches or wider geographical areas.
- Catchment management planning. Provides strategic guidance on the key issues affecting a particular river catchments. Currently there are two Catchment Management Plans in preparation for the Rivers Dee and Spey. Significant resources have been identified and earmarked to help deliver some of these objectives.
- SSSI, SAC and SPA designations can provide advice and supporting management incentives and monitoring for particularly important areas (e.g. EU LIFE Environment and Natura and LEADER +). These designations can also effectively provide consent to, or halt, potentially damaging operations, such as river engineering activities.
- District Fishery Boards provide management guidance and practical action directed primarily at habitat and species improvements for native salmonids. Most of this targeted management, is driven by fishing interests, in particular from private land owners and sporting managers.
- SNH's various conservation grants for positive management of both designated and non-designated sites, especially their Community Grant Scheme and the new '*Natural Care*' programme.
- SEPA's Habitat Enhancement Initiative provides guidance on the implementation of habitat

enhancement within the aquatic environment. It also offers limited funding through its 'demonstration site' scheme for new projects which can exemplify current best management practice to benefit aquatic habitats and species.

- SEPA's Sustainable Urban Drainage Systems (SUDS) promotes sustainable alternatives to conventional urban drainage systems. It aims to reduce the risk of pollution and flooding, and to improve amenity and biodiversity in urban areas. It does this by adopting 'soft engineering' opportunities such as retention ponds, detention basins and constructed wetlands, all integrated into a network of habitats and wildlife corridors.
- Heritage Lottery Funding targeted at Area Partnerships and HAP projects.
- New Opportunities Fund – the Community Land Fund.
- HIE and LEC Community Grant Fund.
- European transitional funds – Community Economic Development Funds for local community development.
- Rural Challenge Funding.
- The Cairngorms Management Strategy identifies general strategic issues and provides a vision for the sustainable management of wetlands and water in the Cairngorms.
- Local authority development plans provide guidance on landuse/development issues.

There is tremendous potential for locally restoring degraded wetland habitats in a number of areas, which are easier and far quicker to recover/recreate than for most other habitats. This is because many wetland habitats are characteristically young or early successional habitats, unlike say mature native pine or oak woodland. Many of the wetland species are also pioneer species and are very good and quick at colonising areas with suitable conditions.

THE MAIN WETLAND AND WATER BIODIVERSITY ISSUES:

The following seven main issues affect or influence, to a greater or lesser degree, practically all the wetland and water habitats and species in the Cairngorms. Biodiversity action taken to address these main issues are likely to benefit a range of important species in the area. The specific issues related to individual habitats or species are detailed in the relevant individual accounts.

The interaction of two or more of these key factors often greatly increases the overall impact on wetland and water communities e.g. the biodiversity impacts of changes in the hydrology followed by a decrease in water quality are likely to be greater than either factor in isolation.

1. Catchment management:

The issues:

- Poor management of multiple use water bodies where activities are not sensitively managed (e.g. by zoning) and where surrounding habitats are inappropriately managed or neglected.
- Changes in surrounding landuse. Especially farm abandonment and afforestation can potentially alter the water table and change the nutrient/pollution load. The FC's Forests and Water Guidelines have virtually eliminated previous poor forestry practice in relation to watercourses.
- Habitat fragmentation. The small total area of several habitats (e.g. fens, marsh, swamp and reedbeds) and critically small population sizes of several associated key species dependant on these habitats give serious cause for concern e.g. Water vole and Pillwort.
- Inappropriate bank management including grazing regimes that lead to bankside and aquatic habitat degradation.

The solutions, actions and targets:

- All partners should support the development of, and initiatives towards, integrated CMPs for all the Cairngorms river catchments and sub-catchments – *by 2005*.
- Ensure all governmental and non-governmental partners consider the impact of current and

future potential land use changes in integrated catchment management plans – *by 2005*. For example, SEPA has specific duties in relation to the conservation and management of rivers and should be involved in significant catchment management proposals at an early stage.

- Assess the opportunities available for managing catchments through zones of biodiversity sensitivity – associated with specific key species and habitats – *by 2010*. Allied to this should be defined ‘*limits of acceptable ecological change*’, where this is possible to determine.
- Promote and encourage the expansion of appropriate aquatic and riparian habitat networks, habitat patches or clusters and restoration of fragmented sites. Work should target habitats with small total areas and especially those with associated key species of critically small population sizes. Care should be taken not to degrade or destroy important existing habitat networks – *effective immediately*.
- Target riparian habitat restoration (inc. woodland) to areas in the upper deforested catchments of rivers and burns and link this to strategic habitat networks – *by 2005*.

2. Changes in hydrology:

The issues:

- Groundwater-surface water interactions. For example, the lowering of water levels caused by over abstraction of surface or groundwater and catchment transfers or by drainage can cause loss of wetland habitats through drying.
- Flood alleviation. Appropriate ‘soft’ engineering/management of floodplains is considered more effective and environmentally beneficial than large-scale ‘hard’ engineering works.
- Long-term changes in flow patterns e.g. climate change and human induced impacts such as forestry and farming on yields.
- Culverting of watercourses.
- Construction and operation of dams and reservoirs.
- Inappropriate dredging/channel deepening and river engineering.
- Obstruction of fish migration routes.
- Farm drainage and forestry ploughing.

The solutions, actions and targets:

- Water level manipulation (abstractions and transfers) can have both positive and negative effects. The impacts of current and future manipulation should be assessed against the value of particular sites for nature conservation needs. Relevant statutory targets are likely to be set for catchment management plans through the EU Water Framework Directive – *by 2005*. In the meantime, develop public registers of water abstraction for catchments.
- Serious consideration should be given to the reinstatement of compensatory flows in rivers blocked by artificial devices such as dams e.g. River Garry or a review of existing agreements. This should be based on a regional assessment of the natural heritage resources present within a particular catchment – *ongoing*.
- Significant increased requirements for public and private water supply should require an environmental assessment and only be taken forward if water conservation measures are practised in all proposed developments. Such assessments should also be based on the water resources available – *by 2005*.
- There should be a presumption against ‘*hard engineering*’ flood alleviation works on all water bodies – *by 2005*, including the deepening and widening of natural water bodies, artificially altering water courses and construction of flood banks. However, it is accepted that under certain circumstances ‘*hard-engineering*’ may be necessary and practical guidance can be provided by SEPA/SNH to ensure minimal damage.
- Promote environmental/green credentials in local business with respect to water use e.g. Green Business Scheme – *ongoing*.
- There should be a presumption against new buildings in floodplain areas. This should be taken forward through Local Plans and other relevant mechanisms – *by 2010*. The increasing reluctance of insurance companies to insure new properties on flood plains should push this

'presumption deadline' significantly closer.

- The temporary water storage capacity of natural floodplains should be evaluated and then highlighted to local people through raising the profile of the natural role of floodplains to store flood water. Promotion of flood management should allow watercourses to flood into their natural floodplain e.g. such as the Cluny Marsh, where a specific release area has been identified – *ongoing*.
- Ensure that environmental assessments are carried out on all proposed physical watercourse developments to ascertain the potential impacts on key species and habitats e.g. Freshwater pearl mussel – *effective immediately*.

3. Climate change and pollution

The issues:

- Climate change. This is likely to have profound and unforeseen impacts on many aquatic habitats. Impacts will depend upon hydrology, precipitation patterns, as well as temperature change. Some aquatic species may be particularly sensitive to climate changes e.g. Atlantic salmon and Freshwater pearl mussels.
- Acidification as a result of atmospheric deposition of sulphur and nitrogen compounds.
- Localised contamination from road surface runoff, organic matter, silt, heavy metals and cooling water discharges.
- Some chemicals cannot be treated during normal or existing sewage treatment works. These may pose a significant threat to biodiversity.
- Poor water quality. For example, eutrophication (inc. cyanobacterial blooms) primarily caused by nitrates/phosphates in sewage and agricultural runoff or forestry use of fertilisers, may result in increased plant growth and domination by a few vigorous species, leading to an overall loss of biodiversity.
- Localised human excrement pollution. For example, localised microbiological contamination of watercourses near well-used bothies and camping sites or poorly functioning septic tanks downstream of skiing areas may pose threats to human health and aquatic flora and fauna.
- Deliberate rubbish dumping.

The solutions, actions and targets:

Acidification and climate change:

- Tackling the issue of climate change is discussed in the *Introduction* under the theme of common threads and recurring issues across all action plans.
- Promotion of riparian broadleaved woodland in appropriate areas may help act as acidification buffers and as bank stabilisation – *ongoing*.

Eutrophication:

- Minimise agricultural nutrient runoff via enhanced agri-environment scheme payments – *ongoing*.
- Encourage better agricultural management options for riparian corridors through appropriate methods such as whole farm nutrient budgeting – *ongoing*.
- Maintain and enhance current sewage control and monitoring, including selective phosphorous removal at sensitive sites, where the phosphorus load is derived from sewage – *ongoing*.
- Relevant partners should continue monitoring of sensitive water bodies, such as Loch Insh and Loch Morlich, in relation to maintaining public awareness of any hazards to human health – *ongoing*.
- Continue with appropriate monitoring and research to aid identification of the factors responsible for algal blooms in affected areas – *ongoing*.

Industrial and domestic sewage effluent, treatment and disposal:

- Ensure that future growth in residential and tourist accommodation is addressed by long-term planning in capacity management especially in relation to the protection of key species and habitats. For example, this should be taken forward through Local Plans and other relevant mechanisms – *by 2005*.

- The environmental capacity of a site should be considered strategically and waste treatment should not be considered the only option to meet demand for expansion and development. The current waste water system focuses on the removal of domestic organic waste using biological processes. There is no requirement to remove other chemicals, therefore there is a need for local manufacturers to reduce the substances discharged from their *ongoing* operations.
- Further enhance industrial/sewage treatment and disposal methods (e.g. Phosphorous removal where this can be shown to have likely environmental benefits) and monitoring. Ensure that treatment works are able to deal with all chemicals likely to be detrimental to key species – *by 2010*. Assess what moves can be made to mitigate localised effluent problems associated with private septic tanks – *by 2010*.
- The problems associated with surface runoff from roads and car parks should be considered and tackled through the inclusion of SUDS in all future developments – *effective immediately*.
- Maintain the highest grade water quality status for all waste waters entering all Cairngorms watercourses. For example, there is a need to consider the impacts of the constituents of road surface runoff water (salt, oil, metals, rubber etc.) on aquatic habitats and key species – *at the earliest opportunity*.
- Promote the removal of superfluous agri-chemicals and other farm waste through the Cairngorms Partnership 'Agricultural Waste Scheme' – *ongoing*.
- Ensure adequate distribution of the leaflet 'Where to go in the Outdoors' amongst walking groups, tourists and all those likely to be in the Cairngorms – *ongoing*.

4. Fisheries management:

The issues:

- Decline in native fish stocks (especially 'Spring salmon').
- Over harvesting of fish.
- Fish predator control management.
- Introduction of non-native fish species.
- Reduction in good fish spawning or rearing habitat.
- Physical developments e.g. groynes and artificial creation of 'salmon pools' may impact on important species and habitats including those of Salmon.
- Aquaculture.
- The introduction of fish, the removal of natural predators, and the manipulation of existing fish stocks can affect natural fish populations, which in turn may alter plant and invertebrate communities.

The solutions, actions and targets:

- All partners should support measures taken to reverse the decline in native salmonid populations, including promotion of catch and release schemes and other methods of restraint – *ongoing*.
- The stocking of watercourses with fish for angling or conservation purposes should only be carried out using local strains of native fish and consideration should be given to the potential impacts on other flora and fauna – *by 2005*.
- Ensure that fishery management practices consider requirements of all native fish species e.g. Arctic Char, Lampreys, Brown trout and Eels – *effective immediately*.
- Due to the near 'natural' state of many of the Cairngorms water courses, minimal intervention should take place within the river channel to achieve habitat improvements. Support and promote moves towards environmentally sensitive habitat restoration in denuded areas, such as increased riparian woodland cover – *ongoing*.
- Ensure that environmental assessments are carried out on all proposed physical watercourse developments, including aqua-culture, to ascertain the potential impacts on key species and habitats – *effective immediately*.
- Ensure that all fish predator control programmes are based on sound scientific evidence, i.e. where there is proof of serious damage – *by 2005*. Develop regular and systematic counts of

- fish eating birds in the area and develop a consistent national approach to the issue – *by 2005*.
- Raise awareness of fishery managers on the potential problems associated with deliberate and inadvertent introductions of non-native fish species – *by 2005*. Also see Section 6. Non native species.
 - Immediate remedial action (removal) should be undertaken if there is confirmation of ‘new’ non-indigenous fish species occurring in the Cairngorms e.g. deliberate stocking or as accidental live-bait coarse fish such as roach or ruff – *effective immediately*.

5. Recreation and tourism:

The issues:

- Water-borne traffic can cause erosion, damage to aquatic plants and increase turbidity, contributing to enrichment and the growth of algae.
- Localised and concentrated recreation pressure, both in time (weekends) and space (popular riparian shores) on watercourses and wetlands may cause disturbance to flora and fauna and damage through discarded litter e.g. fishing line and hooks.

The solutions, actions and targets:

- Use agreed recreational zoning of watercourses and wetlands and use the lessons learned on biodiversity decline on Loch Morlich to inform management decisions elsewhere – *by 2007*.
- Promote responsible recreational water use with recreational users e.g. ‘*Angling for Change*’ - *ongoing*. Note, conflicts that arise in connection to uses of water are often more do with friction between different forms of recreation than with environmental damage *per se*.
- Do not expand recreational opportunities into new areas and water bodies unless an environmental assessment has been undertaken. Future developments should be assessed against the value of particular sites for nature conservation (especially in relation to important species) – *by 2005*.

6. Non-native/non indigenous/alien species:

The issues:

- Introduced non-native species in the wild can potentially kill, harbour diseases or compete with native species and significantly impact upon a range of biodiversity based economic activities.

The solutions, actions and targets:

- Tackling the issue of non-native species is discussed in the Introduction under the theme of common threads and recurring issues across all action plans.

7. Lack of important information/data:

The issues:

- There is a lack of basic up-to-date information on the size, quality or management of some wetland and water habitats (e.g. fens, marsh, swamp and reedbed) in the Cairngorms.
- Several organisations have produced reports, papers, booklets and leaflets on different aspects of wetland and water management and it can sometimes be difficult to find out if and what has been published on an important local issue.
- There is a lack of basic information on the ecology and current status of many important species associated with wetland and water habitats in the Cairngorms. For example, there is still little known on the water quality standards needed to maintain populations of the globally threatened Freshwater pearl mussel or the habitat requirements of the three lamprey species.

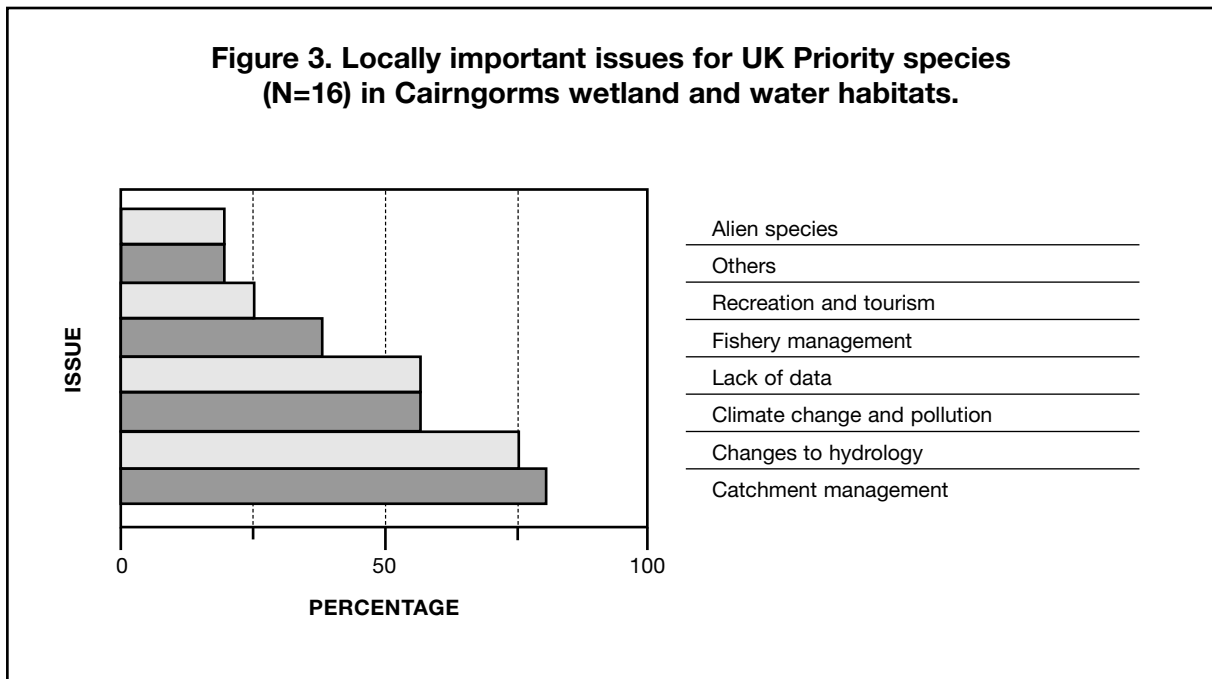
The solutions, actions and targets:

- Identify the total area, and where possible, quality and management of all important wetland and water habitats in the Cairngorms – *by 2005*.

- Where appropriate, commission relevant research into the local issues of concern to important wetland and water habitats and species in the Cairngorms. For example, improve ecological knowledge of 50% of Priority species where important information is currently unknown – *by 2007*.
- Produce and make freely available a regularly updated catalogue of relevant research information and advice on the ecology and management of wetland and water habitats in the Cairngorms - *by 2005*.

MAIN THREATS TO UK WETLAND AND WATER PRIORITY SPECIES IN THE CAIRNGORMS:

Figure 3 identifies the main locally important issues affecting the 16 wetland and water Priority species in the Cairngorms. Catchment management is an important issue for 81% of the Cairngorms wetland and water Priority species. Changes to hydrology are considered a locally important issue for 75% of species. Over half (56%) of the Priority species are affected by, a lack of data and/or sensitive to, pollution and climate change. Fishery management directly affects a third (38%) of wetland and water Priority species. A quarter (25%) of Priority wetland and water priority species have been, or are thought to be, affected by detrimental activities associated with water based recreation and tourism. 19% of Priority species require actions that are outwith the remit of the Cairngorms wetland and water HAP. These ‘others’ issues may relate to actions undertaken in other habitats or refer to activities that have little to do with direct habitat management e.g. illegal pearl fishing. Finally, three Priority species (19%) have been or are directly threatened by non-native or alien species introductions to the Cairngorms area.



Please note that some caution should be used when examining and interpreting the summary data illustrated in Figure 3. The main issues and threats that score most highly for Priority species may not necessarily be the ones which should be addressed most urgently. For example, ‘Lack of data’ of specific issues could solve many of the problems identified under the ‘Catchment Management’ heading.

UK PRIORITY SPECIES AND LOCALLY IMPORTANT SPECIES ACCOUNTS:

The following Cairngorms wetland and water species accounts list the known local issues affecting both the UK Priority species and Locally important species (whose populations are considered to be of high UK importance). Where possible, each specific issue is strongly linked (by numbers in superscript e.g. ^{1,2}) to the relevant 'Main wetland and water biodiversity issues' section. For some species, a single over-riding issue is of paramount importance (e.g. Mink predation for Water voles), whereas others require a suit of co-ordinated action on issues across more than one habitat (e.g. Atlantic salmon). Action by local partners targeted at these broad biodiversity issues is likely to deliver substantial benefits for a range of species. However, some other issues (referenced by #), e.g. illegal pearl fishing#, are not strictly related to wetland and water habitat management and require additional efforts outwith the direct remit of this HAP. For further information on the local distribution of many Priority and Locally important species and the factors affecting local populations, please refer to the 'Biodiversity of the Cairngorms' publication.

Water vole:

The UK's fastest declining animal species has recently been found in small but important upland refuge areas (predominantly burns and blanket bog) across the Cairngorms. It is the subject of detailed survey work in the area.

Locally important issues:

- Predation by American mink⁶. This is considered to be the most important threat to the long-term survival of the Water vole populations in the Cairngorms. American mink have wiped out most Water vole populations from the main stems of all the Cairngorms rivers, leaving small, but important populations in the headwaters of upper tributaries and on areas of adjacent blanket bog habitats.
- The loss, disturbance and fragmentation of riparian habitats is thought to be important in other areas, but its relevance in Cairngorms is thought to be minimal.

UK importance of Cairngorms population:

High, increasing as lowland populations continue to decline. UK Priority species and Locally important species.

Otter:

The lochs, burns and rivers of the Cairngorms are an important stronghold for Otters and they use practically all the watercourses in the area.

Locally important issues:

- Localised impoverished bankside habitat features needed for resting and breeding^{1,2}.
- Incidental mortality, primarily by road deaths and various traps#.

UK importance of Cairngorms population:

Moderate-high. UK Priority species and Locally important species.

Slavonian grebe:

The reasons behind this species decline are unclear, but the following issues are thought to be important and preventable:

Locally important issues:

- Human disturbance on breeding lochs (See RSPB & SNH publication: 'The Grebe Cross Code!')⁵.
- Illegal egg-collecting#.

UK importance of Cairngorms population:

High. UK Species of Conservation Concern and Locally important species.

Goldeneye:

Strathspey is the core UK area for this rare and localised breeding duck.

Locally important issues:

- Availability and suitability of nest sites. Many artificial sites have been successfully used in the area[#].
- Increase in predation of nest sites by American mink⁶ or Pine marten.
- Potential competition for nest sites with non-native Mandarin ducks⁶.

UK importance of Cairngorms population:

Very high. UK Species of Conservation Concern and Locally important species.

Osprey:

Ospreys recolonised the UK in the 1950s and have consolidated their position since then. Strathspey and parts of Tayside are now probably the core UK area for this fish-eating species as it expands its range.

Locally important issues:

- Availability and suitability of nest sites. Many artificial sites have been successfully used in the area[#].
- Illegal egg collecting and deliberate persecution[#].
- Human disturbance at nest sites⁵.

UK importance of Cairngorms population:

High. UK Species of Conservation Concern and Locally important species.

Reed bunting:

Reed buntings use a wide variety of habitats including many wetland sites.

Locally important issues:

Detrimental factors are not currently well known⁷, but these are thought to include:

- Part of general decline in farmland birds, many of which share its diet of cereal, grass, insects and wildflower seeds. This has been attributed to changes in agricultural practices, esp. loss of winter stubbles, turnips, decline in outdoor stock feeding, intensive use of grasslands and general reduction in mixed farming towards increased specialisation¹.
- Deterioration of wetland habitats. Loss of small ponds, unsympathetic river engineering, land drainage (both arterial watercourses and field drains) and excessive encroachment of scrub and carr are all likely to have had adverse effects on breeding and wintering populations (some encroachment is thought to be beneficial)^{1,2}. The effects of cattle grazing in wetland areas are largely thought to be positive for this species.

UK importance of Cairngorms population:

Low. UK Priority Species.

Arctic charr:

A glacial relict fish species, that inhabits several high altitude lochs in the Cairngorms and, uniquely, Loch Insh on the River Spey. The integrity of individual Arctic charr populations is important because of the large genetic diversity between sites.

Locally important issues:

- Lack of important basic data on this fish is currently an important issue⁷.
- Pollution³.
- Introduction of non-indigenous fish species^{4,6}.
- Hydrological management of water levels².

UK importance of Cairngorms population:

High. UK Species of Conservation Concern and Locally important species.

Atlantic salmon:

There is no one simple reason why salmon are declining in the UK, although it is widely accepted that marine survival (or rather mortality) is the area of greatest concern. The relative importance of the following factors probably varies between rivers and even between years.

Locally important issues:

- Over-fishing at sea[#].
- Climatic/oceanographic changes³.
- Pollution (e.g. industrial waste, agricultural chemicals and sewage) is implicated in declines elsewhere³.
- Physical obstacles, such as dams, can block the migration routes on rivers and burns².
- Destruction and deterioration of suitable spawning and nursery areas through inappropriate drainage, river engineering activities and fishery management^{2,4}.
- Inappropriate riparian management¹.
- The direct (e.g. escaped and diseased fish) and indirect (e.g. infestations by sea lice) impacts of marine fish farming have been implicated in the decline of West Coast stocks. The impacts (if any) on East Coast stocks are less clear^{4,6,#}.
- Increased predation has been blamed for exacerbating the decline[#].

UK importance of Cairngorms population:

High. UK Species of Conservation Concern and Locally important species.

Brown trout:

The resident form – Brown trout – has not undergone such a decrease and decline as the migratory form – Sea trout – which has declined greatly across the UK in a manner similar to the population decline in Atlantic salmon. As with Atlantic salmon, there is no one simple reason why Sea trout are declining in the UK, although it is widely accepted that marine survival (or rather mortality) is the area of greatest concern. The relative importance of the following factors probably varies between rivers and even between years.

Locally important issues:

- Climatic/oceanographic changes[#].
- Pollution (e.g. industrial waste, agricultural chemicals and sewage) is implicated in declines elsewhere³.
- Physical obstacles, such as dams, can block migration routes on rivers and burns².
- Destruction and deterioration of suitable spawning and nursery areas through inappropriate drainage, river engineering and fishery management^{2,4}.
- Inappropriate riparian management¹.
- The direct (e.g. escapees, genetic changes and diseased fish) and indirect (e.g. infestations by sea lice) impacts of marine fish farming have been implicated in the decline of West Coast stocks. The impacts (if any) on East Coast stocks are less clear^{4,6,#}.
- Increased predation has been blamed for exacerbating the decline[#].

UK importance of Cairngorms population:

High. Locally important species.

Sea lamprey, Brook lamprey and River lamprey:

The three species of British lamprey are poorly known, but all occur in the Cairngorms rivers. The Sea lamprey is the most threatened, having declined and become extinct from many rivers.

Locally important issues:

- Lack of important basic data on these three fish is currently the main issue⁷.

UK importance of Cairngorms population:

High. UK Species of Conservation Concern and Locally important species.

Great-crested newt:

Although widespread, Great-crested newts have declined dramatically across Great Britain, primarily (especially in lowland areas) because of habitat loss and change. Newts need suitable terrestrial habitats, as well as suitable aquatic habitats.

Locally important issues:

- Loss of suitable breeding ponds, lochs and lochans through vegetation succession, drainage and destruction of suitable riparian habitat^{1,2}.
- Under-recording. Recent local survey results suggest that the species has been overlooked in the Cairngorms and may be more common than suspected⁷.
- The stocking of newt ponds, lochs and lochans with fish leads to losses of newt populations⁴.

UK importance of Cairngorms population:

Low. UK Priority species and Locally important species.

Northern damselfly:

Northern damselflies occur in only three places in the UK: Strathspey, Deeside and Perthshire. It breeds in several different micro-habitats including shallow bogs, open and overgrown ponds and in sheltered areas of larger lochs, where suitable vegetation and an abundance of invertebrate food is available.

Locally important issues:

- Habitat loss of emergent vegetation through shading caused by natural regeneration of trees^{1,2}.
- Water level changes².
- Isolation of colonies¹.

UK importance of Cairngorms population:

High. UK Species of Conservation Concern and Locally important species.

Freshwater pearl mussel:

Locally important issues:

Like many important river species, the survival of the globally threatened Freshwater pearl mussel is inextricably linked to the status of its host fish populations (Atlantic salmon and Brown/sea trout), which in turn, may benefit significantly from the important role mussels play in the aquatic ecosystem:

- Illegal pearl fishing[#].
- Poor water quality, especially nutrient enrichment^{1,3}. There is a lack of important information on pollution threshold tolerance levels of juvenile freshwater pearl mussels⁷.
- 'Instream' habitat removal and alteration through development, drainage schemes, flow regulation, river engineering and fisheries management^{1,2,4}.
- A decline in populations of host salmonid fish⁴.
- Introduced *Ranunculus* weed and the chemical used to control it may become a significant issue on the River Spey⁶.

UK importance of Cairngorms population:

Very High. UK Priority species and Locally important species.

A stonefly *Brachyptera putata*:

This British endemic species is found in the slower reaches of the Dee, Don and Spey catchments and is fairly widespread where suitable habitat occurs. It is covered by a UK Grouped Action Plan for River Shingle Invertebrates. These issues have been identified nationally and it is unclear how many of the following issues are relevant in the Cairngorms.

Locally important issues:

- Acidification in headwaters and upland lakes³.

- Agricultural pollution – from insecticides used in sheep and cattle farming³.
- This species is poorly known and lack of important basic data on this species is considered a key issue⁷.

UK importance of Cairngorms population:

Very high. UK Priority species.

A crane fly *Rhabdomastix laeta* (=hilaris):

This species is under-recorded, but has historically been found at several sites in the Cairngorms area. It is covered by a UK Grouped Action Plan for River Shingle Invertebrates. These issues have been identified nationally and it is unclear how many of the following issues are relevant in the Cairngorms.

Locally important issues:

- Removal of sandy sediment from rivers and banks for fishery management or aggregate^{1,4}.
- Deepening and canalisation of water courses^{1,2,4}.
- Water abstraction from rivers resulting in changes in sedimentation².
- This species is poorly known and lack of important basic data on this species is considered a key issue⁷.

UK importance of Cairngorms population:

High. UK 'Priority species'.

A stiletto fly *Spriverpa* (=Thereva) *lunulata*:

Locally important issues:

This species has been recorded from several locations in the Spey catchment. It is covered by a UK Grouped Action Plan for River Shingle Invertebrates. These issues have been identified nationally and it is unclear how many of the following issues are relevant in the Cairngorms.

- Removal of sandy sediment from rivers and banks for fishery management or aggregate^{1,4}.
- The deepening and canalisation of water courses^{1,2,4}.
- This species is poorly known and lack of important basic data on this species is considered a key issue⁷.

UK importance of Cairngorms population:

High. UK Priority species.

A rove beetle *Thinobius newberyi*:

An endemic British beetle of shingle at the edges of mountain burns and rivers. It is covered by a UK Grouped Action Plan for River Shingle Invertebrates. These issues have been identified nationally and it is unclear how many of the following issues are relevant in the Cairngorms.

Locally important issues:

- Removal of sandy sediment from rivers for aggregate^{1,4}.
- General river management¹.
- Sediment disturbance^{1,2,4,5}.
- Pollution³.
- Weed invasion[#].
- This species is poorly known and lack of important basic data on this species is considered a key issue⁷.

UK importance of Cairngorms population:

High. UK Priority species.

A reed beetle *Donacia aquatica*:

A species present in marginal aquatic vegetation that was formerly widespread, but has since declined. The following issues have been identified nationally and it is unclear how many of the following issues are relevant in the Cairngorms.

Locally important issues:

- Water abstraction².
- Disturbance to marginal vegetation^{1,2}.
- In-filling of ponds¹.
- Eutrophication³.

UK importance of Cairngorms population:

Moderate. UK Priority species.

A whorl snail *Vertigo geyeri*:

Detrimental factors not known for certain, although the habitat is vulnerable to destruction from changes in hydrology or grazing levels, or trampling by humans and animals.

Locally important issues:

- This species is poorly known and lack of important basic data on this species is considered the key issue⁷.

UK importance of Cairngorms population:

Unknown. UK Priority species.

River jelly lichen:

This aquatic lichen is intolerant of polluted conditions and has declined across its whole range. The rivers, Isla, Erict, North Esk and Don contain some of the world's most important remaining populations.

Locally important issues:

Eutrophication of burns and rivers leading to the species being replaced by algae³.

- Increased silt load in rivers and burns^{1,3}.
- Water acidification³.
- Reduced water levels caused by water abstraction².

UK importance of Cairngorms population:

High. UK Priority species.

Grass-wrack pondweed:

This declining species inhabits a variety of mesotrophic water bodies across Britain. The following issues have been identified nationally and it is unclear how many are relevant in the Cairngorms.

Locally important issues:

- Neglect and drying out of ditches^{1,2}.
- Increased boat traffic and associated disturbance and pollution^{3,5}.

UK importance of Cairngorms population:

Low. UK Priority species.

Slender stonewort:

Slender stonewort tends to be found in acidic watercourses and is found on the southern boundary of the Cairngorms area. Although not well known, it is thought that the following issues are detrimental to this relatively widespread species.

Locally important issues:

- This species is poorly known and lack of important basic data on this species is

considered the key issue⁷.

- Pollution from agricultural runoff³.
- Afforestation (acidification) in some catchments^{1,3}.
- Encroachment of scrub and other vegetation at some sites¹.

UK importance of Cairngorms population:

High. UK Priority species.

Pillwort:

Pillwort formerly occurred on the margins of (and sometimes in) peaty still water bodies across the UK, but has been in long-term decline. These issues have been identified nationally and it is unclear how many of the following issues are relevant in the Cairngorms.

Locally important issues:

- Nitrate/phosphate pollution and the associated increase in the growth of competitive species³.
- Abandonment of its main habitats, with lack of disturbance being particularly important¹.
- Modification of water bodies for fishing, including permanent flooding, control of water levels and creation of steep sloping banks at some sites^{2,4}.
- Decline of beneficial land uses e.g. pit digging, curling and grazing¹.
- Drainage and ploughing of extant sites^{1,2}.
- Introduction of competitive non-native species of marginal plant (esp. Australian swamp stonecrop)⁶.
- Loss of pools to landfill, afforestation and intensive recreational uses e.g. fisheries^{1,2,5}.

UK importance of Cairngorms population:

Low. UK Priority species.

Marsh clubmoss:

A species of mires, heaths and lake margins. It grows on bare peaty ground and was formerly recorded at Loch Morlich, but has not been seen since 1980. These issues have been identified nationally and it is unclear how many of the following issues are relevant in the Cairngorms.

Locally important issues:

- Habitat loss, for example, building development or improvement of unmade trackways for recreation^{1,5}.
- Drainage of habitats².
- Cessation of traditional management practices such as peat cutting and grazing¹.
- Nitrate and phosphate pollution and the increase in growth of competitive species³.
- Atmospheric pollution³.
- Afforestation¹.

UK importance of Cairngorms population:

Low, possibly extinct in the area. UK Priority species.

STANDING OPEN WATER – GENERAL ISSUES

Habitat definition:

Standing open water includes natural systems such as lochs and lochans, as well as man made waters such as reservoirs and ponds. It includes the open water zone which may contain submerged, free floating or floating-leaved vegetation, and water fringe vegetation. Standing open waters are usually classified according to their nutrient status and this can change naturally over time. There are four main nutrient classes of open standing water that are used widely. These are oligotrophic (nutrient poor), eutrophic (nutrient rich), mesotrophic (nutrient intermediate) and dystrophic (peaty, highly acidic, with low levels of oxygen) although gradations between these types occur.

Current status, distribution and significance of the habitat:

Standing open waters in the region vary in size from natural large lochs to small lochans and artificial pools. Overall, standing open water supports a good variety of flora and fauna including at least 40 species on the UK Biodiversity list, most of which are birds. The waters support a naturally low biodiversity of lower plants and aquatic animals. The fish are predominantly salmonid although some lochs e.g. Lochs Davan, Kinord and Callater are inhabited by other fish species such as pike and perch, possibly originally introduced by humans but now well established components of the ecology of these waters.

The majority of lochs in the Cairngorms Partnership area drain from resistant rocks such as granite and are oligotrophic and naturally acidic. There are approximately ten mesotrophic lochs and several small dystrophic peaty lochans in the Cairngorms Partnership area. SNH and SEPA have recently completed an invertebrate and macrophyte survey of many relevant water bodies in the area.

The national biodiversity context:

There is a UK Habitat Statement for standing open waters. This gives the following conservation direction to LBAPs, which may adopt some or all of the relevant measures identified nationally:

“Maintain and improve the conservation interest of standing open waters, through the use of integrated catchment management plans, and the sensitive management of adjacent land. Create new standing open waters, of maximum wildlife benefit, where possible.”

Measures identified on a UK basis to consider further include:

- Prepare local water level management plans for the benefit of wildlife, particularly for key sites.
- Develop integrated local catchment management plans.
- Use existing beneficial management measures such as agri-environment schemes.
- Reduce acid emissions nationally, to reduce acid rain damage.
- Carry out Environmental Assessments of potential developments that may have a significant impact on open waters and their associated habitats and species.

Targets:

The following four objectives and targets have been identified for standing open waters in the Cairngorms.

Main objectives/targets:

Target 1: Ensure no net loss in area¹ of standing open waters in the Cairngorms – by 2005.

Target 2: Produce an inventory of the current nutrient status of all important standing open waters in the Cairngorms – by 2005.

Target 3: To ensure good ecological status/quality of standing open waters, maintain and restore, as appropriate, the natural nutrient status² of all standing open waters in the

Cairngorms – by 2010.

Target 4: Ensure no net loss in number and/or range of key species associated with standing open waters in the Cairngorms – by 2005.

¹ The LCS88 gives the total area of 'freshwater' (standing waters > 2ha in size + rivers > 50m wide).

² The Water Framework Directive (WFD) will set statutory water quality limits and target dates for all catchments in the future. The provisional target date of 2010 is therefore likely to be the subject of future changes in light of the WFD. In the meantime, SEPA base standing water quality classification on (changes to) three parameters: 1) Enrichment 2) Acidification and 3) Toxic substances. This three tiered approach to water quality classification should form the basis of 'natural water quality' assessment for standing water in the Cairngorms.

Current factors affecting the habitat in the Cairngorms:

The following specific standing open water issue was identified over those detailed in the 'Main wetlands and water biodiversity issues section':

Changes in hydrology:

The issue:

- Development and in-filling of ponds.

The solution, action and target:

- Pond maintenance, protection and creation should be developed locally in a targeted manner. It would be of greater benefit to key species such as newts, damselflies and dragonflies if pond maintenance and creation were to be developed in clusters rather than in an *ad hoc* dispersed basis.

Practical action:

The Goldeneye Study Group:

Strathspey is the main British breeding area for this beautiful hole nesting duck. The birds (re)colonised Scotland in 1970 because of the provision of nest boxes suitable for Goldeneye. Now at least 130 pairs of Goldeneye breed in the Highland area. A local group of Goldeneye enthusiasts work together to monitor the breeding population and research factors influencing their breeding ecology. Members of the group also work closely with local school children and land managers to produce and put up suitable nest boxes along burns, rivers and lochs in Badenoch and Strathspey.

OLIGOTROPHIC LOCHS – SPECIFIC ISSUES

Habitat definition:

Oligotrophic lochs are those water bodies of low nutrient or nutrient poor status and acidic in character. These water bodies tend to support a low biodiversity and biomass due to the underlying rocks (such as granite) and soils which lack many nutrients found in other water bodies.

Current status, distribution and significance of the habitat:

The majority of lochs in the Cairngorms Partnership area are oligotrophic and acidic in nature. This includes large lochs such as Loch Einich, and Loch Muick to small high altitude oligotrophic lochans and pools (inc. the highest lochs in Britain). Despite being nutrient poor, the water quality of the oligotrophic lochs and lochans in the Cairngorms is excellent, with some of the finest examples in Europe to be found within the area. The nutrient status and the ecology of many of these water bodies have changed little since the last ice age. The fish fauna is dominated by native salmonids, including a number of important and genetically unique Arctic charr populations. There is low species diversity, and a number of specialist species thrive in the oligotrophic lochs and lochans of the Cairngorms e.g. White-faced dragonfly.

The national biodiversity context:

Oligotrophic lochs are not listed separately under the UK Biodiversity Action Plan process and so, there is no UK conservation direction or advice provided for LBAPs.

Targets:

Despite a lack of national advice, oligotrophic lochs are important on a local and national level and as such action should be considered along side that for mesotrophic and eutrophic lochs. In many ways, little direct management is necessary on most oligotrophic water bodies in the Cairngorms and the main objective is to avoid management intervention when and wherever possible.

The following objectives and target have been identified for oligotrophic waters in the Cairngorms:

Additional objective/target:

Target 1: Ensure that any future expansion of fish farming or fishery management does not threaten the nutrient status of oligotrophic waters and does not harm the genetic integrity of any of the Arctic charr populations found in the Cairngorms – by 2005.

Current factors affecting the habitat in the Cairngorms:

The following oligotrophic loch specific issues were identified over and above those detailed in the 'Main wetlands and water biodiversity issues' section.

Climate change and pollution:

The issues:

- Upland oligotrophic lochs, because of their naturally low pH levels, have a poor buffering capacity and are therefore particularly susceptible to acid rain and acidification caused by atmospheric pollution. As a result, some changes to water quality in upland oligotrophic lochs may now be inevitable. Although there are now data which show that mayfly abundance has increased since the mid 1990s – coincident with a reduction in acid deposition.
- Lowland oligotrophic lochs are threatened by an increase in nutrients, through pollution, which can change or 'switch' the nutrient status.

The solutions, actions and targets:

- It may be necessary to carry out further research into the natural buffering capacity of water bodies and investigate practical measures to mitigate changes – *by 2008*.

Practical action:

Non-native fish initiative:

There is considerable local concern that non-native fish species, such as Roach and Ruff, might be introduced to the Cairngorms area deliberately or as a result of indiscriminate use of live-bait for pike fishing. Non-native fish could cause potentially significant and detrimental impacts on the ecology of water bodies in the Cairngorms, as they have done in the Loch Lomond catchment. Non-native fish are generally considered to pose three main threats to native fish populations:

- Competition for food and resources with native fish.
- Direct predation of adults, young and/or eggs of native fish populations.
- Introduction of diseases, viruses and parasites.

It is planned that a number of important local stakeholders will come together shortly to develop a co-ordinated programme of action to tackle non-native fish introductions through education, awareness raising and agreements with participating estates and pike fishermen.

MESOTROPHIC LOCHS – SPECIFIC ISSUES

Habitat definition:

Mesotrophic lochs are those water bodies of intermediate nutrient status. They have a narrow range of nutrients, particularly organic nitrogen and total phosphorous. Mesotrophic lochs are a difficult habitat to define and are perhaps best described as a '*concept habitat*' because there are a suit of characteristics that can be attributed to them by degree, but no one visible characteristic or feature that necessarily makes them mesotrophic, unlike for example, reedbeds or pinewoods.

Current status, distribution and significance of the habitat:

Mesotrophic lochs are relatively rare in the UK and largely confined to the margins of upland areas in the north and west. Due to the sensitivity of the trophic state to artificially increased levels of nitrogen and phosphorous, this is an increasingly rare type of habitat.

There are only a few mesotrophic lochs in the Cairngorms Partnership area. A joint SNH/SEPA invertebrate and macrophyte survey of all relevant water bodies has recently been completed providing an inventory of mesotrophic lochs across Scotland. According to the published inventory the following sites are mesotrophic: Drumore Loch, Loch Kinord, Loch Davan, Loch Aboyne, Loch Mor, Loch of Linthrathen, Loch Vrotachan, unnamed loch at Straloch, unnamed loch at Glenley and unnamed loch above Loch Insh.

The national biodiversity context:

The SNH/SEPA mesotrophic loch inventory was based on both nutrient composition and plant communities. It is proposed that a macrophyte and invertebrate survey should be undertaken for all appropriate standing waters. The inventory will then drive the appropriate action on a site by site basis.

The inventory will divide all mesotrophic lakes into one of three categories:

- 1 Sites with relatively intact ecology. High '*near natural*' nature conservation value.
- 2 Sites suffering some threat or degradation and still maintaining some of its mesotrophic characteristics and nature conservation value.
- 3 Sites formerly mesotrophic, but now damaged beyond all recognition and lost its nature conservation value.

Once each site has been categorised SEPA will identify the competent, relevant body responsible for the site and work with them to carry out a catchment based appraisal and subsequent management of the first two categories of site.

Targets:

The following two targets and objectives have been identified for mesotrophic lochs in the Cairngorms:

Additional objectives/targets:

Target 1: *Maintain the characteristic plant and animal communities of current mesotrophic lochs – ongoing.*

Target 2: *Identify and implement effective remedial action to address nutrient enrichment and pollution of mesotrophic lochs – by 2010.*

Current factors affecting the habitat in the Cairngorms:

The following mesotrophic loch issue was identified over and above those listed in the '*Main wetland and water biodiversity issues section*':

Fisheries management:

- Introductions of non-indigenous/non-native fish to lochs can alter the natural integrity of mesotrophic lochs in various ways: through competition, if bottom-feeding fish are involved and through continual disturbance of the sediment and alteration of the food web structure.

The solutions, actions and targets:

- Fishery managers should not introduce non-indigenous/non-native fish to mesotrophic lochs – *effective immediately*.
- Fishery managers should ensure that any stocking of mesotrophic lochs with native fish ought to consider the likely impacts on native flora, fauna and nutrient characteristics – *effective immediately*.

EUTROPHIC LOCHS – SPECIFIC ISSUES

Habitat definition:

Eutrophic lochs are those water bodies rich in nutrients and typical of lowland Britain. They are highly productive and support a rich biomass of vegetation and plankton. Many lowland water bodies in the UK are now heavily polluted, with nutrient concentrations far in excess of natural levels. Many waters have been enriched as a result of human activity (principally by discharges of phosphorous and nitrates from fertilisers, industry and household detergents) and so have been forced along the trophic continuum from a mesotrophic to a eutrophic state. Consequently, the biodiversity action plans of mesotrophic and eutrophic waters are complementary and their implementation should be co-ordinated.

Current status, distribution and significance of the habitat:

Eutrophic waters are typical and common in lowland Britain. Naturally eutrophic waters are very rare in the Cairngorms Partnership area, with Loch of Kinnordy in Angus probably the only example. Loch of Kinnordy supports large numbers of wildfowl and waders, plus interesting communities of aquatic plants.

National biodiversity context:

There is a UK costed Habitat Action Plan for eutrophic standing waters. This gives the following conservation direction to LBAPs, which may adopt some or all of the relevant measures identified nationally:

- All eutrophic bodies to be classified into three tiers distinguished on the grounds of 'naturalness', biodiversity and restoration potential.
- Ensure the protection and continuation of favourable conditions for all 'Tier 1' waters.
- By 2005 take action to restore favourable condition of 'Tier 2' waters that have been damaged by human activities.
- Ensure no further deterioration occurs in the remaining 'Tier 3' waters.

Targets:

The following two objectives and targets have been identified for eutrophic lochs in the Cairngorms:

Additional objectives/targets:

Target 1: Maintain the characteristic plant and animal communities of the single current eutrophic site, Loch of Kinnordy.

Target 2: Support effective implement of the RSPB's Loch of Kinnordy management plan.

Current factors affecting the habitat in the Cairngorms:

The following issues were identified over and above those listed in the 'Main wetland and water biodiversity issues section':

Catchment land use:

The issues:

- Changes in land cover can release nutrients from the soil into water bodies. The problems are generally exacerbated by the removal of bankside vegetation, which otherwise act as effective barriers to particulate matters and act as sinks for nutrients.

The solutions, actions and targets:

- Land managers in eutrophic loch catchments should be particularly sensitive, and avoid where possible, the removal of bankside vegetation around eutrophic lochs – *ongoing*.
- Support the implementation of the favourable management plan at the RSPB's Loch of Kinnordy reserve – *ongoing*.

RIVERS AND BURNS

Habitat definition:

This habitat includes rivers and burns (streams) from bank top to bank top or where there are no distinctive banks or banks that are never flooded, it includes the extent of the mean annual flood. This includes the open water zone, which may contain submerged, free floating or floating-leaved vegetation, water fringed vegetation and exposed sediments and shingle banks.

Current status, distribution and significance of the habitat:

In their natural state rivers are dynamic systems, continually modifying their form. Few rivers in the UK have not been modified by humans, for example, by flood defence structures or impoundments. Those which are least modified represent a very valuable resource. The plant and animal assemblages of rivers and burns vary according to their geographical area, underlying geology and water quality. The rivers in the Cairngorms are generally oligotrophic, with good water quality and are relatively unaffected by human influences compared to many rivers outwith the area.

The mosaic of features found in Cairngorms rivers and burns supports a diverse range of plants and animals. For example, riffles and pools support aquatic species, and exposed sediments such as shingle beds and sand bars are important for a range of invertebrates, notably ground beetles, spiders and craneflies. Marginal and bankside vegetation supports an array of wild flowers and animals and often provides a wildlife corridor link between fragmented habitat patches. The swiftly moving upland, nutrient poor rivers of the Cairngorms support a wide range of mosses and liverworts and relatively few species of higher plants. Generally, the invertebrate fauna is dominated by stoneflies, mayflies and caddisflies, supporting populations of salmonid fish.

The running waters of the Cairngorms all drain towards the North Sea (except for artificial catchment transfers to the Laggan system) and include all or parts of: Spey, Dee, Tay, Garry, Isla, Don, North Esk, South Esk, Deveron and Findhorn.

The national biodiversity context:

There is a UK Habitat Statement for rivers and streams. This gives the following conservation direction to LBAPs, which may adopt some or all of the relevant measures identified nationally:

“Maintain and improve the quality, state and structure of all UK rivers and streams and their associated floodplains. Restore degraded rivers and streams taking account of water quality, quantity, structure and hydraulic connection with the floodplain.”

Measures to be considered further include:

- Implement integrated catchment management plans.
- Use existing measures and schemes to support the appropriate management of rivers and their associated habitats, in particular floodplains.
- Reduce acid emissions to reduce damage from acid rain.
- Review powers and duties of water management institutions to manage water for nature conservation objectives.

Targets:

The following three objectives and targets have been identified for rivers and burns in the Cairngorms:

Main objectives/targets:

Target 1: Ensure no net loss in length and area of rivers and burns and natural bank features in the Cairngorms – by 2005.

Target 2: To ensure good ecological status/quality of rivers and burns maintain and restore the appropriate natural nutrient status of all rivers¹ and burns in the Cairngorms – by 2010.

Target 3: Ensure no net loss in number and/or range of key species associated with rivers and burns in the Cairngorms – by 2005.

¹ The Water Framework Directive (WFD) will set statutory water quality limits and target dates for all river catchments in the future. It also aims to achieve 'good ecological status' as well as 'good water quality'. The provisional target date of 2010 is therefore likely to be the subject of future changes in light of the WFD. In the meantime, SEPA based standing water quality classification on (changes to) three parameters: 1) Enrichment 2) Acidification and 3) Toxic substances. This three tiered approach to water quality classification should form the basis of 'natural water quality' assessment for standing water in the Cairngorms.

Current factors affecting the habitat in the Cairngorms:

There were no specific river and stream issues identified over and above those detailed in the 'Main wetlands and water biodiversity issues section':

Practical action:

Pearl mussels matter:

The Cairngorms area contains three rivers that are internationally important for their populations of Freshwater pearl mussels – a UK 'Priority species' and a 'Locally important species'. As part of the LBAP project, awareness raising presentations have been given to the media and important local groups such as estates, fisherman, local divers, Police Wildlife Liaison Officers and SNH area staff. Numerous people, particularly river managers, fisherman and conservationists expressed interest in the species, but complained that they had no access to up-to-date published information. To overcome this, the project officer and a member of the LBAP Steering Group, wrote and published an accessible paper on all that was known about the species, for the journal/magazine British Wildlife. Copies of the relevant issue were then distributed to river managers in each of the three Cairngorms rivers, through the local Catchment Management Groups and contacts in the adjacent LBAP areas. The feedback has been very favourable, including estates who asked for as many copies as possible, so that they could put copies in their fishing lodges for visiting anglers to read.

Salmon and trout research:

The Spey Research Trust conduct research into Salmon and Sea trout within the River Spey and provide the information to the Spey Fishery Board to improve their management of these stocks. A range of ongoing monitoring activities are in place including, juvenile surveys using electro-fishing, habitat surveys, catch data analysis and scale collection. Innovative research is also undertaken and over the last ten years has included acoustic fish counter deployment, radio-tracking studies and monitoring the effects of distillery cooling water on salmon development. Enhancement through hatchery reared Salmon is also underway and target areas are those where juvenile Salmon stocks are absent or in low density. One particular example is the Spey Dam area near Laggan. Education also plays an important role with regular bulletins produced, lectures and presentations given to local, national and international audiences. The Trust also have a highly successful and popular 'Salmon Go To School' project within local primary schools to raise awareness of Salmon and other fish conservation within the River Spey.

FEN, MARSH, SWAMP AND REEDBED

Habitat definition:

Fens are peatlands which receive water and nutrients from a ground source as well as from aerial precipitation which means they are minerotrophic. Groundwater lies close to the surface throughout the year. Fens can be subdivided into two main types, topogeneous (water movement vertical) and soligenous (water movement lateral). They can be further sub-divided whether they are acidic/poor (predominantly upland) or calcareous/rich (predominantly lowland). Fens are generally more species rich than swamps and have short vegetation which can be rich and varied. Up to 550 species of higher plants a third of the UK's native plant species are associated with fens across the country.

Swamps usually have taller vegetation than fens dominated by one or two larger plant species. Water table levels are usually at or above that of the vegetation for most of the year. Fen and swamp habitats often occur together and may integrate, but can also be found separately. Both often grade into open water at one end and carr at the other and sometimes occur in association with reedbeds. *Marsh* is a rather ill defined term but usually refers to vegetation occurring on mineral soil which has the water table close to the surface for most of the year. *Reedbeds* are wetlands dominated by reeds, predominantly *Phragmites australis*, wherein the water table is at or above the ground level for most of the year.

Current status, distribution and significance of the habitat:

In the Cairngorms, fen, marsh, swamp and reedbed are localised and often fragmented. Most sites show integration of the five habitats. Lack of proper surveys means that the status of these habitats and how they should be classified is unknown. These habitats have been looked at together in this action plan with a view to clarifying the status, whilst highlighting the need for actions on these often neglected habitats.

The UK is thought to have a large proportion of the fen surviving in the European Union. Throughout Europe fen vegetation has declined dramatically over the past century. Fen is rare in the Cairngorms Partnership area and the most important area, found at the Insh Marshes, is the largest continuous, intact '*poor fen*' habitat in the UK. Despite being classified as '*poor fen*', the Insh Marshes have a very diverse fauna and flora. Breeding birds include, Wigeon, Teal, Snipe, Redshank, Curlew, Water rail, Sedge warbler, Reed bunting and Spotted crane. In winter the site holds large numbers of wildfowl including up to 200 Whooper swans. Many listed invertebrates occur on the reserve, but only the reed beetle *Donacia aquatica* is specifically associated with the fen habitat.

There are few reedbeds in the Cairngorms Partnership area and most of these are very small, with a total area of c52 ha. A map of the distribution of *Phragmites australis* reedbeds shows that sites are found in Strathspey and middle Deeside, but otherwise only near the southern boundary of the Cairngorms Partnership area. It is possible that some undocumented reedbeds occur in other areas. The majority of the UK's reedbeds occur in England. Reedbeds in the Cairngorms Partnership area only account for c4% of the Scottish total and 1% of the UK total. There are several species closely associated with this habitat in the Cairngorms Partnership area. Reedbeds are the main breeding habitat for Reed bunting and other breeding species include Sedge and Grasshopper warbler, Spotted crane and Water rail.

Away from the Insh marshes, there are only small areas of wetland in the Cairngorms. The most significant remaining known sites are around the Dinnet Lochs, Loch of Kinnordy, Loch Alvie, Loch Vaa, Loch Morlich, Loch an Eilean, Loch Pityoulish, Loch Muick, Loch Callater and Loch Garry. Due to the wet climate, waterlogged soils and numerous small lochs and lochans the broad habitat is small but reasonable common. However, the lack of systematic surveys means

that a full site inventory does not exist and the national significance of this resource remains unknown.

Many lowland wetlands have been drained and converted to agricultural use in the past but it is not clear to what extent this has occurred in the Cairngorms Partnership area. Water pollution is a potential threat, with eutrophication at sites such as Loch Alvie a particular problem. Damage from grazing and trampling has been recorded at some loch sides in the Cairngorms Partnership area. Upland flushes and springs have been less affected, but some have been polluted by human waste, for example on Cairngorm. Acidification and climate change are also potential threats.

Fens, marsh, swamps and reedbeds are dynamic semi-natural systems and in general, management is needed to maintain the communities and their associated species richness. Without appropriate management, such as mowing, grazing, burning, cutting or scrub clearance, natural succession will result in the scrub and woodland. Therefore, the actions taken on surrounding habitats, such as agricultural areas, will directly effect the quality of this habitat. Particular care needs to be taken when expanding riparian woodland networks, to ensure that good quality fen, marsh, swamp and reedbed habitats are not damaged or hydrologically compromised by trees.

The national biodiversity context:

There is a UK Habitat Statement for fen, marsh, swamp and reedbed. This gives the following conservation direction to LBAPs, which may adopt some or all of the relevant measures identified nationally:

“Maintain the existing areas and identify those that are suitable for restoration. Create new reedbeds on land of low conservation importance. Identify priority fen sites in critical need of rehabilitation and initiate action - by 2005. All rich fen and other sites with rare communities should also be considered. Ensure appropriate water quality and quantity for the continued existence of all SSSI fens – by 2005. Identify and rehabilitate the priority areas of existing reedbed (targeting those of 2 ha or more) and maintain this thereafter by active management. Create 1200 ha of new reedbed in the UK on land of low nature conservation interest – by 2010.”

Targets:

The following four objectives and targets have been identified for fens, marsh, swamp and reedbed in the Cairngorms:

Main objectives/targets:

Target 1: *Ascertain the distribution and status of fens, marsh, swamp and reedbeds in the Cairngorms through a site inventory – by 2005.*

Target 2: *Ensure no net loss in area of fen, marsh, swamp and reedbed in the Cairngorms – by 2005.*

Target 3: *To ensure good ecological status/quality of important fen, marsh, swamp and reedbed, maintain and restore the appropriate natural nutrient and hydrological status of important fen, marsh, swamp and reedbed in the Cairngorms – by 2010.*

Target 4: *Ensure no net loss in the number and/or range of Key species associated with fen, marsh, swamp and reedbed in the Cairngorms – by 2005.*

Current factors affecting the habitat in the Cairngorms:

In the UK, drainage and agricultural conversion, succession and eutrophication have particularly affected reedbeds and fens. There have been several mainly unsuccessful attempts to prevent flooding from the River Spey. If not managed properly there would be a natural succession of fen and reedbed to scrub and ultimately woodland. Current wetland site management includes scrub removal, light grazing and mechanical topping of vegetation.

There were two specific fen, marsh, swamp and reedbed issues identified over and above those detailed in the 'Main wetlands and water biodiversity issues section':

Catchment management:

The issues:

- Lack of appropriate management of existing fens and reedbeds leading to drying, scrub encroachment and ultimately woodland succession.
- Waste disposal and dumping on important wetland sites.

The solutions, actions and targets:

- Encourage targeted restoration by producing a number of grazing plans to control scrub encroachment where appropriate – *by 2005*.
- Promote the image fens, marsh, swamp and reedbeds as important wetland ecosystem components and not as wastelands suitable for rubbish dumping – *ongoing*.

Practical action

Agricultural waste collection scheme:

The Cairngorms Partnership has been running a free collection service for agricultural waste in Badenoch and Strathspey and parts of upper Morayshire. The scheme collects plastic, oil, oil filters, batteries, animal medicines, sheep dip and other chemicals from farms and crofts in the area. The collection service is part of a larger project to find practical solutions for the disposal of agricultural waste and ensure that the wetlands, burns and tributaries of the River Spey remain a clean and healthy resource for future generations. The scheme has been so successful, that consideration should be given to extending the scheme to other catchments e.g. the River Dee.

Table 3. 'Key' Cairngorms wetland and water species

Wetland and water habitat codes:

SOW = Standing open water, OL = Oligotrophic lochs, EL = Eutrophic lochs, RB = Rivers and burns, FMR = Fen, marsh and reedbed. ♦ = Regularly used by species. (P) = UK Priority species, (C) = UK Species of conservation concern, (L) = Locally important species.

Species	SOW	OL	EL	RB	FMR
Otter <i>Lutra lutra</i> (P)(L)	♦			♦	♦
Water vole <i>Arvicola terrestris</i> (P)(L)	♦			♦	♦
Water shrew <i>Neomys fodiens</i> (C)	♦			♦	♦
Daubenton's bat <i>Myotis daubentonii</i> (C)				♦	
Red-throated diver <i>Gavia stellata</i> (C)		♦			
Black-throated diver <i>Gavia arctica</i> (C)		♦			
Little grebe <i>Tachyhaptus ruficollis</i> (L)	♦				♦
Slavonian grebe <i>Podiceps auritus</i> (C)(L)	♦				
Black-necked Grebe <i>Podiceps nigricollis</i> (L)			♦		
Heron <i>Ardea cinera</i> (L)	♦				♦
Mute swan <i>Cygnus olor</i> (C)	♦			♦	♦
Whooper swan <i>Cygnus cygnus</i> (C)	♦			♦	
Grey-lag goose <i>Anser anser</i> (C)	♦				
Wigeon <i>Anas penelope</i> (C)	♦			♦	♦
Gadwall <i>Anus strepera</i> (C)	♦				
Teal <i>Anas crecca</i> (C)	♦			♦	♦
Pintail <i>Anas acuta</i> (C)	♦				
Garganey <i>Anas querquedula</i> (C)	♦				♦
Pochard <i>Aythya ferina</i> (C)	♦				
Shoveler <i>Anas clypeata</i> (C)	♦				
Tufted Duck <i>Aythya fuligula</i> (C)	♦			♦	
Goldeneye <i>Bucephala clangula</i> (C)(L)	♦			♦	
Red-breasted merganser <i>Mergus serrator</i> (C)	♦			♦	
Goosander <i>Mergus merganser</i> (C)	♦			♦	
All water/wildfowl in general (L)	♦			♦	
Spotted crane <i>Porzana porzana</i> (C)	♦				♦
Water rail <i>Rallus aquaticus</i> (C)	♦				♦
Coot <i>Fulica atra</i> (L)	♦				♦
Moorhen <i>Gallinula chloropus</i> (L)	♦				♦
Curlew <i>Numenius arquata</i> (C)(L)					♦
Snipe <i>Gallinago gallinago</i> (C)					♦
Osprey <i>Pandion haliaetus</i> (C)(L)	♦			♦	
Hen harrier <i>Circus cyaenus</i> (C)(L)					♦
Black-headed Gull <i>Larus ridibundus</i> (L)			♦		
Common tern <i>Sterna hirundo</i> (C)	♦			♦	
Kingfisher <i>Alcedo atthis</i> (C)	♦			♦	

Grey wagtail <i>Motacilla cinera</i> (C)(L)	◆			◆	
Pied Wagtail <i>Motacilla alba</i> (C)(L)	◆			◆	
Dipper <i>Cinclus cinclus</i> (C)(L)				◆	
Sedge warbler <i>Acrocephalus schoenobaenus</i> (C)					◆
Reed bunting <i>Emberiza schoeniclus</i> (P)				◆	◆
Common toad <i>Bufo bufo</i> (C)(L)	◆			◆	◆
Common frog <i>Rana temporaria</i> (C)(L)	◆			◆	◆
Great crested newt <i>Triturus cristatus</i> (P)(L)		◆			
Palmate newt <i>Triturus helveticus</i> (C)(L)	◆				
Smooth newt <i>Triturus vulgaris</i> (C)(L)	◆				
Atlantic salmon <i>Salmo salar</i> (C)(L)	◆			◆	
Sea/brown trout <i>Salmo trutta</i> (L)	◆			◆	
Arctic charr <i>Salvelinus alpinus</i> (C)(L)		◆		◆	
River lamprey <i>Lampetra fluviatilis</i> (C)(L)				◆	
Brook lamprey <i>Lampetra planeri</i> (C)(L)				◆	
Sea lamprey <i>Petromyzon marinus</i> (C)(L)				◆	
Small pearl-bordered fritillary <i>Boloria selene</i> (C)(L)					◆
Northern blue damselfly <i>Coenagrion hastulatum</i> (C)(L)	◆				◆
White-faced dragonfly <i>Leucorrhinia dubia</i> (C)(L)		◆			◆
Freshwater pearl mussel <i>Margaritifera margaritifera</i> (P)(L)				◆	
A freshwater bivalve <i>Pisidium conventus</i> (C)	◆				
A snail <i>Vertigo geyeri</i> (P)					◆
A terrestrial snail <i>Vertigo lilljeorgi</i> (C)					◆
Snail-killing fly <i>Pherbellia brunnipes</i> (L)	◆				
A caddis fly <i>Oligotricha clathrata</i> (L)	◆				
A true fly <i>Microprosopa pallidicauda</i> (L)	◆				
A stonefly <i>Brachyptera putata</i> (P)				◆	
A cranefly <i>Rhabdomastix laeta</i> (=hilaris) (P)				◆	
A stilleto fly <i>Thereva lunulata</i> (P)				◆	
A rove beetle <i>Thinobius newberyi</i> (P)				◆	
A reed beetle <i>Donacia aquatica</i> (P)					◆
Aquatic beetle <i>Olophrum fusccum</i> (L)	◆				
Aquatic beetle <i>Olophrum consimile</i> (L)	◆				
Aquatic beetle <i>Bolitophagus reticulatus</i> (L)	◆				
A moss <i>Anoetangium warburgii</i> (C)				◆	
A moss <i>Rhynchostegium alopecuroides</i> (C)				◆	
String sedge <i>Carex chordorrhiza</i> (C)					◆
Bog orchid <i>Hammarbya paludosa</i> (C)					◆
Orchids in general (L)					◆
Bottle sedge <i>Carex rostrata</i> (L)					◆
Water horsetail <i>Equisetum fluviatile</i> (L)					◆
Shady horsetail <i>Equisetum pratense</i> (L)					◆
Branched bur-reed <i>Sparganium erectum</i> (L)					◆
Scandinavian small reed <i>Calamagrostis purpurea</i> (L)					◆

Brown sedge <i>Carex disticha</i> (L)					◆
Long-stalked yellow sedge <i>Carex lepidocarpa</i> (L)					◆
Tawny sedge <i>Carex hostiana</i> (L)					◆
Lesser tussock sedge <i>Carex diandra</i> (L)					◆
Greater tussock sedge <i>Carex paniculata</i> (L)					◆
Slender sedge <i>Carex lasiocarpa</i> (L)					◆
Water sedge <i>Carex aquatilis</i> (L)					◆
Bogbean <i>Menyanthes trifoliata</i> (L)					◆
Bog myrtle <i>Myrica gale</i> (L)					◆
Greater spearwort <i>Ranunculus lingua</i> (L)					◆
Awlwort <i>Subularia aquatica</i> (L)					◆
Spiny-spored quillwort <i>Isoetes echinospora</i> (L)					◆
Marsh clubmoss <i>Lycopodiella inundata</i> (P)					◆
Nodding bur-marigold <i>Bidens cernua</i> (L)					◆
Marsh cinquefoil <i>Potentilla palustris</i> (L)					◆
Marsh marigold <i>Caltha palustris</i> (L)					◆
Ragged robin <i>Lychnis flos-cuculi</i> (L)					◆
Common valerian <i>Valeriana officinalis</i> (L)					◆
Cowbane <i>Cicuta virosa</i> (L)					◆
Wild angelica <i>Angelica sylvestris</i> (L)					◆
Meadowsweet <i>Filipendula ulmaria</i> (L)					◆
Short-leaved water crowfoot <i>Ranunculus trichophyllus</i> (L)	◆				
Ivy-leaved water-crowfoot <i>Ranunculus hereraceus</i> (C)				◆	
Stream water-crowfoot <i>Ranunculus penicillatus</i> (C)				◆	
Slender stonewort <i>Nitella gracillis</i> (P)	◆				◆
Pillwort <i>Pilularia globulifera</i> (P)	◆				◆
Grass-wrack pondweed <i>Potamogeton compressus</i> (P)	◆			◆	