Highland

BIODIVERSITY

THE VARIETY OF LIFE

A Framework for Biodiversity in Highland

Produced by The Highland Council on behalf of The Highland Biodiversity Partnership

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WISE USE OF RESOURCES, ACTIVE CHOICES

LOCAL AGENDA 21 HIGHLAND

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Introduction

1.1 Biodiversity is about nature, and also about people. Biodiversity may be a fancy name for the richness of the natural world but it also takes us further forward than traditional nature conservation. It sees the natural world as a vital asset and as essential to our survival and our quality of life. It does not however set people apart from the nature, rather it sees the two intertwined - by millions of years of evolution, by history, by culture, and by the use (and sometimes abuse!) of one by the other. The International Convention of Biodiversity, which subsequently has generated this work worldwide on biodiversity, came out of the Earth Summit in 1992. That Summit was called not simply because of a few rich countries' concerns about tigers or whales, but out of concerns for social justice, and out of a recognition that traditional development had failed the World's poorer countries and that a new, better, fairer sort of development was required. It reflected concerns by native peoples that they were losing their culture and traditional way of life, and because it was widely recognised that the Earth was facing major environmental problems that were impacting on all its peoples. These then were the roots of the current focus on biodiversity and the messages are ones which are surely relevant to Highland.

1.2 And so in Highland the challenge of working on biodiversity is both to see what we do in a global context and also to act locally. This action must be inclusive of the whole of the community and a way of life that is still strongly linked to the land, through agriculture, forestry, fisheries, and relatively new industries such as fish farming or tourism. It is a challenge for us all to break out from our traditional ways of thinking. It is a way for local communities to have more ownership and say in the management of natural resources. It is an opportunity to support and celebrate traditional ways of living across the Highlands, such as farming, crofting and fishing. It is a chance to argue for better support for rural areas and for Highland farming. It is also an opportunity to face up to some of the problems the modern world and past management have created for the Highland environment; whether this is through over-exploitation of natural assets, overgrazing, or loss of natural forest cover. And it is a chance to plan for the future, in terms of the kind of rural Highland we wish to see, to safeguard its habitats and species, and the way we all work together to meet our many needs.

1.3 This Framework summarises the biodiversity resource of Highland and outlines an approach to working on biodiversity. The actions within it are for discussion and seek not only to conserve Highland's biodiversity and raise awareness of its benefits, but also to maximise its social and economic value in a sustainable way. It is a Framework to help

spell out some of the key issues for Highland. It is not comprehensive - no document of this size could be, but it aims to identify the key issues, to provoke discussion about what is important, and to help form agreement on what needs to be done. Not everything requires funding, a lot can be done with better understanding, co-operation and voluntary effort. Bringing new resources to this area will however ensure that the legacy of this project is not a series of sterile plans stuck on a shelf, but practical benefits for all.

1.4 This document is also necessarily technical (although we have tried to make it as readable as possible). Its emphasis is ecological, because that is a natural, logical starting point for embarking on a project that spans the natural richness of the Highlands. We make no apology for this, we believe it is a correct approach but we also recognise that this is just a starting point. The discussions this paper will prompt will allow us a very broad perspective on biodiversity. The project will fail if it only involves professional biologists, it needs to have the involvement of crofters, farmers, landowners, foresters, planners, the tourism industry, the local community, and all those with a stake in Highland's majestic biodiversity.

1.5 Who has written this document? It has been compiled by officers of The Highland Council (THC), with helpful inputs from many others, as part of its contribution to the UK Biodiversity Action Plan. It includes the outputs of a workshop held in Inverness in December 200, attended by 50 members of the Highland Biodiversity Partnership.This work on biodiversity is very much a partnership exercise. It recognises considerable work is already underway and that better co-ordination between partners will achieve maximum benefits.

Contents

What is biodiversity?

3.1 Biodiversity is short for "biological diversity", that is simply the natural variety of plants and animals in the world. We all depend on this richness of plants and animals. It has important economic benefits for farming, fishing, tourism and through the provision of raw materials for medical research for example. Plants and animals, and the landscapes they help form are an important part of our cultural heritage, and give us pleasure and enjoyment. Biodiversity also provides us with "natural services" such as soil creation, biological control of pests and flood prevention.

Where did it all start?

3.2 The word "biodiversity" came from the "Earth Summit" held in Rio de Janeiro in 1992, where 159 countries (including Britain) recognised the value of biodiversity to human life and signed the Convention on Biological Diversity. This pledges the UK to conserve biodiversity, to use its components in a way that ensures they continue to be available for future generations, and to share the benefits of biodiversity fairly and equitably between all nations and people. This way of using resources is an integral part of the philosophy of **sustainable development**, whereby any development should ensure that it does not reduce the quality of life of future generations.

Why is biodiversity different from what has happened before?

3.3 Biodiversity has become a new "buzz word", which has already attracted wide spread attention. Although linked to the ideas of nature conservation, the whole approach is far more inclusive, both in the issues addressed and in terms of who is involved. It is not just about habitats and species nor designated sites and protection; it is fundamentally about the sustainable and equitable wise use of natural resources. A key aspect of this is recognising the importance of local action and allowing local communities to set their own priorities.

What has happened so far?

3.4 The UK Government has commissioned a detailed set of recommendations on how the Convention on Biological Diversity should be implemented, known as the "**UK Biodiversity Action Plan**". This includes lists of habitats and species, which are considered to be the ones most in need of conservation in the UK (the **UK BAP priority habitats and species**). National plans (Species Action Plans and Habitat Action Plans) or statements (where action required is limited) have been prepared for all these species and habitats. The UK Biodiversity Action Plan also identifies a further 677 **other species of conservation importance,** for which a national plan is not being produced at this stage, but for which action may be needed.

3.5 The national plans outline overall objectives for each habitat and species and detail requirements for policy change, research, management needs and so on. Where a species is very restricted in distribution, implementation of the national plan has often resulted in local action on the ground, but for more widespread species (e.g. water vole or red squirrel), local action will need to be picked up at a local level.

What about Local Biodiversity Action Plans?

3.6 The majority of local authorities are now involved in the preparation of **Local Biodiversity Action Plans (LBAPs)**, which are contributions to the UK Biodiversity Action Plan. LBAPs are prepared by partnerships of interested organisations and

individuals. They are a way of ensuring that national plans for habitats and species are implemented at a local level. They are also a way of determining and addressing local priorities for biodiversity and for involving local people in action on the ground. There has been a diversity of approach and rate of progress, but many areas have struggled to move from the plan stage to practical action. This is something we must avoid in Highland.

Objectives for Biodiversity in Highland

3.7

- to maintain and enhance Highland's native biodiversity
- to increase local awareness and knowledge of biodiversity and foster the active involvement of local communities in looking after it
- to raise public awareness of the social and economic value of biodiversity
- to encourage sustainable uses of biodiversity
- to encourage more sustainable practices in all activities which impinge on Highland's biodiversity

What has happened in Highland so far?

4.1 In 1997 the Cairngorms Partnership commenced preparation of an LBAP for the area within their remit, which includes the majority of Badenoch and Strathspey. An audit of the biodiversity resource has now been published and production of a suite of habitat action plans (that will effectively form the LBAP) is nearing completion. A number of practical projects are also already underway. The Highland Council along with many of the other partners in the Highland Biodiversity Project actively supports the work in the Cairngorms.

4.2 In its approved Structure Plan (March 2001), The Highland Council made a commitment to lead the production of a suite of LBAPs to cover the rest of Highland by 2002. The Structure Plan states that this will be done as a partnership exercise which will involve local communities. It also states (Policy N4) that the Council will have regard to LBAPs in the consideration of development proposals.

4.3 In 1999 an informal "Biodiversity Partnership" was established of organisations and individuals across Highland who have an interest in promoting biodiversity. As a first step, an evaluation of the existing and potential uses of biodiversity was commissioned, funded by THC, HIE, SNH and RSPB[1]. This report conducted by Bidwells highlights the broader socio-economic and cultural values of biodiversity.

4.4 A number of organisations are already involved in implementing plans for UK BAP habitats and species in Highland, including SNH, RSPB, FC and others. The work underway is just a small part of that required however.

The proposed approach

5.1 The intention in Highland is to have a broad approach to biodiversity, looking not only at species and habitats, but also at the social and economic opportunities provided by biodiversity. A mainstay will be the Local Biodiversity Action Plans (LBAPs), which will identify and implement local priorities for action. The scale and diversity of Highland is such that one Biodiversity Action Plan for Highland would be inappropriate, and so a series of plans are envisaged. Action will also be needed on a Highland-wide basis for some issues and species. This may be through the work of existing individual agencies or

[1] *Highland Council Biodiversity audit and evaluation report* Bidwells (2000)

on a collective basis through the Highland Biodiversity Partnership. Where possible work will be carried out through existing initiatives.

The species and habitats resource

6.1 The UK Biodiversity Action Plan identifies 238 priority species and 41 priority habitats (plus Birch woodland, which is to be added) which occur in Scotland. Highland supports 192 of the priority species and 455 of the "other species of conservation importance". 40 of the 42 priority habitats are present in Highland.

6.2 This presents a somewhat daunting responsibility, with Highland having not only a high proportion of the species, but also often being the stronghold or even the sole location for them. A high proportion of the priority species occur in a very restricted number of sites however. In the majority of cases the management of these species and sites is already in hand, being undertaken by organisations such as SNH. It is the more wide-ranging species which attract less dedicated management and which generally will therefore most benefit from Local Biodiversity Action Plans.

6.3 Many species share the same ecological requirements, such that a certain management regime may benefit many species. At a national level this has already been recognised, and either species are grouped together within single plans or plans are being implemented in a co-ordinated way.

6.4 In the case of Highland a number of key habitats support significant numbers of the priority species, such that maintaining appropriate management of the habitat will maintain the species. Key habitats in this category in Highland include:

- native pine woodlands (particularly important for wood ants, fungi, red squirrel, capercaillie and other priority species),
- arable farmland (8 priority bird species are associated),
- montane habitats (not identified as a national priority habitat their own right, despite supporting many priority species) and
- rivers and their associated habitats.

6.5 The UK priority species lists are only part of the biodiversity picture. They do not necessarily identify those species which are "keystone" species for certain habitats, but themselves are not rare and therefore not "priority species". An example is kelp forests. Kelp is not rare, but provides a source of food not only for the animals that lives amongst it, but also most animals in the surrounding area. In addition locally important species are often strongly contributing to the distinctiveness of specific areas. Both of these issues should be addressed in LBAPs.

Introduction to habitat topic papers.

7.1 The following sections give a broad overview of the biodiversity resource in Highland by habitat group, based largely on information already available elsewhere. Sources include SNH's Natural Heritage Zone reports and discussions with key partners. This report seeks to both inform and act as a starting point for discussion. Each section includes:

- a brief summary of the resource in Highland and its relative importance
- an issues and themes section
- details of priority BAP species recorded in Highland
- other species of conservation interest
- key objectives
- current mechanisms for promoting biodiversity
- policy measures required
- potential practical opportunities for enhancing biodiversity and its sustainable use
- survey/research information and requirements

7.2 The section summarising the resource focuses particularly on those habitats which have been identified as UK Biodiversity Action Plan priority habitats, although it also touches on other habitats, particularly where they are important for priority species. It has not been possible to obtain definitive figures on the relative extent of different habitats. In some case these do not exist as surveys are not complete, and where surveys do exist, figures have not been collated specifically for Highland. Distribution maps are currently being produced for all habitats for which there is survey information by SNH, and some of these should be available in the near future. Species listed as occurring within each habitat are not complete, but are intended to give an indication of the key species which are present.

7.3 To some extent priorities have been identified, where for example certain habitats or issues are of greater significance on a Highland-wide level. More detailed prioritisation will be required when Local Biodiversity Action Plans are prepared.

7.4 The biodiversity resource has been divided into six sections: the Seas; Coasts and Firths; Mountains, Heaths and Bogs; Farmlands and Lowland Grasslands; Forests and Woodlands; and Lochs, Rivers and Marshes. Inevitably this is an artificial division, as habitats are a continuum and do not operate in isolation. The papers should not therefore be read in isolation, particularly as the most fruitful opportunities for enhancing biodiversity are likely to be those which look at whole ecological systems.

THE SEAS

8.1 A high proportion of Highland's population live near the coast, and many depend on the sea for their livelihood or recreation. Fishing is a mainstay primary industry, which brings considerable local income, although there are issues of managing inshore waters to accommodate all those fishing it and to ensure the maintenance of stocks. Aquaculture, particularly salmon and shellfish farming has also brought both jobs and prosperity to some of Highland's most economically fragile and peripheral areas. However the growth of this industry has raised concerns over disease and environmental degradation. Species such as seals fuel strong debate. The seas remain an important transport route for freight, and oil exploration and its conveyance harbours the continual threat of marine pollution. There are difficult issues to be tackled. The oceans are wild areas which we harvest not farm, and the natural environment has a vital role to play in assuring this continued bounty. Although increasing numbers of people are enjoying the marine environment through diving, recreational boating and wildlife boat tours, it remains the most unknown aspect of our environment, too easily out of sight and therefore mind.

The biodiversity resource: Key habitats and species in Highland

8.2 The sea and seabed around Scotland support a tremendous variety of wildlife. This is due to the complexity of the environment, there being both warm ocean currents from the south (the Gulf Stream) and cold sub-Arctic waters from the north, variations in tidal range and geology.

8.3 **Sublittoral sands and gravels** are the most common habitats found below the level of the lowest low tide around the UK, in a wide variety of environments. The diversity of wildlife living there varies depending upon the degree of environmental stress, for example the degree of wave action. Many of the inshore areas are important nursery grounds for juvenile commercial fish species, and offshore sand and gravel habitats support internationally important fish and shellfish fisheries. Although widespread, this group of habitats is particularly under threat from fishing, aggregate dredging, pollutants and those activities which may affect tidal flow regimes, wave exposure or sediment deposition. The West Coast Sea lochs, the Cromarty Firth and Skye are all noted as locations for specific variants of these habitats.

8.4 **Mud habitats in deep water** occupy the sea bed below 20-30m in many areas of the UK's marine environment, including sea lochs. They support a very high diversity of small burrowing animals, including sea pens, *Nephrops norvegicus (*scampi*)* and urchins. The majority of deep sea habitats are fished, principally for *Nephrops* using benthic trawls or creels. The impacts of creels are thought to be minimal, whereas trawling can be very detrimental. Marine fish farms can also pose a threat , through anchoring and discharges of feed and chemicals from sites with poor water circulation . The west coast of Scotland is the most important part of the UK for this habitat, which is present in all the sea lochs.

8.5 **Maerl beds** are created by several species of red algae that form a coral- like structure in high energy environments. They are known to be present in less than 1% of the UK's inshore waters, occurring off the southern and western coasts of Britain. Highland is particularly significant for maerl beds. The Sound of Arisaig, Upper Loch Torridon and Handa Sound all have large areas of maerl beds, also there are areas in Loch Carron. Maerl is significant not only in its own right but also for its value as nursery grounds for scallops.

8.6 **Horse mussel (*Modiolus modiolus*) beds** form at depths of between 5 and 70 m in fully saline, often moderately tide-swept areas off northern and western parts of the

British Isles, both in sea lochs and in open areas of sea.. They are long lived species and recruitment is slow, such that they are very vulnerable to disturbance as recovery is very slow, if it occurs at all. Fishing, particularly using trawls and dredges, is known to be damaging, and other physical impacts such as aggregate extraction are also likely to be detrimental. The impacts of pollution are unknown. Whilst horse mussels are widespread as individuals, beds are uncommon. Small areas of beds occur within Lochs Duich, Long and Alsh (candidate SAC).

8.7 Particular note should be made of the significance of the west coast **sea lochs**, which support so many of the nationally important coastal and marine habitats.

8.8 **Habitats classified as UK BAP priority habitats which occur in Highland**

- Sublittoral sands and gravels
- Maerl beds
- Mud habitats in deep water
- *Modiolus modiolus* reefs (horse mussel)

8.9 *Lophelia pertusa* reefs, *Sabellaria alveolata* reefs, *Sabellaria spinulosa* reefs and *Serpulid* reefs are marine UK BAP priority habitats which do not occur in Highland.

8.10 **UK BAP Priority species recorded in Highland associated with marine habitats**

- Otter, harbour porpoise, baleen whales, toothed whales, small dolphins
- marine turtles
- Common scoter (a duck)
- Commercial marine fish, deep water fish (for example black scabbard fish, blue ling, orange roughy), common skate, twaite shad, allis shad,
- basking shark
- sea pen, northern hatchet shell, a fan shell, native oyster.
- *Ascophyllum nodosum* ecad *mackii* (unattached brown algae)

8.11 **Some other species of conservation interest**

- Common and grey seals
- Great northern, black and red throated divers, Slavonian Grebes use coastal areas in winter and spring. Eider duck
- Wild salmon and sea trout.

8.12 **Key biodiversity objectives**

- To maintain and enhance the rich marine heritage of coastal waters, through the promotion of the sustainable management of fish stocks and aquaculture.
- To promote local involvement in the management of coastal waters.
- To raise public awareness of the value of the marine biodiversity resource.

8.12 **Trends and issues**

See also those in section on Coasts

- Intensification of **fishing** over last 50 years with technological advances, leading to larger catches, also significant discarded by-catches. Fisheries now experiencing declining catches, primarily due to stock depletion and habitat deterioration. Stock management highly complex and very little known. Growing awareness amongst fishermen regarding responsible fishing.
- Lobster numbers have declined.
- Coastal **water quality** improving, as effluent loading reducing. Sewage dumping at sea now eliminated. Greatest pollution problems now from diffuse sources such as agriculture. Further improvements likely with integration of range of water related/pollution control legislation under EU Water Framework Directive. Provision /upgrading of sewage treatment facilities still needed in some areas to improve water quality.

- Ongoing damage to seabed from **dredging** for navigational purposes, trawling and aggregate extraction. Potential conflicts with aquaculture. Suction dredging for shell fish not currently a major issue, but pressure may increase in relation to fisheries for razor clams.
- Extensive development of **aquaculture** over last 30 years, growing in scale and diversity of species; the best sites are now developed, however there has been continuing modifications of many sites to optimise growing conditions, minimise impacts and maximise production. Interest in diversifying from salmon to species such as halibut and cod is growing and in a small number of locations these species have replaced salmon. Technology advancing eg automatic feeding systems.
- Fish Farming Framework Plans (now known as Aquaculture Framework Plans) introduced by Highland Council in 1988, ongoing, although not complete coverage, advisory not statutory.
- Primary legislation anticipated to move planning role for fish farms from the Crown Estate to local authorities, Aquaculture Framework Plans to become statutory.
- EU's revised Environmental Impact Assessment Regulations now embrace fish farming to greater extent. Shell fish farming currently exempt from EAs- may change.
- Impacts of fish farming on seabed biota, water quality (from food, waste products, chemicals).
- Conflicts between operation of fish farms and wildlife.
- Increase in shell fish farming in recent years, especially with crofters diversifying.
- Growing interest in seabed "ranching" of scallops or crustaceans via Several (give access rights to an individual) or Regulating Orders, may focus more attention on outer sea loch areas.
- Occasional occurrence of naturally occurring toxic algal blooms which result in bans on shell fish marketing. Some speculation regarding possible influence of fish farms.
- Decline in numbers of wild migratory salmonids on many west coats rivers. There may be several reasons for this including high densities of sea lice associated with salmon farms affecting migratory fish passing nearby. Also knock on impacts on Fresh water pearl mussel which is dependent on wild migratory salmonids at certain stage in life cycle.
- Ongoing impacts from **oil and gas** industry, threat of pollution from oil spills. Development of the Atlantic frontier oil field.
- **Marine pollution** from shipping and marine litter. Also pollution/litter from local fishing and aquaculture and harbour activities. High risk of tanker/ other shipping disaster, especially west coast.
- **Artificial reefs-** their potential and associated issues need to be investigated, waste minimisation issues.
- Increased demand for moorings and slipways, but not currently recognised as a threat to biodiversity.
- **Climate change -** rise in sea levels. Great deal of research but need to consider implications.
- Development on the coast - discharges
- **Increase in green tourism**.
- **Algal blooms** – seasonal increase toxin levels
- **Renewable energy issues**- wave and wind.
- **Marine tourism** development been very ad hoc, mixed approach.
- **Designation and management approach**. Review needed of available mechanisms and appropriate approach.
- **Maerl and sea lochs identified as key habitats for action**.

8.13 **Current mechanisms/ initiatives for promoting biodiversity**

- Special Areas of Conservation – marine sites (Sound of Arisaig, Moray Firth etc)
- Marine Consultation Areas
- Statutory conservation designations, management agreements/strategies
- The Minch Forum (not currently active)
- Marine Wildlife Tour operators voluntary code of conduct
- Scottish Coastal Forum (currently developing a Scottish Coastal Strategy)

8.14 **Proposed policy/Highland- wide measures for promoting & protecting biodiversity**

- Promotion of more sustainable fishing through stock conservation, local management groups, no take zones, area access agreements for inshore fishing and seabed harvesting, use of Regulating Orders.
- Extend coverage of Aquaculture Framework Plans.
- Provision of advice to fisheries organisations, fishermen and policy makers so as to improve the monitoring of fishing activity.
- Promote minimum use of artificial inputs to fish farms and organic practices.
- Marine nature reserves with management plans.
- Develop Integrated Coastal Zone Management Strategies (ICZM) - pilot study around Skye and Lochalsh undertaken but not implemented.
- Effective liaison between fish farm operators and game fishing interests to minimise conflicts of interest.
- Re-routing of shipping away from the Minch.
- Shellfish Classifications. Inshore areas designation in relation to water quality and the need to treat the mussels before consumption.

8.15 **Potential practical opportunities for enhancing biodiversity and its sustainable use**

- Research into the effects of fishing gear and aquaculture on biodiversity, also review of best practice.
- Determine the extent of unmodified examples of habitats/ ecosystems and protect best examples from adverse impacts.
- Investigation of more effective construction and management of fish farms to reduce losses to escapes and predators.
- Assist development of non-lethal methods to protect farmed stock from predators, which avoid non-target species.
- Marine tourism-develop approach to marine tourism, opportunities could include interpretation of a fish farm
- Voluntary codes of practice between fish farm operators and conservation interests.
- Visits to other fisheries e.g. New Zealand to look at management options.
- Interpretation of marine mammals. Use of underwater video for interpretation.
- Encourage reportings of marine mammals by fishermen and others.
- Work with fishermen to reduce by-catches and to dispose of discarded gear safely.
- Seals a useful focus for discussing many issues as particularly visible, high profile.
- Make use of travelling information/ interpretation eg on boat. Focus particularly on llinks between “habits and habitats”- what we do has an impact.
- Investigate better use of coastal transport.
- Small grant scheme or award to promote best practice in marine sustainable management.
- Integrate datasets of marine information and identify gaps.
- Whole lochs project looking at whole system from river to sea loch, including nutrient loading, community engagement.

8.16 **Sources of Further Information**

- *Loch Eriboll Aquaculture Framework Plan*, Highland Council 2000
- *UK Biodiversity Group Tranche 2 Action Plans Vol 5, maritime species and habitats*, UK BiodiversityGroup, 1999.

  Argyll LBAPs for marine wildlife, Draft.

  Administrative models for integrated management of the Minch, PR Burbridge 1999.

  West Coast Sea Loch Study: the importance of Loch Torridon to the local community, Angus McHattie 1999.

8.17 **Survey/Research information and requirements**

Information required on marine litter and sources

Information required on economic significance of marine resources.

Need further work on long term trends in seabed flora and fauna.

COASTS AND FIRTHS

9.1 Highland's coasts are wonders of natural beauty, and vary from storm-torn seacliff to sheltered sea loch. Unlike much of the rest of the UK coast, Highland's coasts are relatively unmodified, and have a high value not only for biodiversity, but also in terms of landscape, recreation, enjoyment and also grazing in the case of machair. Coastal areas have a key role in tourism and recreation, with many visitors coming to Scotland specifically to enjoy its coast. This is despite the low profile given to the coast in marketing for tourism, such that the potential is probably far greater.

The biodiversity resource: key habitats and species in Highland

9.2 Highland has a long and varied coastline, which supports the whole range of coastal BAP habitats. It is important to note the interdependency of many coastal habitats, such that impacts on one cause knock-on effects on another. For example mudflats depend on soft coasts and salt marshes for the replenishment of sediments, and mudflats also dissipate wave energy, which prevents salt marsh erosion.

9.3 **Machair** grasslands are found on areas of wind-blown sand, with Scotland having two-thirds of the global resource. The most extensive areas are on the Western Isles, Tiree and Orkney. Highland is the next most significant area, supporting machair in the crofting areas of Sutherland and possibly elsewhere on the west coast. Machair is highly dependent on the traditional system of small scale rotation and low input agriculture and supports diverse plants, high densities of breeding waders, corncrakes, and various insects including the great yellow bumble bee. Whilst of importance, machair systems in Highland are comparatively small, and do not develop the range of habitats and species seen in the islands.

9.4 **Coastal saltmarsh** is a restricted habitat by its nature, as it mostly occurs in a narrow zone at the top of intertidal mudflats and fringing shores of firths, but in the UK as a whole it has also suffered great losses through land claim. North west Highland is the stronghold for one particular type of saltmarsh (Turf fucoid saltmarsh), for which Highland therefore has particular responsibility. There is also another very restricted type which occurs in the Inner Moray Firth. There are also two examples of cliff top saltings, which are found in only about fifteen places in Scotland and not in the rest of the UK. These are in north Sutherland. Highland has some particularly good examples of transitions from saltmarsh to freshwater habitats, notably at Loch Fleet in Sutherland, which has the best example in the UK of a saline alderwood at the Mound.

9.5 The highest **cliffs** on mainland Britain are at Clo Mor in Sutherland, with the rest of the north and west coast of Highland having a significant proportion of the UK resource. Steep cliffs are perhaps the most natural environment in the UK, with specialised vegetation and internationally important seabird breeding colonies. The degree of exposure often replicates upland conditions, such that arctic-alpine plants are found at sea level. The best example in the UK of this altitudinal variation is at Invernaver in Sutherland.

9.6 In terms of the range of variation and the size of the systems, Highland is probably the most significant area of Scotland for **sand dunes**. The best lichen- rich sand dunes in Scotland occur in the Moray Firth.

9.7 **Coastal vegetated shingle** occurs in a variety of landforms, the commonest being a narrow fringing deposit. The majority of the UK's shingle occurs in England and Wales. Within Scotland, Argyll, the Solway and Spey Bay have the majority of the resource. Highland is relatively less significant, but there are locally important areas in the Firths, in east Sutherland and in association with sand dune systems.

9.8 **Coastal grazing marsh** is land that was previously saltmarsh, which is separated from the sea by an embankment and which is periodically flooded with freshwater. There are not thought to be any examples of this in Highland.

9.9 Highland is particularly important for **maritime heath**, which is a mosaic of species rich grassland and dwarf shrub heath, with distinctive maritime plants such as spring squill and Scottish primrose. Scottish primrose is restricted globally to Highland and Orkney. The majority of the Scottish resource of maritime heath occurs in Highland and Orkney, and in Highland it is concentrated in North Caithness and North Sutherland.

9.10 Also of particular note in Highland, are the only two examples in Britain of **coastal juniper scrub**. These are at Morrich Mhor and Invernaver.

9.11 **Seagrass beds** occur in intertidal and shallow subtidal areas, usually in sheltered situations such as estuaries, shallow inlets and lagoons, where they form dense beds. The plants of eel grass and tasselweed stabilise the substratum, provide protection from wave action for other coastal habitats, are an important source of organic matter, and provide shelter and a surface for attachment by other species, including the young stages of commercially important fish and crustaceans. Eelgrass is an important source of food for wildfowl. The Cromarty Firth supports probably the largest total area of dwarf eelgrass and narrow leaved eelgrass in Britain (approx 1200 ha). The Moray Firth is another nationally important site.

9.12 **Saline lagoons** are expanses of coastal water of varying salinity, which are wholly or partially separated from the sea. They are widespread globally but very restricted in Europe. Scotland has 139 examples, of which the majority are in the Outer Hebrides and the Northern Isles. 15 are in Highland.

9.13 **Mudflats** are found in sheltered intertidal areas, particularly estuaries. They have a high productivity, but low biodiversity. However they provide feeding and resting areas for internationally important numbers of wintering and migratory waterfowl, and are also important nursery areas for flatfish. Although a widespread habitat, the UK extent of the resource has been dramatically reduced by land claim for development.

9.14 **Sheltered muddy gravels** also occur in estuaries, rias and sea lochs, in areas protected from strong wave action. The habitat is most diverse in the more saline conditions of the lower shore. Good examples of this habitat are rare, but the Sound of Arisaig is a notable location, having high and relatively constant salinity. Here the muddy gravels support an important and diverse community of burrowing animals (for example burrowing anenomes, as well as animals attached to pebbles (for example molluscs). The native oyster (a UK BAP species) is sometimes present in this habitat.

9.15 **Tidal rapids** are high energy environments resulting from a constriction in the coast line, such as at the entrance to the deep sea lochs of the west coast. These are linked to the sea by narrow rock sills, over which the tide flows. The tidal flow constantly replenishes the food resource, such that the marine communities are very diverse. There are abundant animals fixed on or in the seabed, including soft corals, sponges, mussels and anemones. In shallower waters are kelp and seaweeds characteristic of tide-swept areas. There are good examples at Loch Alsh and the Sound of Arisaig.

9.16 **Habitats classified as UK BAP priority habitats which occur in Highland**

*indicates habitat discussed in another section

- Machair
- Coastal saltmarsh
- Coastal sand dunes
- Coastal vegetated shingle
- Maritime cliff and slope
- Lowland heath (includes maritime heath)*
- Mudflats
- Reedbeds*
- Saline lagoons
- Seagrass beds
- Sheltered muddy gravels
- Tidal rapids

9.17 **Priority BAP species recorded in Highland associated with the coast**

- Otter, reed bunting
- Machair: corncrake, great yellow bumble bee, northern colletes bee, endemic eyebrights, petalwort (liverwort).
- Saltmarsh: endemic eyebright, sea bryum moss, lesser bearded stonewort
- Maritime cliff and slope: endemic eyebrights.
- Saline lagoons: lagoon seaslug (*Tenellia adspersa*)?
- Sand dunes: lesser bearded stonewort?
- Coastal juniper: scrub on the Morrich Mhoir and at Invernaver.

9.18 **Some other species of conservation interest**

White-tailed sea eagle, common seals, grey seals, Scottish primrose, *Corynephorus canescens (*a coastal grass in Achaidh Mhoir and Sands of Morar, Lochaber, probably introduced*), Eleocharis parvula* (a grass, Cromarty Firth*), oyster plant (Mertensia maritima)*, purple oxytropis (*Oxytropis halleri)*, *Carex maritima (sedge)*and *Equisetum variegatum (horsetail), Carex recta (sedge, tidal sections of estuaries).*

9.19 **Key biodiversity objectives for coasts and firths**

- To maintain and where possible enhance and restore the biodiversity of coastal habitats and species.
- To maintain the natural dynamics of coastal processes wherever possible.
- To ensure sustainable use of the coastal resource through the promotion of integrated coastal planning.
- To promote enjoyment and understanding of the coast, within the carrying capacity of the resource.

9.20 **Trends and issues**

(see also those in section on the Seas)

- **Climate change** is most significant issue. Sea level rise anticipated as a result of global warming. Low lying coasts most likely to be affected. On or near soft coasts will cause reworking of coastal sediments; generally outer firths will lose sediments and inner firths will gain sediments. Salt marshes will move inland, where topography and land-use permit.
- Climate change likely to increase both storm intensity and frequency, leading to coastal erosion. Already pressure for improvements to coastal defences.
- Inadequate planning to assess impact of climate change both on the natural heritage and on man made environment. Some modelling been carried out in England using airborne radar to assist mapping.
- Highland has more natural coast than much of mainland Scotland. In some areas **artificial constraints to natural processes** include sea defences, recreational use, agricultural use.

- Ongoing **developments** for oil and gas industry, other built development, fish farming, coastal recreation cause land claim, disturbance to wildlife, pollution. Significant EU investment in new coastal infrastructure eg roads, bridges, piers.
- **Agricultural improvement** has resulted in alteration or loss of coastal habitats. See Farmlands section for trends in crofting land which affect machair.
- Increasing demand for clean beaches has lead to increases in use of mechanical **beach-cleaning** machinery- damage to fauna, upsets natural processes. "Blue flag" standard demands use of machinery.
- **Extraction of sand and shingle**, often for agricultural use under permitted development rights. Can cause erosion and loss of vegetation. This needs to be more clearly flagged up in relation to climate change.
- Coast is a key **recreation** resource, great benefit to tourism industry. Highland tends to be marketed for its mountains rather than its coast however. Great marketing potential. Rising demand for green tourism. Seabirds and cliffs key asset.
- Recreational pressure a potential issue for sand dunes, needing careful management, with disturbance and localised erosion a problem in the past in some areas (Achmelvich and Clachtoll). Some dunes affected by golf courses, also habitat loss. Spread of scrub not a problem on Highland sand dunes, generally do not need intervention. Caravan sites on sand dunes been an issue in the past, but no known current proposals.
- Key issue for **salt marshes** is grazing pressure. Many salt marshes are designated, but management agreements needed to ensure appropriate grazing level continues.
- Key issue for **Lowland/maritime heath** is grazing levels. Work on Hoy established that enhancement of both agricultural viability and biodiversity interest possible by varying the shepherding. No additional costs. May be applicable elsewhere.
- **Seagrass beds** vulnerable to wasting disease caused by slime mould, not occurred recently, environmental stress likely to weaken resistance to it. Most at risk from land claim, increases in turbidity, nitrate concentrations, oil, oil dispersants.
- Coastal **water quality** improving, as effluent loading on marine environment has been reducing. Sewage dumping at sea now eliminated. Water quality will be improved further by various EC Directives including the Water Framework Directive.
- Greatest pollution problems now from diffuse sources such as agriculture. Further improvements likely with integration of range of water related/pollution control legislation under EU Water Framework Directive.
- **Sand and shingle systems and maritime heath identified as key habitats for action.**

9.21 **Current mechanisms for promoting biodiversity**

- Moray Firth Partnership
- Cromarty Firth Liason Group
- Rural Stewardship Scheme.
- Minch Project (recently finished)
- Special Areas for Conservation, other statutory conservation designations, SNH management agreements, SNH grants, nature reserve management.

9.22 **Policy measures required**

- See those for farmlands which encompass machair.
- "Blue flag" beach status currently demands mechanical rubbish clearance. Amend regulation to allow hand picking of rubbish.
- Review the guidance to local authorities on managing recreation on sand dunes.
- Promote integrated coastal management, including production of shoreline management plans.
- Planning for climate change.

9.23 **Potential practical opportunities for enhancing biodiversity and its sustainable use**

- Promote greater enjoyment and understanding of the coast.

- Market the coast of Highland as a visitor resource.
- Promote grazing methods used for maritime heath on Hoy.
- Interpretation of traditional farming/crofting practices.
- Interpretation of archaeological remains and links with the environment in coastal areas.
- Schools project looking at bumble bees.
- Encourage wider support for and recognition of importance of small scale agricultural units, also encourage use of vacant and under-utilised crofts.
- Encourage appropriate grazing levels for individual units based on their carrying capacity and their ability to produce home-grown feeds and proportion of species rich grasslands.
- Promote grazing methods used for maritime heath on Hoy.
- Encourage use of cattle where appropriate and native breeds with local wintering using locally grown fodder.
- Machair projects.
- Monitoring of dynamic change to coast.
- Local management of areas- Local Nature Reserves?
- Integrate databases.
- Look at whole river/ sealoch systems and their management- demonstrate benefits of integrated management, establish monitoring base..
- Sand dunes- identify areas which demonstrate dynamic processes.

9.24 **Survey/Research information and requirements**

- Comprehensive surveys exist of sand dunes, machair and saline lagoons. Incomplete survey of salt marshes.
- Survey of sea cliffs (high priority) and shingle needed.

9.25 **Sources of Further Information**

Coastal Cells in Scotland HR Wallingford 2000 (look at coastal erosion)
Guide to managing coastal erosion in beach/dune systems SNH 2000
Coastal Directories JNCC 1997/98
The nature of grazing: farming with flowers at Loft and the Hill of White Hamars, SNH/SWT 1998
The Moray Firth management guidelines and action programme Moray Firth Partnership

MOUNTAINS, HEATHS AND BOGS

10.1 Mountains are one of the defining features of Highland, and represent some of the least disturbed areas for wildlife in Britain. They are also a key economic and social resource, being important for agriculture, forestry, field sports and tourism. Yet they also face considerable challenges. Many of these traditional activities are under threat from low economic viability. In many areas grazing levels by sheep and deer are too high. In others natural vegetation has been lost, particularly scrub and upland woodland. Climate change threatens the survival of some of the rarest species. Munro bagging has become a national sport and while human visitation does not directly threaten most species, there can be indirect effects. Much of our upland vegetation is not naturally rich in species or rarities, but the species which are present tend to be specialised and not found elsewhere. The uplands are of particular importance for mosses, liverworts, lichens and ferns.

The biodiversity resource: key habitats and species in Highland

10.2 The natural tree line in Highland is at about 600m, although it is lower in exposed parts of the north and west. Above about 750m the level of exposure restricts vegetation to a mosaic of dwarf shrubs, moss heath and rough grassland. Then on the high tops there is distinctive, but very restricted, montane vegetation, including alpine heaths, montane scrub, and those plant communities restricted to rock ledges, crevices in rocks, and late-lying snow patches. These all support specialist plants and animals, with some birds being particularly associated with the summit plateaux. Highland is of particular importance for montane habitats, and a number of the montane plants are not found elsewhere in the UK outwith the Cairngorms.

10.3 Although Highland would once have been predominantly covered in woodland, it is now dominated below the tree line by moorland with heather and other dwarf shrubs (upland heathland), grassland, and by peatlands. Plantation forestry is also a significant land cover.

10.4 **Upland heathland** is regarded as being of international significance, being largely confined to the UK and the western seaboard of Europe. Although it occurs throughout Britain, the most important areas are to the north of the Highland Boundary Fault. It is generally found from the upper edge of enclosed land up to about 750m. Of particular significance is the type of upland heathland characterised by the North Atlantic liverwort. This habitat occurs in small patches on boulder fields and on north facing slopes down the north west coast and on the Outer Hebrides, with just small amounts on Skye and Rum. Torridon has perhaps the best examples in the world. It is found largely in designated sites.

10.5 **Lowland heath** tends to be below 300m and supports different plant communities from upland heath, although the management issues for the habitats are the same. Maritime heath is a type of lowland heath adapted to exposed coastal conditions (see coastal section), for which Highland is of particular note. Highland has perhaps just under a third of the lowland heathland resource of Scotland. Britain has a particular responsibility for lowland heath as we have a large percentage of the remaining resource and particularly of wet and humid heaths and maritime heaths. Good examples are at Durness, Inchnadamph, Loch Maree, the Cairngorms, Invernaver and the Drumochter Hills.

10.6 **Peatlands or bogs** are broadly divided into two types, both being fed only by rain and melting snow, rather than ground water or streams. **Blanket bogs** cover extensive areas of hill land, whereas **lowland raised bogs** tend to be isolated domes of peat. Both these

types of peatland are of international importance. Lowland raised bogs develop predominantly in lowland areas and are rare in Highland. The Flow Country across Sutherland and Caithness is one of the largest areas of blanket bog in the world. Blanket bogs support a very wide range of both land and water based (in the many lochans and lochs) wildlife. They are of particular importance for breeding birds including red-throated divers and golden plovers. They are also important as repositories of archaeological and palaeoecological evidence, which can tell us much about previous cultures and previous environments. In the context of climate change the role of blanket bogs as a carbon store is now considered to be very significant.

10.7 **Limestone pavement** is a very scarce habitat, which is of European importance. In Scotland as a whole there are only about 300 hectares scattered over about 20 locations, whereas other parts of Britain and Ireland have more extensive limestone pavement. In Highland the limestone pavements are formed on the Durness limestone, which outcrops at Strath Suardal (Skye), Rassal, Inchnadamph and Durness itself. The plant communities at three of the localities are considered to be of such significance that they have been selected to be designated as sites of European importance. Hazel scrub is present on parts of the Strath Suardal pavements, which are likely to support BAP lichens and a fungus (this is the case with coastal hazel scrub elsewhere).

10.8 **Habitats classified as UK BAP priority habitats which occur in Highland**
**indicates habitat discussed in another section*

- Blanket bog
- Limestone pavements
- Lowland heathland
- Lowland raised bog
- Upland calcareous grasslands*
- Upland heathland

10.9 **UK BAP priority species recorded in Highland associated with mountains, heaths and bogs**

Juniper, mountain scurvy-grass, Newman's lady fern, Norwegian mugwort, Oblong woodsia, woolly willow, alpine moss pertusaria lichen, alpine sulphur-tresses lichen, Baltic bog moss, Skye bog moss, a lichen, northern prongwort, Scottish beard moss, silky swan-neck moss, Stabler's rustwort liverwort, white stalk puffball fungus.
Argent and sable moth, netted mountain moth, northern dart moth, sword grass moth, Nightjar, black grouse, common scoter.

10.10 **Some other species of conservation interest**

Golden plover, red throated diver, dotterel, golden eagle.

10.11 **Key biodiversity objectives for Mountains, Heaths and Bogs**

- Maintain and where possible restore the current extent of upland habitats. The priorities are the regeneration of tall herb vegetation, alpine willow scrub, moss heaths, wet and dry heath, blanket bog, species rich grassland and the transitions between habitats, and the promotion of more appropriate grazing and burning management.
- Where appropriate extend native woodland and scrub in the uplands, following an analysis of the appropriate balance in a given area.

10.12 **Trends and issues**

- Increases in afforestation from 1940s to 1980s at expense of heather moorland, rough grassland and blanket bog. Not currently so much an issue, as FC now indicate

presumption against planting on active peatlands. Some existing plantations having impact on adjacent peatlands.

- Various peatland restoration schemes now underway. Drainage for agriculture has reduced extent and condition of peatlands. Past agricultural improvement can also be locally significant. Commercial peat extraction not currently undertaken in Highland. Domestic peat cutting still takes place.
- Increases in native woodland and natural regeneration schemes leading to consideration of balance between open ground and woodland.
- Commercial forestry and grant-aided natural regeneration of woodlands requires stock/ deer-fencing to exclude grazing and encourages long-term dense regeneration of scrub and tall heather. It also discourages burning on adjacent ground.
- Forestry plantations are frequently unmanaged and harbour foxes and crows that predate on moorland birds.
- Increases in rough grassland at expense of heather moorland and damage to peatlands due to overgrazing by high deer and sheep numbers and decline in shepherding. This overgrazing also causes and exacerbates localised wind erosion and run-off.
- Poor muirburn practices leading to deterioration and loss of heather moorland and peatlands, and prevention of natural regeneration of woodlands, scrub and dwarf heath. Particularly a problem in the west on wet heath.
- Increased use of ATVs for recreation, agriculture and sporting activities causes localised erosion.
- Decline in hill cattle since 1970s, contributing to decline in diversity of some grasslands.
- Increases in tourism and recreational use of the uplands. Related localised development may not always be appropriate, also localised erosion and disturbance.
- Increased awareness of natural heritage value of uplands.
- Increases in other types of development including hydro electric infrastructure and tracks.
- Heavy dependence on agricultural commodity support mechanisms, making farming vulnerable to changes in market. Some beneficial increases in agri-environment measures. Unpredictable effects of new LFA proposals.
- Farm diversification leading to pressure for alternative land uses, but opportunities for reducing reliance on high stock numbers and for more integrated developments and marketing.
- Long term changes through acidification and climate change (montane species esp vulnerable).
- Accidental or intentional killing of protected species by estates as part of vermin control.

10.13 **Current mechanisms/ initiatives for promoting biodiversity**

- Conservation designations, SNH management agreements, nature reserve management.
- SNH's Peatland Management Scheme in Caithness and Sutherland.
- A number of blanket bog restoration projects underway in Caithness and Sutherland involving RSPB, FC.
- Agri-environment schemes and moorland management schemes (with stock disposal options).
- SAC are developing training courses for farmers, crofters etc on agri-environment options eg moorland management planning and have lodged a HISTP bid to implement in HIE
- Tomorrow's Heathland Heritage, HLF funded scheme for lowland heath (unknown whether Highland will be included).
- Deer Management Groups, with potential to increase biodiversity benefits.
- Deer Management Plans in some areas, eg Cairngorm Speyside DMG, ditto.
- Ongoing research and trials on deer fencing methods to reduce bird mortality (FC, DCS etc).
- Cairngorms Upland Grain initiative.

10.14 **Policy/ Highland-wide measures for promoting biodiversity**
(see also Farmlands section)

- Agriculture support reform, particularly to promote organic/low input farming, use of hill cattle, better muirburn and shepherding, sustainable management of peatlands, marginal arable cropping including hay meadows and cereals. Also improved incentives for keeping stock off the in-bye in summer.
- Promote better management of supplementary hill feeding.
- Promote either consultation or statutory control of all development issues in the uplands.
- Review of muirburn legislation, promotion of Muirburn Code.
- Carbon sink.
- Amended system of estate evaluation not focusing solely on stag numbers.
- Implement the recommendations of the UK Raptor Working Group.
- Develop strategies to reduce deer numbers to levels compatible with maintaining priority habitats in favourable condition.
- Assess the carrying capacity of upland/bog habitats for grazing, including common grazings.

10.15 **Potential practical opportunities for enhancing biodiversity and its sustainable use**

- Joint training programmes on best muirburn practice/ vegetation management for gamekeepers/estates/deer managers, with incentives to encourage implementation. Priority is west coast.
- Explore new markets for shooting forest rather than hill deer.
- Long-term planning for black-grouse.
- Further research and monitoring on moorland management and on sustainable harvest of quarry species, with demonstrations of good practice.
- Encourage woodland and scrub habitat for black grouse - many estates only value red-grouse and burn heather with naturally regenerating trees.
- Provision of guidance on cost-effective design and construction for upland tracks
- Promotion of guidance/training on sensitive use of ATVs and encouragement of use of ponies for deer extraction
- Promote positive grazing management, particularly cattle through agric and forestry grants, with additional grants as stopgap pending wider agri-environment measures.
- Promotion of quality meat marketing and marketing of locally grown produce.
- Increase availability of info to tourists on informal outdoor recreation opportunities
- Develop Deer management plans to identify damage to natural heritage and appropriate stocking.
- Promote schemes for demonstration of sustainable deer management (Glen Affric NNR, Strathconon).
- Use of existing forestry grant mechanisms for natural regeneration, woodland edge habitats etc. WGS applications and grants need to demand higher deer culls and offer greater incentives and compensation.
- Further peatland restoration schemes.
- Code of practice for domestic peat cutting
- Monitor key alpine species to assess impact of climate change
- Develop plans to identify the appropriate balance between open ground and woodland for specific areas.
- Training for local service/ accommodation providers on the value of the upland resource.
- Promote local participation in habitat protection and improvement, to improve local skills, local involvement.

10.15 **Survey/research Information and requirements**

- *An Inventory of Lowland Raised Bogs in Great Britain,* SNH

- *Scottish Blanket Bog Inventory,* SNH, currently being compiled.
- *Inventory of Scottish lowland heathlands*, SNH, needs updating.

10.16 **Sources of further information**

- *Good Practice for grouse moor management,* Moorland Working Group, pub SNH 1998.
- *A muirburn code,* SNH, 1993.
- *The Flow Country*, RA Lindsay et al NCC 1988
- *Open Hill Deer Management Plans Guide*, DCS

FARMLANDS AND LOWLAND GRASSLANDS

11.1 Farmers and crofters have long been stewards of the countryside. They and their forebears are part of a tradition of human activity that has shaped the landscape, creating new and different habitats for wildlife while harvesting biodiversity to put food on our plates. When ecologists talk of semi-natural habitats it is in part a misnomer, these are natural habitats but created through the intervention of Man since early times. Yet modern agriculture also has placed pressures on the land which have the potential to exclude almost all wildlife, while the economic necessity of maximising production is very real. The desperate level of farm incomes at present, and the wholesale restructuring that European farming is undergoing makes the future highly uncertain. Food production will surely remain one primary aim of farming, although agricultural support will encourage a multi-benefit approach as we have seen in forestry in the last decade. The challenges are:

- to secure a satisfactory level of geographically targeted support, such as in agri-environment measures, to permit these changes and to secure a future for upland farming and crofting; and
- to engineer a paradigm change so that those involved in both agriculture and conservation can re-think their approach to what is a vital part of rural life in the Highlands.

The biodiversity resource: key habitats and species in Highland

11.2 As a major land use, farming has a key role in the maintenance of biodiversity. Managed and cultivated farmland creates a diverse landscape, which includes grazing for stock, cereal production, oil-seed rape, potatoes, neaps, set- aside, boundary features and woodland. Together this diversity of conditions can support a wide range of species. Some of these species are closely linked with the farming cycle and what happens within the fields through the year, whilst others are linked with boundary features.

11.3 The split between “Farmlands and lowland grasslands” and “Mountains, heaths and bogs” is obviously an arbitrary one, and is particularly fuzzy in the context of Highland. In many of the crofting areas for example, upland habitats are found at sea level and can be the dominant habitats.

11.4 **Lowland hay meadows** are flower-rich hay meadows which occur typically on well drained unimproved unproductive soils. They have gradually declined with agricultural intensification and the crofting areas of Lochaber and Skye now have the largest extent of these grasslands in Scotland. There are only isolated examples elsewhere. They are important for a range of plants and insects and in some areas for corncrakes.

11.5 **Lowland dry acid grasslands** occur typically on nutrient-poor, free-draining soils over acid rocks, sand or gravel, below the enclosure line. They support more “heathy “plants such as heath bedstraw and tormentil, with dwarf shrubs such as heather and blaeberry being present in small quantities. They occur mainly on the upland fringe and in the coastal regions of the north and west, where they are used for rough grazing. They are important breeding areas for wading birds, and feeding and hunting grounds for birds of prey. Typically these grasslands are poor in plant species, but if the management is favourable they can be richer. Where there is natural flushing with nutrients from springs, more species-rich variations of the grasslands occur, and these are particularly important. Where the grass is more open on sandy soils, there can be a considerable number of ground-dwelling and burrowing insects.

11.6 **Purple moor grass and rush pasture** also occurs below the line of enclosure, predominantly on shallow peats. It is a rare habitat which is more extensive in South

West Scotland and Argyll than further north, but it does occur in Highland. Here it tends to be more extensive and more species-rich on the west. The diverse structure of these flower-rich wet grasslands supports a wide range of insect life, including the marsh fritillary butterfly and the narrow-bordered bee hawk-moth. It is also important for a number of birds, such as snipe and curlew. Where the grasslands are species poor, this can often be the result of inappropriate management. Cattle grazing is often beneficial.

11.7 **Upland calcareous grasslands** are generally restricted to shallow soils over lime-rich rocks. Despite their name, they can occur right down to sea level in exposed conditions, and arctic-alpine plants can be present at both high and low altitudes. The most important type in nature conservation terms is the *Dryas heath* (Mountain avens*)* variant, which is internationally important. It is restricted to just several hundred hectares and most if not all of this is in Highland, largely along the north coast and down the north-west coast to Skye. The best examples are in designated sites, where there are also associated limestone habitats. The other types of upland calcareous grasslands occur more widely both in Highland and elsewhere in Scotland, on basalt as well as limestone.

11.8 **Floodplain grazing marsh** is pasture with water filled ditches which is regularly flooded and which is grazed and occasionally cut. This type of habitat is found mainly in England. Its exact distribution in Highland is not known, but it is thought that the Insh Marshes are the only significant example in Highland. Grazing marshes are important for breeding waders such as snipe, lapwing and curlew, and for wintering wildfowl. **Coastal grazing marsh** is land that was previously saltmarsh, which is separated from the sea by an embankment and which is periodically flooded with freshwater. There are not thought to be any examples of this in Highland.

11.9 **Cereal field margins** and headlands are important in the more intensively farmed arable areas around the Moray Firth as feeding and hunting areas for birds such as the grey partridge and barn owl. They also support two rare arable “weeds”. Winter stubbles and fodder crops are also important and provide shelter and food over winter for a number of farmland birds.

11.10 There is no survey information available on **ancient and or species rich hedgerows** in Highland, but they are not thought to be extensive.

11.11 **Improved grasslands** in the straths may be low in plant diversity, but are important feeding areas for many moorland and peatland birds such as golden plover, curlew, redshank and lapwing. Where these grasslands have wet patches and areas of longer vegetation, they provide more opportunities for wildlife.

11.12 **Reverted** improved grassland can also be of nature conservation value and are an overlooked biodiversity resource. There are a whole range of types of this grassland, reflecting the conditions prior to improvement, but there is no information on their extent or location.

11.13 In some areas long established **road verges** and also **golf courses** are an important refuge for plants and associated species of unimproved grassland. Their value can often be improved by sympathetic management. Little is known about this resource in Highland.

11.14 Upland hay meadows and lowland calcareous grasslands are two UK BAP priority habitats of farmland not recorded in Highland.

11.15 **Habitats classified as UK BAP priority habitats which occur in Highland**

*indicates habitat dealt with in another section

- Lowland (neutral) hay meadows.
- Machair*
- Lowland dry acid grassland
- Purple moor grass and rush pasture
- Upland calcareous grassland
- Coastal and floodplain grazing marsh
- Ancient and/or species rich hedgerows
- Cereal field margins

11.16 **UK BAP Priority species recorded in Highland associated with farmlands and lowland grasslands**

Brown hare, water vole, great crested newt, pipistrelle bat, skylark, corn bunting, bullfinch, grey partridge, reed bunting, song thrush, tree sparrow, linnet, corncrake, great yellow bumble bee, northern colletes bee, marsh fritillary butterfly, northern brown argus butterfly, a picture- winged fly, 2 arable weeds, orange-fruited elm lichen.

11.17 **Some other species of conservation interest**

Barn owl, twite, lapwing, snipe, curlew, yellowhammer, redshank, swallow, badger, stoat, weasel, frog, toad, daubenton bat, small pearl-bordered fritillary butterfly, small blue butterfly.

11.18 **Key biodiversity objectives for farmlands and lowland grasslands**

- Promotion of farming methods compatible with optimising biodiversity.
- Maintenance and restoration of existing habitats and creation of new areas of habitats.

11.19 **Trends and Issues**

- Move towards specialisation, concentrating on growing crops on the east and grass on the west. Increased reliance on bought-in feedstuffs rather than home grown.
- Loss of flower- rich grassland through agricultural improvement by drainage, reseeding, increased fertiliser application, shift from hay making to silage, use of herbicides. Shift to silage has increased risks of effluent and pollution, reduced breeding bird success (thicker crop, earlier cut).
- Move to autumn-sown crops (although not to same extent as in southern Britain), reducing area of stubbles and bringing forward harvesting dates . Stubbles provide food and shelter for overwintering birds, by spring the autumn sown crops too dense for nesting birds.
- Use of dips lead to loss of invertebrates. Also disposal of sheep dip an issues.
- General trend of mechanisation and intensification of arable and cereal crop production (less waste), reduction in crop rotation, switch to year-round grazing of inbye, and decline in undersowing of cereal crops to produce grass ley.
- All the above factors lead to reduction in diversity of management both within fields and through the year, leading to reduced biodiversity. Also reduction in diversity of habitats, isolation and loss of habitats. In-cropped areas becoming less hospitable for wildlife.
- Countryside Stewardship Scheme and Cairngorms Straths ESA have increased land area being farmed with environmental benefits. Now replaced by Rural Stewardship Scheme. More land in set-aside scheme. Demand for entry to environmental schemes far exceeds available budgets, so many farmers disappointed.
- Work by FWAG, SAC, SNH and others has increased awareness of environment amongst farming community.
- Sheep have largely replaced cattle in crofting areas.

- Rise in bracken cover through reduction in cattle, through liming, cessation of cutting for bedding and loss of native woods. Particularly a problem in Lochaber.
- Increased transportation costs of feedstuffs and of livestock to markets has exacerbated reduction in cattle in the west.
- Inbye croft land often neglected (but can also be over grazed) or sublet, increasing division of common grazings and machair. Common grazings a key issue- agricultural funding does not reflect the institutional and social complexities of crofting areas, where crofters may depend on a large area of common grazing and yet payments are area based. Also one crofter may use many crofts, but have to prove continuos use for 5 years for payments.
- Grazing Committees not functioning well.
- Dramatic loss and neglect of hedgerows and boundary walls, also damage to hedgerows and field margins from herbicides and pesticides.
- Loss of traditional land management skills
- Increased use of broad spectrum anti-parasitic drugs has reduced no. and variety of insects assoc with dung, which provide food for some birds.
- Damage to soil structure and fertility through intensification, with run-off of sediments and fertilisers impacting on adjacent water features.
- Rural population decline, closure of rural services, labour less available.
- Problems with transfer of information from R and D to practical use. Not enough encouragement for innovation.
- Need more community involvement- greater awareness of specialness.
- **Key habitats for action** are traditional hay meadows, and rough grasslands as a buffer between improved grassland and moorland to provide nesting and feeding opportunities for birds.

11.20 **Current mechanisms/ initiatives for promoting biodiversity**

- Corncrake grassland scheme covering Skye and Ardnamurchan
- Countryside Premium Scheme/ forthcoming Rural Stewardship Scheme with prescriptions to promote biodiversity, but funding very limited.
- Cairngorms straths ESA (now closed to new applicants).
- Skye and Lochalsh Horticultural Association ?
- Lochaber lamb promotion ?
- Conservation designations, nature reserve management, SSSI management agreements, SNH grants.
- SNH North West Agricultural Demonstration Project (completed 2000).
- FWAG
- Highland and Islands Organic Producers Association.
- Management agreements with RSPB.
- Agricultural Waste Disposal Project in Cairngorms, free service, demonstration days, leaflet.
- Pilot rabbit clearance scheme in Cairngorms.
- Cairngorms upland grain initiative, pays farmers to grow sacrificial grain crops to benefit farm land birds.

11.21 **Policy/Agri-environment measures required**

- Increase budget for Rural Stewardship Scheme.
- Measures to increase spring sown cereals and winter stubbles, and the maintenance and enhancement of field boundary habitats, margins and hedgerows.
- Promotion of rotational cropping to help farmland finches and buntings, corncrakes, arable weeds and grasslands.
- Extend hedgerow protection to Scotland.
- Provision of grant aid for management, restoration and establishment of hedges.

- Further research on the practicalities of more environment friendly farming (SNH TIBRE Programme).
- Encourage low-input/organic food production, and local processing, marketing and distribution, also co-operative schemes to stabilise prices.
- Encourage wider support for and recognition of importance of small scale agricultural units, and small scale management (eg small bales), also encourage use of vacant and under-utilised crofts and discourage amalgamation. Recognise value of rotational management.
- Encourage appropriate grazing levels for individual units based on their carrying capacity and their ability to produce home-grown feeds and proportion of species rich grasslands.
- Encourage use of cattle where appropriate and native breeds.

11.22 **Potential practical opportunities for enhancing biodiversity and its sustainable use**

- Extension of the corncrake grassland scheme
- Schools project looking at bumble bees
- Provision of business advice on marketing using environmental credentials. This would need the introduction of a recognised environmental standard for farming.
- Training (SAC are developing conservation training and technical notes for farmers & crofters).
- Farm waste management scheme. Farm waste management plans addressing silage, slurry, fuel, other chemicals, with on-farm demonstration days. Partial scheme exists in Cairngorms for the disposal of plastic waste and spent sheep dip.
- Nutrient budgeting project.
- Promotion of small-scale farm forestry.
- Interpretation of traditional farming/crofting practices/benefits for biodiversity.
- Barn owl nest box schemes.
- Promotion of biodiversity on golf courses.
- Promotion of new allotments with wildlife in mind – on-farm diversification
- Highland Lamb Scheme, with linked whole-farm environmental plan.
- Sacrificial cropping schemes to increase habitat/ winter feeding for farmland birds.

11.23 **Opportunities for multi-benefit projects**

- Better interpretation of Farming and Croft and its role in shaping the countryside
- Marketing of products using environmental quality: much talked of, but very little has actually been done
- Crofting and cattle initiative, in priority areas where there is highest chance of retaining cattle. Raise awareness of effect on invertebrates of wormectins, awareness of biodiversity benefits of cattle and cropping. Winter keep and housinf, woodchip corrals. Marketing.

11.24 **Survey/Research information and requirements**

- Skye and Lochaber are only areas of Highland where survey of lowland grassland has taken place (now out of date). Distribution of ancient and or species rich hedgerows unknown
- Work needed on ecology of Marsh Fritillary/ Narrow bordered bee hawk moth and appropriate grazing management (species of wet grasslands with Devil's bit scabious).

- Identification of economic and environmental factors that allow the retention of cattle in crofting areas. - an SAC project is proposed to look at the economic, cultural and environmental factors that sustain 'traditional' crofting and to identify a support mechanism to reinstate these practices in target (pilot) areas.

11.25 **Further information**

Management advisory notes on grazing management, Scottish Wildlife Trust various dates

Highland and Western Isles Regional Action Plan, Butterfly Conservation,1999, Draft.

FORESTS AND WOODLANDS

12.1 Forests and woodlands are key features of our landscape. There can be no finer sight than the great pinewoods of Strathspey and Affric with their russet boughs on a late summer evening, or birch and rowan woodlands as the leaves turn and fall. They also represent a key financial asset, a source of employment, and a huge community resource. Our native woodlands have traditionally had an important role not only for their wood as firewood and timber (the latter being a niche market today) but also to provide grazing and shelter for stock, and shooting opportunities. More recently the use of forests and woodlands for recreation has increased. Communities are wanting to play a greater part in their management and even take on ownership. The important function forests and woodlands perform as carbon sinks is also now more widely recognised. Over the last decade more and more forests and woodlands have come to be managed for a range of complementary uses. There has been a particularly noteworthy turn around in the management of both large areas of planted forests and native woodlands to favour biodiversity.

12.2 Woodlands bind our soils, enrich our rivers, and purify our air. They are diverse and productive terrestrial ecosystems, supporting common and rarer mammals and birds, some of which at least will be familiar to most people, and whole hidden army of invertebrates, fungi and bacteria, of which we are seldom aware, including some species which may not even have been discovered to date.

The biodiversity resource: key habitats and species in Highland

12.3 Native woodland is now very restricted throughout Highland. Significant areas are naturally treeless due to the climatic conditions and extensive peatlands. Elsewhere the extent of native woodland has declined dramatically as a result of prehistoric clearance for agriculture, grazing by deer and sheep, and indiscriminate muirburn. The management of deer is the most significant issue affecting the condition of our native woodlands and the biodiversity they support. The remaining native woodland in Highland has a national, and in the case of some woodland types, an international significance. Of all native woodland in Scotland, 88% occurs north of the Highland Boundary Fault.

12.4 **Birch dominated woodland** is perhaps the most widespread broadleaved woodland type in Highland and is particularly important for invertebrates. There are smaller amounts of **upland oak woodland**, where oak is mixed with birch or on more fertile sites with ash and hazel. Associated with some of our woodlands, particularly those woodlands influenced by the wetter more temperate climate of the west coast (oceanic woodlands), are internationally important communities of mosses, liverworts and lichens. Although “oceanic” oak dominated woodlands are not so extensive as in Argyll to the south, they are nevertheless an important part of the resource, being particularly widespread in Wester Ross and Lochaber. There are also important less oceanic oakwoods further east, for example in the Great Glen. Where the underlying rocks are more nutrient rich, then woodlands are dominated by ash or hazel. Throughout Scotland as a whole, oceanic **upland ash/hazel woods** occur predominantly in Skye, Morvern and also Mull, such that Highland has the majority of this woodland type.

12.5 Highland has a high proportion of Scotland’s **native pine woodlands**, which are most widespread in Strathspey, and in the Beauly Catchment, although there are also important fragments elsewhere. Pine is a very widespread species worldwide, but Scottish woods are notable for their genetic diversity and for being at the edge of the range for this species. Some of the rarest UKBAP priority species are found only in pinewoods.

12.6 **Wet woodlands** divide broadly into bog woods (where trees have established on bogs) and alluvial woods. There are also riparian woods, but these tend to be free draining. Wet woodlands of any size are very restricted in number throughout Scotland, with Highland supporting the majority of any quality. These are along the River Conon (which has perhaps the greatest potential of any alluvial woodland in Scotland), the Mound alder woods by Golspie and the Urquart Bay woods. As well as supporting a number of specialised insects and other wildlife, wet woods also provide key nutrients inputs to adjacent rivers, through runoff and leaf litter. The loss of riparian woodland and these nutrient inputs is thought to be a key issue in the decline of game fisheries.

12.7 **Lowland wood pasture and parkland** is a poorly represented habitat type in Highland, although the long history of grazing has produced woodlands with the characteristics of wood pasture. In some areas there are estates with parkland. Also areas where old avenues, field boundary trees and old shelterbelts provide the same conditions of large open grown trees. These often have a high biodiversity value, and a number of the UKBAP priority invertebrate and lichen species favour these situations.

12.8 **Aspen** is a species which occurs infrequently but is widespread. It occurs either as isolated groups which are maintained by suckering or in the Spey Valley as woods dominated by aspen. The Spey Valley aspen woodlands are particularly important for insects of dead and dying wood, including a hoverfly which is a BAP priority species. Aspen is grazed preferentially by deer.

12.9 **Montane and treeline scrub** are important parts of the biodiversity resource dealt with in the Mountains section.

12.10 The dominant woodland cover throughout the Highlands is **coniferous plantation**. Many long established plantations have existing value for biodiversity, but significant opportunities exist for increasing the area with value, through restructuring, replacement of other conifers with Scots pine and inclusion of native broadleaved species.

12.11 **Habitats classified as UK BAP priority habitats which occur in Highland**

- Native pine woodlands
- Upland mixed ash woodlands
- Upland oak woodland
- Wet woodland
- Upland birch (not currently on UK BAP list but is to be added).
- Lowland wood pasture and parkland

12.12 **UK BAP priority species recorded in Highland associated with forests and woodlands**

- Red squirrel, black grouse, capercaillie, nightjar, Scottish crossbill, spotted flycatcher, tree sparrow, wryneck, great-crested newt.
- Pearl bordered fritillary butterfly, chequered skipper butterfly, dark bordered beauty moth, argent and sable moth, barred toothed stripe moth, cousin German moth, 2 craneflies, 4 species of wood ant, a spider, a hoverfly, a mason bee.
- Juniper, woolly willow, small cow-wheat, twinflower. 8 lower plants of broadleaved woodland, 16 lower plants of coniferous woodland.

12.13 **Some other species of conservation interest**
Wildcat, bats, dwarf birch, goshawk

12.14 **Key biodiversity objectives**

- To secure widespread recovery and expansion of native woodland, by natural regeneration where possible, including treeline and juniper scrub, taking into account the needs of open ground species.
- To maximise the social and economic value of all woodland in an environmentally sustainable way.
- To maximise the biodiversity of plantations.

12.15 Trends and issues

- Native woodland has been much reduced by clearance, grazing (by deer, sheep, feral goats), and intensive muirburn. Exists only as fragments, which are often heavily grazed and therefore low biodiversity value. Regeneration frequently absent.
- High deer numbers are the most significant issue, damaging existing native woodlands, constraining their natural expansion. Key looming issue is the management of deer within new native woodlands, especially those planted within the last 10 years which are approaching the point at which deer will break through old fences.
- Woodlands were traditionally grazed by cattle and pigs, beneficial if not too intensive. Clearance led to exclusion of domestic stock. In many birchwoods tradition of using woodland as winter shelter and grazing continues.
- Natural tree-line woods and alpine scrub virtually absent except in small areas in Cairngorms.
- Woodland cover dominated by intensive forestry plantations. Over last decade changes in forestry policy led to restructuring (ongoing) of commercial forests and increase in value for biodiversity, notably Forest Enterprise forests.
- Increases in afforestation from 1940s to 1980s at expense of heather moorland, rough grassland and blanket bog (not currently so much an issue). More recently increases in native woodland and natural regeneration schemes leading to need for consideration of balance between open ground and woodland.
- Woodland can be unmanaged and harbour foxes and crows that predate on moorland birds.
- Woodland restoration constrained by need for stock/deer fencing, which gives unnatural woodland edge and structure, is intrusive in landscape, obstructs access, hazard to woodland grouse, discourages burning on adjacent ground. More effective deer control is preferable.
- Recent rise in support for concept of Forest Habitat Networks based on Core Forest Area and wooded linkages with other areas.
- Growing community interest in owning/ managing woodlands.
- Rhododendrons still a major issue in many woodlands.
- Increasing use of woodlands for recreation.
- Sika deer are spreading and hybridising. DCS view is that shoot-on-sight policy by estates is only action that can be taken.
- Grey squirrels are spreading northwards and may displace red squirrels.
- Wildcat are interbreeding with feral domestic cats.
- Accidental or deliberate killing of protected species, including wildcat, pine marten and birds of prey, by sporting estates as part of vermin control.
- Dutch elm disease progressing northwards.
- Bracken an issue in some areas, for example bracken control needed for certain woodland edge butterflies. Insufficient data to establish extent of problem.
- Alder die back- extent not known in Highland.
- Capercaillie work currently focusing on relict populations only; management is good for other things too. More co-ordination needed.

12.16 **Current mechanisms/ initiatives for promoting biodiversity**

- Forestry Commission WGS, Farm Woodland Premium Scheme, forthcoming Rural Stewardship Scheme.
- North Highland Forest Trust
- Highland Birchwoods
- Establishment of community woodlands, including at Abriachan, Culag, Tongue, Skerray, Assynt.
- FC Challenge Funds (until 2001, can be higher grant rate than WGS).
- Scottish Native Woods
- Conservation designations, nature reserve management, SSSI management agreements.
- Capercaillie management initiatives by Forest Enterprise and RSPB, including advice to estates, advisory days, Strathspey Capercaillie Group, LIFE bid for Capercaillie work.
- The Forest of Spey Initiative, project officer looking at marketing, community involvement, riparian woodlands, processing, new planting etc.
- Cairngorms Forest and Woodland Framework.
- Forest Enterprise Forest Design Plans and Caledonian Forest Reserves, work by FE towards specific BAP species and habitat plans, including black grouse, capercaillie, freshwater pearl mussel, juniper, native pinewoods, coastal sand dunes, blanket bog.
- Community Facilitator for FE woods in Highland, encouraging community involvement.
- Fire Protection Groups, led by estates in Cairngorms.
- Grazing in Birchwoods research project in Cairngorms.
- Wet Woods LIFE Project, includes restoration work at Abernethy.
- Forest of Spey Project, considering demonstration house to be built using local timber.
- LIFE Wet woods Project, ends 2001, includes work on River Conon; work on Lower Spey and Urquart bay woods also proposed.
- Management agreements with RSPB.
- Atlantic Oakwood Restoration Project, partnership between SNH, Millenium Forest for Scotland, FC, RSPB, with LIFE funding to restore a no. of oakwoods, including major rhododendron clearance in Sunart Oakwoods..
- Caledonian Partnership brings together various organisations to work towards common aims.
- Caledonian Forest Project in Glen Affric, through Caledonian Partnership.
- 2002 to be year celebrating Scotland's trees and woods.
- Montane Scrub Action Group, looking at key restoration sites for montane scrub.

12.17 **Policy/Highland-wide measures for promoting biodiversity**

- Modification of deer management through Deer Management Plans to significantly reduce deer numbers in native woodlands and elsewhere.
- Promote grant aid to support planting of policy and field margin trees.
- Promote updated Muirburn Code
- Recreation of native woodland networks (ongoing).
- Grant schemes to promote upland ash and hazel woodland, wet woodlands, montane scrub.

12.18 **Potential practical opportunities for enhancing biodiversity and its sustainable use**

- Identification and management of trees in and around settlements, including veteran trees, planting of new trees.

- Use of existing forestry grant mechanisms for natural regeneration, woodland edge habitats, cattle grazing in woodlands where appropriate, increased levels of deer culling.
- Promote control of exotic species within native woodlands, including under-planted and regenerating exotic conifers and rhododendrons. Need strategy for rhododendron work. Also promote follow-up work in woods where initial clearance work already undertaken.
- Support adoption of multi-purpose objectives in WGS schemes and revised Forest Design Plans.
- Discourage use of fencing for WGS native woodland schemes and promote removal of redundant deer fences.
- Continued monitoring of wildcat to determine extent of hybridisation and development of action plan.
- Red squirrel working group. Forest and woodland management to promote red squirrels. Monitoring of red squirrels.
- Monitoring for invasion by grey squirrel and establishment of contingency plans for grey squirrel control.
- Encourage establishment of local woodland management committees.
- Raise public/timber industry awareness of need to control movement of diseased wych elm. Consider use of cordon sanitaire.
- Training on management to favour woodland/woodland edge butterfly species: small pearl-bordered fritillary, pearl bordered, chequered skipper.
- Grants to promote management for woodland butterflies.
- Increase the environmental standard of commercial woods, including increased open ground. Extend the grant aid available for this.
- Explore new markets for shooting forest rather than hill deer.
- Long-term planning/ coordination for black-grouse projects.
- Encourage woodland and scrub habitat for black grouse - many estates only value red-grouse and burn heather with naturally regenerating trees.
- Interpretation to raise awareness of importance of lower plants.
- Identification and management of designed landscapes.

12.19 **Opportunities for multi-benefit projects**

- Woodland expansion could enrich landscape, improve winter grazing resource, improve fisheries, provide timber, improve recreation opportunities.
- Promote demonstration schemes of native woodland restoration, showing sustainable and integrated management.
- Improve the quality of timber from native species, notably birch.
- Promotion of local use of wood/ small saw mills, to maximise returns to local community, also produce products locally. (Much work been done in Wales on promoting economic use of ancient woodlands).
- Heating schemes using wood chips.
- Development work to encourage riparian planting in targeted areas.
- Opening up of remote plantations to improve biodiversity value, allow recreation.
- Create a major timber resource by grant aiding the replacement of conifer plantations with birch managed for timber.

12.20 **Research and survey information/ requirements**

- Identify the extent of each habitat type in Highland (SNH currently undertaking).

12.21 **Sources of further information**

Highland and Western Isles Regional Action Plan, Butterfly Conservation 1999. Draft.
Montane scrub, Montane Scrub Action Group/ SNH 2000.

LOCHS, RIVERS AND MARSHES

13.1 Water is a key feature of the Highland landscape, with distinctive wildlife and very obvious social and economic uses. Freshwaters are also important for recreation and sport. They are also uniquely dependent on the management of other adjacent habitats in their catchments for their quality. which is of course why catchments are so important.

The biodiversity resource: key habitats and species in Highland

13.2 Highland has a high density of water bodies and rivers, but the underlying geology is such that they tend to have a naturally low diversity of species.

13.3 Whilst **rivers** are not themselves categorised as BAP priority habitats, they support a number of priority species and impact directly on other habitats which are priority ones. Where present **river shingle and gravel** are important features as they support a number of specialised insects. Rivers also support other species such as otters, water voles, salmon, sea trout and fresh water pearl mussels. In some areas there is adjacent wet alder woodland or ash woodland but this is limited in extent. The majority of rivers tend to be fast flowing and bouldery, with no marked flood plains, although the Spey and some of the rivers of Caithness and Sutherland are exceptions. River water quality is good relative to much of Britain in terms of lack of pollution, but the loss of bankside vegetation, impacts of overgrazing and afforestation, and modification for water supply and hydroelectricity give scope for future improvements.

13.4 **Fens** are peatlands which receive at least some water and nutrients from the soil, rock and ground water. Fens are part of a transition of habitats through time and space, which starts with an area of open water. As this fills in thorough a build up of vegetation and sediment, new plants colonise and different plant communities develop depending on the water depth, including reedbeds, fens, wet woodland and marshy grassland. Fen peatlands are much more limited in extent in Scotland compared with England, and in Highland the majority of sites are very small and therefore tend to get overlooked. The Insh Marshes is an exception, having the largest example of nutrient poor fen in the UK. Fens support diverse communities of plants and animals, including otters and many breeding birds.

13.5 **Reedbeds** are also much more extensive in England than in Scotland, with the majority of larger reedbed sites being concentrated in south east England. In Highland the Insh Marshes are particularly important, with one of the largest reed beds in Scotland (26 ha) after the Tay reedbeds (410 ha). Reedbeds tend to support a richer diversity of birds and insects in the south of the UK. They are nevertheless important in Highland for a number of birds which are uncommon in either a national or Highland context, notably reed bunting, willow, sedge and grasshopper warblers, and water rail.

13.6 **Mesotrophic lakes** are those which have a moderate level of nutrients. They have the highest variety of plant species of any lochs and insect and fish diversity is also high. They are relatively uncommon in the UK. **Eutrophic standing waters** are by contrast those with a naturally high level of nutrients and are more common in lowland southern Britain. Less than 5% of the water bodies in Highland are naturally either mesotrophic or eutrophic, such that any examples are significant. Due to geographical remoteness, there is a reasonable proportion which are less affected by Man's influence than elsewhere in Britain.

13.7 The majority of Highland's lochs are oligotroph ic or nutrient poor. **Oligotrophic lochs** are not a UK BAP priority habitat, but these lochs are nevertheless worthy of consideration. This is partly because they are so widespread (a "keystone" habitat) and partly because they are so often under threat from catchment impacts. The main threat is changes to their nutrient status.

13.8 **Habitats identified as UK BAP priority habitats which occur in Highland**

- Fens
- Reedbeds
- Eutrophic standing waters
- Mesotrophic lakes

13.9 **UK BAP Priority Species recorded in Highland associated primarily with lochs, rivers and marshes**

- Common scoter, freshwater pearl mussel, otter (lack of info), water vole, great crested newt.
- Group of river beetles and craneflies associated with river shingle, several craneflies of wet woodland and of streamsides, dark bordered beauty moth (favours damp aspen woodland), northern damselfly (favours small pools) and a stonefly found in slow reaches of rivers.
- River jelly lichen, Scottish small reed, pillwort, long-leaved thread moss, Shetland pondweed.

13.10 **Some other species of conservation concern**

- Sea Trout, Atlantic salmon, lampreys (three species).
- Red and black throated divers, Slavonian grebe, sawbill ducks (research and monitoring needed), dippers.

13.11 **Key biodiversity objectives for lochs, rivers and marshes**

- To maintain or where possible reinstate near natural patterns of water flow, water exchange, sediment movement and deposition, and the structure of river channels and loch basins.
- To improve and restore freshwater and riparian habitats and the populations of associated species on a catchment basis.
- To improve fisheries in the main rivers and tributaries.
- To raise awareness of the intimate relationship between rivers, water bodies, the wildlife they support and the ongoing processes in their catchments.

13.12 **Trends and issues**

- **Water quality** generally high, but concerns re impacts of sheep dip, fertilisers, septic tanks, acidification from forestry, overloading of sewerage systems, fish cages.
- Reduction in **productivity** of rivers, notably decline in salmon and trout stocks. Affects river productivity- dead fish enrich headwaters.
- Recent increases in **riverside vegetation** through agriculture and forestry grants. However riverside woodland frequently absent and bankside vegetation tightly grazed, reducing organic input, increasing sediment input and channel erosion, leading to demand for downstream engineering, also silting of fish spawning grounds. High priority issue.
- **Acidification** from acid rain a key issue but starting to see upturn in conditions.
- Water acidification, phosphorous inputs and modified water flow from conifer planting in catchments. In recent years increasing native woodland restoration and restructuring of commercial plantations to benefit of freshwaters, such that now largely addressed.

- High levels of grazing, inappropriate muirburn, peatland drainage and poorly designed tracks all leading to increased **sedimentation**. Land management in catchments and the impact of agricultural grants a high priority issue.
- Forthcoming EU **Water Framework Directive** (implement by 2010) will have dramatic impacts by integrating water management policy and practice, promoting River Basin Management Plans. May not be in sufficient detail.
- Many lochs/ rivers already modified for **hydro electric** schemes or water supply, continuing construction of and proposals for hydro electric schemes. More strategic approach needed.
- "In –river" **engineering works** to improve river flow patterns and habitats for the benefits of fisheries with mixed impacts. Less than other parts of UK. A moderate priority.
- Various other engineering works such as bridges and culverts and flood relief works with negative impacts. Projected increases in flood frequency due to climate change and increase in hard surfacing in catchments likely to increase demand for flood relief works. Flood relief works can cause erosion, sedimendation, flooding elsewhere, loss of habitat, reduced recreational access. Review of planning needed (GDO Class 20). More demands need to be made of developers.
- Engineering works can be barriers to fish migration.
- A need for longer term planning for river engineering and more emphasis on natural solutions. Glasgow University been working on this, but not being promoted sufficiently.
- Water quality/chemistry and biology generally good, but **flow regimes** highly modified. Directive will tackle this on some rivers, but others will be exempt.
- **Water abstraction** can be an issue locally, but not a major issue in Highland.
- Nutrient enrichment not generally an issue. Sometimes an issue on Loch Insh.
- Expansion of American **mink** population causing damage to native biodiversity. High priority, especially on the west- impact on coastal sea bird colonies, breeding freshwater birds. Less of a problem on the east.
- Proliferation of **invasive plant species** such as Giant Hogweed, Japanese Knotweed and Himalayan Balsam. An issue for Highland Council. Also shading by rhododendrons.
- Freshwater **fish farms** may have negative impact on water quality. Expanded in recent decades, production of rainbow trout or salmon smolts. Localised nutrient enrichment, spread of parasites and escapes all possible.
- Coastal fish farms have greater impact as many more. Impacts under debate.
- Some lochs and rivers are stocked with **non-native fish**, also escapes from fish farms and live bait. Been raised in the Cairngorms, Code of practice for anglers. Not a big issues on the west.
- **Climate change**. May result in new disease and parasite problems for fish. Biggest impact will be changes in precipitation and flow regimes. More intense events likely. Scottish Executive sponsored research on this, but cannot quantify. West will be wetter, east will be drier.
- Freshwaters present largely untapped resource for **recreation** and enjoyment, with opportunities for awareness raising. Need data on limitations on recreation expansion.
- Very little knowledge on **lamphreys**.
- **Accountability** and openness of organisations associated with rivers an issue, including Salmon Fishery Boards.
- Removal of **gravel** may be an issue in some areas.
- **Key habitats for action are rivers including alluvial habitats.**

13.13 **Current mechanisms/ initiatives for promoting biodiversity**

- Groundwater Regulations
- Control of Pollution Act.
- FC's Forest and Water Guidelines
- Conservation designations, nature reserve management and SSSI management agreements
- Fishery Trusts- ongoing survey work, management planning and habitat enhancement, including AWCFT habitat enhancement project.
- SERAD/SNH policy statement "Angling for change".
- RSS Measures
- SEPA Habitat Enhancement Initiative.
- LIFE UK Rivers Project (includes Rivers Borgie, Kerry and Moidart- SACs for Freshwater pearl mussel) ongoing, will involve river strategies.
- Pearl mussel awareness project through Cairngorms Partnership to prevent illegal collection.
- River Spey Catchment Management Plan being developed through Spey Catchment Steering Group.
- LIFE bid for River Conon- unsuccessful but will have project proposals.
- Cairngorms Rivers Project, a Cairngorms Partnership initiative to develop an integrated strategy.
- Slavonian Grebe leaflet by RSPB/ SNH, aims to reduce disturbance.
- FWAG guidelines for wetlands.
- SEPA Sustainable Urban Drainage System guidance.
- SWT water vole campaign.

13.14 **Policy/ Highland-wide measures required for promoting biodiversity**

- Encourage River Basin Management Plans, catchment flood management strategies and Fishery Management Plans. Housing in rural areas likely to be a key issue.
- Forestry grant development and promotion to support riverside woodland planting and management. More incentives may be needed.
- Encourage good management of fish farms and Area Management Agreements
- Precautionary approach to siting of fish farms on freshwater lochs, seek to have all fish farming activities brought under planning and development control
- Ensure scientifically valid rationale for permitting predator control of fish eating birds
- Seek to have river engineering works brought within the full planning process
- Explore methods of mitigating impacts of regulated water flow
- Agri-environ measures which encourage reduced input agriculture.

13.15 **Potential practical opportunities for enhancing biodiversity and its sustainable use**

- Code of practice for anglers on diver breeding lochs.
- Develop role of anglers in promoting biodiversity, including visiting anglers.
- Agreements with some estate owners and angling interests to ensure some rivers and lochs not artificially stocked, code of practice for stocking.
- Promotion of responsible fresh water angling to take pressure off sensitive areas.
- Promotion of niche markets for angling, developing charr and eel farming. Also general promotion of angling in Highland.
- American mink control measures.
- Riverside woodland planting and management.
- Restoration of riverside vegetation, to provide habitat for water voles, otters, improve fisheries.

- Pearl mussel awareness project to prevent illegal collection– people need to be convinced that it is important. Gillies have knowledge, but lack of reporting. Previously had Operation Necklace.
- Farm waste collection schemes (exists in Cairngorms)
- Dragonfly surveys involving wider community.
- Otter interpretation/ conservation
- Sponsorship from water users eg distilleries.
- More use of reed beds for waste water management.
- "Water of Life" project to raise awareness of rivers, links with other habitats, interconnectedness of impacts of people/processes/habitats. Funding for community projects.

13.16 **Opportunities for multi-benefit projects**

- Local initiatives on sub-catchment planning.
- Restoration of flood plain systems including woodland (some ongoing work Conon). Promote use of floodplains for wet grazing and timber production to alleviate need for flood defences.

13.17 **Survey/Research information and requirements**

- Research into Slavonian grebe decline.

13.18 **Sources of further information**

- *Water vole conservation handbook,* Rob Strachan, 1998 (published for EN, EA, WCRU.)
- *Cairngorms Rivers Project Phase 1 Report*, Cairngorms Partnership, 2000

The connecting threads

14.1 Previous sections seek to give order to biodiversity by developing clear habitat themes that link issues and priorities relating to landuse, nature, people and conservation. The introduction makes it clear that this is a technical and essentially ecological perspective, and that others coming to this Framework from different backgrounds can leaven it and add depth. In addition there are a number of key issues which cross-cut every habitat. These connecting threads are important elements of any biodiversity approach. We are thinking here of education and awareness projects, projects that promote better interpretation, that develop skills to manage and benefit from the natural heritage, that address biodiversity in terms of it recreational value and enjoyment and that encourage business development, and in terms of its links with other disciplines such as archaeology. There are also the questions of how communities can be better involved in management of Highland's biodiversity, and how wider questions of sustainability can also be addressed within the biodiversity agenda. Some of these issues are addressed in terms of specific examples in individual habitat sections, but one can also envisage action at a more strategic level.

Education and Awareness

14.2 Education and awareness is important for specific groups working in the countryside, (such as farmers, crofters, or road maintenance engineers), for visitors (to impart why Highland's biodiversity is just so special) and for Highland community as a whole. The Highlands Youth Strategy “Right Here, Right Now!”, identifies improvement in knowledge of the natural heritage and the associated opportunities as a priority. Current national schemes are often ill suited to Highland's young people, especially in areas of social exclusion. The Highland Environmental Network is currently an entirely voluntary organisation supported by the Education Service and has recently produced a valuable teachers pack on field work. There is a case for a better resourced organisation, with dedicated project staff addressing biodiversity in the context of sustainability issues. Perhaps those involved in biodiversity also need to find new ways of expression and to take themselves a little less seriously! In England, Community or Parish Mapping has been used as a useful means of raising awareness of what is one a community's door step. This has been a very successful way of working. A review of the ranger services is beyond a Biodiversity project, but the valuable service that the rangers provide in this whole field must be recognised.

Interpretation

14.3 Interpretation is an area which has received much attention in recent years and the Highland Interpretive Strategy and associated Area Strategies are useful guides to how interpretation can be extended. Part of this is about informing, part of it is about enhancing the visitor experience. Visitor viewing facilities can be found linked to CCTV at Fosinard (hen harriers) and North Kessock (red kite). Possibilities also exist for sites with eagles and other birds of prey to exploit this technology. In Wales one farmer regularly lays carrion and charges visitors to see red kites feeding, surely there are ways that income can be generated for the local community by providing improved interpretation. Interpretation is not simply about 'boards', it is about imaginative communication of all forms. More use could be made of the arts more to celebrate Highland's natural richness? A serendipitous nature trail where visitors discover interpretation, sculpture, poetry and history hidden on the trail, etched on rocks, on a plinth in a pool, in rock cracks, encountered on dramatic art forms has interesting potential. Arboretums of native trees arranged by name according to the Gaelic Language have been established in a number of locations in Highland. There are also species which are poorly interpreted, that occur widely in Highland - for example cetaceans (Gills Bay).

14.4 Where people can tell this story then this is one of the most effective means of all. All of us have a fascination with the daily lives of those in other places, so as well as guiding, a broad heritage perspective is highly desirable. More effort to link interpretation of farming (and forestry) practice is vitally needed. How many pier heads give visitors any clues about what is landed and where it is from? Some further questions: where does this heritage interpretation already occur but where biodiversity could be introduced? Is there the potential for training local people to provide interpretation as part of a crofting income - maybe linking these to *micro interpretive centres*, half way houses between manned interpretive centres and simply boards? If so do we need to rethink out charging policy for guiding? The work of the Dùthchas project may also have potential in terms of projects and ideas here.

Recreation

14.5 Considerable investment has gone into Highland in terms of footpath networks, upland paths and long distance routes and Sustrans cycleways. Maybe we should think more about capitalising on this investment in terms of interpretation? Alternatively are the undiscovered jewels that more could enjoy if only they knew about them? Conversely, are there real pressures from visitor presence and if so where?

Better Use of Information

14.6 To achieve all these things there is a need for enhanced community skills, (recognised to some degree in The Community Learning Strategy). This includes knowledge of a locality's flora and fauna. Some of this might be aided by more efforts to encourage hobby naturalists. To those not who are not currently interested in natural history it can present in a rather dull and studious image. Simple things like bat groups, school nature gardens and bird box schemes can help dispel such myths while being of genuine conservation value. A national programme to promote swift conservation has brought attention to this overlooked and declining bird.

14.7 The access to quality biological information is also important both in terms of the network of protected sites and of the wider countryside. How accessible are existing records and what they mean to people who might wish to use them? What are our gaps in our knowledge, and how might we plug them? When we do collect and present information is it clearly with an end in mind? Have we thought about change in the countryside and how we should monitor this? Such issues link to questions around a Highland Biological Records Centre. There is also an opportunity to think about associated issues such as the inter-relation of biodiversity priorities with landscape and archaeology. For example it is a major concern of the latter, that native woodland re-established can damage key archaeological sites. Efforts in the area of local biodiversity can be also used to improve the quality of statutory and non-statutory plans: these can benefit from better information, enhanced working relationships and better consideration of biodiversity priorities.

Business

14.8 Green tourism offers many opportunities. The Audit and Evaluations study identified some of these, and some ideas in terms of new, more sustainable ways to generate income from our biodiversity. For example, maybe a biodiversity pack to accommodation providers would be a good way of informing their visitors of the biodiversity on show in Highland. However, entrepreneurial thinking is difficult, and it is not simple a matter of having a good idea that is likely to result in new rural enterprises. Indeed, it is good people and a good interface between private and public/voluntary sectors that are crucial. Yet there is potential for diversification. One area that might be important is set-up advice for Green Tourism Businesses, and a question is whether existing agencies are well equipped to give this. At the same time this business must be founded on sustainable practice, if it and the resource are to survive. So projects promoting good practice such as those focused on viewing capercaillie leks in Strathspey and *The Dolphin Space*

Programme are important, and ripe for extension, provided this involves the businesses in question.

Community Involvement

14.9 Then there is the issue of Community involvement. We have already identified proposals to work with existing community partnerships. This is important if we are to get the multiple, broad benefits that are the aim of the Project. Other questions must involve what involvement can communities have in the management of the natural heritage surrounding them. Patterns of land ownership often have precluded much say or making the most of that asset, but land reform opens up new possibilities. This is not least because owning the resource is the first step, not the last and invites considerable debate on management. We have been learning in this direction. The John Muir Trust are acknowledged leaders in this field but even they would probably admit to learning by experience (and there are others with considerable combined experience for example HIE, SERAD, HC, FC, SNH, and the RSPB). Designated sites and nature reserves offer the potential to tackle this community involvement from another direction, and imaginative ways of involving the community are possibility, which the voluntary and statutory organisations are only now beginning to develop. The proposal to using existing rural partnerships in developing LBAPs offers much in this direction.

Partnership

14.10 Finally, biodiversity offers the opportunity to develop trusting partnerships. If we can make progress, gain each other's confidence, we can start to look at some of the more difficult issues without dismissing each other's viewpoint. There are controversial species, (birds of prey, geese, seals etc) and management issues (deer, fisheries, freshwater management). A biodiversity project cannot solve these overnight, perhaps at first we need to put some of these delicate issues aside, but in due course and with commitment there will be common interests or at least understanding on certain issues, and others the opportunity to look jointly at difficulties and seek out resolutions.

14.11 **Sources of further information**

Action for Scotland's Biodiversity, SBG, 2000.
Biodiversity of the Cairngorms, Cairngorms Partnership, 1999.

Annex1: Priority and other species which are particularly appropriate for inclusion in Highland LBAPS.

This is very much an initial list which will need to be added to and refined at a local level.

Priority UK BAP species

Pseudocyphellaria norvegica a lichen
Collema dichotum river jelly lichen
Juniperus communis Juniper
Linnaea borealis twinflower
Melampyrum sylvaticum small cow-wheat
Salix lanata wooly willow
Saxifraga hirculus marsh saxifrage
Sprianthes romanzoffiana Irish lady's tresses
Woodsia livensis oblong woodsia
Bombus distinguendus great yellow bumble bee
Formica spp wood ants
Aricia artaxerxes northern brown argus
Boloria euphrosyne pearl bordered fritillary
Carterocephalus palaemon chequered skipper
Eurodryas aurinia marsh fritillary
Epione paralellaria dark bordered beauty
Hemaris tityus narrow-bordered bee hawk moth
Noctua orbona lunar yellow underwing moth
Semiothisa carbonaria netted mountain moth
Coenagrion hastulatum northern damselfly
Margaritifera margaritifera fresh water pearl mussel
Arvicola terrestris water vole
Lepus europaeus brown hare
Lutra lutra otter
Pipistrellus pipistrellus pipistrelle bat
Sciurus vulgaris red squirrel
All marine mammals
Melanitta nigra common scoter
Tetrao tetrix black grouse
Tetrao urogallus capercaillie
Perdix perdix grey partridge
Crex crex corncrake
All priority farmland birds
Commercial marine fish
Deep water fish
Cetaceans

Other species

Cupido minimus small blue butterfly
Erynnis tages dingy skipper
Boloria selene Small pearl bordered fritillary

Kentish glory moth *Endromis versicolora*
Welsh clearwing moth *Syanthedon scoliaeformis*
Micromoth *Leucoptera orobi*
Goat moth *Cossus cossus*
All bat species
Wild cat
Mountain hare
Grey seal and common seal
Wild salmon (“keystone” species)
Sea trout (ditto)
Lamphreys (three species).
Kelp (keystone species)
Sawbill ducks
Black throated diver *Gavia artica*
Red throated diver Gavia stellata
Slavonian grebe
Red-breasted merganser *Mergus serrator*
Goosander *Mergus merganser*
Redshank
Greenshank
Lapwing
Golden plover
Ring ousel
Yellow hammer
Twite
Red grouse
Tern species
Ptarmigan Lagopus mutus
Scottish primrose *Primula scotica*
Dwarf birch *Betula nana*