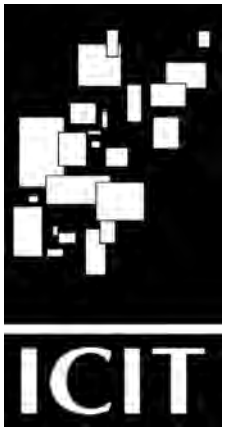
The Orkney Local Biodiversity Action Plan

A plan for action to conserve Orkney's Biodiversity

Prepared by
Orkney's Biodiversity Steering Group
for The Orkney Environment Partnership
December 2002

Orkney's Community Biodiversity Project is supported / funded
by the following organisations:

Environment & Rural Affairs Department



Printed by The Orcadian Limited,
Hatston, Kirkwall, Orkney, KW15 1DW

Tel: 01856 879000
www.orcadian.co.uk

FOR FURTHER INFORMATION ON ANYTHING CONTAINED WITHIN THIS MANUAL, PLEASE CONTACT:

NADINE RUSSELL
COMMUNITY BIODIVERSITY PROJECT
8 BROAD STREET
KIRKWALL
ORKNEY
KW15 1NX
TEL: 01856 888760
EMAIL: nadine.russell@orkney.gov.uk

Glossary

Biodiversity: The term biodiversity describes the variety of life at all biological scales, from diversity within ecosystems, communities, species and populations, to the level of genetic variation present within species and their constituent populations. In short it encompasses the diversity of all life on earth.

CITES: Convention on International Trade of Endangered Species

Community: A naturally occurring assemblage of plant and animal species living within a defined area or habitat. Communities are named after one of their dominant species (e.g. pine forest) or the major physical characteristics of the area (e.g. a freshwater pond community).

Conservation: The sensible use of the earth's resources in order to avoid excessive degradation and impoverishment of the environment. This includes the maintenance and preservation of natural environments and the creation of new ones (e.g. nature reserves, national parks, and SSSIs).

CPS: Countryside Premium Scheme (agri-environment scheme concluded in 2000)

Dystrophic: A body of water that contains a large amount of undecomposed organic matter derived from terrestrial plants. Poor in dissolved nutrients and therefore unproductive.

EC: European Community

Ecosystem: A biological community and the physical environment associated with it.

Endemic: Describes any species that is restricted to one or a few localities in its geographical distribution. Endemic species are often confined to islands and are vulnerable to extinction.

EU: European Union

Eutrophic: A body of water where increased mineral and organic nutrients has reduced the dissolved oxygen, producing an environment that favours plant life over animal.

FA: Forestry Authority

FC: Forestry Commission

FWAG: Farming and Wildlife Advisory Group

Habitat: The place in which an organism lives, which is characterised by its physical features or the dominant plant types.

ICIT: International Centre for Island Technology

CEH: Centre for Ecology and Hydrology

JNCC: Joint Nature Conservation Committee

LCS88: Land Cover Survey 1988

LBAP: Local Biodiversity Action Plan

LNR: Local Nature Reserve

MNCR: Marine Nature Conservation Review

NCC: Nature Conservancy Council

NSA: National Scenic Area

OFC Orkney Field Club

OIC: Orkney Islands Council

Oligotrophic:	Poor in plant nutrients and hence life, but rich in oxygen. Said of lakes and similar habitats.
ONTB	Orkney Native Tree Project Group
Pers comm:	Personal communication
pH:	A scale that indicates the acidity or alkalinity of a solution. Scale runs from 0 to 14 with 7 being neutral, <7 is increasingly acidic and >7 increasingly basic.
RSPB:	Royal Society for the Protection of Birds
RSS:	Rural Stewardship Scheme (agri-environment scheme started in 2001)
SAC:	Scottish Agricultural College
SAC:	Special Area of Conservation
SEPA:	Scottish Environmental Protection Agency
SEERAD:	Scottish Executive Rural Affairs Department
SNH:	Scottish Natural Heritage
SPA:	Special Protection Area
SSSI:	Site of Special Scientific Interest
SWT:	Scottish Wildlife Trust
UKBSG:	UK Biodiversity Steering Group

SECTION A

INTRODUCTION

1. Conserving the Biodiversity of Orkney

Biodiversity is simply "the Variety of Life, and refers to the whole range of animals, plants and microorganisms on earth, from the tiniest bug to the mightiest whale, along with the ecosystems in which they live.

Conserving biodiversity is not just about rare and threatened species and habitats, but the commonplace as well. All those who care about the countryside are in fact appreciating biodiversity. It is important for maintaining the quality of our lives and is intimately bound up with it.

Although the countryside may still appear visually attractive, it has become apparent that much of its richness and diversity is under threat; some plants and animals that were once familiar are now rare, others have become extinct altogether. This century the UK has lost over 100 species including 7% of our dragonflies, 5% of our butterflies and more than 2% of our fish and mammals (according to the UK Biodiversity Action Plan). More are in danger of disappearing, especially at the local level. Nature has an in-built propensity to change, continually evolving new variants and new species, but all of this occurs naturally over a length of time. The world is losing species at a faster rate now than ever before, as a result of human activity; biodiversity cannot evolve fast enough to compensate for losses at anything like the current rate and so is declining at an accelerating rate. Orkney is a place of great beauty and biodiversity, but here too the marine and terrestrial environments are under pressure from increased economic activity. In the last half-century some species have greatly declined or even disappeared and the area of semi-natural vegetation has greatly decreased.

There are many reasons why we should conserve biodiversity:

- In the context of sustainability we should be handing on to future generations a world that is richer than the one we inherited;
- Species which evolved over thousands of years may be lost very quickly, and cannot be re-created;
- Natural processes help to protect our planet, e.g. through regulating climate and air quality;
- In maintaining the productivity of our crops we rely upon a reservoir of their wild relatives and the pool of genetic material that they hold;
- In conserving the biodiversity of Orkney not only will we be taking responsibility for the quality of our local environment, we will be contributing to global biodiversity.

This plan marks a major step in the conservation of Biodiversity in Orkney. It has been authored by the Biodiversity Steering Group of the Orkney Local Biodiversity Forum, which is now part of the Orkney Environment Partnership, and is proposed for adoption by the constituent members of the Forum.

2. The Orkney Local Biodiversity Action Plan and its National Context

The UK Biodiversity Action Plan (UKBAP) was launched in 1994 as a means of meeting the UK's obligations under the Biodiversity Convention (signed by the UK and over a hundred other countries at the Rio Earth Summit in 1992) to "develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity". The stated goal of the UK BAP is to "conserve and enhance biological diversity within the UK, and to contribute to the conservation of global diversity through all appropriate mechanisms". A UK Steering Group has been established to take this forward.

The Scottish Biodiversity Group (SBG) was established to progress the UKBAP in Scotland. The SBG has now evolved into the Scottish Biodiversity Forum (SBF). This Group is chaired by the Scottish Executive and includes representatives from statutory conservation agencies, non-governmental organisations, landowners and land managers, fisheries interests, commerce and industry, academics and recreational interests.

"Biodiversity, the UK Steering Group Report" (1995) sets out the Government's goals for Biodiversity into the 21st Century and details those habitats and species for which Action Plans should be produced. The report identifies 39 Priority habitats. The report also identifies 1,250 species, which are globally threatened, or declining in the UK, and sorts them into two groupings "Species of Conservation Concern"; and within this "Priority Species".
The intention was that action plans would be produced for the entire "Priority Species" list, but not for the other species on the published "Species of Conservation Concern" list.

Six volumes of National Action Plans have been produced to date. National Action Plans have been prepared for all Priority Species and Habitats.

The Local Process

To achieve the UK's commitments, action has to be taken at both national and local levels. Local Biodiversity Action Plans (LBAPS) are seen as the means by which the UKBAP will be delivered at the local level. Targets set nationally for species and habitats of conservation concern will be translated into actions, which are achievable in a local context. In addition, LBAPs are expected to provide a focus for the conservation of locally valued species and habitats.

The Orkney Local Biodiversity Action Plan (Orkney LBAP) is Orkney's contribution to the process of conservation of biodiversity, which is taking place throughout the country. This plan identifies actions which we can take locally, and which will make a contribution to the conservation of those species and habitats identified as being "at risk" or "threatened" in the UK as a whole. It is presented as a series of individual species, habitat and area action plans and associated guiding principles. All these plans will identify the most important sites, both designated and non-designated. A key element of the LBAP is the importance of the wider countryside outside these sites, which is the habitat for many species and part of the range of others, and is essential for migration, dispersal and genetic exchange. The LBAP is dynamic in nature and will evolve with time as new initiatives, threats and opportunities arise; new action plans will be added to the series as they are developed and old action plans will be updated.

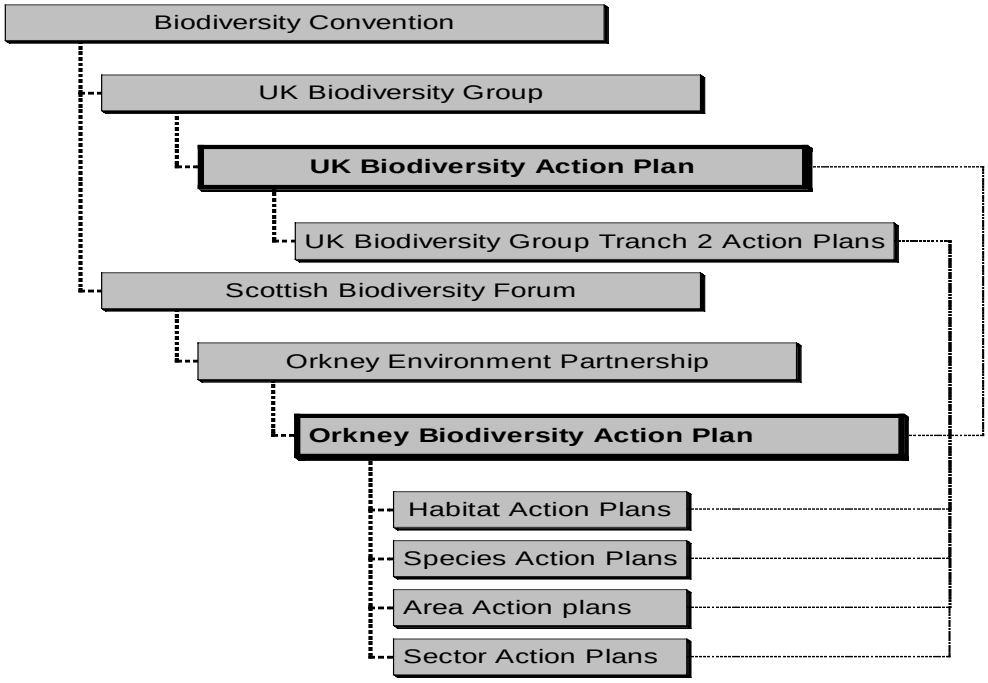
The Orkney LBAP highlights the key habitats and species for which individual action plans are being prepared. It also identifies the actions required and the key partners who can carry them out.

It is anticipated that, after publication and amendment of the various habitat and species action plans prepared by the Biodiversity Steering Group of the Orkney Environment Partnership, constituent members will sanction the plans. In many cases this will require adoption at a formal meeting of that organisation, such as consideration by the Planning Committee of Orkney Islands Council or the steering group of FWAG. Once the plan is adopted by a number of Partnership Members it will be appended to this document and will be the responsibility of the identified lead agency, which initially will be the Biodiversity Steering Group, to promote the implementation of the specific action plan.

The Biodiversity Steering Group acts for the Orkney Environment Partnership to manage the process of producing individual species and habitat Action Plans within the county. The Partnership is comprised of representatives of the locally based organisations with an interest in and influence over biodiversity. Members of the Environment Partnership are asked to contribute to the debate over actions within the individual plans and to endorse the final draft once a consensus is reached. In this way local ownership and support for the plans is ensured. It is advised by a Biodiversity Steering Group made up of representatives of the key interests in the process.

In addition to these, but equally important are the "generic actions", which cover a range of common issues and which, if addressed, would make a major contribution to sustaining and enhancing biodiversity in Orkney. Parish or Area Biodiversity Action Plans have been developed as a means of identifying and ensuring effective action at the community level. Sectoral Action Plans, identifying the actions required within the different economic sectors of the Islands are also being developed with Fisheries and Agricultural sector working groups developing these themes.

UK Biodiversity groups and their relationship to the Orkney Environment Partnership



In the past, traditional management of semi-natural habitats ensured the survival of most species, including rare and declining ones, and contributed to the qualities we now appreciate. In modern times, great changes in the way natural resources are used means that such traditional management can rarely be relied on to conserve the quality of habitats. A new approach is required, though the aim is frequently to continue with aspects of traditional management. Their conservation should be addressed by implementing the actions listed in the habitat action plans and for this reason the Orkney LBAP is largely habitat based.

In some cases human influence on the countryside and marine environment has caused particular species to decline to dangerously low levels; for these a more targeted approach is necessary so individual action plans will have been prepared, both at a UK level and a local level. Rare, declining or threatened species are not more important than others; they simply require more urgent action. In most cases specific management for these species will in fact be beneficial to a wide range of wildlife.

Some species and habitats require action to enhance them or to reinstate their position within the landscape or the Orkney ecosystem. Local action plans are being written for these habitats and species, which are critical or at risk and which need local action to conserve them

Action Plan	**Element of Biodiversity considered**	**Proposed number**
Species	National Priority Species	42
	Species of Conservation Concern	114
	Locally Important Species	300*
Habitats	All National Priority and Locally Important Habitat types occurring in the islands	48
Community	Area based action plans, assessing and proposing actions for individual parishes and Islands	21
Sector	Plans based on the impacts of economic sectors	4

* The process of identifying species of local importance for inclusion in the Action Plan will be ongoing

The Local Biodiversity Action Plan is a major building block in the development of a Local Agenda 21 strategy for Orkney.

3. The Objectives of the Plan

GOAL:
To conserve and enhance biological diversity within Orkney and to contribute to the conservation of national and global biodiversity.

OBJECTIVES:
1. To maintain and, where practicable, to enhance;

    - the overall populations and natural ranges of native species and the quality and range of wildlife habitats and ecosystems
    - internationally and nationally important and threatened species habitats and ecosystems
    - species, habitats and managed ecosystems that are characteristic of Orkney or are perceived to be of local importance
    - the biodiversity of natural and semi-natural habitats where this has diminished over recent decades

2. To increase public awareness of, and involvement in, conserving biodiversity.

3. To identify priorities for habitat and species conservation in Orkney and set realistic targets and timescales for these.

These broad goals and objectives reflect those of the UK Plan.

The production of this plan provides an opportunity to reflect on Orkney's place in national and international nature conservation. Orkney is in a privileged position with a climate and past patterns of land-use, which have resulted in it hosting a wide range of nationally rare habitats and species. The county also boasts a very high proportion of the national complement of coastal habitats.

The biodiversity of any area is inextricably linked to its landscape and heritage since the three inevitably evolve together. Because of this close association, the objectives of the Orkney BAP will help to preserve and reinforce the landscape character and heritage of Orkney in the same way as the Development Plan and Landscape Character Assessment guidelines will compliment action for biodiversity.

The plan sets out the priority action required to protect and enhance the current biodiversity of Orkney. Many of the proposed actions involve positive management to conserve Orkney's wildlife. Other actions associated with this include lobbying for change in agricultural practice and in the incentives and markets, which currently drive them, influencing policies and protection of sites through development plans and maximising any opportunities, which the development process might offer.

These are difficult challenges and require a balanced approach, but when set against sometimes conflicting objectives and a history of losses and degradation of biodiversity locally, nationally and internationally it cannot be too much to ask that efforts should be increased now to ensure that losses are stemmed and that we can pass on to future generations a wildlife legacy no less rich than we have at present.

4. The Biodiversity Resource and What is Important.

In August 1997 the Biodiversity Forum (now Orkney Environment Partnership) published "Biodiversity in Orkney an audit of priority and locally important habitats and species". This report aimed to describe the biodiversity resource in Orkney as a basis for the production of Local Biodiversity Action Plans. It conceded that it is not a full account of all the habitats and species found in Orkney as it concentrates primarily on UK priority habitats and species. Many species that are rare in Orkney but not uncommon or threatened in the rest of the UK were not included, and many "common" yet highly valued species were also not considered, but it is was an important resource for the Orkney LBAP.

In 2001-02 the "Biodiversity in Orkney an audit of priority and locally important habitats and species" was extensively reviewed. The "Orkney Biodiversity Audit" as it is now called, consists mainly of two sections, supersedes the previous one and is the most up to date. It consists mainly of two sections, the first section is a habitat table, "Table 1: Categories of habitat found within Orkney", which lists all the Broad Habitats, and Priority Habitats i.e. habitats for which the UK has international obligations; are at risk; habitats which are functionally critical; and / or are important for key species. This table also lists Locally Important Habitats. Further details and descriptions for these habitats can be found in their respective action plans.

The second section is a species table, "Table 2: Species that are considered to be of conservation concern in Orkney", it gives accounts of UK Priority Species which occur, or have occurred in the recent past, in Orkney and those species which are important in a local context.

It is recognised that the audit will always be incomplete and it is therefore accepted by the Orkney Environment Partnership that it will require regular updating and review. This is a key task for the Partnership who has asked the RSPB to take the lead in maintaining this important dataset.

The Orkney Biological Records Centre Project is expected to make a significant contribution to the maintenance and accuracy of the biodiversity audit, especially in terms of providing information on the location of biologically diverse "hotspots" within the county, which require specific attention.

One of the major omissions from the audit is a lack of consideration of the marine environment. This omission is being addressed by research projects into the distribution of *Zostera*, *Maerl* and *Modiolus* conducted by MSc students at ICIT who are also undertaking a major compilation of marine biological records.

5. Habitat Action Plans (HAP's)

Orkney is fortunate in being custodian to a wide range of habitats, largely stemming from its varied geological and land-use history. In preparing the plan it was decided that, rather than attempting to select individual habitats for consideration, all habitats should be included. This is the only approach which can adequately safeguard the range of biodiversity present.

The habitat groupings, which have been used in the plans, reflect those habitats occurring in Orkney for which UK Action Plan Steering Group statements have been prepared augmented by those habitats identified by the Biodiversity Steering Group as reflecting local circumstance. Some habitats cover vast areas whereas others are very small. However large or small they all add to the richness of Biodiversity in Orkney.

All of the habitats are important at least at a county level, some are nationally important and there are a number, which are of international significance. The habitats for which Habitat Action Plans will be produced are as follows:

Bold = UK Priority Habitat * = Locally Important Habitat

Upland Birchwood
*Willow Scrub
*Broad-leaved plantation & policy woodland
*Miscellaneous field boundaries
*Road verges
Cereal field margins
*Arable crops
*Extensive Hay/Silage crops
*Wet meadow
*Herb rich grassland
Upland heathland
*Treeless woodland and dale
*Maritime heath
*Empetrum heath
*Lichen heath
*Species rich heath
*Marsh
Fens
*Base-rich flushes
*Base-rich fen
Reedbeds
Blanket bog
*Basin bog
Eutrophic standing waters
Mesotrophic lochs
*Oligotrophic & Dystrophic lochs
*Ponds and milldams
*Burns and canalised burns
*Montane habitats
*Inland rock
*Built up areas and gardens
Maritime cliff and slopes
*Maritime grassland
Coastal sand dunes
Machair
*links
*Aeolianite
Coastal vegetated shingle
*Coastal strandline
Coastal saltmarsh
Mudflats
Sheltered muddy gravel
Tidal rapids
***Modiolus modiolus* beds**
Seagrass beds
Maerl beds
Saline lagoon
Mud in deep water

All the Habitat Action Plans should be written by March 2002.

There are eight additional Habitat Statements, which describe the remaining locally occurring habitats. These can be found in the HAP's section of the Orkney LBAP Manual.

6. Species Action Plans (SAP's)

Orkney hosts a wide range of species. Its maritime situation and northern latitude result in the occurrence in Orkney of many species which are internationally threatened and nationally rare. The populations of many of these species are currently declining but it is generally accepted that to cover them all with action plans is unrealistic.

As a first stage in selecting species for action it is important to identify which of the species in Orkney are rare or declining. A number of criteria were used:

1. All species on UK Biodiversity Group list of species of Conservation Concern.
2. Plant species defined nationally as "rare" or "scarce" found in Orkney.
3. All species protected by statute (Wildlife and Countryside Act etc) found in Orkney.
4. Species that are considered locally important.

These lists formed a starting point for selecting those species for which individual action plans are required to be produced (see "Orkney Biodiversity Audit").

UK list	Number of Species on Orkney List
Priority Species	42
Species of Conservation Concern	114
Local	300
All species	456

The species for which Species Action Plans will be produced are as follows:

First Group of 10	**Second Group of 10**	**Third Group of 10**
Great yellow bumblebee	Dark green fritillary	Seals
Pipistrelle bat	Trout	All Sharks
Otter	Orkney vole	Redshanks
Common skate &	Brown hare	Arctic tern (Terns)
Thornback ray	Toad	Short-eared owl
Corncrake	A Dragonfly	Lapwing
Skylark	Hen harrier	Red-throated diver
Reed bunting	Twite	Linnet
Juniper	Orchid species	Eared willow
Purple ramping fumitory	Cetaceans	Oyster plant
Scottish primrose		

No timescale is set for the completion of these plans, as yet.

7. Area Action Plans

The Orkney Environment Partnership has identified that the most appropriate delivery mechanism to achieve on the ground action is to involve local communities in the identification of priorities and assist them with the drawing up of action plans for their own area. Parish or Area Biodiversity Action Plans identify what is of local importance, as well as echoing national priorities to provide individual landowners with an overview of how management of their parcel of land relates to the immediate surroundings.

The profile of biodiversity was raised within the dispersed communities of the archipelago through the community liaison exercise. Each community council and island community was approached by the LBAP Project Officer with a view to identifying locally important species and habitats, and to promote the concept of the conservation of biodiversity. Important contacts were made during this process, which allows the Island and parish plans to focus on the concerns and aspirations of these communities, as well as providing a resource which allows the identification of national priorities within local areas. A project officer has been appointed to assist Communities in drawing up Area Action Plans for their island or Parish.

Area Action Plans are to be prepared for all Island areas and Mainland Parishes, and endorsed by their respective Community Councils by the end of 2002.

Area	**Status of Plan**	**Proposed publish date:**
1. Sanday	Completed	December 2000
2. Westray	In Draft	December 2002
3. Papa Westray	In Draft	December 2002
4. Eday	Completed	December 2002
5. Stronsay	Completed	December 2001
6. Shapinsay	Completed	December 2001
7. Hoy, Walls & Graemsay	In Draft	December 2002
8. S. Ronaldsay & Burray	Completed	December 2002
9. Sandwick	Completed	December 2001
10. Tankerness & Deerness (inc. St Andrews & Copinsay)	In Draft	December 2002
11. Holm & Wideford	In Draft	December 2002
12. N. Ronaldsay	In Draft	December 2002
13. Orphir & Scapa	In Draft	December 2002
14. Evie & Rendall	In Draft	December 2002
15. Rousay, Egilsay & Wyre	In Draft	December 2002
16. Birsay	In Draft	December 2002
17. Stromness		
18. Kirkwall	In Draft	December 2002
19. Flotta	In Draft	December 2002
20. Harray & Stenness	In Draft	December 2002
21. Firth & Sunnybrae	In Draft	December 2002

8. Sectoral Plans

Currently there are two established sectoral groups/plans. The Farming Biodiversity Action Plan Group (Farm BAP) and the Fishing Biodiversity Action Plan Group (Fish BAP). Both groups are well established and are involved action plans and other developments in their respective areas. These groups have representatives from all fields within fishing and farming

in Orkney. It is hoped that a Business Biodiversity Action Plan Group will be established at some point in the future.

9. Prioritising the plans

Selecting which species should be given immediate attention has proven to be difficult. While there is an objective, "scientific", way of evaluating which habitats and species should be addressed first, this is likely to be complex and time consuming. The objective method of evaluating species and habitats depends on good quality information, and although this exists for some species (notably birds) it is poor or non-existent for other species groups. In practice priorities will be determined by a need to choose species and habitats for which action can be identified and implemented relatively easily, and non-controversially.

Work was undertaken over the winter of 1997-8 to contact local communities to ascertain which habitats and species were perceived to be the most important in a local context.

In total 83 different species (or species types) were identified by community groups as being of importance. The majority of these were identified for aesthetic reasons although a number of commercial species (Razor Clams, Cockles, Cod, Herring, old cereal varieties) were also identified.

A total of 21 distinct habitats were identified as being of note by the Community participation exercise. Based on the results of this exercise the following species and habitats were prioritised for immediate action:

Habitats:
Roadside Verges
Heaths
Upland Heath
Sand dunes / Machair

Species:
Otter
Hen Harrier
Curlew
Lapwing
Skylark
Common Toad
Orkney Vole
Brown hare

10. Links with Other Initiatives

The Biodiversity Action Plan process cannot occur in isolation and the action plan targets will be largely achieved through existing initiatives and mechanisms. The objective of the BAP is to ensure that other plans, programmes and policies incorporate appropriate biodiversity targets and are committed to their implementation.

Orkney Islands Council has a key role to play within the process, through its commitment to Local Agenda 21. Conservation of biodiversity is a key test of sustainable development. Orkney Islands Council can make significant contributions to the Orkney LBAP through the promotion of the principle of sustainability and in fostering greater understanding and appreciation of nature conservation through education, interpretation, training and the provision of information to the public.

Some initiatives operating in the County such as the Corncrake initiative are linked to the conservation of individual species but others, notably the Countryside Premium Scheme and its successor the Rural Stewardship Scheme, have a much wider impact on the habitat that supports some of Orkneys "prime biodiversity". Other initiatives such as the "Grounds for Learning" initiative address the educational and awareness raising aspects of the LBAP process.

The development of the Orkney Biodiversity Records Centre is also of note as making a significant contribution to the conservation of biodiversity. This facility for biological recording is expected to make a lasting impact on the widespread availability of information on individual species found in Orkney through providing a repository for data warehousing of information collected by the Biological Recording Community past, present and future. Data on the abundance and location will ultimately feed into revisions of the Biodiversity Audit.

11. Implementation

The Orkney LBAP will stimulate a new, more focused approach to the conservation of biodiversity. It is an opportunity to initiate new projects and to re-focus existing efforts. While the partnership members represent the key players in the process it is important that the circle of involvement will extend beyond the existing partnership and into the wider community, so raising awareness of the issues. As a starting point it is essential that the members of the Partnership take their part in initiating the process.

The development of individual plans will be an interactive process as the Orkney Biodiversity Records Centre delivers more complete information on the status of species and habitats. None of the plans contained in this document should be considered absolute and it is essential at the outset to recognise the long-term nature of many of the management prescriptions made in the Plans. Any action will take years to be truly effective and it may take much longer for any measurable success to be identified through monitoring programmes. Regular review and reappraisal of the goals and achievements of the plan is essential to ensure it is still addressing the priority issues.

The Biodiversity Steering Group will act as the local lead agency for each habitat and species action plan to ensure that action plans are taken forward. They have an important role in encouraging action, which works towards the aims of the Action Plans. They are not expected to take sole responsibility for a habitat or species but to act as champions for the action plans, encouraging others to work towards the Action Plans aims and co-ordinating that work. The Biodiversity Steering Group may enlist the help of local agencies to help further individual HAP's and SAP's and/or appoint local lead partners.

One of the main roles of the Lead Agencies will be the monitoring of progress toward the plans' targets and the review, in future years, of the plans themselves. The Environment Partnership itself will provide a platform for further co-ordinating the action taken and ensuring that a consistent approach to achieving the targets is set out in individual plans.

Each agency should thus:

1. Ensure that its voice is heard, through the Orkney Environment Partnership, in the development of each action plan to foster ownership of the plan.
2. Produce a statement, which details its role in, and specific commitment to, implementing the individual action plans.
3. Give due regard to the content of the action plans in the preparation and execution of its policies, plans and programmes, and in consultations with any national hierarchy.
4. Nominate a single local officer who has responsibility for ensuring that the commitments of the organisation to the Local Biodiversity Plan process are disseminated to those who effect action on the ground.

12. Generic Actions

A number of common issues exist which, if addressed, would make a major contribution to sustaining and enhancing biodiversity in Orkney. Some require continued implementation of existing measures or further strengthening of policies, which are beginning to incorporate biodiversity objectives. Others may require a considerable change of direction or emphasis.

Awareness Raising

Fully achieving the objectives of the LBAP may require a complete change in attitude, which can only by achieved by provision of effective and appropriate information. An increased awareness of the importance of maintaining a healthy biologically diverse ecosystem needs to be fostered to ensure that where management operations are considered the land manager is aware of the wider implications that this may have. Increased emphasis needs to be placed on the economic and social benefits of environmental protection to ensure that a healthy ecosystem is given an appropriate weighting in economic development decisions.

All agencies and organisations have a role to play in this regard, ensuring that the "biodiversity message" is spread as widely as possible. This is an action point for all agencies and individuals involved in the LBAP process. Orkney Islands Council, through the Education Authority, has an opportunity to ensure that awareness of the richness of Orkney's biodiversity is stressed at all levels of education, and beyond through the community education system. SNH and SERAD have a role in supporting this action while at the same time promoting the principals of conservation of biodiversity in the wider community. The University of the Highlands and Islands likewise has a major role to play in this regard.

The agricultural advice agencies (FWAG and SAC) are uniquely placed to bring the "biodiversity message" to the farm gate and to the awareness of the land managers who can have the greatest impact on the conservation of biodiversity.

Policy and legislation

The Planning Authority, Harbours Authority, SEPA, SNH and SEERAD all exercise a regulatory function, which can impact on the conservation of biodiversity. Each of these organisations should ensure that where statutory protection is given to a particular habitat or species, that statutory protection is pursued vigourously.

Where there is leeway for local policy to influence the implementation of statutory control every effort should be made to ensure that the highest possible level of protection is given to the priority species and habitats. The Development Plan prepared by Orkney Islands Council has a major role to play in ensuring that built development or change of use does not impact on areas of prime biodiversity. It is therefore, essential that our intentions towards such issues be clearly defined in the Structure and Local Plans in order that they can be effective in protecting the biodiversity of the County. Opportunity should be taken to add to the overall quality of habitats in Orkney through planning conditions, especially where loss of habitat is unavoidable.

Other agencies and organisations have an opportunity to incorporate objectives for protection and enhancement of biodiversity within their own policies and programmes, especially those with land holdings which include priority habitats or who exert an influence over the management or use of such areas. It could be expected that NOSWA, NFUS, RSPB, SLA, SWT, SAC, FWAG and OE would all incorporate biodiversity objectives into the next generation of their own business plans as a key element of sustainable development.

Legislative changes will almost certainly be required to achieve the conservation and enhancement goals of the Local Biodiversity Action Plan. SEERAD is uniquely placed to

inform and advise ministers of the changes needed to the agricultural policies that can have such an important impact on agricultural land use trends, and consequently biodiversity. Other agencies also have a role in advising government; SEPA and SNH have a key role in this respect.

Site safeguarding and management

Conservation of biodiversity requires action "on the ground" through site protection and management. While the 'cream' of Orkney's biodiversity could be expected to be protected by the statutory network of SSSIs managed by SNH or by direct ownership by nature conservation agencies, the greater volume and diversity exists outwith such protection and is managed according to commercial objectives. The mosaic of "tertiary" sites of local nature conservation importance as defined in the Orkney Islands Council Development Plan and those areas which meet no designation criteria but are nonetheless important areas of prime biodiversity are most at risk from degradation. These sites represent the greatest challenge to the Local Biodiversity Action Plan.

Mechanisms exist to assist landowners with the management of their land and consideration should be given by OIC, in consultation with others, to the designation of Local Nature Reserves or the negotiation of Management Agreements under the Wildlife and Countryside Act (1963) to achieve appropriate management of areas of "prime biodiversity". FWAG and SAC provide land use advice to the agricultural community and are well placed to give appropriate advice to land managers. Agricultural grant systems, the Countryside Premium Scheme and its successor the Rural Stewardship Scheme in particular, remain the most plausible method of achieving appropriate management of these sites. It is recognised that significant changes in agri-environment schemes will be required to realise the full potential of this mechanism, however a significant step forward was taken when the national and local biodiversity priorities were incorporated as one of the ranking categories for selection into the Rural Stewardship Scheme.

In the marine environment active management is much more difficult and will rely more on enforcement of regulations than incentives.

Conservation of biodiversity can also be achieved by site acquisition for conservation management. OIC, RSPB and SWT have utilised this mechanism to safeguard sites of prime biodiversity interest

Advisory and Information

Much loss of habitat and pressure on individual species results from ignorance of its existence or importance. Sympathetic management will be much more likely if a manager is aware of the prime biodiversity on his land and is advised on appropriate management prescriptions. While there is no doubt that commercial pressures will require to be offset by other compensatory systems much can be achieved at no cost to either land managers or to the public purse.

Through the Orkney Biodiversity Records Centre, SAC and FWAG are best placed to deliver this advice and it should be a key aim of these bodies to ensure that land managers are aware of an possible opportunities to conserve and enhance biodiversity on their land.

Some non-agricultural habitats can also benefit from increased awareness of their sensitivities. Marine and urban habitats fall into this category, but the identification of the appropriate delivery mechanism for such advice will depend upon the habitat in question.

Research and Monitoring

Identification of "at risk" habitats and species depends on accurate and frequent monitoring of the status of the subject. Without empirical assessment of the status of species or habitats

it will be difficult to make a realistic assessment of the efficacy of the Action Plan. While excellent information exists for some species and certain designated areas, there are considerable gaps in our knowledge. The Orkney Biodiversity Records Centre, supported by the Orkney Field Club, will be instrumental in the development of base line biotic information, collating the vast number of existing records and allowing assessment of the status of a given species or habitat. Additional survey work will be required to allow assessment over time and SNH will have a key role in this regard.

The updating of existing geographic datasets such as the MLURI landcover map of Scotland would make a significant contribution to our ability to note change, and consideration should be given to the funding of a Phase 1 Habitat Survey for the County.

Identification of change is only one part of the research needs of the Orkney LBAP. Additional research on management 'best practice' is required to ensure that action is effective. SWT have made a significant contribution to this for maritime grassland in its publication "The Nature of Grazing" and ICIT have numerous research projects associated with marine habitats and species. Further specific research topics could be suggested to the University of the Highlands and Islands and Heriot Watt University to fill any perceived gaps in our knowledge.

Summary of generic actions

	Awareness Raising	Policy and Legislation			Site management		Advice	Research and Monitoring
		Policy	Advice to Government	Lobbying	Management	Acquisition		
FWAG	■			■	■		■	
ICIT	■						■	■
NFU				■				
NOSWA		■			■			
RSPB	■			■	■	■		■
SAC	■				■		■	
SLF				■				
SNH	■		■		■		■	■
SEERAD	■		■		■			
SWT	■			■	■	■		■
SEPA	■		■		■		■	■
OBRC	■						■	
OFC	■							■
OIC	■	■			■	■		
OE	■	■						
UHI	■							■

13. List of members in the Environment Partnership

Community Biodiversity Project
Environmental Concern Orkney
International Centre for Island Technology
National Farmers Union
North Isles Environmental
Orkney Chamber of Commerce
Orkney Enterprise
Orkney Farming and Wildlife Advisory Group
Orkney Field Club
Orkney Fisheries Association
Orkney Health Board
Orkney Islands Council
Orkney Organic Group
Orkney Quality Food and Drink
Orkney Tourist Board
Royal Society for the Protection of Birds
Scottish Agricultural College
Scottish Environment Protection Agency
Scottish Executive Environment and Rural Affairs Department
Scottish Natural Heritage
Scottish Wildlife Trust

SECTION B

ORKNEY'S BIODIVERSITY AUDIT

Biodiversity in Orkney

An update of the local biodiversity audit of terrestrial and marine, species and habitats

Prepared on behalf of
The Orkney Environment Partnership
January 2002

ORKNEY BIODIVERSITY AUDIT 2002

An update of the first two biodiversity audit reports: "Orkney Biodiversity Audit" published in January 2000, and "Biodiversity in Orkney ~ an audit of priority and locally important habitats and species" published in August 1997.

Prepared on behalf of the Orkney Environment Partnership

EDITED BY

2002: Rachel Bain, Chris Booth, Elaine Bullard, Gail Churchill, John Crossley, Sydney Gauld, Jonathan Side, Christine Skene and Eric Meek

2000: Jonathan Side, Eric Meek, Elaine Bullard, Tasha Hunter, Iain Macdonald, Neil Golding, Nicola Abrams, and John Crossley.

Contributors:
Nicola Abrams, Ross Andrew, Rachel Bain, Piers Blaxter, Chris Booth, Elaine Bullard, Colin Chadwick, Liz Charter, Gail Churchill, John Crossley, Tim Dean, Tom Eggling, Neil Golding, Sydney Gauld, Tasha Hunter, Rosemary McCance, Iain Macdonald, Kostantinos Margaris, Eric Meek, Clive Mitchell, Stig Moe, Graeme Morgan, George Paximadis, Jonathan Side and Malcolm Thomson.

Summary

Biodiversity is the 'variety of life' – all living creatures and their habitats. In 1994, following on from the 1992 Earth Summit in Rio, the government launched its UK Biodiversity Action Plan to aid the conservation of priority threatened species and habitats and to contribute towards Local Agenda 21. The UK Biodiversity Steering Group was established in order to recommend how to take the Action Plan forward. At UK level 1,250 species and 61 'broad' and 'key' habitats were identified and given various levels of priority to be tackled at both national and local scales. At the local level these are to be addressed through the development of Local Biodiversity Action Plans.

This report presents the results of an audit of the priority species and habitats which are present, or have occurred in the recent past, in Orkney.

It is not a complete account of the biodiversity of the area, neither does it consider every species present. However, it is a first step towards identifying the actions necessary in Orkney to help achieve national biodiversity targets, and to deliver benefits for species and habitats of local importance.

This audit was produced in a very limited timescale. Consequently, the occurrence of some of the listed species and habitats need further confirmation and some of the accounts are incomplete – often as a result of lack of information. However, the audit gives a preliminary assessment of the biodiversity of Orkney and should be reviewed and updated on a regular basis.

The biodiversity of Orkney is rich and often unique. The islands are of considerable importance for many UK priority habitats and species, and locally distinctive because of others. This audit should help as a first step towards developing local action plans to ensure that this range of biodiversity is conserved and enhanced.

CONTENTS

1. INTRODUCTION

This third Orkney Biodiversity Audit report has been produced as part of the ongoing process of Local Biodiversity Action Planning in Orkney, and to update national and local, species and habitat priorities to assist with the further development of local action plans. It updates the earlier *Biodiversity in Orkney: an audit of priority and locally important habitats and species* (August 1997) and *Orkney Biodiversity Audit January 2000*, and has been produced, as was the earlier work, for the Orkney Biodiversity Action Forum, which is now part of the Orkney Environment Partnership. The work of the Partnership and its relationship to international and UK initiatives on biodiversity has recently been reviewed (*The Orkney Local Biodiversity Action Plan*, March 2002). The detail of this work and the background to the earlier biodiversity audit report have not been included again in this update and readers interested in this should consult these references.

The principal changes appearing in this update can be summarised as:

- the incorporation of comments and amendments to text based on responses received from a wide range of individuals and organisations asked to review the earlier 2000 audit report;
- the incorporation of new priority habitats from the UK Biodiversity Group Tranche 2 Action Plans;
- our attempt to make this report more user-friendly and enable easier updating, and availability in electronic (e.g. web-based) form;
- a critical, if still somewhat unsatisfactory, review of the criteria for inclusion of species and habitats which, although not identified as national priorities, have undoubted particular or local significance.

Already at the time of writing it is evident that further updates will be required to incorporate additional national and international work on marine habitats and species, along with UK Biodiversity Group reviews of species and habitats. The earlier 1997 audit report contains a brief account of each of the 28 UK short list and middle list species (now referred to as priority species) known or believed to occur in Orkney. It was hoped that these accounts could be extended to all species of national conservation concern and to species of local importance for the January 2000 audit. Such a task has proved beyond the reasonable endeavours of those involved in the second update audit, and indeed, for many taxa, will almost certainly require considerable prior investigation and publication by local specialists if it is ever to be comprehensive and complete. For this reason the 28 species accounts provided in the earlier 1997 audit report were not included in the January 2000 audit nor have they been included here, as little supplementary information or improvement to these could be made. We remain of the view that providing such accounts for all species identified in the audit is an important element of local biodiversity action planning but recognise that this will have to be a goal for the longer term. The Orkney Biodiversity Records Centre will, once its database is established and continually updated, provide an important baseline against which future changes in species and habitat diversity in Orkney can be gauged, and thus will provide data crucial to future audit updates and local biodiversity action planning.

Where to find habitats

- Table 1 (pages B3–B5) summarises broad habitat types and priority and locally important habitats found in Orkney.
- An explanation of the terminology used for habitat types and the structure adopted for the habitat accounts is given in Section 3 (pages B1–B2).

Where to find species

- Table 2 (pages B11-B33) lists all species recorded in this audit report as being of conservation concern in Orkney.
- An explanation of these lists and of the criteria used to construct Table 2 can be found in Section 4 (pages B6-B9)

Where to find explanations of abbreviations and terminology

- A Glossary is provided at the front of this manual, which includes some definitions.
- Definitions of the habitat terms used in this audit (Broad Habitat Type, Key Habitat and Priority Habitat, and Locally Important Habitat) appear in Section 3 (pages B1-B2).
- Definitions for the species terminology used (Priority Species, Species of Conservation Concern and Species which are Locally Important) can be found in Section 4 (pages B6-B7).

3. Habitats

Introduction and Definitions

The 'Biodiversity in Orkney: an audit of priority and locally important habitats and species' (August 1997), provided habitat accounts of the habitats listed in the Biodiversity: the UK Steering Group Report (1995) that occur in Orkney. When the Audit was updated in January 2000 amendments were made to the broad habitat list to accommodate amendments in the UK Biodiversity Group Tranche 2 Action Plans (1998).

Subsequently the Joint Nature Conservation Committee (JNCC) published in July 2000, Guidance on the Interpretation of the Biodviersity Broad Habitat Classification (terrestrial and freshwater types): definitions and the relationship with other habitat classifications. This resulted in some revisions to the Broad Habitat types.

It has therefore been necessary in the 2002 edition of the Orkney Biodiversity Audit to reassess local habitats in relation to the Broad Habitat types. A great deal of time has been spent ensuring all habitats occurring within Orkney fit appropriately into the amended classification system. Importantly, the Audit also includes a number of habitats that are not designated as UK Priority Habitats, but which are considered by local specialists to be of particular national and for local importance. The list of habitats occurring in Orkney is provided in Table 1 and definitions of terms are provided below.

Broad Habitats

The broad habitat types comprehensively cover, and should encompass all, the habitat types that occur within the UK. The full list of Broad Habitats are given in Table 1.

NB The marine broad habitats are in the process of being revised. This section of the table will be amended accordingly once the revisions have been completed.

Priority Habitats

There are many competing claims on our landscape resources and natural heritage. Priority habitats form a selected list of habitats defined as being of the highest conservation concern on the basis of expert judgement.

NB Priority habitats replace the earlier 'key habitats' in the revised habitat definitions. The function of both is the same but the terminology has been modified.

Selection Criteria for Priority Habitats

A habitat is defined as a Priority Habitat if it meets one or more of the following criteria:

- it is a habitat for which the UK has international obligations;
- the habitat is at risk, such as those with a high rate of decline, especially over the last 20 years;
- it is a habitat which is rare;
- the habitat (particularly marine) is functionally critical (essential for organisms inhabiting wide ecosystems, e.g. spawning fish);
- the habitat is important for keystone species;
- the habitat is important for rare species.

Key Habitats and Priority Habitat Action Plans

Originally 38 Key Habitats were identified as national priorities. UK action plans were drafted for 14 of these. A further 14 terrestrial and freshwater priority habitat action plans have been published. Additionally 19 priority habitat action plans have been published for maritime and coastal habitats. Each of these has been costed, as a national action plan, by the UK Biodiversity Steering Group.

Locally Important Habitats

These are habitats not identified as Broad Habitat Types, or Priority Habitats in the UKBSG report and its amendments, but are significant nonetheless – because we believe they are locally distinctive and have been selected by the county recorders and/or the local communities.

EXPLANATORY NOTE: Table 1 provides a list of habitats found in Orkney. Within each Broad Habitat type is listed the appropriate UK Priority Habitats and whether or not they occur in Orkney. Also listed within each Broad Habitat are the appropriate local habitats and indication as to whether they are locally important.

Table 1: Categories of habitat found within Orkney.

No.	Broad Habitat Type	UK Priority Habitats	UK Priority Habitat Occurrence in Orkney	Local Habitats **UK Priority=Bold** Locally important =*
1	BROAD-LEAVED MIXED AND YEW WOODLAND	Upland oak woodlands	Not present	
		Upland birchwood	**Present**	**Upland birchwood**
		Lowland beech	Not present	*Willow scrub
		Upland mixed ashwoods	Not present	*Broad-leaved plantations and policy woodlands
		Wet woodlands	Not present	
		Lowland wood pastures and parkland	Not present	
2	CONIFEROUS WOODLAND	Native pine wood	Not present	Conifer plantation
3	BOUNDARY AND LINEAR FEATURES	Ancient and/or species rich hedgerows	Not present	*Miscellaneous field boundaries *Road verges Hedges Stone and earth boundary features
4	ARABLE AND HORTICULTURE	**Cereal field margins**	**Present**	**Cereal field margins** *Arable crops
5	IMPROVED GRASSLAND	Coastal and floodplain grazing marsh	Not present	Improved grassland *Extensive Hay/Silage crops
6	NEUTRAL GRASSLAND	Lowland meadows	Not present	*Wet meadow Semi-natural grassland *Herb rich grassland
		Upland hay meadows	Not present	
7	CALCAREOUS GRASSLAND	Upland calcareous grassland	Not Present	
8	ACID GRASSLAND	Lowland dry acid grassland	Not present	Acid grassland
9	BRACKEN	Bracken	Not present	

NO.	BROAD HABITAT TYPE	UK Priority Habitats	UK Priority Habitat Occurrence in Orkney	Local Habitat **UK Priority=Bold** Locally important=*
10	DWARF SHRUB HEATH	**Upland heathland**	**Present**	**Upland heathland** *Treeless woodland and dales *Maritime heath *Empetrum heath *Lichen heath *Species rich heath
		Lowland heathland	Not present	
11	FEN, MARSH AND SWAMP	**Fens**	**Present**	**Fens** *Marsh *Base-rich flushes *Base-rich fen
		Reedbeds	**Present**	**Reedbeds**
12	BOG	Lowland raised bog	Not present	*Basin bog
		Blanket bog	**Present**	**Blanket bog**
13	STANDING OPEN WATER AND CANALS	**Eutrophic standing waters**	**Present**	**Eutrophic standing waters**
		Mesotrophic lochs	**Present**	**Mesotrophic lochs**
		Aquifer fed naturally fluctuating water bodies	Not present	*Oligotrophic & Dystrophic lochs *Ponds and milldams
14	RIVERS AND STREAMS	Chalk rivers	Not present	*Burns and Canalised burns
15	MONTANE HABITATS	None		*Montane habitats
16	INLAND ROCK	Limestone pavement	Not present	*Inland rock
17	BUILT UP AREAS AND GARDENS	None		*Built up areas and gardens
18	SUPRALITTORAL ROCK	**Maritime cliff and slopes**	Present	**Maritime cliff and slopes** *Maritime grassland

NO.	BROAD HABITAT TYPE	UK Priority Habitats	UK Priority Habitat Occurrence in Orkney	Local Habitats UK Priority=Bold Locally important=*
19	SUPRALITTORAL SEDIMENT	**Coastal sand dunes**	**Present**	**Coastal sand dunes**
		Machair	**Present**	**Machair** *Links
		Coastal vegetated shingle	**Present**	*Aeolianite **Coastal vegetated shingle** *Coastal strandline Storm beach
20	LITTORAL ROCK	Littoral chalk	Not Present	
		Sabellaria alveolata reefs	Not Present	
21	LITTORAL SEDIMENT	**Coastal saltmarsh**	**Present**	**Coastal saltmarsh**
		Seagrass bed (*Zostera noltii*)	Not present	
		Mudflats	**Present**	**Mudflats**
		Sheltered muddy gravels	**Present**	**Sheltered muddy gravels**
22	INSHORE SUBLITTORAL ROCK	Sublittoral chalk	Not Present	
		Sabellaria spinulosa reefs	Not Present	
		Tidal rapids	**Present**	**Tidal rapids**
		***Modiolus modiolus* beds**	**Present**	***Modiolus modiolus* beds**
23	INSHORE SUBLITTORAL SEDIMENT	**Seagrass beds (*Zostera marina*)**	**Present**	**Seagrass beds (*Zostera marina*)**
		Maerl beds	**Present**	**Maerl beds**
		Saline lagoons	**Present**	**Saline lagoon**
		Mud in deep water	**Present**	**Mud in deep water**
		Serpulid reefs	Not Present	*Inlets and enclosed and sheltered bays
		Sublittoral sands and gravel	Not Present	
24	OFFSHORE SHELF ROCK			To be reviewed
25	OFFSHORE SHELF SEDIMENT	Sublittoral sands and gravels		To be reviewed
26	CONTINENTAL SHELF SLOPE	*Lophelia pertusa* reefs	Present but offshore	To be reviewed
27	OCEANIC SEAS		Status uncertain but offshore	To be reviewed

4. SPECIES

4.1 Orkney Species Audit: National and Local Priorities

Table 2 lists all species that are considered to be of conservation concern in Orkney. It includes:

- the UK priority species, and species of conservation concern that occur, or have occurred within the recent past, in Orkney;
- species which are important in the local context.

NB It is not a list of all the species found in Orkney, just those considered to be of Conservation Concern

All priority species, species of conservation concern, and species of local importance, recorded in the Orkney LBAP area have been identified using information held by local biological recorders, individual experts and local communities. This has been augmented where necessary, by information held by statutory and non-statutory agencies or organisations, or gleaned from various published and unpublished sources.

This process of identifying species of local importance for inclusion in the inventory must be ongoing. More species will be added to, or removed from, the Orkney list as more information becomes available.

National Context: Selection and Criteria Used

Species of Conservation Concern (formerly Long List species)

The UK Biodiversity Steering Group listed a total of 1,250 Long List species, now know as Species of Conservation Concern, that qualify for inclusion in the UK Biodiversity Action Plan by falling into one or more of the following categories:

- threatened endemic, and other globally threatened species;
- species where the UK holds more than 25% of the world, or appropriate biogeographical population;
- species whose numbers or range have declined by more than 25% in the last 25 years;
- In some instances where the species is found in fewer the 15 ten km squares in the UK;
- species which are listed in EU Birds or Habitats Directives, the Berne, Bonn or CITES conventions, or under the Wildlife and Countryside Act 1981 and the Nature Conservation and Amenity Lands (Northern Ireland) Order 1985.

Priority Species (formerly Middle and Short List Species)

From within the list of Species of Conservation Concern those species which qualify for one or more of the following categories are classed as priority species:

- Species which are globally threatened;
- Species which are rapidly declining in the UK (i.e. by more than 50% in the last 25 years).

These are of higher priority than the species of conservation concern because of the degree of threat, rarity or rate of decline. (Such species originally comprised the Middle and Short Lists.

Local context: Priority Species - Selection and Criteria Used

The decision to include species on the Orkney list is based on one or more of the following criteria, of which some reflect national concerns and some reflect local criteria adopted by the audit.

- It is an endemic species or where UK has over 25% of the population
- The species is scarce in Scotland (defined as being found in fewer than 15 10km squares in Scotland)
- The species is scarce in the UK defined as being found in fewer than 15 10km squares in the UK
- It is a notable UK species
- It is a UK threatened species
- The species is of local importance in Orkney
- The species may be threatened by development
- The species is of unknown or uncertain status
- It is a Red Data Book species
- The species is thought to be extinct in Orkney but evidence is inconclusive
- A core population of the species is held in Orkney
- The species is indicative of the health of a habitat
- The species is of particular popular appeal – based on canvassing at public meetings, or identified during the drafting of area-based local biodiversity action plans in Orkney
- It is a vulnerable UK species
- It is a species which is unusual or unique to Orkney
- It is a species which is an important food for other species
- It is a species whose capture or sale has been banned
- The species is scarce or threatened within Orkney

4.2 Limitations and Recommendations

- Further clarification is needed for species for which status is uncertain. This will require input from local and national biological records and experts. For example verification, of (the potential for) re-colonisation, is needed concerning species which are thought to be locally extinct, but have been included in the audit. This includes some bird species presently listed.

- Local names for several taxa were not available at time of going to print; input from local specialists is being sought to provide this important information.

- The species of local importance have been identified by local biological recorders, associated bodies (SNH, RSPB, ICIT, etc), individuals with special interest and knowledge and the local communities.

- There is a requirement for more specific local criteria to be identified for each species. It is hoped to address this in the next update of the Audit.

- Given that the Orkney archipelago is dominated by its diverse and largely virgin coastline, and associated intertidal and subtidal habitats, the paucity of information on many coastal and marine species (and habitats), in comparison with other, better studied, environments remains a limitation of this audit update.

Table 2: Species that are considered to be of conservation concern in Orkney

Key to Table 2:

UKL: UK priority list, either:
- P Priority species
- C Species of Conservation concern

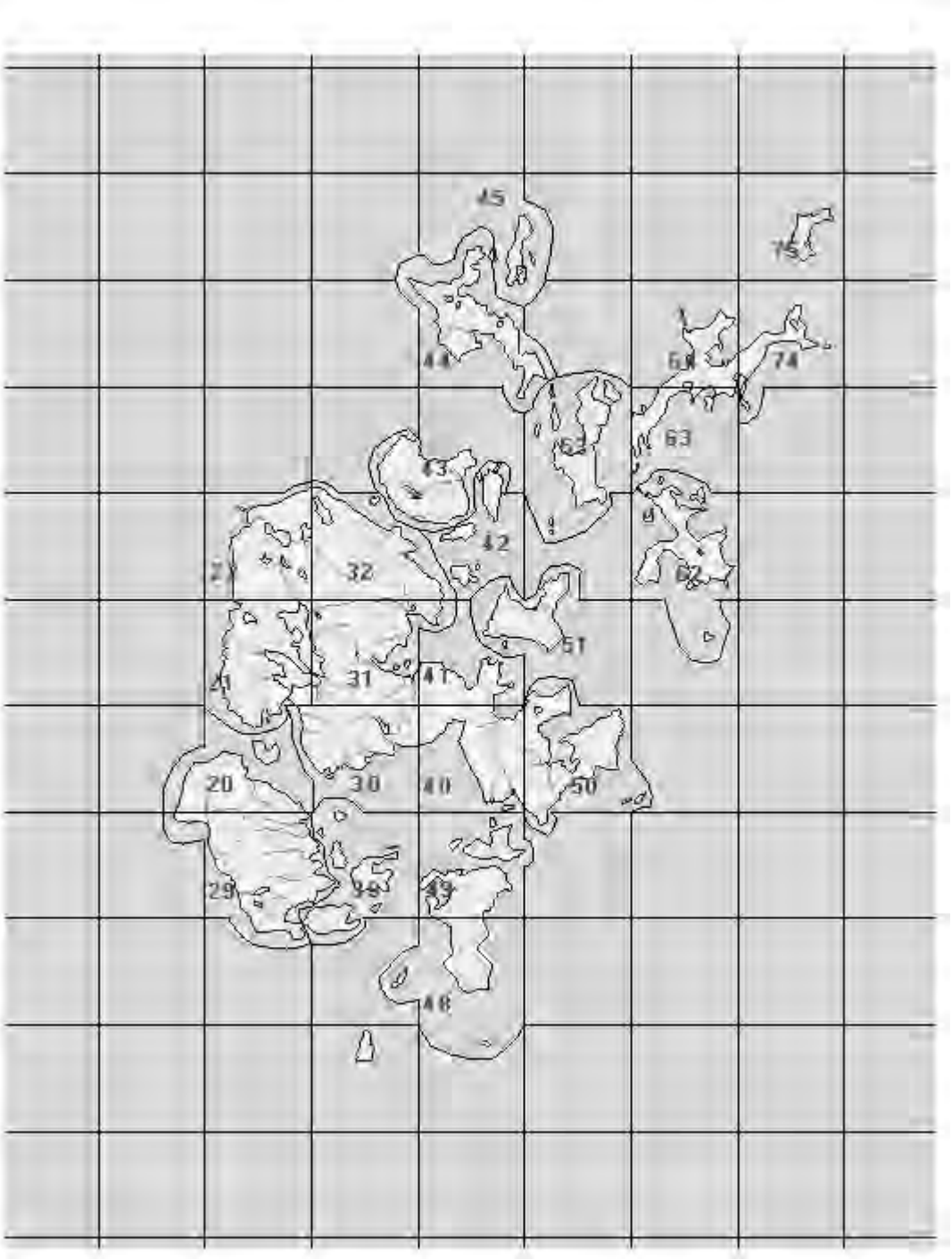
L Cri: Local Criteria:
Species that are not on any UK list but are identified as being of local importance as identified by the following local criteria:
- *1 suggested by local expert
- *2 suggested by local community
- *3 suggested by both

NB The status of the Species of Conservation Concern are provided in the Biodiversity: UK Steering Group Report Volume 2: Action Plans (1995)

DISTRIBUTION: these codes refer to the islandised squares proposed by E. Bullard (reproduced on page **B9**)

HABITAT: these codes refer to the general habitat classifications listed below:

COASTAL MARITIME TYPES CODES used to describe Orkney habitat occurrence of species are as follows: (**C**) **Shore and coastal habitats**: C1 – maritime cliff and slope; C2 – shingle above high water; C3 – boulders and rock above high water; C4 – strandline; C5 – machair and aeolianite; C6 – sand dunes; C7 – salt marsh; C8 – brackish water bodies; C9 – inlets and enclosed bays. (**M**) **Marine**: M1 – coast; M2 enclosed sea areas; M3 – sounds and firths; M4 – open sea (water column); M5 – shelf break.



Map, showing "Islandised Squares" for local recording, developed by Elaine Bullard.

Table 2: Species that are considered to be of conservation concern in Orkney

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
VERTEBRATES							
Mammals							
Apodemus sylvaticus	Wood mouse	Muridae	Fairly common; threats - change in farming practice, fewer stacks being kept in fields throughout winter	*	*1		20, 21, 22, 29, 30, 31, 32, 39, 40, 41, 50, 51, 53, 62, 63, 64, 74, 75
Balaenoptera acutorostrata (baleen whales group)	Minke whale	Balaenopteridae	Fairly common; threats - reduction in food from fishing, whaling	P	*1	M4	11, 29, 49
Delphinus delphis (small dolphins group)	Common dolphin	Delphinidae	Uncommon; threats - net entanglement and over-fishing	P	*1	M2, M3, M4	21, 30, 31, 32, 49, 41, 75
Globicephala melas (toothed whales group)	Long-finned pilot whale	Delphinidae	Fairly common; threats - mass killing, fishing, seismic exploration	P	*1	M2, M3, M4	39, 41, 43, 44, 53, 62, 63
Grampus griseus (small dolphins group)	Risso's dolphin	Delphinidae	Fairly common; threats - net entanglement and over-fishing	P	*1	M2, M3, M4	10, 39, 44, 59
Halichoerus grypha	Grey seal	Phocidae	Very common resident breeder; threats - hunting, over-fishing	C	*3	M2, M3, M4	39, 32, 48, 42, 44, 53, 62, 63
Lagenorhynchus acutus (small dolphins group)	Atlantic white-sided dolphin	Delphinidae	Fairly common; threats - net entanglement and over-fishing	P	*1	M4	21, 41, SS
Lagenorhynchus albirostris (small dolphins group)	White-beaked dolphin	Delphinidae	Common; threats - net entanglement and over-fishing	P	*1	M2, M3, M4	18-19, 10-12, 39, 30, 49, 40, 62-63, SS
Lepus europaeus	Brown hare	Leporidae	Widely distributed on Mainland, decreased over last 25yrs, but recent improvement in status	P	*3		29-, 20-, 21-22, 30-32, 48-, 49-, 40-41, 43-, 50, 51-, 53-
Lepus timidus	Mountain hare	Leporidae	Confined to Hoy where it is fairly common	C	*3		29, 20, [42]
Lutra lutra lutra	European otter	Mustelidae	Well distributed, fairly common; threats - accidental deaths from road kills and drowning in creels	P	*3	C6	29, 20-22, 39, 30-32, 48-49, 40-45, 50-53, 62-64, 74-75
Megaptera novaeangliea	Humpback whale	Balaenopteridae	Very rare; threats net entanglement and overfishing of food supply	P	*1		
Microtus arvalis orcadensis	Orkney vole	Muridae	Locally abundant and unique to Orkney; important prey species	*	*3		21-22, 30-32, 48-49, 40-41, 43-44, 50, 53, 63-64, 74
Neomys fodiens	Water shrew	Soricidae	Uncertain, only reported from Hoy. Last record Braebuster 1964	C	*3		29, 20
Orcinus orca (toothed whales group)	Killer whale	Delphinidae	Fairly common; threats - net entanglement, over-fishing, whaling	P	*3	M2, M3, M4	18, 19, 10-12, 37-39, 30, 47-49, 40, 57, 53, 75
Phoca vitulina	Common seal	Phocidae	Very common; threats - hunting and over-fishing	C	*3	M2, M3, M4	20, 39, 30, 48, 41, 42, 44, 50, 62, 63, 64
Phocoena phocoena	Harbour porpoise	Phocoenidae	Common; threats - net entanglement, over-fishing, pollution	P	*3	M2, M3, M4	29, 20, 21, 38, 39, 30, 32, 49, 50, 51, 75
Physeter catodon (toothed whales group)	Sperm whale	Physeteridae	Uncommon; threats - seismic exploration, over-fishing, whaling	P	*3	M4	20-21, 39, 30, 33, 48, 49, 40, 42, 43, 44, 50, 63, 74
Pipistrellus pipistrellus	Pipistrelle bat	Vespertilionidae	Uncommon, 1 small colony known; threats - roost disturbance	P	*3		29, 21
Sorex minutus	Pygmy shrew	Soricidae	Fairly common and widespread; threats - domestic or feral cats	C	*1	C1	29, 20-22, 39, 30-32, 48-49, 40-41, 43-44, 50-51, 62

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Amphibians							
Bufo bufo	Common toad	Bufonidae	Uncommon or rare, severe decline	C	*3		29, 20, 21, 22, 39, 30, 31, 32, 48, 41, 50
Fishes							
Ammodytes tobianus	Sandeel [lance]	Ammodytidae	Uncertain, declining or less accessible to terns and kittiwakes	*	*1	M3	?
Cetorhinus maximus	Basking shark	Cetorhinidae	Uncommon, fishery threat	P	*3	M4	39, 30, 49, 40, 62
Clupea harengus (commercial marine fish group)	Herring	Clupeidae	Locally abundant, summer and autumn, local spawning area+D148 to the north east	*	*1	M4	?
(Deep water fish group)			Several species of deep water fishes now considered to be of priority conservation concern	P			
Lamna nasus	Porbeagle shark	Lamnidae	Uncommon, fishery threat	C	*3	M4	?
Pomatoschistus minutus	Sand goby	Gobiidae	Uncommon, fishery threat	C			
Prionace glauca	Blue shark	Carcharinidae	Uncommon, fishery threat	C	*3	M4	?
Raja batis	Common skate	Rajidae	Decline now noted as serious	P	*1		
Raja naevus	Cuckoo ray	Rajidae	Occurs sporadically and produces relatively few live young	*	*1	M2, M3, M4	?
Salmo salar	Atlantic salmon	Salmonidae	Uncommon	C	*2	M2, M3, M4	?
Salmo trutta	Trout	Salmonidae	Species of particular local importance	*	*3		
Squalus acanthias	Spurdog [hoe or sea da']	Squalidae	Occurs sporadically and produces relatively few live young	*	*1	M2, M3, M4	?
Reptiles							
Dermochelys coriacea (marine turtles group)	Leatherback turtle	Dermochelyidae	Rare, Orkney waters may be important to some populations	P	*3	M2, M3, M4	28, 22, 39, 40, 51, 54, 74
Birds							
Accipiter nisus	Sparrowhawk	Accipitridae	Rare breeding resident, uncommon on passage	C	*1		20, 31, 32, 41, 43
Acrocephalus schoenobaenus	Sedge warbler	Sylviidae	Fairly common breeding summer visitor and passage migrant	C	*1		29, 20, 22, 31, 32, 49, 40, 42, 43, 44, 53, 63, 64
Alauda arvensis	Skylark [laverock]	Alaudidae	Common breeding and passage migrant, uncommon in winter	P	*3		29, 20-22, 39, 30-32, 48-49, 40-45, 50-51, 53, 62-64, 74-75
Alca torda	Razorbill [coulter-neb]	Alcidae	Common breeding species, uncommon in winter	C	*1	C1	29, 20-22, 39, 32, 48-49, 41, 43-45, 50-51, 53, 62, 64
Anas acuta	Pintail	Anatidae	Uncommon breeding summer visitor, uncommon in winter	C	*3		21, 22, 30, 31, 51, 62, 75
Anas clypeata	Shoveler	Anatidae	Uncommon breeding summer visitor, resident in the N Isles	C	*3		21, 22, 48, 40, 41, 42, 44, 45, 50, 51, 62, 64, 75

Table 2: Species that are considered to be of conservation concern in Orkney

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Anas crecca	Teal	Anatidae	Fairly common breeder, common during migration and in winter	C	*3		29, 20-22, 39, 30-32, 48-49, 40-45, 50-51, 53, 62-64, 74-75
Anas crecca	Teal	Anatidae	Fairly common breeder, common during migration and in winter	C	*3		29, 20-22, 39, 30-32, 48-49, 40-45, 50-51, 53, 62-64, 74-75
Anas penelope	Wigeon	Anatidae	Uncommon breeder, common on passage and in winter	C	*1		29/20, 22, 31, 32, 48, 40, 42, 43, 48, 50, 51, 53, 62
Anas platyrhynchos	Mallard [stock duck]	Anatidae	Common breeding and winter visitor	C	*2	C9	29, 20-22, 31-32, 48-49, 40-45, 50-51, 53, 62, 75
Anas querquedula	Garganey	Anatidae	Scares in Orkney, rare breeding species	*	*1		22, 51
Anas strepera	Gadwall	Anatidae	Rare but regular breeding species, uncommon passage migrant	C	*1		22, 51, 75
Anser albifrons	White-fronted goose	Anatidae	Fairly common but local winter and passage visitor	C	*1		PM, W, NB
Anser anser	Greylag goose	Anatidae	Core wintering population in Orkney. Abundant winter visitor	*	*1		21, 22, 31, 32, 41, 42, 50,51, 53, 62
Anthus petrosus	Rock pipit [taing sparrow]	Motacillidae	Fairly common resident breeding species	C	*1	C1, C4	29, 20-22, 39, 30-32, 48-49, 40-45, 50-51, 53, 62-64, 74-75
Anthus pratensis	Meadow pipit [teeting, tit lark]	Motacillidae	Abundant breeding summer visitor, uncommon or rare in winter	C	*1		29, 20-22, 39, 30-32, 48-49, 40-45, 50-51, 53, 62-64, 74-75
Arenaria interpres	Turnstone	Scolopacidae	Common in winter and on passage, recorded throughout year	C	*1	C4	PM, W, NB
Asio flammeus	Short-eared owl [cattieface]	Strigidae	Uncommon breeding and passage migrant	C	*3	C6	29, 20-21, 30-32, 48-49, 41, 43, (44), 53
Asio otus	Long-eared owl	Strigidae	Uncommon passage and winter visitor (-), has bred	C			PM, W
Aythya ferina	Pochard	Anatidae	Common winter visitor and now regular breeder	C	*1		W, NB
Aythya fuligula	Tufted duck	Anatidae	Fairly common breeding species, common in winter	C			21, 22, 31-32, 40, 42-45, 51, 62, 64
Aythya marila	Scaup	Anatidae	Fairly common localised winter visitor, has bred	C	*1		W
Branta leucopsis	Barnacle goose [horra goose, rood goose]	Anatidae	Common localised winter and passage visitor	C	*3		PM, W, NB
Bucephala clangula	Goldeneye [gowdie duck, kwink]	Anatidae	Fairly common winter visitor	C			W, NB
Buteo buteo	Buzzard	Acciptridae	Rare resident breeding species and passage visitor	C	*1		29, 20
Calidris alba	Sanderling	Scolopacidae	Fairly common localised passage and winter visitor	C	*1	C4	PM, W, NB
Calidris alpina	Dunlin [plover page, boondie]	Scolopacidae	Fairly common breeder, common on passage and in winter	C	*1		29, 20-22, 30-32, 48, 43-45, 53, 62, 64

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Calidris maritima	Purple sandpiper	Scolopacidae	Common passage and winter visitor	C	*1	C4	PM, W, NB
Carduelis cannabina	Linnet [lintie]	Fringillidae	Uncommon breeding resident, fairly common passage visitor (+)	P	*1		29, 20-22, 30-32, 48-49, 41-44, 50, 53, 62, 64, 75
Carduelis chloris	Greenfinch	Fringillidae	Uncommon breeding resident, common passage visitor	C	*1		29, 30, 31, 49, 40, 41
Carduelis flavirostris	Twite [heather lintie]	Fringillidae	Once fairly common breeding resident, declining rapidly	C	*1	C1	29, 20, 39, 30-32, 49, 41-45, 50, 53, 62, 75
Cepphus grylle	Black guillemot [tystie]	Alcidae	Common resident breeding species	C	*3	C3, C1	29, 30, 48-49, 41, 44-45, 50, 53, 62, 75, S1
Charadrius hiaticula	Ringed plover [sandico, sandlark]	Charadriidae	Fairly common breeder, common on passage and in winter	C	*3	C2, C5, C4	29, 20-22, 39, 31, 48, 41-42, 44-45, 50, 62
Circus cyaeus	Hen harrier [cata-belly]	Acciptridae	Uncommon breeding resident and declining	C	*3		29, 20, 22, 30-32, 43
Clangula hyemalis	Long-tailed duck [calloo]	Anatidae	Common winter visitor (-), has bred	C	*1	M2, M3	W
Coturnix coturnix	Quail	Rallidae	Scarce in Orkney. Rare breeding species	*	*1		sporadic
Corvus corax	Raven	Corvidae	Important northern breeding population	*	*3		all squares
Corvus monedula	Jackdaw	Corvidae	Threatened within Orkney, uncommon breeding species, possibly winter visitor	*	*1		22, 32, 62
Crex crex	Corncrake	Rallidae	Uncommon breeding, summer and passage visitor	P	*3		21, 22, 31, 42, 43, 44, 45, 51, 62
Cygnus cygnus	Whooper swan	Anatidae	Fairly common passage and winter visitor	C	*3		PM, W, NB
Cygnus olor	Mute swan	Anatidae	Uncommon resident breeder, fairly common non-breeder	C	*3		21-22, 31-32, 48-49, 40-45, 51, 62, 64, 74-75
Delichon urbica	House martin	Hirundinidae	Rare breeding summer visitor (3-4 pairs), uncommon on passage (-)	C	*1		29, 21-22, 30-31, 40-41, 44, 62
Emberiza schoeniclus	Reed bunting	Emberizidae	Fairly common breeding resident (-), and passage migrant	P	*1		29, 20-22, 30-31, 48-49, 40-45, 51, 75
Falco columbarius	Merlin	Falconidae	Uncommon breeding (-)(+), passage and winter visitor	C	*1		20, 29, 30, 31, 32,40,43
Falco peregrinus	Peregrine	Falconidae	Uncommon breeding resident	C	*1		20, 21, 22, 29, 30, 32, 39, 40, 43, 48, 49, 50, 53, 62
Falco tinnunculus	Kestrel [moosie-haak, wind-cuffer]	Falconidae	Uncommon/rare breeder (-), uncommon on passage and in winter	C	*1	C1	22, 30, 31, 32, 48, 49, 40, 44, 50, 53, 64
Fratercula arctica	Puffin [tammie norie, pope, lyre]	Alcidae	Abundant but localised breeding species, rare in winter	C	*3	C1, C3, M4	20-22, 32, 48, 43-45, 50-51, 53, 62, 64
Fulmarus glacialis	Fulmar [mallimack]	Procellariidae	Abundant breeding resident (+), high % of UK population, characteristic of Orkney	*	*1	C1, C3, M4	29, 20-22, 39, 30-32, 48-49, 40-45, 50-51, 53, 62-64, 74-75
Gallinago gallinago	Snipe [horse-gowk, heather-bleater]	Scolopacidae	Fairly common breeder, common on passage and in winter	C	*3		29, 20-22, 39, 30-32, 48-49, 40-45, 50-51, 53, 62-64, 74-75

Table 2: Species that are considered to be of conservation concern in Orkney

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Gavia arctica	Black-throated diver	Gaviidae	Uncommon passage and winter visitor	C		M2, M3	W, NB
Gavia immer	Great northern diver [immer goose]	Gaviidae	Fairly common winter visitor, chiefly in Scapa Flow	C	*1	M2, M3	W, NB
Gavia stellata	Red-throated diver [rain goose, loon]	Gaviidae	Fairly common breeding species, uncommon in winter	C	*3	M2, M3	29, 39, 31-32, 40, 43, 51, 53, 62
Haematopus ostralegus	Oystercatcher [shalder, chaldro, skeldro]	Haematopodidae	Common breeder (+), less common in winter and on passage, characteristic of Orkney	*	*3	C2, C5	29, 20-22, 39, 30-32, 48-49, 40-45, 50-51, 53, 62-64, 74-75
Hirundo rustica	Swallow	Hirundinidae	Uncommon breeding visitor (+), fairly common on passage	C	*3		29, 20, 22, 31-32, 48-49, 41, 43-45, 51, 53, 62-63, 75
Hydrobates pelagicus	Storm petrel [alamottie]	Hydrobatidae	Common breeding visitor	C	*1	C3, C1, M4	32, 48, 45, 53, 62, S1
Lagopus lagopus scoticus	Red Grouse	Tetraonidae	Locally important, uncommon and probably declining breeding species	*	*1		20, 22, 29, 30, 31, 32, 39, 40, 41, 43, 50
Larus argentatus	Herring gull [white-maa; skorie=juvenile]	Laridae	Common breeding resident (-), and winter visitor, declining nationally and now locally	C	*1	C1, C2, M1, M4	30, 32, 48-49, 43-45, 50-51, 53, 62, 64, 74, S1
Larus canus	Common gull [cullya, and as for herring gull]	Laridae	Common breeder (-), abundant on passage and in winter, high % of UK population	*	*1		29, 20, 22, 39, 30-32, 48-49, 40-41, 43-45, 50-51, 62, 64
Larus fuscus	Lesser black-backed gull [baakie, swart back]	Laridae	Common breeding summer visitor	C	*1	M1, M4	30, 32, 48, 40, 43-45, 50-51, 53, 62, 64, 74
Larus marinus	Great black-backed gull	Laridae	30% of UK population in Orkney, common breeder	*	*!		29, 20, 21, 39, 30, 31, 32, 48, 49, 40, 41, 42, 43, 44, 45, 50, 51, 53, 62, 63, 64, 74
Limosa lapponica	Bar-tailed godwit	Scolopacidae	Fairly common winter visitor	C		C4	W, NB
Limosa limosa	Black-tailed godwit	Scolopacidae	Uncommon visitor, breeds annually	C	*1		22, 31, 32
Melanitta fusca	Velvet scoter	Anatidae	Uncommon winter visitor (-)	C		M2, M3	W, NB
Mergus serrator	Red-breasted merganser [harle, sawbill]	Anatidae	Fairly common breeding species, winter visitor	C	*1	M2	29, 21-22, 30-32, 49, 40-45, 62
Miliaria calandra	Corn bunting [skitter-broltie]	Emberizidae	Very rare breeding resident (-), or now probably extinct as a breeder in Orkney	P	*3		21, 50, 62, 64, 74
Morus bassanus	Gannet [solan goose]	Sulidae	Common breeding and passage visitor	C	*1	C1, M4, M3	S2, 55
Motacilla alba	Pied wagtail [willie wagtail]	Motacillidae	Fairly common breeding summer visitor, rare in winter	C	*1		29, 20, 30, 49, 41-45, 50-51, 62-63, 75
Numenius arquata	Curlew [whaup]	Scolopacidae	Common breeding species, abundant in winter	C	*3	C4	29, 20-22, 39, 30-32, 48-49, 40-45, 50, 53, 62
Numenius phaeopus	Whimbrel [summer whaup, titterel]	Scolopacidae	Uncommon breeding summer visitor, fairly common on passage	C	*1		32, 53

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Oceanodroma leucorhoa	Leach's petrel	Hydrobatidae	Uncommon visitor, probable but rare breeder	C		C3, M4, M5	55
Oenanthe oenanthe	Wheatear [chackie, stone-chat, stinkiebeul]	Turdidae	Fairly common breeding summer visitor, common on passage	C	*1	C3	29, 20-22, 32, 48-49, 42, 45, 50-51, 53, 62, 74
Phalacrocorax aristotelis	Shag [skarf, tappie whaesie]	Phalacrocoracidae	Common breeding resident	C	*1	C1, C3, M2, M3	29, 21-22, 39, 48, 44-45, 50, 62
Phalacrocorax carbo	Cormorant [scarf, hiblin]	Phalacrocoracidae	Fairly common breeding species	C	*1	C1, C3, M2, M3	48, 42, 53, 62, 75
Phalaropus lobatus	Red-necked phalarope	Scolopacidae	Rare visitor, has bred, locally extinct	P			X*
Phylloscopus trochilus	Willow warbler	Sylviidae	Uncommon breeding summer visitor, fairly common on passage	C			29, 20, 31, 49, 40, 43, 51
Plectrophenax nivalis	Snow bunting [snow flake]	Emberizidae	Common, but declining, passage and winter visitor	C			PM, W, NB
Pluvialis apricaria	Golden plover [pliver]	Charadriidae	Uncommon breeder, common winter and passage migrant	C	*1		29, 20, 30, 32, 42-43, 45, 53
Podiceps auritus	Slavonian grebe	Podicipedidae	Uncommon winter visitor; > 30% of British wintering population in Scapa Flow	C	*1		W, NB
Porzana porzana	Spotted crake	Rallidae	Rare breeding species	*	*1		42, 75
Prunella modularis	Dunnock	Prunellidae	Uncommon breeding resident, uncommon on passage	C	*1		29, 20, 30-31, 41, 43, 51
Puffinus puffinus	Manx shearwater [lyre]	Procellariidae	Uncommon breeding species, fairly common passage migrant	C	*1		29
Rallus aquaticus	Water rail	Rallidae	Rare breeding species, uncommon passage visitor	C	*1		22, 42-44, 51, 75
Regulus regulus	Goldcrest	Sylviidae	Rare or uncommon resident breeder, common passage migrant	C	*1		29, 20, 39, 31, 41, 43, 51
Riparia riparia	Sand martin	Hirundinidae	Rare breeder in Orkney	*	*1		21, 40
Rissa tridactyla	Kittiwake [kittick, wekko, feckie]	Laridae	Abundant breeding (-), summer visitor and passage migrant, high % of UK population, declining	*	*1		29, 21, 32, 48, 43-45, 50, SS
Saxicola torquata	Stonechat	Turdidae	Uncommon breeding resident	C	*1		29, 20, 30-32, 49, 40, 43, 51, 53
Somateria mollissima	Eider [dunter]	Anatidae	Common breeding resident	C	*1		29, 20-22, 30-32,48-49, 41-45, 50-51, 62-64, 74-75, SS
Stercorarius parasiticus	Arctic skua [scootie allan]	Stercorariidae	Common breeding summer visitor (+) and passage migrant	C	*3		29, 20-22, 39, 32, 48-49, 41-45, 50, 53, 62, 74-75
Stercorarius skua	Great skua [bonxie]	Stercorariidae	Common breeding summer visitor (+) and passage migrant	C	*3		29, 20, 32, 48-49, 41-45, 50, 53, 62, SS
Sterna albifrons	Little tern	Sternidae	Scares in Orkney, rare breeding species	*	*1		49, 63, 75

Table 2: Species that are considered to be of conservation concern in Orkney

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Sterna hirundo	Common tern [pickie-terno, pickie]	Sternidae	Uncommon breeding summer visitor	C	*3		29, 39, 31-32, 48, 42, 44-45, 50, 53, 64, 75
Sterna paradisaea	Arctic tern [pickie terno, pickie]	Sternidae	Abundant breeding summer visitor (-), marked decline (60-70%)	C	*3		29, 21-22, 39, 32, 48-49, 42-45, 62, 64, SS
Sterna sandvicensis	Sandwich tern	Sternidae	Uncommon breeding summer visitor	C	*3		31-32, 48, 41-42, 44-45, 51, 64, 75
Tadorna tadorna	Shelduck [sly goose, links goose]	Anatidae	Fairly common breeder, rare from September-November	C	*3		29, 20-22, 39, 30-32, 48-49, 40-45, 50-51, 53, 62-64, 74-75
Tachybaptus ruficollis	Little grebe	Podicipedidae	Scarce in Orkney. Uncommon but regular breeding species	*	*1		49, 40, 44, 51
Tringa totanus	Redshank [watery pleeps]	Scolopacidae	Fairly common breeder, common in winter and on passage (-)	C	*3		29, 20-22, 39, 31-32, 48-49, 41-42, 45, 50-51, 64
Turdus philomelos	Song thrush [mavis]	Turdidae	Uncommon breeding resident, fairly common on passage	P	*3		29, 20-21, 30-32, 49, 40-41, 43-44, 50, 62, 75
Uria aalge	Guillemot [aak]	Alcidae	Abundant breeding species, common in winter, characteristic of Orkney	*	*3		29, 21-22, 39, 30-32, 48-49, 40-41, 43-45, 50-51, 53, 62
Vanellus vanellus	Lapwing [teeick]	Charadriidae	Common breeder (-), common in winter and on passage, high % of UK population	C	*3		29, 20-22, 39, 30-32, 48-49, 40-45, 50-51, 53, 62-64, 74-75
INVERTEBRATES							
Ants							
Myrmica ruginodis	a red ant	Formicidae	Only confirmed species of ant in Orkney. Cosmopolitan in habitat choice	*	*1		20, 21, 22, 29, 30, 31, 32, 50
Bees							
Bombus distinguendus	Great yellow bumblebee	Bombidae	Nationally scarce, recent records in Orkney and the Outer Hebrides	P	*1		21, 22, 30, 39, 48, 49, 63
Bombus muscorum	Heath carder	Bombidae	Localised, mainly coastal and northern species. Declining in the UK. Common in Orkney	*	*1		
Wasps							
Dolichovespula sylvestris	Tree wasp	Vespidae	Very recent coloniser, rare	*	*1		20, 32, 40
Dolichovespula norvegicus	Norwegian wasp	Vespidae	Localised distribution, uncommon	*	*1		20, 32, 40, 41, 42, 49
Paravespula vulgaris	Common wasp	Vespidae	Localised distribution, uncommon but incresing	*	*1		20, 31, 32, 40, 41, 49
Nematus stichi	a sawfly	Tenthredinidae	Resident, machair and sandhill (JNCC, 1997, Draft MS, p 98)	*	*1	C5, C6	29
Beetles							
Acupalpus dorsalis	a ground beetle		Status: 2nd Scottish record, coll.E.Milner, N. Hoy, 2000, det. A Williams	*	*1		
Agabus melanarius	a water beetle	Dytiscidae	UK Notable	*	*1		

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Agabus paludosus	a water beetle	Dytiscidae	Local	*	*1		
Apion ryei	a weevil	Apionidae	Endemic herbivore, Orkney & Outer Hebrides, on Trifolium pratense	*	*1		?
Brychius elevatus	Crawling water beetle	Haplidae	Local', NCC Invertebrate Site Register	*	*1		
Chaetarthria seminulum	a Scavenger water beetle	Hydrophilidae	UK Notable	*	*1		
Choleva glauca	Fungus beetle	Leiodidae	UK Notable	*	*1		
Chrysolina crassicornis	a leaf beetle	Chrysomelidae	Endemic, Orkney, Shetland & Argyll: Yesnaby, on Plantago maritima	C	*1	C1, C5, C6	21
Coelambus novemlineatus	a water beetle	Dytiscidae	Uncertain, open water habitats (JNCC, 1997, Draft MS, p98)	*	*1		?
Hybius aenescens	a water beetle	Dytiscidae	UK notable, recently recorded in Orkney	*	*1		
Hydraena britteni	a small water beetle	Hydraenidae	Local	*	*1		
H. gracilis	a water beetle	Dytiscidae	Status: Local, NCC Invertebrate Site Register	*	*1		
Hydrophilus piceus	Great silver water beetle	Hydrophilidae	Uncertain, RDB 3	C	*1		?
Hydroporus longicornis	a water beetle	Dytiscidae	UK Notable	*	*1		
Hydroporus melanarius	a water beetle	Dytiscidae	Status: Local, NCC Invertebrate Site Register	*	*1		
Hydroporus obsoletus	a water beetle	Dytiscidae	UK Notable	*	*1		
Hydroporus umbrosus	a water beetle	Dytiscidae	Status: Local, NCC Invertebrate Site Register	*	*1		
Hydrothassa hannoveriana	a leaf beetle	Chrysomelidae	Scarce, boggy areas with Caltha palustris & moss, Stromness	*	*1		21
Notiophilis rufipes	a ground beetle	Carabidae	Uncertain, first record for Scotland, Pegal, N. Hoy (Welch,1993)	*	*1		20
Pelophila borealis	a ground beetle	Carabidae	RDB 3, confined to Orkney, Shetland and onesmall population in Scottish Highlands	*	*1		
Potamonectes griseostriatus	a water beetle	Dytiscidae	Uncertain, open water habitats (JNCC, 1997, Draft MS, p98)	*	*1		?
Rhagonycha elongata	a soldier beetle	Cantharidae	Uncertain, nationally notable	*	*1		?
Stictonectes lepidus	a water beetle	Dytiscidae	UK Notable	*	*1		
Trechus fulvus	a ground beetle	Carabidae	Nationally scarce (B), Hyman & Parsons, 1992	*	*1		

Table 2: Species that are considered to be of conservation concern in Orkney

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Tropiphorus terricola	Brown weevil	Curculionidae	Woodland, wet flushes, dry grass (JNCC, 1997, Draft MS, p97)	*	*1		29/20
Butterflies							
Argynnis aglaja scotica	Dark green fritillary	Nymphalidae	Resident, rare, once well distributed, now only from Bu, Burray. Declined markedly	*	*3	C5, C6	49
Coenonympha tulia	Large heath	Satyridae	Resident, local on moors, widely seen esp to the S & W	C	*3		29, 20, 21, 22, 39, 30, 31, 32, 48, 50
Polyommatus icarus	Common blue	Lycaenidae	Resident, common and well distributed, VII-VIII	*	*2		?
Caddis flies							
Ylodes reuteri	a caddis fly	Leptoceridae	Resident RDB 2 (vulnerable), in vegetation in brackish water Harray Loch	*	*1	C8	21/31
Damselflies and Dragonflies							
Aeshna juncea	Common hawker	Aeshnidae	Reasonably common and widespread on Hoy.Scarce on Mainland	*	*3		20, 29, 30, 31?, 32
Cordulegaster boltonii	Golden-ringed dragonfly	Cordulegasteridae	Occurs at a few sites on Hoy	*	*3		20, 29
Enallagma cyathigerum	Common blue damselfly	Coenagriidae	Reasonably common and widespread on Hoy. Scarce on Mainland and some other islands	*	*3		20, 22, 29, 30, 32, 42, 43
Ischnura elegans	Blue-tailed Damselfly	Coenagriidae	Scarce but widespread. Tolerates brackish conditions.	*	*3		20,21,22, 29, 30, 31, 32, 42, 49, 50, 62, 74.
Libellula quadrimaculata	Four-spotted chaser	Libellulidae	Confined to one or two sites on Hoy	*	*3		20, 29
Pyrrhosoma nymphula	Large red damselfly	Coenagriidae	The commonest but not the most widespread damsel	*	*3		20, 21, 22, 29, 30, 31, 32, 40, 41, 43, 50
Sympetrum danae	Black darter	Libellulidae	A few know breeding sites on Hoy and one or more sites on Mainland	*	*3		20, 29
Mayflies							
Baetis muticus	a mayfly		Recorded in Orkney in 1990 & 1998	*	*1		
Siphlonurus lacustris	a mayfly		Newly recorded in Orkney 2000	*	*1		
Flies							
Aphrosylus raptor	a Dolichopodid fly	Dolichopodidae	Resident, coast, carnivorous larvae (JNCC, 1997, Draft MS, p97)	*	*1	C2, C3, C4, C9	22
Delia caledonica	a fly	Anthomyiidae	A new species recorded from Orkney and threatened	*	*1		?
Neoascia geniculata	a hoverfly	Mileesiinae	Uncertain, Hoy & Stronsay (Andrew & Watt, 1993, OFC BR Sup)	*	*1		20, 62
Neoascia obliqua	a hoverfly	Mileesiinae	Recently recorder in West Mainland, status: Notable	*	*1		
Orthonevra geniculata	a hoverfly	Mileesiinae	Uncertain, S. Ronaldsay (Andrew & Watt, 1993, OFC BR Sup)	*	*1		48/49

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Platycheirus podagratus	a hoverfly	Mileesiinae	RDB Notable, old record, pre1980	*	*1		
Rhamphomyia morio	a fly	Empididae	Uncertain, resident, predator, beaches of shell sand or pebbles	*	*1	C2, C4, C9	?
Tipula limbata	a cranefly	Tipulidae	Resident with soil dwelling larva?, blanket bog, N. Hoy	*	*1		29/20
Stoneflies							
Dinocras cephalotes	a stonefly		UK fairly common, recorder in Orkney only from Durkadale Burn, West Mainland	*	*1		32
Grasshoppers							
Chorthippus parallelus	Meadow grasshopper	Acrididae	Scarce, recorded from five sites in Hoy	*	*1		29, 20
Omcestus viridulus	Common green grasshopper	Acrididae	Recorded from one site on Hoy (Rackwick) but probably now extinct	*	*1		29 (extinct)
Tetrix undulata	a grasshopper	Acrididae	Formerly recorded on Mainland but now extinct. Suspected on Hoy but not proven	*	*1		20?, 32 (extinct)
Moths							
Agrotis vestigialis	Archer's dart	Noctuidae	Resident, locally common on sand hills, VIII; threats - sand ext.	*	*1	C6	29, 20, 21, 30, 49, 50
Apamea zeta assimilis	Northern arches	Noctuidae	A northern race of the montane Central Eurosiatic species A.zeta, resident of Hoy/Orphir moors, VII-VIII	*	*1		20, 30
Carsia sororiata anglica	Manchester treble-bar	Geometridae	Resident, local on moors, VIII; threats - moorland reclamation	*	*1		20, 22, 29,30,31,41
Entephria flavicinctata	Yellow-ringed carpet	Geometridae	Present status uncertain, possibly a univoltine resident on Hoy	*	*1		20, 29, ?
Eudonia alpina		Pyralidae	Only recorded from Hoy (Weir, 1882)	*	*1		20, 29
Eupithecia venosata ochraceae	Netted pug	Geometridae	Resident, common wherever there is Silene maritima, VII	*	*1	C1, C2, C4	20, 21, 22, 30, 49, 40, 41, 50
Euxoa cursoria	Coast dart	Noctuidae	Formerly a common resident, status now unknown	*	*1		20, 29
Diarsia mendica orkneyensis	Ingrailed clay	Noctuidae	Resident, common in all habitats, very variable, VII-VIII	*	*1		29, 20-22, 39, 30-32, 48-49, 40-41, 50-51, 53, 62-64, 74-75
Dyscia fagaria	Grey scalloped bar	Geometridae	Resident, moors, seen June - August, Hoy Orphir & Stenness. May now have been removed from UK list.	*	*1		20, 30, 31
Parasemia plantaginis insularum	Wood tiger	Arctiidae	Resident, mainly moors but well distributed, less common, VI-VII	*	*1		29, 20, 30, 49
Perizoma flavofasciata	Sandy Carpet	Geometridae	Recorded from several locations in the past few years	*	*1		30,31,32,41,49
Psyche casta		Psychidae	Univotine resident. Only record from Hoy, maybe all female population. Patchy distribution in Scotland	*	*1		20, 29
Saturnia pavonia	Emperor	Thyatiridae	Resident, common on moors and marshes,V-VI	*	*2		

Table 2: Species that are considered to be of conservation concern in Orkney

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Thera cognata	Chestnut-coloured carpet	Geometridae	Resident, locally common on Hoy, VII-VIII	*	*1		20
Thera juniperata orcadensis	Juniper carpet	Geometridae	Resident, last recorded by McArthur (1895) on Hoy	*	*1		20
Udea uliginosalis	a moth	Pyralidae	Resident	*	*1		30
Xestia alpicola alpina	Northern dart	Noctuidae	Resident, probably biennial, Hoy (McArthur,1895) & Orphir	P	*1		30
Millepedes							
Nanogona polydesmoides	a millepede	Craspedosomatidae	Uncertain, may be synanthropic, widespread in Britain	C	*1		41
Spiders							
Agyneta cauta	a money spider	Linyphiidae	Uncommon, Harvey, Nellist & Telfer, 2002	*	*1		
Agyneta conigera	a money spider	Linyphiidae	Locally uncommon.	*	*1		
Araeoncus crassiceps	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Araeoncus humilis		Linyphiidae	Locally uncommon.	*	*1		
Baryphyma trifrons	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Bathyphantes approximatus	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Centromerus arcanus	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Clubiona comta		Clubionidae	Locally uncommon. A woodland species, associated with native willow scrub	*	*1		
Drepanotylus uncatus	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Erigone arctica	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Erigone capra		Linyphiidae	Nationally notable	*	*1		
Erigone longipalpis	a money spider	Linyphiidae	Status: Uncommon, Harvey, Nellist & Telfer, 2002	*	*1		
Halorates reprobus	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Hilaira excisa	a money spider	Linyphiidae	Status: Uncommon, Harvey, Nellist & Telfer, 2002	*	*1		
Hilaira frigida	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Hypselistes jacksoni		Linyphiidae	Locally uncommon. Associated with blanket bog	*	*1		
Hilaira pervicax		Linyphiidae	Nationally notable	*	*1		
Hyposinga pygmaea		Araneidae	Locally uncommon.	*	*1		
Jacksonella falconeri		Linyphiidae	Locally uncommon.	*	*1		
Latithorax faustus	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Lepthyphantes minutus		Linyphiidae	Locally uncommon. A woodland species.	*	*1		
Lepthyphantes whymperi	a money spider	Linyphiidae	Nationally scarces (Notable B), Harvey, Nellist & Telfer, 2002	*	*1		
Leptorhopterum robustum	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Lophomma punctatum	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Mecynargus (Rhaebothorax) morulus	a money spider	Linyphiidae	Status: Locally rare, Harvey, Nellist & Telfer, 2002	*	*1		
Meioneta beata	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Meioneta nigripes		Linyphiidae	Nationally notable	*	*1		
Minyriolus pusillus	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Neon reticulatus	a jumping spider	Salticidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Nesticus cellulanus	a comb-footed cellar spider	Nesticidea	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Ozyptila atomaria	a crab spider	Thomisidea	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Ozyptila trux	a crab spider	Thomisidea	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Pelecopsis nemoralis	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Pirata piraticus	a wolf spider	Lycosidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		?
Poeciloneta variegata	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Robertus arundineti	a comb-footed spider	Theridiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Scotinotylus evansi	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		

Table 2: Species that are considered to be of conservation concern in Orkney

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Silometopus ambiguus	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Trichopterna thorelli	a money spider	Linyphiidae	Status: Very Local, Harvey, Nellist & Telfer, 2002	*	*1		
Typhochrestus digitatus	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Walckeneria clavicornis	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Walckeneria dysderoides	a spider	Linyphiidae	Status: uncommon, Harvey, Nellist & Telfer, 2002, coll./det. A. Milner, Berriedale, N. Hoy, 2000	*	*1		
Walckeneria vigilax	a money spider	Linyphiidae	Status: Local, Harvey, Nellist & Telfer, 2002	*	*1		
Pseudoscorpions							
Neobisium carcinioides		Order: Pseudoscorpiones	Berriedale, Hoy. Only record of a pseudoscorpion from Orkney and Shetland	*	*1		
Worms & Leeches							
Chaetopterus variopedatus	a tube-dwelling polychaete	Chaetopteridae	Unusual, recorded Wide Firth - Murray et al, In prep, MNCR	*	*1	M3	41
Hirudo medicinalis	Medicinal leech	Hirudinidae	Uncertain, listed in NN (1985); not by Maitland & Kellock (1971)	P	*1		?
Ophelia bicornis	an estuarine polychaete	Opheliidae	Common in Orkney, no threat	C	*1	C9	
Molluscs							
Atrina fragilis	Fan mussel	Pinnidae	Rare, live from Bring Deeps and some recent from deep water	P	*1	M2, M4	15, 30, 39, 59, 78
Cerastoderma glaucum	Lagoonal cockle	Cardiidae	Uncertain, recorded from The Ouse, Firth	*	*1	C9	31
Hydrobia neglecta	a snail	Hydrobiidae	Common and not threatened	C	*1	C8	31, 64
Leiostyla anglica	a snail	Pupillidae	Recorded from peaty moorland, Hoy and one other location	C	*1		20
Lymnaea peregra	a snail (near-involute form)	Lymnaeidae	Interesting near involute form from Swannay Loch	*	*1		32
Margaritifera margaritifera	a freshwater pearl mussel	Margaritiferidae	Very rare or extinct, vulnerable, live from Stenness Loch, 1957	P	*1	C8	21
Modiolus modiolus	Horse mussel	Mytilidae	Common and not threatened	C	*1	M2, M3	29, 20-22, 39, 30-32, 48-49, 40-43, 45, 50-51, 74
Mya arenaria	Sand gaper	Myidae	A very small form of M. arenaria occurs in Stenness Loch	*	*1	C8	29, 21, 30, 31, 49
Nucella lapillus	Dog whelk	Muricidae	Abundant and not threatened	C	*1	M1	29, 20, 21, 41, 50, 51
Ostrea edulis	Native oyster	Ostreidae	Once common but fished out in 1922; now very rare or extinct	P	*1	M1	50

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Theodoxus fluviatalis	a snail		Harray and Stenness Lochs, only Scottish localities (NN, 1985)	*	*1	C8	21, 31, 50
Vertigo lilljeborgi	a terrestrial snail	Vertiginidae	RDB 3 species, one specimen - Loch of Skaill, 1966	C	*1		21
Crustaceans							
Nephrops norvegicus	Norway lobster	Nephropidae	Over exploited and subject to catch quota management	*	*1	M4	?
Sea Anaemones							
Scolanthus callimorphus	Worm anenome	Edwardsiidae	Uncertain	C	*1		?
Sea Urchins							
Strongylocentrotus droebachiensis	Northern sea-urchin	Strongylocentrotidae	Uncertain, recorded from Shetland	C	*1		?
PLANTS							
Algae							
Cladophora sauteri	a green alga	Chlorophyceae	Known from Harray Loch	*	*1		21
Fucus disticus	a brown algae	Phaeophyceae	Birsay, Eynhallow - at southern edge of geographic range	*	*1		
Lithothamnion coralloides	a red alga	Rhodophyceae	Uncertain, Scottish records may refer to L. glaciale	C	*1	M3	?
Lithothamnion glaciale	a red alga	Rhodophyceae	Uncertain, but threatened by possible extraction	*	*1	M3	20
Phymatolithon calcareum	a red alga	Rhodophyceae	Abundant and nationally significant, threatened by extraction	C	*1	M3	20, 21, 31, 32, 41,42, 43, 50, 51
Fungus							
Clavaria zollingeri	a fairy club	Clavariaceae	Uncertain, two records- Hoy and Orphir	C	*1		20, 30
Coprinus comatus	Shaggy ink cap	Coprinaceae	Locally common, widespread on lawns, pastures and waste ground	*	*1		20, 21, 22, 41, 64
Hygrocybe calyptriformis	Pink meadow cap		Only recently recorded in Orkney	P	*1		29, 39, 53
Wawelia microspora			Species new to science, recently recorded in Orkney, type locality, Dartmoor, Devon, Webster, J et al1999	*	*1		
Langermannia gigantea	Giant puffball	Lycoperaceae	Occasional, widely distributed, improved grassland, nettlebeds	*	*1		21, 22, 31, 32, 53
Lichens							
Alectoria sarmentosa vexillifera	a lichen	Alectoriaceae	Uncertain but nationally scarce	*	*1		?
Caloplaca cerinella	a lichen	Teloschistaceae	Uncertain but nationally scarce	*	*1		30, 31

Table 2: Species that are considered to be of conservation concern in Orkney

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Catapyrenium cinereum	a lichen	Verrucariaceae	Uncertain but nationally scarce	*	*1		41
Cladonia fragilissima	a lichen	Cladoniaceae	Nationally scarce species, threatende in Europe	*	*1		?
Lobaria pulmonaria	a lichen		Occurs in Berridale, northern most site in UK	*	*1		
Lecidea confluens	a lichen	Lecidaceae	Uncertain but nationally scarce	*	*1		?
Peltigera scabrosa	a lichen	Peltigeraceae	Known in UK from Easter Ross and Orkney	*	*1		32
Psorotichia schaereri	a lichen	Lichinaceae	Uncertain but nationally scarce	*	*1		?
Schaereria fuscocinerea	a lichen	Schaereriaceae	Uncertain but nationally scarce	*	*1		?
Stringula taylorii	a lichen	Stringulaceae	Uncertain but nationally scarce	*	*1		?
Toninia lobulata	a lichen	Bacidiaceae	Uncertain	*	*1		32
Liverworts							
Barbilophozia atlantica	a liverwort		Hoy. Dry acid block screes, rocky ravines, lochside boulders, shady sandstone crags.	*	*1		20
Calypogeia azurea	a liverwort		Glims moss. In blanket bog, on heaths and moorland, peaty or sandy soil.	*	*1		32
Eremonotus myriocarpus	a liverwort		Historic record. Damp basic rocks, shaded cliffs.	*	*1		20
Gymnomitrium crenulatum	a liverwort	Gymnomitriaceae	Uncertain	C	*		20
Herbertus stramineus	a liverwort	Herbertaceae	Uncertain	C	*		20
Jungermannia subelliptica	a liverwort		Hoy. Moist, usually basic, damp soil and rocks in crevices, waterfalls and cliffs.	*	*1		20
Leiocolea fitzgeraldiae	a liverwort		Historic record	*	*1		
Lepidozia pearsonii	a liverwort	Lepidoziaceae	Uncertain	C	*		20
Odontoschisma elongatum	a liverwort		Historic record for Hoy. Moist soils by lochs and flushes, boggy ground on moorland.	*	*1		20
Plagiochila carringtonii	a liverwort	Plagiochilaceae	Uncertain	C	*1		20, 29
Plagiochila spinulosa	a liverwort	Plagiochilaceae	Uncertain	C	*		20
Porella obtusata	a liverwort		Historic record for Hoy. Acid or basic low lying rocks, often near the sea.	*	*1		20

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Riccia cavernosa	a liverwort		Burray. Damp soil, dune slacks often where basic	*	*1		49
Mosses							
Amblyodon dealbatus	a moss		Burray only site so far. Occurs dune slacks, tufa springs on cliffs	*	*1		49
Brachythecium mildeanum	a moss		Stronsay only site so far.	*	*1		62
Bryum weigelii	a moss		Historic record for Hoy. Mountain springs and flushes	*	*1		20, 29
Campylopus schimperi	a moss		Historic record for Hoy.	*	*1		20
Campylopus subulatus	a moss		Historic record for Hoy.	*	*1		20
Dicranella crispa	a moss		Historic record for Stromness	*	*1		21
Distichium inclinatum	a moss		Occurs in Burray and Aikerness.	*	*1		32, 49
Dreplanocladus lycopodioides	a moss		Historic record for Rothiesholm, Stronsay	*	*1		62
Leucobryum glaucum	a moss		Acid moorland and mire	*	*1		20, 29, 32
Orthothecium rufescens	a moss		Records for Quoyawa, Hoy.	*	*1		20
Philonotis seriata	a moss		Historic record near Garson Burn	*	*1		?
Sphagnum austinii	a moss		Occurs Glims Moss and Queenfiglamo. Nationally decreasing	*	*1		32
Sanionia orthothecioides	a moss		IUCN near threatened, occurs in maritime grassland	*	*1		50
Sphagnum magellanicum	a moss	Sphagnaceae	Often in raised bogs. Indicator of health of bog	*	*1		29, 30, 32
Stoneworts							
Chara aspera	Rough stonewort	Characeae	Nationally scarce species. Common in Orkney, its main stronghold in British Isles	*	*1		20+, 21+, 22+, 30+, 31+, 40+, 42+, 43+, 44+, 48+, 49+, 51+, 62+, 63+, 64+,74+, 75+
Chara baltica	Baltic stonewort	Characeae	Very rare or extinct, RDB 2, Last - Loch of Stenness, 1925	P		C8	21-
Chara canescens	Bearded stonewort	Characeae	Very rare or extinct, RDB 1, Last - Loch of Stenness, 1926	P		C8	21
Chara curta	Lesser bearded stonewort	Characeae	Occasional in Orkney, main stronghold in British Isles	P	*1	C8	20+, 22+, 31+, 42+, 43+, 64+, 74+
Chara muscosa	Mossy stonewort	Characeae	Very rare or extinct, RDB 1, last record Mill of Rango, 1925	P			21

Table 2: Species that are considered to be of conservation concern in Orkney

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Chara rudis	Rugged stonewort	Characeae	Uncommon in British Isles. Rare in Orkney	*	*1	C8	21, 74+
Tolypella glomerata	Clustered stonewort	Characeae	Rare and threatened in British Isles. Rare in Orkney	*	*1	C8	21+, 31+, 43-, 64+
Tolypella nidifica	Bird's nest stonewort	Characeae	Very rare, RDB 1, only one known site in Orkney, lost from Loch of Boardhouse	P	*1	C8	21+, 22+
Vascular Plants							
Ajuga pyramidalis	Pyramidal bugle	Labiatae	Native. Only one site now known and almost extinct in it. No obvious reason for decline which occurs also outwith Orkney.	*	*1		20-, 30+, 31-, 40-
Ammophila arenaria	Marram		Common, but declining as older dunes have been lost through extraction and erosion	*	*1		29-, 20-, 21+, 22-, 30-, 31-, 48+, 49+, 40-, 41-, 42+, 43-, 44+, 50+, 53+, 62+, 63+, 64-, 74+
Angelica archangelica	Angelica		Not native in the British isles, long history of medicinal and culinary use.	*	*1		41-, 43-, 44+
Arctostaphyllos alpinus	Alpine bearberry/ black blaeberry	Ericaceae	Native. No threat at present although Westray site destroyed by cultivation. The fact that it grows at unusually low elevations in Orkney may be a danger.	*	*1		29+, 20+, 43+, 44-
Arctostaphylos uva-ursi	Bearberry		A few large patches on Hoy, but comparatively rare	*	*1		29+, 20+, 39-
Aster tripolium	Sea aster		Rare in N. Scotland. When growing on steep cliffs this species may be difficult to locate	*	*1		29-, 21+, 39+, 31+, 42+, 43+, 44+, 50-, 63+
Avena fatua	Wild oat		Occurs in less than 3 sites in Orkney	*	*1		31-,40+
Avena strigosa	Bristle oak, black oak			*	*1		21-, 30-, 48+, 75+
Betula pubescens	Downy birch		Native on Hoy. Being planted many mainland sites and seeding	*	*1		29+, 20+, 22+P, 30+P, 32+P, 40+P
Bolboschoenus maritimus	Sea club-rush		Historic record	*	*1		44-
Briza media	Quaking-grass			*	*1		40+, 42+, 43-, 51-
Callitriche hermaphroditica	Autumnal water-starwort	Callitrichaceae	Native. Very sensitive to pollution and declining in some water bodies.	*	*1		21-, 22+, 30-, 31+, 32-, 48-, 49+, 40-, 41-, 42+, 43+, 44-, 45-,50-, 51, 62-, 63+
Caltha palustris	Marsh marigold/ king cup	Ranunculaceae	Native. Robust species tolerating some disturbance.	*	*2		29, 20-22, 39, 30-32, 48-49, 40-45, 50-51, 53, 62-64, 74-75
Calystegia soldanella	Sea bindweed		Vulnerable.	*	*1		49+
Carex capillaris	Hair sedge		Vulnerable, only one known sites in Orkney	*	*1		45+
Carex diandra	Lesser tussock sedge		Habitat very vulnerable	*	*1		22+, 31+, 32+
Carex flacca	Glaucous sedge		Important in Primula scotica habitats.	*	*1		29+, 20+, 21+, 22+, 39+, 30+, 31+, 32+, 48+, 49+, 40+, 41+,42+, 43+, 44+, 45+, 50+, 51+, 53+, 62+, 63+, 64+, 74+, 75+

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Carex maritima	Curved sedge	Cyperaceae	Native. Apparently sensitive to small changes in habitat, and has shown a steep decline in recent years - although possibly under-recorded rather than declining	*	*1	C6	29+, 21-, 22-, 49-, 41-, 42-, 44-, 45-, 50-, 53-, 64+, 74-, 75-
Carex riparia	Great pond-sedge		Only one confirmed site	*	*1		62+
Carex riparia x rostrata	Hybrid sedge		One confirmed site, only known record in the British isles	*	*1		32+
Catabrosa aquatica	Whorl-grass		Declining all over the UK and rare in northern Scotland	*	*1		29-, 21+, 22-, 32-, 43-, 44-, 45-, 50+, 62-, 75-
Catapodium marinum	Stiff sand grass		Very vulnerable species of annual grass.	*	*1		21-, 32+, 43-
Centaurea cyanus	Cornflower		Last seen in 1971, almost certainly extinct in Orkney as a wild plant.	P	*1		20-, 21-, 50-
Chamaemelum nobile	Chamomile		Historically widespread, but may now be extinct in Orkney	*	*1		21-, 22-, 30-, 31-, 41-, 50-
Chrysanthemum segetum	Corn marigold		Rapidly declined since 1980, mainly due to changes in farming and garden cultivation.	*	*1		29-, 20-, 21+, 22-, 39+, 30+, 31+, 32+, 48+, 49+, 40+, 41-, 42-, 50+, 53+
Cornus suecica	Dwarf cornel		Confined to almost inaccessible ledges.	*	*1		20+
Corylus avellana	Hazel		Only three native specimens left in Orkney.	*	*1		20+, 39+, 32+, 43+
Dactylorhiza purpurella	Northern fen orchid	Orchidaceae	Native. Sensitive to changes in habitat, including cutting & grazing management & soil enrichment	*	*2		29, 20-22, 39, 30-32, 48-49, 40, 42-43, 50, 75
Dactylorhiza sp	Spotted orchids		As a group very important in Orkney.	*	*3		
Diphasiastrum alpinum	Alpine clubmoss		Vulnerable, declined.	*	*1		29-, 20-, 21-, 22-, 30+, 31+, 32+, 41-
Draba incana	Hoary whitlowgrass		Vulnerable	*	*1		20+, 31-, 32+, 43+, 44-
Drosera longifolia	Great sundew		A distinctly northern species.	*	*1		29+, 20+, 30-, 32+
Dryas octopetala	Mountain avens	Rosaceae	Native. Probably a relict species in Orkeny, seriously affected by acidification or nitrogen (bird droppings)	*	*1		20+
Dryopteris aemula	Hay-scented buckler-fern	Dryopteridaceae	Native. Frequent only in parishes and islands around Scapa Flow. Vulnerable to muirburn and heavy grazing.	C	*1		29+, 20+, 39-, 30+, 49+
Dryopteris oreades	Mountain male-fern		Vulnerable	*	*1		20+, 43+
Equisetum pratense	Shady horsetail	Equisetaceae	Native. Very rare in Orkney; one known site probably not endangered at present.	*	*1		43+
Eriophorum latifolium	Broad-leaved cottongrass		Only one small site in Orkney	*	*1		29+
Erodium cicutarium	Common stork's bill		Declining	*	*1		50-, 74-, 75+

Table 2: Species that are considered to be of conservation concern in Orkney

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Eupatorium cannabinum	Hemp agrimony		Increased in Orkney. Very rare in the north	*	*1		48+
Euphrasia atroviolacia	an eyebright	Scrophulariaceae	Native. Especially sensitive to change in its habitat (Machair). Not yet on the UK list	*	*1	C5,	22+, 63+
Euphrasia farhaidensis	an eyebright	Scrophulariaceae	New species	*	*1		74+
Euphrasia foulaensis	an eyebright	Scrophulariaceae	Native. As with most semi-parasitic annuals, very sensitive to changes in habitat and unusual weather conditions.	*	*1	C1, C7	21+, 22+, 39-, 30+, 48-, 49+, 43-, 44-, 45-, 50+, 51-, 53-, 62-
Euphrasia heslop-harrisonii	an eyebright	Scrophulariaceae	Native. As with most semi-parasitic annuals, very sensitive to changes in habitat and unusual weather conditions.	P	*1	C1	48-, 50+, 53-
Euphrasia marshallii	an eyebright	Scrophulariaceae	Native. As with most semi-parasitic annuals, very sensitive to changes in habitat and unusual weather conditions.	C	*1	C1	21+
Euphrasia ostenfeldii	an eyebright	Scrophulariaceae	Native. As with most semi-parasitic annuals, very sensitive to changes in habitat and unusual weather conditions.	*	*1	C1	21+
Euphrasia rotundifolia	an eyebright	Scrophulariaceae	BAP endangered, very doubtful species, anywhere	P	*1		22-
Euphrasia (as yet unnamed)	an eyebright	Scrophulariaceae	Native. Especially sensitive to change in its habitat (Machair). Not yet on the UK list but probably +/- RDB status.	*	*1	C5	63+
Festuca arenaria	Rush-leaved fescus		Not seen in Orkney since 1886	*	*1		21-, 30-
Fragaria vesca	Wild strawberry		Becoming scarce	*	*1		43+, 44-
Fritillaria meleagris	Snaked-head fritillary		Garden throw-out about 1987.	*	*1		74+
Fumaria bastardii	Tall ramping fumitory	Fumariaceae	Native. As with all weeds of cultivation today, especially sensitive to weedkillers and often now only surviving on recently disturbed dumps and waste ground.	*			20-, 21-, 40-
Fumaria capreolata	White ramping fumitory	Fumariaceae	Native. As with all weeds of cultivation today, especially sensitive to weedkillers and often now only surviving on recently disturbed dumps and waste ground.	*			21+, 22+, 30-, 49-, 41+, 44-, 62+, 63-, 64+
Fumaria densiflora	Dense flowered fumitory	Fumariaceae	Native. Almost qualifies as National Scarces species	*	*1		62+, 64+
Fumaria purpurea	Purple ramping fumitory	Fumariaceae	Native. Its frequent occurance in Orkney may result in it losing its Nationally Scarces status	P	*3		29+, 22+, 39+, 30-, 31-, 48-, 49+, 40+, 42-, 50+, 62+
Galium sterneri	Limestone bedstraw	Rubiaceae	Native. As it thrives in a fairly wide range of habitats probably under no threat at present.	*	*1	C5	29+, 20+, 21-, 39+, 30+, 31-, 32+, 48+, 41-, 42+, 43+, 44-, 45-, 74-
Gnaphalium sylvaticum	Heath cudweed	Asteraceae	Native. A notoriously fickle species	C	*1		29+, 21-, 22-, 30-, 41-
Goodyera repens	Creeping lady's-tresses		Possibly extinct.	*	*1		21-, 31-
Hammarbya paludosa	Bog orchid		Recently recorded, 2000.	C	*1		29+
Hieracium orcadense	Hawkweed		Badly in need of new research.	*	*1		20-, 30-

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Hierochloë odorata	Holy-grass	Gramineae	Native or if not, probably long-standing established alien	C	*1		30+, 41+, 42+
Hymenophyllum wilsonii	Wilson's filmy-fern	Hymenophyllaceae	Native. Very fragile and sensitive to physical damage	C	*1		29-, 20+, 43+
Isoetes lacustris	Quillwort		Affected by changes in use of our few hill lochs.	*	*1		29-, 43+
Jasione montana	Sheeps' bit		Orkney's only definitely native member of the Campanulaceae.	*	*1		48+, 49+, 53+, 63+, 75+
Juncus balticus	Baltic rush		Recently recorded, 1996.	*	*1		50+, 74+
Juniperis communis	Juniper		Very vunerable to fire	P	*1		29+, 20+, 21+, 32+, 48+, 40-, 43+, 51+, 75-
Loiseleuria procumbens	Trailing azalea		Rare alpine dwarf shrub in Orkney	*	*1		29+, 20+
Lupinus nootkatensis	Nootka lupin		Declining and perhaps hybridises with garden lupins.	*	*1		21+, 22+, 30+, 31+, 32+, 40-, 41+
Lychnis flos-cuculi	Ragged robin	Caryophyllaceae	Native. Moderately robust species able to colonise sites unlikely to be disturbed.	*	*2		29, 20-22, 39, 30-32, 48-49, 40-45, 50- 51, 53, 62-64, 74-75
Lycopodium annotinum	Interrupted club-moss		Recently recorded, 2000.	*	*1		20+
Medicago sativa ssp. Falcata	Sickle medick		Nationally scarce species. Probably now extinct in Orkney.	*	*1		21-, 41-
Melampyrum pratense	Common cow-wheat		Now very rare in Orkney	*	*1		29+, 20+, 30-
Mertensia maritima	Oyster plant	Boraginaceae	Native. Abundance varies from year to year due to winter storms. Sensitive to sheep grazing, sand extraction and similar physical disturbance.	*	*3	C2, C3, C4	21-, 22-, 39+, 48+, 49+, 40-, 42+, 44-, 50+, 62+, 63+, 64+, 74+
Myrica gale	Bog myrtle		Now only one colony in Orkney	*	*1		32-, 53+
Ophioglossum azoricum	Small adder's-tongue	Ophioglossaceae	Native. Largely confined to sheep-grazed uninhabited islands	*	*1		29+, 20+, 21-, 39+, 30-, 48?, 62+, 75+, SS-
Orchis mascula	Early purple orchid		Rare in Orkney, confined to two colonies.	*	*1		20+, 40+, 41+
Orthilia secunda	Serrated winter-green	Pyrolaceae	Native. Very rare and sensitive to muirburn and peat extraction.	*	*1		43+
Oxyria digyna	Mountain sorrel		Probably restricted due to lack of suitable habitats	*	*1		20+
Parnassia palustris	Grass-of-parnassus		Two forms probably occur in Orkney. Further study is required.	*	*1		29+, 20+, 21+, 22+, 39+, 30+, 31+, 32+, 48+, 49+, 40-,41+, 42+, 43+, 44+, 45+, 50+, 51+, 53-, 62+, 63+, 64+, 74+, 75+,
Phegopteris connectilis	Beech fern		Very rare in Orkney	*	*1		20+
Pimpinella saxifrage	Burnet-saxifrage		Confined to 2 - 3 small colonies in Orkney.	*	*1		41+

Table 2: Species that are considered to be of conservation concern in Orkney

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Poa alpina	Alpine meadow-grass	Gramineae	Native. Very rare in Ortkney. Very sensitive to grazing, including, probably, Lepus timidus. Also to physical damage, e.g. rock climbing.	*	*1		20+
Polygonum boreale	Northern knotgrass	Polygonaceae	Doubtfully native as subject to fluctuating numbers which are difficult to explain. Sensitive to weedkillers.	*	*1		29-, 39-, 31-, 32-, 49+, 40-, 41+, 42+, 43-, 50-, 51-, 62+, 63+, 64-, 75+
Polystichum lonchitis	Holly fern		Relatively rare, and vulnerable.	*	*1		20+
Populus tremula	Aspen		One of Orkney's truly native trees, surviving entirely by vegetative reproduction and very vulnerable to grazing by all herbivores.	*	*1		29+, 20+, 22+, 39+, 30+, 32+, 49+, 40+
Potamogeton filiformis	Slender pondweed	Potamogetonaceae	Native. Sensitive to pollution and drainage.	*	*1		20?, 21-22+, 30+, 31-32-, 48+, 49-40-, 41?, 42-45+, 50-51+, 62-64+, 74-75+
Potamogeton friesii	Flat-stalked pondweed	Potamogetonaceae	Native. Sensitive to pollution and drainage.	*	*1		22-, 32-, 48-, 42+, 43+, 44-, 50-, 51+, 62-, 63+, 64+, 74+, 75-
Potamogeton lucens	Shining pondweed	Potamogetonaceae	Native. Seems safe at present in only known site.	*	*1		43+
Potamogeton praelongus	Long-stalked pondweed	Potamogetonaceae	Native. Seems safe at present in only known site.	*	*1		50+
Potamogeton pusillus	Lesser pondweed	Potamogetonaceae	Native	*	*1		1?, 21-, 22+, 30+, 31+, 32+, 48+, 49-, 40-, 43+, 44-, 50-, 51+,62-
Potamogeton x zizii	a hybrid pondweed	Potamogetonaceae	Native. Seems safe at present in only known site.	*	*1		43+
Primula scotica	Scottish primrose	Primulaceae	Native. Extremely sensitive to any knid of habitat change, even slight. At least 15 recorded sites have been lost in Orkney in the last century	C	*3		29+, 21+, 39+, 43+, 44+, 45+
Primula veris	Cowslip		Rare and declining in Orkney, due to habitat loss.	*	*1		20-, 32+, 42+, 44+, 64+
Pseudorchis albida	Small white orchid		This orchid has disappeared from many of its old sites and is clearly declining, perhaps partly from loss of habitat	*	*1		29+, 20+, 21+, 30+, 31+, 40-, 50-
Pyrola rotundifolia ssp. rotundifolia	Round-leaved wintergreen	Pyrolaceae	Native. Has been declining rather alarmingly for at least 100 years although only threats appear to be muirburn and peat extraction.	*	*1		29-, 20-, 30-, 43+
Ranunculus hederaceus	Ivy-leaved water-crowfoot	Ranunculaceae	Native. Vulnerability unknown.	C	*1		29-, 21-, 22-, 43+, 45+, 51-
Rorippa islandica	Northern yellow-cress	Cruciferae	Native. More frequent in Britain than formerly believed &, and scarce but widespread in Orkeny	*	*1		49+, 43+, 45+, 50+, 53-, 62+, 64-, 74+, 75+
Rubus chamaemorus	Cloudberry		Rare in Orkney, probably only female plants. Records need updating	*	*1		20+, 31-
Rubus septentrionalis	Bramble		Native brambles were presumed to have died out in Orkney within the last 100 years, this northern species is truly wild.	*	*1		30+
Ruppia cirrhosa	Spiral tasselweed	Ruppiaceae	Native. Rare (extinct in one earlier site). Sensitive to changes in water salinity and nutrients. Otherwise fairly safe in deep water site.	*	*1	C8	21+, 31+, 41E
Sagina subulata	Awl-leaved pearl-wort		Very limited distribution in Orkney.	*	*1		43+, 44-, 45+
Salicornia europaea agg.	Common glasswort	Chenopodiaceae	Native. All glasswort species in Orkney have declined in the last 50 years owing to the practice, until recently, of draining and re-seeding saltmarsh.	*	*1	C7	?

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Salix aurita	Eared willow			*	*1		
Salix cinerea	Grey willow			*	*1		
Salix myrsinites	Myrtle-leaved willow	Salicaceae	Native. Female. One specimen only remains in a precarious site vulnerable to rockfall. Rock climbing should be avoided in the vicinity and establishment in a safer site should be pursued.	*	*1		20+
Salix phylicifolia	Tea-leaved willow/ rice	Salicaceae	Native. Frequent in less acid wetlands in West Mainland and Hoy. Important for Hen Harrier roosts.	*	*3		20+, 22+, 30+, 31+, 32+, 40+, 41+, 42-, 43+,
Salix phylicifolia x repens = x schraderiana	Hybrid willow	Salicaceae	Very rare British hybrid. Although both parents are frequent, this hybrid seems exceptionally rare.	*	*1		3?, 31+
Samolus valerandi	Brookweed		Very unusual, also outwith its normal range	*	*1		62+
Saussurea alpina	Alpine saw-wort		Just escapes NCC status.	*	*1		20+, 43+
Saxifraga aizoides	Yellow saxifrage		Typical of important (Natura 2000) alkaline flushes	*	*1		29-, 20+
Saxifrage oppositifolia	Purple saxifrage			*	*1		20+
Saxifrage stellaris	Starry saxifrage						29-, 20+
Scandix pecten-veneris	Shepherd's needle		Almost certainly extinct in Orkney	P	*1		20-, 21-, 31-, 32-, 49-,50-
Schoenoplectus lacustris	Bullrush			*	*1		29-, 20+, 31+, 43+, 64-
Schoenoplectus tabernaemontani	Glaucos bullrush			*	*1		20+, 22-, 32-, 40+, 43+, 62+, 64+, 74+
Schoenus nigricans	Black bog-rush		Needs further detailed habitat recording.	*	*1		29+, 20+, 21+, 22+, 39+, 30+, 31+, 32+, 48+, 49+, 40+, 41+, 42+, 43+, 44-, 45+, 50+, 51-, 62+, 63+, 64+, 75+
Scutellaria galericulata	Skull-cap			*	*1		42+, 43+, 64+, 75-
Senecio sylvaticus	Wood groundsel			*	*1		29-, 20+, 22-, 30-
Silene acaulis	Moss campion			*	*1		29+, 20+, 44+
Sorbus aucuparia	Rowan		Native tree.	*	*1		29+, 20+, 21-P, 22+, 39+, 30+31+P, 32+P, 40+P
Stellaria holostea	Greater stitchwort		Well established, but on a verge so susceptible.	*	*1		31+
Taraxacum europhyllum	a dandelion		Native. Rare sub-species.	*	*1		1, 40+
Taraxacum fulvicarpum	a dandelion		British endemic	*	*1		1, 22-, 45-

Table 2: Species that are considered to be of conservation concern in Orkney

SCIENTIFIC NAME	COMMON NAME	FAMILY	CURRENT STATUS	UKL	LOCAL CRITERIA	HABITAT	DISTRIBUTION
Taraxacum landmarkii	a dandelion		Local (N & W), British native.	*	*1		1, 20-, 31-, 40-, 43-
Taraxacum orcadense	a dandelion		No records for 30 years. Endemic.	*	*1		21-, 39-, 31-, 40-, 50-, 63-
Taraxacum rubellum	a dandelion		Rare dandelion confined to northern Scotland.	*	*1		20?, 21-
Taraxacum subnaevosum	a dandelion		Native. Rare sub-species.	*	*1		1, 21+, 48-
Taraxacum tanylepis	a dandelion		An endemic Orkney species which needs re-finding	*	*1		22-
Thalictrum alpinum	Alpine meadow-rue		A low level alpine in Orkney and a special habitat indicator.	*	*1		29-,20+, 21+, 22+, 30+, 31+, 32+, 41-, 42+, 43+, 44+, 45-
Trientalis europaea	Chickweed winter-green		Very rare in Orkney and often in curious sites.	*	*1		22-, 30-, 31+, 32+, 51-
Vaccinium uliginosum	Bog blaeberry		Important constituent of Montane Heath in Orkney. Not quite nationally scarce species, however appears to be increasing in Orkney.	*	*1		29+, 20+, 22+, 39+, 32+, 49+, 43-
Viola tricolor ssp curtisii	Heart's-ease pansy		A dune and machair species and vulnerable to anything damaging these habitats.	*	*1		63-, 64-, 65-
Zostera angustifolia	Narrow-leaved eel-grass	Zosteraceae	Native.	*	*1	M2, M3	31-, 50-
Zostera marina	Eelgrass/ common grass-wrack	Zosteraceae	Native. Has suffered historical decline from wasting disease.	C	*1	M2, M3	20-, 21-, 30-, 49+, 42-, 43+, 44-, 50+, 63+, 64+, 74-
Invasive Aliens							
	Hedgehog						
	New Zealand flat-worm						
	Vine weevil						
Campylopus introflexus	a moss		It can slow down the regeneration of calluna				

DISTRIBUTION IS BASED ON ISLANDISED SQUARES PROPOSED BY E. BULLARD AND NOW WIDELY ADOPTED FOR ORKNEY RECORDING - THESE ARE REPRODUCED ON PAGE B9

SECTION C

HABITAT ACTION PLANS

SECTION C

HABITAT ACTION PLANS

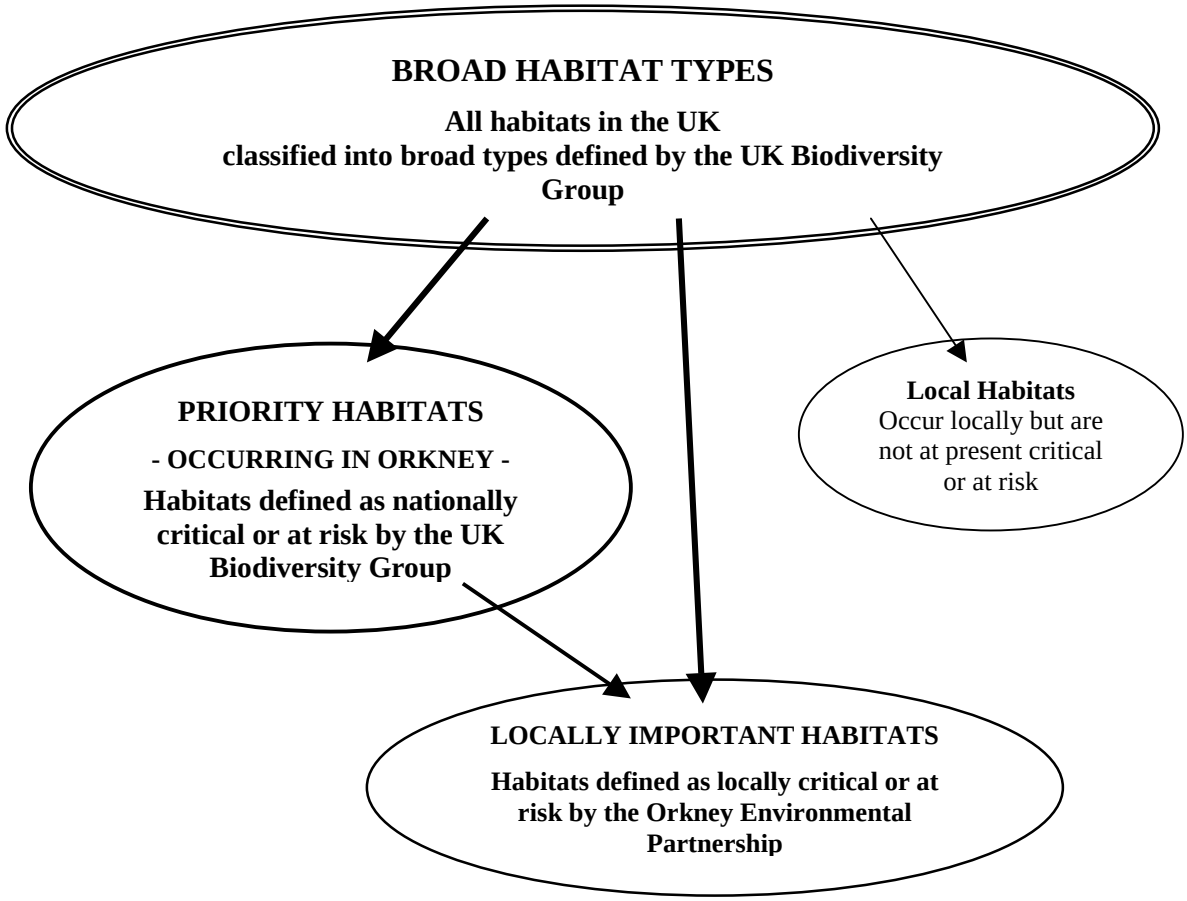
Table of Contents

Marine Habitats - not revised for 2002 edition

Order and division of Biodiversity Action Plan habitats

This series of Habitat Action Plans has been designed to include all the terrestrial and freshwater habitats that occur in Orkney and to be compatible with the framework of the national BAP process.

The Broad Habitats provide the main frame within which fit the much greater number of 'Priority' and 'Locally Important', and 'Local' habitats. The aim of the editors has been to describe all habitat types in Orkney, whatever their importance, then identify the national Priority ones and select Locally Important ones.
The process is not complete. The national classification of marine habitats is being revised, and these include habitats that merge with the terrestrial and freshwater ones along the shore.



Note on land cover and habitat area data

A number of different data sets exist for the land cover and habitat types of Orkney. For all land cover types for the whole county the most recent available set is 'The Land Cover of Scotland 1988' (LCS 88) by the Macaulay Land Use Research Institute (1993). This is based on aerial survey photos taken in the 1980s. Another is the 'National Countryside Monitoring Scheme' by SNH (1992). This is based on sampling of aerial survey photos taken in the 1970s. Land use and habitats can only be indirectly inferred from land cover. Figures derived from these mapping exercises cannot simply be used for BAP habitats, as the classification systems used in all three systems are different, as is the degree of detail. Nevertheless, these systems provide figures that can be interpreted for areas of most BAP Broad Habitats and the most discernible national and local habitat types.

Numerous specific habitat and localized area surveys exist for Orkney, and these provide much better local information (though few are complete for a habitat type). They also have used different habitat classifications, but these are reasonably comparable with BAP types.

In addition, the Scottish Executive Environmental and Rural Affairs Department (SEERAD) annually collects detailed statistics of pastureland types and crops grown. There are also soil survey maps published by the Macaulay Institute for Soil Research (1979). The latter are especially useful in showing areas of peat, one of the larger land covers of Orkney.

For this audit and series of HAPs, local survey information, and in some cases SEERAD figures, have been used wherever possible to provide figures for areas of habitats. Where such figures have been incomplete or not available, the LCS 88 figures have been used, with qualifying comments based on other available information. The use of these various sources is made clear in the text.

In 2002, data should be available from the Countryside 2000 Survey, carried out by the Centre for Hydrology and Ecology. This is based on satellite imagery of the whole country, truthed by detailed field survey of a sample of 1 km squares, and airborne remote sensing. Data sets closely compatible with BAP habitats will be generated.

References and further information

There are publications and reports relevant to many of the individual Action Plans. These are provided as a common list at the end of the Habitats sections. References relevant to individual Action Plans are given in the final section of each.

1. BROADLEAVED MIXED AND YEW WOODLAND BROAD HABITAT TYPE

GENERAL UK DESCRIPTION

This type is characterised by vegetation dominated by trees that are more than 5m high when mature, which form a distinct, although sometimes open canopy with a cover of more than 20%. It includes stands of both native and non-native broad-leaved tree species, where the percentage of these trees in the stand exceeds 20% of the total cover of the trees present. Woodlands that are dominated by conifer trees with less than 20% of the total cover provided by broad-leaved trees are included in the "*Coniferous woodland*" broad habitat type. Stands may be either ancient or recent woodland and either semi-natural arising from natural regeneration of trees, or planted.

Scrub, mainly shrubs usually less than 5m high, and carr (woody vegetation of fens and bog margins) are included in this broad habitat type if the canopy cover is greater than 30% and the patch size of scrub is greater than 0.25ha. Exceptions to this include gorse which is included in the "*Dwarf shrub heath*" broad habitat type; and hedges which are included in the "*Boundary and linear features*" broad habitat type.

Note on woodland and scrub sites of less than 0.25 ha.

Woodland and scrub sites of more than 0.25 ha in area are unusual in Orkney. The hostile climate together with pressure from agriculture have in pre-historic times reduced ancient woodlands and in modern times discouraged extensive new planting. Also, the most favourable sites for trees are often small; and recent planting efforts have been sensitive to landscape character and chosen smaller sites. This means that relict areas and new plantations much smaller than 0.25 ha in area, excluded from the UK broad habitat definition, are of great value in Orkney. The Orkney HAPs for woodland habitats should in this local context be taken as applying to sites of less than 0.25 ha in area.

UK PRIORITY HABITATS PRESENT:	**LOCALLY IMPORTANT HABITATS:**
Upland birchwood (proposed)	**Willow scrub**
	Broad-leaved plantation and policy woodland

LOCAL STATUS

The Broad Habitat type is not well represented in Orkney, but there is a key site for a Priority Habitat.

The fragmented nature and small areas of individual sites means that the habitat cannot support a range of species comparable to that of similar habitats on mainland Scotland. This applies especially to birds and mammals, less so to plants and invertebrates. Some species common further south are scarce in Orkney and are of local priority status.

Many woodland species can be found associated with a range of woodland types, often also in gardens. Others have been recorded in Orkney only at Berriedale or other similar Hoy woodlands (*Upland birchwood*), or are associated more particularly with one of the woodland types.

REFERENCES AND OTHER INFORMATION SOURCES

Bremner, A. H. and Bullard, E.R. *Trees and Shrubs in Orkney.*
Taylor, J. (1995). *Orkney Native Tree Conservation Strategy*. Report for Orkney Native Tree Group, Kirkwall

Guidance leaflets and other literature are available from RSPB, SNH, FA, SAC, FWAG.

1.1 Upland birchwood — priority habitat (proposed)

1. UK PRIORITY HABITAT DESCRIPTION

This woodland type was not initially considered by the UK Biodiversity Steering Group as a key habitat, but it has now been proposed as a priority habitat by the Scottish Biodiversity Group. A UK HAP is in preparation.

It is found in the upland zone of Britain, where at least half of the tree canopy is birch. It is one of the main woodland types in Scotland and by far the most extensive deciduous type. It is endangered by degradation and fragmentation.

2. CURRENT LOCAL STATUS AND EXTENT

Only one site in Orkney conforms to the UK definition – Berriedale in Hoy. This could be the most important biodiversity site in Orkney, since it is a relict of the ancient natural vegetation of Orkney. Elsewhere, birch *Betula pubescens* woodland occurs only as scrub fragments, of much less than 0.25 ha in area, also in north Hoy. Other, larger, native woodland sites in Hoy though lacking birch *B pubescens* are in character similar to Berriedale, and should, in the unusual Orkney context, be treated as a birch woodland type. This is upland woodland descended from the original tree cover of Orkney i.e. that which developed after the last Ice Age. It contains all or most of the range of native trees: downy birch *B pubescens*, hazel *Coryllus avellana*, rowan *Sorbus aucuparia*, aspen *Populus tremula*, and willows *Salix* species as well as an understorey of wild roses *Rosa* species and honeysuckle *Lonicera periclymenum* and a ground flora of ferns and tall herbs, heather *Calluna vulgaris* and crowberry *Empetrum nigrum*.

Such woodland is a relict of ancient woodland cover. Decline of the once extensive tree cover of Orkney seems to have happened quite rapidly approximately 5000 years ago and may have been caused by a combination of a slight climatic change and the activities of neolithic farmers (grazing, fire etc). After this time the blanket peat that covers large areas of Orkney formed, creating inhospitable ground conditions for natural regeneration. There is no evidence that this area has changed in historical times.

Approximately 20 hectares of native trees of Orkney provenance have been planted in the 1990s. Birch *B pubescens* is included in many of the site plantings, but is unlikely to dominate many of them. These new native woodlands are included in this habitat type.

Mixed plantations of alien and native species the latter of non-Orkney provenance, including birch *B pubescens*, have been widely planted. These are not included in this habitat type but in *Broadleaved plantation and policy woodlands*.

3. LOCAL DISTRIBUTION

Mature upland birchwood is confined to Hoy, with Berriedale the outstanding site. This is the northernmost natural woodland in the UK. Smaller sites with birch *Betula pubescens* occur in North Hoy only, for instance at Whaness, Burn of Quoys and Segal. Other larger sites of similar character but without birch can be found elsewhere in Hoy, notably at Pegal Burn and South Burn.

Native birch *B. pubescens* and rowan *Sorbus aucuparia* and native hazel *Corylus avellana* are found only in Hoy. Other tree and shrub species associated with the woodland type can be found in small numbers (in areas much less then 0.25 ha) at a large number of sites. Almost all these sites are in Hoy, Mainland, South Ronaldsay and Rousay. Aspen *Populus tremula* is found in Hoy and is widespread on cliff ledges on other islands around Scapa Flow, usually in monoclonal groups: twelve different clones have been identified from those sites investigated in Orkney. As well as in Hoy, there are aspen *P. tremula* at Waulkmill Bay, Orphir; and Hoxa, South Ronaldsay.

A native tree plantation has been established at Durkadale by the Orkney Field Club. Newly planted native woodlands occur in over 20 different sites throughout Orkney including Queenamidda, West Linnadale, Hobbister Reserve, Burn of the Sale and Burnbraes.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Orkney's native tree population is probably genetically unique having evolved separately on the islands. Birch woodland has a distinct flora and fauna, with species found nowhere else in Orkney. Berriedale is the most important site for *Lepidoptera* in Orkney and an important site for lichens (Lobarion relict species grow only on birch and rowan). 127 species of vascular plants having been identified at Berriedale. Hoy is the most northerly British station for 52 species of moths with 25 of these dependent on birch (Lorimer 1983), and for several species of spider. The invertebrate fauna includes primary woodland indicator species, and a species of the order *Pseudoscorpiones*, the only known record of that order from Orkney and Shetland.

National Priority Species	
Songthrush *Turdus philomelos*	
Local Priority Species	
Pygmy shrew *Sorex minutus*	Wood mouse *Apodemus sylvaticus*
Sparrowhawk *Accipiter nisus*	Willow warbler *Phylloscopus trochilus*
A spider *Walckenaeria dysderioides*	A spider *Lepthyphantes minutus*
A false scorpion *Neobisium carcinioides*	Rowan *Sorbus aucuparia*
Aspen *Populus tremula*	Grey willow *Salix cinerea*
Downy birch *Betula pubescens*	Myrtle-leaved willow *Salix myrsinites*
Hazel *Coryllus avellana*	Eared willow *Salix aurita*
Honeysuckle *Lonicera periclymenum*	Wilson's filmy fern *Hymenophyllum wilsonii*
Wild rose *Rosa spp*	Pyramidal bugle *Ajuga pyramidalis*
Primrose *Primula vulgaris*	A lichen *Lobaria pulmonaria*
A fungus *Cortinarius decolorans*	A fungus *Russula spagnophila*

5. CURRENT FACTORS AFFECTING THE HABITAT

There are few factors affecting this habitat at the present time.

- Fire is a threat, especially so as there is just one outstanding site. There is however little or no muirburn carried out in the vicinity of sites, but there has been one very destructive fire in Hoy in recent times.
- Grazing is a potential threat. It is excluded at the key sites in North Hoy, but not elsewhere in Hoy. Some remnant and degraded stands in the southern part of Hoy are heavily grazed by sheep. Trees situated in sheltered sites in the hills are at risk from grazing sheep even when stocking densities are low.
- Rarity: hazel and aspen and myrtle-leaved willow are at risk due to very small remaining numbers: neither hazel nor aspen is setting seed at the present time, and myrtle-leaved willow is reduced to one female plant in the wild (though offspring have been propagated).
- Genetic dilution from planting of native trees of non-Orkney provenance in proximity to true natives would threaten the integrity of local genetic types.

6. CURRENT ACTIONS AND OPPORTUNITIES

There has been a great deal of local effort devoted to research into and conservation of this habitat, due to a keen awareness among conservation bodies and scientists of the status of Berriedale, as a relict of the ancient native vegetation of Orkney and Britain's most northerly native woodland.

6.1 Management

- Berriedale and most other sites are within the Hoy SSSI, also designated a cSAC and SPA. An SSSI site management statement has been drawn up.
- Berriedale and other North Hoy sites are within the Hoy and West Mainland National Scenic Area.
- Berriedale and most other sites are on the RSPB's Hoy Reserve or Hoy Trust land. Grazing is excluded on the majority of the RSPB reserve as a whole, and the Hoy Trust has erected fencing to exclude grazing from the other main sites.
- Some sites outside the SSSI and RSPB reserve are being managed through occupiers' participation in the Orkney Native Tree Project, others through inclusion in CPS or RSS. Each of these sites has a management plan. Of the 130 Orkney farms so far participating in CPS or RSS, it is thought that very few include areas of this habitat, but nevertheless some important sites, and lesser sites of more suppressed scrub, have been brought under management.
- Through the Orkney Native Tree Project, birch has been introduced to some sites with sparse, remnant tree cover.
- 20 hectares of new native woodlands, which include birch, have been planted in the 1990s, largely through the Orkney Native Tree Project (ONTP), with support from OIC, SNH, the Millennium Commission, FA and FWAG. RSPB has planted native trees in Hoy, and is steadily replacing conifers at the plantation at White Glen with native species including birch. The Orkney Field Club (OFC) has for many years maintained a new plantation of native species, including birch at Durkadale in Evie. A number of sites of similar quality, but usually much smaller, have been planted with agri-environment scheme grants.
- FA grants: Woodland Grant Scheme (WGS) and Woodland Improvement Grant scheme (WIG) – are available for native woodland planting and management. Woodland investment grants are subject to wide-ranging consultation: biodiversity is a key criterion. FA has been highly supportive of native tree planting and conservation efforts in Orkney.
- SEERAD grants: Farm Woodland Premium Scheme (FWPS) and Rural Stewardship Scheme (RSS) - are also available for native woodland planting and management.
- OIC has been supporting the planting of native trees through the ONTP, and itself plants native species.

6.2 Research and Guidance

- The Hoy Partnership, a community group including representatives of OIC, Orkney Enterprise, SNH and RSPB has been set up to develop Hoy and manage the Hoy Ranger. Maintenance and enhancement of the area's biodiversity, including its woodland, and education and research are among its objectives.
- Monitoring of Hoy trees has been carried out by RSPB.
- There are current proposals to research the genetic make-up of Orkney hazels and undertake micro-propagation. Micropropagation has already been carried out on an experimental basis.
- Collection of seeds from native trees has been carried out by OFC members and ONTP. Propagation has been carried out within and outwith Orkney.
- A reference collection of young trees has been established in Tankerness House Gardens, through ONTP
- Guidance on conservation and planting is available through ONTP, FWAG and SAC.
- A great variety of leaflets and guidance material, both national and local, is available, notably through the ONTP and FWAG.
- OIC is in process of drawing up an Orkney Woodland Strategy, in accordance with Scottish Forestry Strategy guidelines: the strategy will include policies to conserve and enhance native woodlands and increase community involvement.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Maintain the current extent, distribution and quality of all existing upland birchwood in Orkney.
- Increase the area of upland birchwood in Orkney - **Target: 5 hectares by 2007**
- Develop biodiversity of new areas of upland birchwood plantings - **Target: 10 sites by 2007**

8. ACTION PLAN AGENCIES

8.1. National agencies: yet to be identified for national HAP

8.2. Local partners: SNH; OIC; Forestry Authority (FA); SEERAD; Hoy Trust; Hoy Partnership; Orkney Native Tree Project (ONTP); FWAG; SAC; Orkney Field Club (OFC). (National lead agencies, when recruited, will include some of the above.)

9. PROPOSED ACTION WITH AGENCIES

The UK HAP (in preparation) will direct the statutory agencies in their approach, and give a conservation direction to the local HAP. Targets and responsibilities will therefore trickle down from the national plan. The actions listed below are additional or complementary to those of the national plan, to which reference should be made.

A detailed local conservation strategy was drawn up in 1995 by J Taylor for the ONTP. Many of the actions have been set in motion and some of the objectives achieved. The strategy is still highly relevant at this time.

9.1 Site safeguard and management

- Make available top-up funding for management and planting of upland birchwood in Orkney, reflecting the extra costs, compared to mainland Scotland, of planting small sites in the islands by 2002 (FA).
- Ensure that all Hoy upland birchwoods, including fragmentary remnants, have a site management plan by 2003 (SNH, RSPB, Hoy Trust, Hoy Partnership).
- Seek to protect all vulnerable sites from fire (SNH, RSPB, Hoy Trust).
- Seek to protect all vulnerable sites from grazing by 2005 (SNH, RSPB, Hoy Trust).
- Begin introduction of birch to selected sites by 2005 (SNH, RSPB, Hoy Trust).
- Maintain the programme for the propagation of plants from the native populations (RSPB, Hoy Trust, ONTP, OFC).
- Initiate micro-propagation and introduction of hazel and aspen to selected sites by 2005 (ONTP)
- Seek to establish elements of native understorey at ten recent native tree plantations by 2007 (SNH, FA, ONTP, FWAG).
- Seek to establish a further 5 hectares of new woodland with native species including birch by 2007 (FA, ONTP, FWAG).

9.2 Advisory

- Complete final version of a good practice code in selection of species for planting new woodlands by 2002, with principal aim of avoiding introduction of alien species, and native species of non-native provenance, into sensitive sites (ONTP); approve the code (SEERAD, FA).
- Promote good practice in use of local provenance trees (SAC, FWAG).
- Promote WIGs aimed at conserving this habitat (SAC, FWAG).
- Promote agri-environment scheme options aimed at conserving this habitat (SAC, FWAG).
- Promote FA and SEERAD schemes aimed at new planting of this habitat (SAC, FWAG).

9.3 Research and monitoring

- Complete survey of all Orkney sites, for species, condition and management by 2003 (SNH, RSPB, Hoy Trust, ONTP).
- Establish monitoring programme for key sites by 2003 (SNH, RSPB, Hoy Trust, FA).
- Research into the biodiversity of these sites (SNH, OFC).
- Initiate research into genetics of local hazel by 2002 (SNH, RSPB, FA, ONTP).
- Promote research into establishing understorey flora at new plantations by 2002 (SNH, RSPB, Hoy Trust, FA).

9.4 Promotion and awareness raising

- Stimulate public interest in native trees and their use through talks, displays, trips etc (SNH, RSPB, ONTP, FWAG, OFC).
- Encourage educational initiatives, especially in Hoy (SNH, RSPB, Hoy Trust, Hoy Partnership, OIC)
- Educate public to avoid planting trees which are native to Orkney but imported from elsewhere (ONTP/OFC).
- Develop links with other island groups outwith Orkney who are undertaking native tree conservation projects. (FWAG, ONTP).

REFERENCES AND OTHER INFORMATION SOURCES

Bullard, E.R. (1991). Orkney Woodland. *Bull. Orkney Fld Club 1991* (contains a Berriedale Plant List)

Chapman, H.M. and Crawford, R.M.M. (1981). Growth and Regeneration in Britain's most Northerly Native Woodland. *Trans. Bot. Soc. Edin*. 43.

Dalby, K & C. (1994). Lichens from Berriedale. *Bull. Orkney Fld Club 1994*

Davies, B.J. (1987). *A Structured Survey of the Orcadian Woodland* (Thesis submitted to University of Manchester)

Gammack, J.J.M. (1978). *Aspects of Regeneration of* Betula pubescens *and* Sorbus aucuparia *in Berriedale, North Hoy, Orkney* (Thesis submitted to University of Aberdeen)

Lorimer, R. I. (1983). *The Lepidoptera of the Orkney Islands.* Faringdon: Classey

RSPB. North Hoy Reserve Annual Reports. RSPB Orkney

Taylor, J. (1995). *Orkney Native Tree Project Restoration Strategy* (for Orkney Native Tree Group)

ONTP and FWAG: numerous advisory and information leaflets are available

1.2 Willow Scrub — locally important habitat

1. LOCAL HABITAT DESCRIPTION

Willow scrub occurs in fen or marsh and bog margins, also in upland dales as a relict of ancient woodland cover. There has also been some planting of this type of woodland. Fragmentary scrub is included within other Broad Habitats.

There are scrub sites in Orkney that fit the national broad habitat definition: "scrub vegetation where the woody component tends to be mainly shrubs usually less than 5m high and carr (woody vegetation of fens and bog margins) …[where] …the canopy cover is greater than 30% and the patch size … is greater than 0.25ha". Such sites are few in Orkney. Sites of smaller area are commoner but still scarce and valuable; therefore the note in section 3 of the Broad Habitat description applies: for action planning treat sites of less than 0.25 ha in area in the same way as larger ones.

Two or three different species of willow and hybrids (usually eared willow *Salix aurita*, tea-leaved willow *S. phylicifolia*, grey willow *S. cinerea, S. cinerea oleifolia*) are the commonest species in almost all Orkney scrub sites. *S aurita* is the most widespread. These may be regarded as the local equivalent of EC Habitats Directive Annex 1 Type "bog woodlands". Willow carr, especially eared willow *S aurita*, occurs also on the fringes of blanket bog and in dales in the hills as an upland scrub type. Eared willow *S aurita* occurs sometimes as natural regeneration on abandoned peat cuttings.

Some alder *Alnus glutinosa* scrub planted in the 18th or early 20th century and recently planted willow scrub of Orkney provenance is included in the local habitat definition. Alder *A glutinosa* may have been a constituent of the ancient native scrub of Orkney.

The local name for willow scrub is '*rice*', c.f. the place name Rysa near Lyness in Hoy.

2. CURRENT LOCAL STATUS AND EXTENT

This is an important local habitat, being a scarce relict of ancient native vegetation cover and supporting several national and local priority species. Scrub of any type is not a common habitat in the Orkney landscape, much of the habitat it once occupied having been drained and improved for agriculture, or subjected to continual grazing. Willow scrub however is capable of rapid recovery from suppressed remnants. It is less able to regenerate from seed in the absence of soil disturbance and subsequent favourable conditions.

The only available figure for the extent of this habitat is a National Countryside Monitoring Scheme (1992) estimate of 11 ha of 'low scrub'. This estimate is certainly on the low side. RSPB have surveyed 7.5 ha on their Birsay Moors and Cottasgarth Reserve. NCMS found a reduction in area from 64 ha in the 1940s.

Some tree plantings of late 19th or early 20th century included alder, which is now the dominant species at these sites. The total area is approximately one hectare.

Approximately 20 hectares of native trees of Orkney provenance have been planted in the 1990s. Willows *Salix* species are included as a major component of most of the site plantings.

3. LOCAL DISTRIBUTION

Sites of any size are almost entirely confined to West Mainland and Hoy. In Hoy there are many willow *Salix* species patches in the dales of burns draining to the east and on the lower peat slopes, as at Burn of Heldale, near Stoneyquoy and Burnhouse. Several of these amount to at least 0.25 ha in area.

On Mainland, the largest and key fen, marsh or bog sites are at Winksetter, Harray; and Caldale, St Ola. There are several others, e.g. along the Hillside Burn, Evie; Loch of Banks and near the Loch of Sabiston, Birsay; and Rossmyre, Firth. There is a single East Mainland site at Wideford, St Ola, modified by planting of alien species. The largest upland site, dominated by eared willow *Salix aurita* is probably at Russadale, Stenness with many smaller patches elsewhere, e.g. Hobbister, Orphir. Native willow in smaller or very small patches, almost always eared willow *Salix aurita*, is widespread in the Mainland, occurring also in South Ronaldsay and Rousay, but not in the outer north isles.

Mature alder *A glutinosa* scrub is found at two sites, Carrick in Eday, and Saltness in North Walls.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Scrub provides nesting and roosting sites for a variety of wetland and woodland bird and mammals. Its importance as shelter and hunting ground for moorland birds is increasingly recognised. As noted for the *Upland birchwoods*, there are specifically associated invertebrates, though less is known about the scrub habitat than birchwood.

National Priority Species	
European otter *Lutra lutra lutra*	Songthrush *Turdus philomelos*
Reed bunting *Emberiza schoeniclus*	Linnet *Carduelis cannabina*
Local Priority Species	
Pygmy shrew *Sorex minutus*	Wood mouse *Apodemus sylvaticus*
Sedge warbler *Acrocephalus schoenobaenus*	Hen harrier *Circus cyaneus*
A spider *Clubonia comta*	Grey willow *Salix cinerea*
Willow warbler *Phylloscopus trochilus*	Tea-leaved willow *Salix phylicifolia*
Eared willow *Salix aurita*	Wild rose *Rosa spp*
Primrose *Primula vulgaris*	

5. CURRENT FACTORS AFFECTING THE HABITAT

This habitat is much more widespread than *Upland birchwood* and is subject to more pressures. Factors affecting this habitat include:

- Grazing: this continues to damage or even destroy some sites, especially the smaller ones. Agricultural support measures, in particular area payments conditional on agricultural use of the land concerned, have increased pressure on the habitat. Economic pressures often lead to increases in livestock numbers, with the same result.
- Fire: muirburn is seldom carried out in the vicinity of sites, but there is some threat.
- Conversion of native scrub to mixed alien/native woodlands is common. The native scrub trees are often thought inferior to more substantial alien species.
- Hybridisation and genetic mixing from planting of alien species and native trees of non-Orkney provenance in proximity to native species and types may threaten the integrity of local genetic types.

6. CURRENT ACTIONS AND OPPORTUNITIES

These are the same as for the *Upland Birchwood* habitat, except that the willow scrub is a much more widespread habitat with a corresponding wider focus beyond the area of North Hoy. Also, some references to site information require changing.

6.1 Management

As for Upland Birchwood, except:

- SSSIs including the habitat are, in addition to Hoy; Orphir & Stenness Hills; West Mainland Moorlands; Keelylang Hill & Swartabeck Burn, Orphir/Stenness; Loch of Banks and Glims Moss & Durkadale, Birsay. Site management statements have been drawn up.
- Of these SSSIs, Hoy is an SPA and cSAC; Orphir & Stenness Hills, West Mainland Moorlands and Keelylang & Swartabeck are all part of one SPA.
- Sites within RSPB reserves include Loch of Banks, Birsay Moors, Cottascarth, and Hobbister.
- Hoy and part of Orphir & Stenness Hills are within a NSA.
- More sites are managed by occupiers' participation in the Orkney Native Tree Project, including substantial areas in Hoy and at Rossmyre and Russadale.
- SEERAD grants: CPS and RSS provide grants for managing this habitat. 5.7 ha are entered into the 'Management of scrub' option of CPS. The option applies to severely suppressed scrub. No figures are yet available for equivalent options taken up in the single RSS year of 2001.
- SEERAD Habitats Scheme: the scheme is now closed, but management agreements remain in place. Scrub management was one of its provisions. No figures are available for the area so managed. 48 Orkney farms are participating in the scheme, but few of them adopted this management option.
- New sites have been planted of mixed native species, many of them willow Salix species, also alder *Alnus glutinosa*, through the Orkney Native Tree project or with CPS grant. Some of the sites chosen have been treeless gullies with some remnant native vegetation, situated within the improved lowland landscape.

6.2 Research and Guidance

- Any current research and guidance is the same as for *Upland birchwood*, though scrub receives less attention.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

There is no UK HAP in preparation for this habitat, as there is for *Upland birchwood*. Objectives and actions proposed are nevertheless similar, and the local conservation strategy drawn up in 1995 by J Taylor applies to all tree habitats in Orkney.

A difference between conservation approaches to the two habitats stems from the more widespread occurrence of willow scrub, and therefore the more frequent involvement of lead agencies; and the potential for more loss of the habitat through grazing and agricultural improvement.

- Maintain the current extent, distribution and quality of all existing willow scrub in Orkney.
- Increase the cover of willow scrub at suitable sites – **Target: 10 hectares by 2007**
- Develop biodiversity of new areas of willow scrub plantings – **Target: 10 hectares by 2007**

8. ACTION PLAN AGENCIES

Local partners: SNH; OIC; Forestry Authority (FA); SEERAD; FWAG; SAC; Orkney Native Tree Project (ONTP); Hoy Trust; Orkney Field Club (OFC).

9. PROPOSED ACTION WITH AGENCIES

9.1 Site safeguard and management

- Ensure the conservation of willow scrub under LFA cross-compliance rules (SEERAD).
- Make available top-up funding for management of the habitat in Orkney, reflecting the extra costs, compared to mainland Scotland, of managing small sites in the islands by 2002 (FA).
- Ensure that local planning mechanisms take into account the particular wildlife interest of willow scrub by 2002 (OIC)
- Ensure that all willow scrub within SSSIs, RSPB reserves and Hoy Trust land, including suppressed remnants, is included in site management plans by 2003 (SNH, RSPB, Hoy Trust).
- Maintain the programme for the propagation of plants from the native populations (RSPB, Hoy Trust, ONTP, OFC).
- Seek to establish elements of native understorey at ten recent native tree plantations by 2007 (FA, Hoy Trust, ONTP, FWAG).
- Seek to establish or re-establish a further 10 hectares of willow scrub by 2007 (FA, ONTP, FWAG).

9.2 Advisory

- Encourage owners and occupiers of land with scrub to value it for its biodiversity (SAC, FWAG).
- Promote WIGs aimed at conserving this habitat (SAC, FWAG).
- Promote agri-environment scheme options aimed at conserving this habitat (SEERAD, SAC, FWAG).
- Promote FA and SEERAD schemes aimed at new planting habitat (SAC, FWAG).
- Promote good practice in use of local provenance trees as in 8.1 (SAC, FWAG).
- Promote the Muirburn Code, especially in relation to protecting scrub habitat (SEERAD, SAC, FWAG, SNH).

9.3 Research and monitoring

- Complete survey of most significant Orkney sites, for species, condition and management by 2005 (SNH, RSPB, Hoy Trust, ONTP).
- Research into the biodiversity of these sites (SNH, OFC).
- Promote research into establishing understorey flora at new plantations by 2002 (SNH, RSPB, Hoy Trust, FA).

9.4 Promotion and awareness raising

- Stimulate public interest in native trees and their use through talks, displays, trips etc (SNH, RSPB, ONTG, FWAG, OFC).
- Encourage educational initiatives (SNH, RSPB, Hoy Trust, OIC).
- Educate public to avoid planting amongst willow scrub alien species and willows which are native to Orkney but imported from elsewhere (ONTG, OFC).
- Develop links with other island groups outwith Orkney who are undertaking native tree conservation projects (ONTG, FWAG).

REFERENCES AND OTHER INFORMATION SOURCES

See under *Upland birchwood*
Tickner, M. (1999). *NVC Survey of Orkney Reserves at Hobbister, Birsay Moors and Cottasgarth*. Report for RSPB

1.3 Broadleaved plantations and policy woodlands — locally important habitat

1. LOCAL HABITAT DESCRIPTION

These are mainly broadleaved woodlands, planted by man. The species used are overwhelmingly alien to Orkney. The commonest species is sycamore *Acer pseudoplatanus*. Other species include wych elm *Ulmus glabra*, alder *Alnus glutinosa*, beech *Fagus sylvatica*, horse chestnut *Aesculus hippocastanum*, ash *Fraxinus excelsior* and whitebeam *Sorbus* species. Species native to Orkney but of non-Orkney provenance are sometimes included in these woodlands. Some coniferous trees may be included, for instance larch *Larix* species.

The habitat is comprised mainly of old plantations, 100 to 150 years old, and some newer plantations, mainly dating from the last 25 years.

Large trees are also a feature of gardens and public places in the larger settlements of Kirkwall, Stromness and St. Margaret's Hope. They are included in the *Built-up areas and gardens* habitat type.

2. CURRENT LOCAL STATUS AND EXTENT

There are several old deciduous plantations in the islands, which although small in total area are nevertheless important in creating habitat diversity. A number of species, especially birds, which are locally scarce are highly dependent on the habitat.

Many of the old plantations are in poor condition, as a consequence of their age and the harsh environment. The management and condition of some of the new plantations is also poor.

Land Cover of Scotland 1988 (1993) estimates 20 ha of 'undifferentiated broadleaved woodland'. The LCS 88 definition, of broadleaved trees of any species with a cover of at least 50%, is different from that of the Broad Habitat and this Local Priority Habitat, but local knowledge suggests that is approximately correct. The area of new plantations established in the last 20 years or so is not known, but is probably less than 10 ha. Most are located on privately owned land, though OIC has been involved and planted a substantial community woodland at Glaitness.

3. LOCAL DISTRIBUTION

On the Mainland old plantations exist at Woodwick, Evie; Binscarth, Firth; and Berstane, St. Ola; with smaller copses at Ogalby, Stromness; Grindally, Gyre, Swanbister and Smoogro, Orphir; Nisthouse, Harray; and Graemeshall, Holm. In the north isles there are substantial woods at Balfour, Shapinsay; Trumland, Rousay. Plantations in the south isles are at Melsetter House garden, and a smaller one at Bu, Hoy.

New planting at Redland, Firth in the past 30 years has been highly successful, with rapid growth rates achieved. The proportion of conifers there is greater than 80%, but there is a distinct broadleaved area of many different species at the eastern end.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Orkney's deciduous plantations are not rich in native flora, the ground and shrub layers often being dominated by invasive aliens such as pink purslane *Claytonia sibirica* and salmonberry *Rubus spectabilis*. However, damp woodland floors may produce spectacular showings of lesser celandine *Ranunculus ficaria* and opposite-leaved golden saxifrage *Chrysosplenium oppositifolium* and naturalised bulb species, including hybrid bluebells; while ferns especially broad buckler *Dryopteris dilatata*, male *D. filix-mas*, lady *Athyrium filix-femina* and common polypody *Polypodium vulgare*, may be frequent.

Melsetter House is the site of Orkney's only bat colony, of pipistrelles *Pipistrellus pipistrellus.*

Certain species of moth are only present in Orkney because of the presence of broad-leaved plantations; *Acleris sparsana*, a tortrix, only occurs where there is plentiful beech or sycamore, while *Caloptilia syringella* is virtually dependant on ash.

Amongst birds, the rook *Corvus frugilegus* is dependent on the broad-leaved plantations, virtually all the 1,900 nests recorded in a 1996 census occurring in this habitat. Sparrowhawk *Accipiter nisus* nesting in broadleaved plantations nearly always select a coniferous tree. Some woodland edge and garden birds, common in the UK but scarce in Orkney, are reliant on these plantations. They include robin *Erithacus rubecula*, dunnock *Prunella modularis*, chaffinch *Frinilla coelebs*, and greenfinch *Carduelis chloris.*

National Priority Species	
Pipistrelle bat *Pipistrellus pipistrellus* (SAP)	Linnet *Carduelis cannabina*
Songthrush *Turdus philomelos*	
Local Priority Species	
Pygmy shrew *Sorex minutus*	Wood mouse *Apodemus sylvaticus*
Dunnock *Prunella modularis*	Sparrowhawk *Accipiter nisus*
Long-eared owl *Asio otus*	Greenfinch *Carduelis chloris*
Willow warbler *Phylloscopus trochilus*	

5. CURRENT FACTORS AFFECTING THE HABITAT

The greatest threat to deciduous plantations is lack of management.
The majority of trees in the older woods are now over 100 years old and, with some notable exceptions, little planting is being undertaken to replace them.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1 Management, Research and Guidance

- Management plans aimed at remedying the decline of some of the old plantations have been drawn up by the Orkney Native Tree Project officer in 2000-2001.
- Owners of some of the old plantations have undertaken some replanting.
- There have been recent extensions to some old plantations by new planting with grant assistance from FA, notably at Binscarth.
- New sites have been planted, also with FA grant aid. The sites have mostly been small.
- FWAG provides advice on new plantings, including integration into the landscape, use of appropriate and diverse species, and maximizing biodiversity.
- The OIC Strategic Plan includes policies for conservation of trees.
- OIC is in process of drawing up an Orkney Woodland Strategy, in accordance with Scottish Forestry Strategy guidelines: the strategy will include policies to conserve and enhance plantations and increase community involvement.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Maintain the current extent, distribution and quality of the old plantations – **Target: actions taken to improve the condition and enhance diversity of 10 hectares by 2007**
- Ensure the successful establishment and development of the more recent plantations – **Target: a minimum 80 % in favourable condition by 2007**

8. ACTION PLAN AGENCIES

Local partners: SNH; OIC; Forestry Authority (FA); SEERAD; FWAG; SAC; Orkney Native Tree Project (ONTP).

9. PROPOSED ACTION WITH AGENCIES

9.1 Site safeguard and management

- Seek to have management plans in place for all old plantations by 2002 (ONTP).
- Ensure that local planning mechanisms take into account the particular value of these plantations (OIC).

9.2 Advisory

- Promote WIGs aimed at conserving and enhancing this habitat (SAC, FWAG).
- Promote the utilisation of FA and SEERAD schemes for planting of new woodlands, aiming at these being predominantly native in character (see under Upland Birchwood habitat type) (SAC, FWAG).
- Promote better maintenance of new plantations (SAC, FWAG).

9.3 Research and monitoring

- Carry out an audit of the old woodlands, detailing extent, quality and management requirements, by 2002 (ONTP).
- Promote research into and trials of species new to Orkney which may be used for establishing shelter (FA, SAC, FWAG, ONTG).

9.4 Promotion and awareness raising

- Develop links with other island groups outwith Orkney who are undertaking tree planting and research projects. (FWAG, ONTP).

ADDITIONAL REFERENCES AND OTHER INFORMATION SOURCES

See under *Broadleaved woodland*

2. CONIFEROUS WOODLAND — BROAD HABITAT TYPE

1. GENERAL UK DESCRIPTION

This broad habitat type is characterised by trees that are more than 5m high when mature, which form a distinct, although sometimes open canopy which has a cover of more than 20%. It includes stands of coniferous tree species where the percentage cover of these trees in the stand exceeds 80% of the total cover of the trees present. Woodlands that are made up of broad-leaved and conifer trees with less than 80% of the total cover provided by conifer trees are included in the *"Broad-leaved, mixed and yew woodland"* broad habitat type.
The UK description includes both native and planted woodland.

UK PRIORITY HABITATS PRESENT:

None

LOCALLY IMPORTANT HABITATS:

None

Other locally occurring habitats: **Conifer plantation**

2.1. Conifer plantation — local habitat

1. LOCAL HABITAT DESCRIPTION

This is coniferous woodland, mostly planted within the last 50 years. The most common plantation species are lodgepole pine *Pinus contorta*, but numerous other species such as sitka spruce *Picea sitchensis*, Norway spruce *P. abies*, mountain pine *Pinus montana*, and western hemlock *Tsuga heterophylla* also occur.
Larch *Larix decidua* has been widely planted also, but except at Vinquoy Hill, Eday, as a constituent of broadleaved plantations as at Binscarth and Berstane, and in towns and gardens. Such scattered and mixed plantings are not included in this local habitat type.

The hillside wood at Vinquoy Hill is a purely coniferous plantation of larch *Larix decidua*, now virtually impenetrable as a result of the contorted growth forms resulting from exposure.

2. CURRENT LOCAL STATUS AND EXTENT

Coniferous plantations cover only 10 hectares as estimated by Land Cover of Scotland 1988 (1993), an insignificant percentage of the area of Orkney. Most were established by the Forestry Commission in Hoy in the 1950s in order to discover whether there was potential for commercial forestry in the islands. The conclusion was negative.

3. LOCAL DISTRIBUTION

The experimental plantations in Hoy are at Bu Hill, Hoy Lodge, White Glen and Lyrawa, while another privately planted wood is at Wee Fea, Lyness. Elsewhere there is a successful new plantation at Langskaill in Tankerness and some very small copses such as that at Netherbutton, Holm, near the old wartime cinema on Flotta; the surprisingly successful one at Lucknow, Shapinsay; and the Vinquoy Hill larch *Larix decidua* wood.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Not surprisingly, native flora is not especially notable in these plantations. However, a number of other species have taken advantage of this alien habitat to establish and consolidate populations. They can be rich in fungi and in some bryophytes (mosses and liversworts).

Amongst birds, herons *Ardea cinerea* occur, with Orkney's only colony of 10 - 12 pairs being found in one of the Hoy plantations. Sparrowhawk *Accipiter nisus* is very dependent on conifers, the majority of the 6 or so pairs, which nest in Orkney each year utilising plantations. Song thrush *Turdus philomelos* and linnet *Carduelis cannabina* have small populations in Orkney conifers, as do willow warbler *Phlloscopus trochilus*, dunnock *Prunella modularis* and goldcrest *Regulus regulus*. Occasional breeders in the islands such as the woodcock *Scolopax rusticola*, siskin *Carduelis spinus* and redpoll *C. flammea* also require conifers. Tree sparrow *Passer montanus*, a sharply declining species and now extinct as a breeder in Orkney, used to nest in the Eday plantation but seems unlikely to re-colonise. One wintering bird of note, the long-eared owl *Asio otus* is largely dependent on conifers for its daytime roost sites.

National Priority Species	
Songthrush *Turdus philomelos*	Linnet *Carduelis cannabina*
Local Priority Species	
Willow warbler *Phylloscopus trochilus*	Sparrowhawk *Accipiter nisus*
Dunnock *Prunella modularis*	Long-eared owl *Asio otus*
Greenfinch *Carduelis chloris*	

5. CURRENT FACTORS AFFECTING THE HABITAT

Fire is always a potential threat to coniferous plantations surrounded by moorland. The White Glen plantation was badly damaged in a fire in 1984 and is now gradually being converted by the RSPB to a native woodland using stock of local provenance. Wind damage occurs occasionally and can result in serious losses if not managed effectively. The current small scale of planting is unlikely to be detrimental to the biodiversity interest of the islands provided that it does not occur in priority habitats. Coniferous trees tend to attract specific insect pests that can be extremely damaging.

An increase in the area of this habitat, by afforestation with alien conifers, has in the past been seen as a threat to the character of the Orkney landscape, and to other habitats, but any large scale planting now seems unlikely.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1 Management, Research and Guidance

- The gradual conversion of the fire-damaged White Glen plantation to a birchwood is an example that could be followed with other plantations. The plantations would provide excellent shelter for establishment of other tree species, with the prospect of a great increase in biodiversity.

REFERENCES AND OTHER INFORMATION SOURCES

Lorimer. R.I. (1988). The Lepidoptera of the Orkney Islands: supplement 1983-87. *Entomologists' Gazette*. 39

3. BOUNDARY AND LINEAR FEATURES — BROAD HABITAT TYPE

GENERAL UK DESCRIPTION

This broad habitat type covers a diverse range of linearly arranged landscape features such as hedgerows, lines of trees, stone walls and earth banks, grass strips and dry ditches. These features may occur separately or in combinations forming multi-element boundaries. This habitat type also includes some of the built components of the rural landscape including roads and tracks and their associated verges of semi-natural habitat.

This habitat type does not include roads and tracks in urban areas as these are included in the *"Built-up areas and gardens"* broad habitat type. It also does not include canals and ditches that are water filled for the majority of the year, which are included in *the "Standing open water and canals"* broad habitat type, rivers and streams which are in the *"Rivers and streams"* broad habitat type, and linear features in woodland such as rides and fire breaks which are either included in the "*Broad-leaved, mixed and yew woodland"* or "*Coniferous woodland"* broad habitat types. Cereal field margins managed for nature conservation are included in the "Arable and horticultural" broad habitat type.

UK PRIORITY HABITATS PRESENT:	**LOCALLY IMPORTANT HABITATS:**
None	**Miscellaneous field boundaries** **Road verges**

Other locally occurring habitats: **Hedges**
Stone and earth boundary features

3.1 Miscellaneous field boundaries — locally important habitat

1. LOCAL HABITAT DESCRIPTION

This habitat includes a variety of farmland linear features including tracks, spaces between double fences forming farm boundaries, also odd corners of disused ground amongst farmland. Banks of burns and canalised burns are not included here as they are included in the *Rivers and Streams* broad habitat. Banks of smaller ditches without permanent running water, and the wider fenced-off margins of all watercourses, are included here.
Fragments of national priority and other locally important habitats may survive in these situations when otherwise lost from the local vicinity. Field edges and farm roads may be richer remnants of pre-field creation and borders of lochs, burn and ditch banks may have elements of tall fen communities. Drier boundaries can be composed of neutral grassland with some richness of plant species, or remnant heath.

2. CURRENT LOCAL STATUS AND EXTENT

These features provide habitat essential to the survival of much familiar farmland wildlife, and some rare and declining species. They are very important as linking habitats or 'corridors' through agricultural land.
The quantity and area of these features has decreased markedly in the last 30 years.

There are no figures available for area.

3. LOCAL DISTRIBUTION

These features occur very commonly throughout the isles in a landscape of small farms and small fields associated with mixed farming based on cattle production.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

This varied habitat supports a wide range of farmland birds, mammals and invertebrates: many of these species have declined greatly throughout the UK as a result of agricultural intensification.

Ditch sides are a nesting habitat for redshank *Tringa totanus*. Many distinctive common wetland plants occur. Orkney voles occur at some of the highest densities recorded, providing food for hunting hen harrier and short-eared owl. Twite *Carduelis flavirostris* and other farmland birds may nest. Rough, unmanaged, but species-poor grassland along field boundaries, ditches and in other odd corners provides wintering and nesting habitats for invertebrates, and many typical plants (especially *Stachys* species and umbellifers) are an important nectar source for adult invertebrates, including less common species, such as the great yellow bumblebee *Bombus distinguendus*.

National Priority Species	
Reed Bunting *Emberiza schoeniclus*	Corncrake *Crex crex*
Brown hare *Lepus europaeus*	Great yellow bumblebee *Bombus distinguendus*
Linnet *Carduelis cannabina*	
Local Priority Species	
Orkney vole *Microtus arvalis orcadensis*	Common toad *Bufo bufo*
Pygmy shrew *Sorex minutus*	Wood mouse *Apodemus sylvaticus*
Kestrel *Falco tinnunculus*	Hen harrier *Circus cyaneus*
Twite *Carduelis flavirostris*	Redshank *Tringa totanus*
Meadow pipit *Anthus pratensis*	Sedge warbler *Acrocephalus schoenobaenus*
Heath carder bee *Bombus muscorum*	A weevil *Apion ryei*
Ingrailed clay (a moth) *Diarsia mendica orkneyensis*	Ragged robin *Lychnis flos-cuculi*
Northern fen orchid *Dactylorhiza purpurella*	Primrose *Primula vulgaris*
Tea-leaved willow *Salix phylicifolia*	Nootka lupin *Lupinus nootkatensis*
Wild roses *Rosa* species	A fairy club (fungus) *Clavaria zollingen*
Shaggy ink cap *Coprinus comatus*	

5. CURRENT FACTORS AFFECTING THE HABITAT

Many of these features are associated with a past agricultural system, of smaller, unmechanised farms with small fields and lower stocking density. The area, number and diversity of these habitats has been reduced simply as a result of modern farming development. Some particular factors are:

- amalgamation of farms and loss of 'double-fence' march boundaries; amalgamation of fields;
- loss of traditional tracks that served for access to field, water and seashore: now largely redundant, they are often incorporated into enlarged fields;
- fertiliser, slurry and pesticide drift, as even single incidents impoverish flora and fauna, and the effects are cumulative;
- Less Favoured Area payment (CAP): the area-based payments for arable crops and grassland provided by CAP apply only to land that is in agricultural use, thereby encouraging the incorporation of these habitats into grazed or cropped land;
- Extensification payment (CAP): extra livestock subsidy payments made to producers with low stocking rates are dependent on the availability of extensive grazing areas: this too has encouraged the incorporation of these habitats into grazed or cropped land;
- these features are not the object of any specific conservation measures provided by agri-envrironment schemes: CPS and RSS offer incentives for fencing off burn and large ditch margins, but not other linear habitats;
- straightening and squaring off of field boundaries, and improved field drainage causing loss of rough vegetation in corners.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1 Management

- SEERAD grants: CPS and RSS provide grants for fencing off extended burn margins, which in the Orkney context (of few substantial burns) includes the margins of larger ditches; and for creating areas of corncrake *Crex crex* cover (small areas of tall vegetation including flag iris *Iris pseudacorus*); with 130 Orkney farms so far in these schemes, burn or ditch margins have been protected or extended in most of these.
- SEERAD's Organic Aid Scheme provides incentives for conversion to organic farming: organic methods provide a richer flora and fauna on field edges: about 10 farms are organic or in conversion: there is potential for much more organic production.
- Less Favoured Area (LFA) support payments to farmers are conditional on observance of a code good farming practice, including the protection of natural habitats and landscape features: these are weak in relation to these particular habitats but could be strengthened.
- Pesticide environmental protection legislation requires observance of buffer zones by watercourses.
  Bio-security measures: anti-Bovine Viral Disease (BVD) measures, initiated in 2000 by the Orkney Livestock Association and financially supported by OIC, require (amongst other measures) a three-metre stock-free gap between neighbouring farms.

6.2 Research and Guidance

- Research on the Orkney vole *Microtis arvalis orcadensis* has highlighted the importance of this habitat for the vole and for hunting birds of prey.
- Guidance on creation and management, and protection of habitats and sites adjoining crops, is provided by FWAG and SAC.
- Education in agriculture, including environmental protection, is provided at Orkney College.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Increase area of miscellaneous field boundaries.
- Improve conservation management of miscellaneous field boundaries.

Targets: 50% of farms in Orkney to have created new field boundaries features or improved management of existing boundaries by 2007

8. ACTION PLAN AGENCIES

Local partners: SNH; SEERAD; NFU; FWAG; SAC; Orkney College.

9. PROPOSED ACTIONS WITH AGENCIES

9.1 Site safeguard and management

- Press for new agri-environment scheme measures to conserve these habitats (SEERAD, NFU, SNH, SAC, FWAG).
- Ensure the conservation of these habitats under LFA cross-compliance rules (SEERAD).

9.2 Advisory

- Promote agri-environment scheme options which can be used to conserve this habitat (SAC, FWAG).
- Ensure adequate advice is available and provided to all landowners on best practice (FWAG, SAC, SEERAD).

9.3 Research and monitoring

- Research into the extent and quality of these habitats by 2005 (SNH).

9.4 Promotion and awareness raising

- Promote organic farming (SAC, Orkney College).
- Raise awareness of biodiversity and farming value of these habitats through events and farm walks (FWAG).

REFERENCES AND OTHER INFORMATION SOURCES

Charter, E. (1995). *Farming with Wildlife in Mind.* Orkney FWAG, Kirkwall

Reynolds, P.R. (1992). *The impact of changes in land-use in Orkney, on the vole* Microtis arvalis orcadensis *and its avian predators.* PH.D Thesis for University of Aberdeen

3.2 Road verges — locally important habitat

1. LOCAL HABITAT DESCRIPTION

This habitat is comprised of road verges with unimproved/semi-improved dry and damp grassland, some with heather and remnants of past vegetation pre-field creation. Typical are remnant plant communities of unimproved neutral grassland and heaths. Road grit falling on verges of roads passing through open moorland provides an unusually rich artificial habitat. The locally important habitat does not include verges with coarse vegetation composed of taller grasses and robust weeds.

2. CURRENT LOCAL STATUS AND EXTENT

The entire Orkney road verge is a narrow strip approximately 700 miles in total length. It is currently under survey to determine the extent of locally important habitat. The more species-rich grassland type continues to decline in most areas, being replaced by coarse, species-poor vegetation.

3. LOCAL DISTRIBUTION

Examples of species-rich verges are the new Rackwick Road on Hoy; Olad Brae, South Ronaldsay; Lyde Road, between Harray and Firth; the Hillside and Durkadale roads in Birsay and Evie, the Brodgar road, Leon Brae and part of the Westside road in Rousay.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

A feature of the Orkney countryside are those verges with naturally short native grasses and sedges and colourful plants including red and white clover *Trifolium pratense* and *T repens*, bush vetch *Vicia sativa*, meadow vetchling *Lathyrus pratensis*, lady's smock *Cardamine pratensis*, primrose *Primula vulgaris*, bird's-foot trefoil *Lotus corniculatus*, devil's-bit scabious *Succisa pratensis*, many orchid species and others. It is the main habitat for twayblade *Listera cordata*.The verges provide relatively safe nesting sites for birds, and habitat for grassland Lepidoptera as well as the Orkney vole and pygmy shrew. A few native species of wild flowers are entirely confined to verges.

National Priority Species	
Linnet *Carduelis cannabina*	Great yellow bumblebee *Bombus distinguendus*
Local Priority Species	
Orkney vole *Microtus arvalis orcadensis*	Wood mouse *Apodemus sylvaticus*
Pygmy shrew *Sorex minutus*	Kestrel *Falco tinnunculus*
Meadow pipit *Anthus pratensis*	Ingrailed clay (a moth) *Diarsia mendica orkneyensis*
Heath carder bee *Bombus muscorum*	A weevil *Apion ryei*
Northern fen orchid *Dactylorhiza purpurella*	Ragged robin *Lychnis flos-cuculi*
Nootka lupin *Lupinus nootkatensis*	Primrose *Primula vulgaris*
Sheep's-bit *Jasione montana*	Glaucous sedge *Carex flacca*
Shaggy ink cap *Coprinus comatus*	Greater stitchwort *Stellaria holostea*
A fairy club (fungus) *Clavaria zollingen*	

5. CURRENT FACTORS AFFECTING THE HABITAT

- OIC Department of Technical Srvices has a policy that has historically favoured a neat, tidy appearance with frequent cutting. Management has in general, in the past, contributed to the reduction in biodiversity of verges: frequent cutting of most verges prevents plants from completing annual cycle of flowering and seeding; leaving cuttings to lie and rot has an adverse effect as such management favours robust grasses, especially cocksfoot *Dactylis glomerata*, dock *Rumex* species and hogweed *Heracleum sphondyllium*: species diversity and interest is lost. The policy is under review.
- Enrichment from carelessly spread fertilisers and slurry on adjoining fields also favours robust grasses and weeds.
- Spray drift is very damaging if it occurs: the results are loss of species diversity and replacement with coarse weeds.
- There is some risk of road improvement works destroying sites unless care is taken to reduce fertility, and to re-sow with short native species of grass before coarse weeds take root.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1 Management

- OIC Technical Services Department has a policy in place to address its statutory duties on road safety and the control of injurious weeds, to maintain highways and a tidy appearance, and to conserve the biodiversity of verges where possible. Three cuts a year are generally carried out, sometimes four. The policy is that flower-rich verges are left uncut until the following routine cut, where other constraints allow. In addition, identified verges adjacent to heathland or of other special biodiversity value are subject to special treatment: listed verges are not cut at all, and some others are subject to only one cut in late summer. No-cut verges are in Orphir, Birsay, Harray, South Ronaldsay, Hoy, Rousay, Shapinsay and Eday. One-cut verges are in Egilsay, Eday and Papa Westray.

6.2. Research and Guidance

- The Orkney Countryside Committee has nominated two representatives (from OFC and SNH) to monitor verges, with a view to protecting the most natural verges and developing a management plan for maintenance of all verges. Deerness and Orphir parishes were originally selected for experimental verge management, then from 1997 onwards the whole of Mainland, Burray and South Ronaldsay verges have been inspected annually and their current condition mapped and reported to both OCC and the Department of Technical Services Department of OIC. From 2000, a comprehensive survey technique has been developed and by the end of 2001 a survey carried out of all Mainland. The survey is planned to cover remaining areas in 2002 with the assistance of Orkney Field Club.

The long-term solution for verges with taller vegetation may be deliberate impoverishment of soil fertility by the removal of cut vegetation and prevention of fertilizer and slurry being spread onto field verges.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Carry out favourable management of all verges of 'locally important habitat' quality. **Target: policy implemented by 2002**
- Begin re-instatement of poorer quality verges. **Target: policy trialled by 2005**

8. ACTION PLAN AGENCIES

Local agencies: OIC; SNH; OFC.

9 PROPOSED ACTIONS WITH AGENCIES

9.1 Site safeguard and management

- Implement revised policy on verge cutting following 2000-2002 study and report recommendations by 2002 (OIC).
- Mark verges for no or infrequent cutting by 2002 (OIC).
- Surface new verges associated with road engineering with poor or thin soil covering from 2003 (OIC).

9.2 Advisory

- Provide training to road maintenance staff (OIC).
- Ensure adequate advice is available and provided to all landowners on best practice (FWAG, SAC, SEERAD).

9.3 Research and monitoring

- Complete survey of all verges and make recommendations on management by 2002 (SNH, OFC).
- Undertake a feasibility study and trial of verge cuttings removal and composting by 2005 (OIC).

9.4 Promotion and awareness raising

- Raise awareness of public, especially Community Councils, of biodiversity and financial benefits of new, environment-friendly verge cutting (OIC, SNH).

REFERENCES AND OTHER INFORMATION SOURCES

OIC, Technical Services Department.
Orkney Field Club (Secretary) and SNH allocated staff

3.3 Hedges — local habitat

1. LOCAL HABITAT DESCRIPTION

Hedgerows are defined generally as continuous linear scrub less than 4 m high. Extended hedges are lengths of hedgerow adjoined by wide grassy margins fenced off from livestock. Older examples are usually single species, hawthorn or gorse, or rarely beech. Several places in Orkney have luxuriant *Fuchsia* hedges. More recent ones include varied garden shrubs, especially *Rosa rugosa*, *Fuchsia* and willows *Salix* species.

2. CURRENT LOCAL STATUS AND EXTENT

Very few, nearly all are on 19th century estates. Occasionally new hedges can be found.

3. LOCAL DISTRIBUTION

Gorse hedges occur in South Ronaldsay and Stenness; hawthorn at Barnhouse, Stenness; Binscarth and Redland, Firth; Lyking, Sandwick; Elwick, Shapinsay and Hall of Tankerness; fuchsia especially in Rousay, and beech at Berstane, St. Ola. There is an unusual mixed-species hedge in Burness, Sanday.
New hedges are more widely distributed, with one or two in the outer North Isles.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Hedges provide valuable shelter and habitat for mammals, birds and many species of invertebrates, including pollinating insects. Birds include Orkney's few woodland edge or scrub species, including robin *Erithacus rubecula*, dunnock *Prunella modularis*, song thrush *Turdus philomena* and linnet *Carduelis cannabina*, and migrant birds. Extended hedges with wide margins, especially those next to sheltered ditch banks, are of greatest value.

National Priority Species	
Linnet *Carduelis cannabina*	Great yellow bumblebee *Bombus distinguendus*
Song thrush *Turdus philomelos*	
Local Priority Species	
Orkney vole *Microtus arvalis orcadensis*	Wood mouse *Apodemus sylvaticus*
Pygmy shrew *Sorex minutus*	Dunnock *Prunella modularis*
Honeysuckle *Lonicera periclymenum*	Greenfinch *Carduelis chloris*

5. CURRENT FACTORS AFFECTING THE HABITAT

- Old hedges are degenerating from age and access by livestock. Lack of pruning contributes to the deterioration of hawthorn.
- Hedge plants in the *Ribes* genus have in some instances been lost to disease.
- Enrichment from carelessly spread fertilizers and slurry on adjoining fields and spray drift encourages robust grasses and coarse weeds instead of varied wild plants in the hedge margin.
- New hedges are often poorly maintained, and some have failed to establish.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1. Management

- SEERAD grants: CPS and RSS provide grants for planting new and restoring old hedges; RSS provides payments for creating extended hedges.
- Less Favoured Area (LFA) support payments to farmers are conditional on observance of a code good farming practice, including the preservation of hedges.

6.2. Research and Guidance

- Advice is available from FWAG and SAC on new hedge planting and maintenance.
- Locally tailored advisory leaflets are available from FWAG.

3.4 Stone and earth boundary features — local habitat

1. LOCAL HABITAT DESCRIPTION

These boundary features include stone dykes, Caithness flag dykes and other stone features among farmland including gravestones, standing stones, ruined buildings, sheep enclosures and shelters, planticrus (small enclosures near the shore used for growing kale) and remnant turf-built hill dykes. The majority of stone dykes were built during the 19th century agricultural improvements and enclosures. Many smaller enclosures around farmsteads, stackyards and on earlier “out-bye” land are older. Turf dykes may often survive from older land division into "in-bye" and "out-bye". In all, these features are distinctive in the open Orkney landscape: in some places they are the predominant features.

2. CURRENT LOCAL STATUS AND EXTENT

The occurrence of such features is extensive, but there is no complete survey information. Farm audits for agricultural investment and agri-environment schemes collect such information on a farm-by-farm basis, but no known collation has been done.

The condition of many stone dykes has in the past deteriorated, some being reduced to piles of stones. Turf dykes have almost disappeared. Caithness flag dykes were never common, and have also deteriorated. Nevertheless, a good standard of upkeep is maintained in many places.

3. LOCAL DISTRIBUTION

Stone dykes are commonest on substantial improved farms of the 19th century and other core areas of long settled farmland; Sandwick is particularly well provided with stone dykes, as are many of the north isles. There are some unusual dykes laid with slanted stones in the Tenston area of Sandwick. Small enclosures are found everywhere.

Notable sites are North Ronaldsay’s sheep dyke and enclosures on Swona, and Stromness NSA.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Dykes contain numerous holes and cracks that provide growth, shelter and nest sites for variety of plants and animals. Birds nest in them (for example, wheatear *Oenanthe oenanthe*, tystie *Cephus grylle*, storm petrel *Hydrobates pelagicus*, and fulmar *Fulmarus glacialis)*. Insects utilise them (for example, spiders, woodlice and bees). They are a shelter for mammals and migrant birds, and used as song posts in the absence of trees. Turf dykes are often botanically comparatively rich remnants in improved land. Several of Orkney's few ant colonies have been found on old turf dykes and stone dykes often support a rich lichen flora.

National Priority Species
None

Local Priority Species

Pygmy shrew *Sorex minutus*
Storm petrel *Hydrobates pelagicus*
Wood mouse *Apodemus sylvaticus*
Wheatear *Oenanthe oenanthe*

5. CURRENT FACTORS AFFECTING THE HABITAT

- Amalgamation of fields has often led to subsequent neglect of dykes that divided them.
- Fences have in many instances replaced stone dykes as stock-proof barriers.
- Cost and time requirements mean that dyke restoration is not viable without grant aid even then it is often not a high priority.
- Turf dykes are often destroyed when field boundaries are renewed.
- Stone enclosures are neglected when their original purpose has gone.
- Stone is often removed from disused structures for use elsewhere.
- Spray drift and fertiliser or slurry spreading can destroy lichens.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1. Management

- SEERAD agricultural investment grant schemes and Crofters Agricultural Grant Scheme: these continue to aid the costs of (re)building stone dykes. The level of uptake is not high. Similar grants are available from the agri-environment schemes.
- Less Favoured Area (LFA) support payments to farmers are conditional on observance of a code good farming practice, including the preservation of stone dykes and ancient monuments: at least some of these structures should qualify as ancient monuments.
- OIC re-builds when roads are widened or altered.

6.2. Research and Guidance

- Training courses are available and quite frequently provided by the Orkney Training Group instructor.

4. ARABLE AND HORTICULTURE — BROAD HABITAT TYPE

GENERAL UK DESCRIPTION

This broad habitat type covers arable cropland (including perennial, woody crops, and intensively managed, commercial orchards), commercial horticultural land (such as nurseries, commercial vegetable plots and commercial flower growing areas), freshly-ploughed land, annual leys, rotational set-aside and fallow. This habitat type includes cereal field margins but not field boundaries as these are included in the 'Boundary and linear features' broad habitat type. This habitat type also does not include domestic gardens and allotments as these are included in the 'Built-up areas and gardens' broad habitat type.

UK PRIORITY HABITATS PRESENT:	LOCALLY IMPORTANT HABITATS:
Cereal Field Margins	**Arable crops**

LOCAL STATUS

All tilled land in Orkney is included in this broad habitat type and in 2000 this amounted, according to SEERAD statistics printed in the Orkney Economic Review (2001), to 4885 ha. 82% of this was barley, the remainder oats, turnips, potatoes and others. There is little Set-aside in Orkney, and almost all of it is managed to provide autumn and winter grazing.

4.1 Cereal field margins — priority habitat

1. UK PRIORITY HABITAT DESCRIPTION

For the national action plan, cereal field margins are defined as 'strips of land lying between cereal crops and the field boundary, and extending for a limited distance into the crop, which are deliberately managed to create conditions which benefit key farmland species'. The main types include a 6 m 'wildlife strip' adjacent to the crop, which is cultivated but not cropped, and a 6 m or 12 m 'conservation headland' forming the outer margin of the crop, managed with reduced pesticides. Both may be bordered by a 1 m 'sterile strip' to prevent the spread of arable weeds from field margin into crops. Game crops, stubble or grassland fallow lying between the annual crop and field boundary are also included as cereal field margins.

2. CURRENT LOCAL STATUS, EXTENT AND DISTRIBUTION

Few fields in Orkney are managed by methods approximating those above. It is a created habitat, brought about by careful management of the margins of cereal crops that would otherwise be of very low value for biodiversity. The Priority Habitat is more relevant to areas of Britain with intensive cereal growing. Despite this, many field margins in Orkney are quite diverse, and there is the potential for them to be more or less so depending upon how they are managed.

At a small number of farms throughout the isles cereal fields are managed according to the prescriptions of the 'Conservation Headlands' option of CPS and RSS, i.e. they fit the Priority Habitat definition. 5.7 ha are entered into the 'Management of Conservation Headlands' option of CPS. No figures are yet available for equivalent options taken up in the single RSS year of 2001.
There are no other known cases of this type of management.

The combined effects of climate and farming systems can provide arable habitats over entire fields that are at least equal in biodiversity to *Cereal Field Margins*. These Orkney habitats are described in the separate section on *Arable Crops* (4.2*)*. However, most of what is known about the biodiversity of arable crops results from research carried out on field margins, and it is convenient to describe it in this section.

3. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Up to 100 species of wild plants may be found in cultivated land in Orkney, many of them declining species in the UK and some of them rare in the UK. More commonly, around 30 species may be expected to occur at a single cereal field margin site in Orkney. Among these are the local priority species listed below, also speedwell *Veronica*, *Geranium* and fumitory *Fumaria* species, crucifers and scentless mayweed *Tripleurospermun inodorum*. Local weeds important for providing seeds for small seed-eating birds are known to include knotgrass *Polygonum* spp, redshank *Persicaria maculosa* and corn spurrey *Spergula arvensis.* Species to benefit especially include skylark *Alauda arvensis*, twite *Carduelis flavirostris* and reed bunting *Emberiza schoeniclus*. Probably several hundred species of insects occur (over 1000 are known from studies in the south of UK). The great majority of these are associated with the wild plants; others are predators, which also take many crop pests. Both plants and insects are food sources for small mammals and a wide variety of birds, many of these also declining. At the top of this chain are the birds of prey. Arable weeds, especially those of the labiate family provide important forage for nectar-feeding insects, including bumblebees.

The greatest diversity of plants and insects occurs at the field margin, as the plants take advantage of the poorer crop-growing conditions there; and the insects benefit from the refuge and over-wintering habitat at the field edge.

National Priority Species	
Brown Hare *Lepus europaeus*	Reed bunting *Emberiza schoeniclus*
Skylark *Alauda arvensis*	Corn bunting *Miliara calandra*
Linnet *Carduelis cannabina*	Shepherd's needle *Scandix pecten-veneris* (Extinct)
Purple ramping-fumitory *Fumaria purpurea*	Great yellow bumblebee *Bombus distinguendus*
Local Priority Species	
Orkney vole *Microtus arvalis orcadensis*	Pygmy shrew *Sorex minutus*
Merlin *Falco columbarius*	Kestrel *Falco tinnunculus*
Kestrel *Falco tinnunculus*	Meadow pipit *Anthus pratensis*
Sparrowhawk *Accipiter nisus*	Twite *Carduelis flavirostra*
Short-eared owl *Asio flammeus*	Swallow *Hirundo rustica*
Hen harrier *Circus cyaneus*	Heath carder bee *Bombus muscorum*
Dense-flowered fumitory *Fumaria densiflora*	Bugloss *Anchusa arvensis*
Long-headed poppy *Papaver dubium*	Corn marigold *Chrysanthemum segetum*
Northern dead-nettle *Lamium confertum*	Corn spurrey *Spergularia arvensis*
Northern knotgrass *Polygonum boreale*	Common stork's-bill *Erodium cicutarium*

4. CURRENT FACTORS AFFECTING THE HABITAT

The habitat as defined in the UK HAP is known to exist in Orkney only as a result of agri-environment schemes. It does not exist in Orkney, as it sometimes does in intensive cereal growing areas in southern Britain, as a result of adopting specialised techniques for weed control in field margins. Factors that depress uptake of the 'Conservation Headlands' option of agric-environment schemes are:

- annual payments received on the small areas involved are not high;
- in the context of a mixed farming system like Orkney's, the arable break is a convenient opportunity to treat broad-leaved weeds in grassland with herbicide.

Broader trends in the development of agriculture may well involve changes that determine the availability of this option. These are dealt with more fully in the section on *Arable crops*, but could include reductions in CAP support for grow cereal growing, a probable decline in mixed farming, and field amalgamations.

5. CURRENT ACTIONS AND OPPORTUNITIES

5.1 Management

- SEERAD grants: CPS and RSS provide grants for creating this habitat. Of the 130 Orkney farms participating in the schemes very few have adopted this management option (see sections 2 and 4 above).
- Pesticide environmental protection legislation provides a potential opportunity for creating this habitat: the requirement to observe a no-spray buffer zones by water courses could be turned to advantage by creating a cereal field margin habitat.
- Those few farms in Orkney that grow substantial areas of cereal and oilseed crops, and have land in set-aside, could adopt the option to create cereal field margins on that Set-aside, at least experimentally.

5.2 Guidance

- Guidance on creation and management, and protection of habitats and sites adjoining crops, is provided by FWAG and SAC.

6. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

Maintain and where possible enhance the biodiversity of field margins in Orkney. **Target: 20 farms practicing management of *Cereal field margins* by 2005.**

7. ACTION PLAN AGENCIES

7.1 National agencies: SEERAD; SNH

7.2 Local partners: RSPB; FWAG; SAC; Orkney College

8. PROPOSED ACTIONS WITH AGENCIES

The UK HAP directs the statutory agencies in their objectives and targets, and gives a conservation direction to the local HAP. Targets and responsibilities will therefore trickle down from the national plan. The actions listed below are additional or complementary to those of the national plan, to which reference should be made.

8.1 Advisory

- Encourage farmers entering agri-environment schemes to take up the 'Conservation Headlands' or similar option (SAC, FWAG).
- Advise farmers and contractors on current best practice in cereal field margin management by 2003 (SAC).
- Promote a targeted, minimal-use policy (for example the techniques set out in SNH's 'TIBRE' initiative) on pesticides (SAC, FWAG).

8.2 Research and monitoring

- Initiate research on the quality of this habitat in Orkney by 2005 (SNH, RSPB).

8.3 Promotion and awareness raising

- Raise awareness of biodiversity and management of these habitats through events and farm walks (FWAG).
- Develop training courses on cereal field margin management by 2004 (SAC, FWAG, Orkney College).
- Identify and use a demonstration site for cereal field margin management by 2004 (SAC, Orkney College, FWAG).

REFERENCES AND OTHER INFORMATION SOURCES

Andrews, J. & Rebane, M. (1994) *Farming & Wildlife. A practical management handbook.* RSPB
Orkney FWAG
Orkney Islands Council. (2001). Orkney Economic Review No 19. Department of Development and Protective Services, OIC, Kirkwall

4.2 Arable Crops — locally important habitat

1. LOCAL HABITAT DESCRIPTION

The local habitat includes arable crops grown to feed livestock and humans, to provide habitat for game and other wildlife, and 'set-aside' if it is left fallow. Commercial crops include spring barley and some oats for harvesting, some mixed crops for whole-crop silage, turnips, oilseed rape and vegetables. Game and wildlife habitat consists of mixed crops. 'Set-aside' in Orkney is often grass-covered, but may simply be left as a weedy fallow. This local habitat has been prioritised because it can be of the greatest value for fauna and flora associated with agriculture, more even than the Priority Habitat *Cereal field margins.*

Commercial arable cropping in Orkney has for a number of reasons greater benefits for a wide range of fauna and flora than it does in more southern parts of Britain. The sub-optimal climate for cereals and the place of cereal-growing in a mixed farming system have consequences for the management and growth of these crops. These include spring sowing and, often, poor seedbeds, leading to comparatively low yields, winter stubbles and late harvests. The results can, sometimes, be similar to those intended from management devised specifically for biodiversity in crop-growing regions further south. Other, non-cereal crops provide a further range of farmland habitats. For these reasons *'Arable crops'* are a Locally Important Habitat. One important qualification should be attached to this description: most commercial crops are now grown by efficient modern methods with inputs of fertilisers and pesticides, which impose limits on their value as wildlife habitat.

2. CURRENT LOCAL STATUS, EXTENT AND DISTRIBUTION

Areas of crops grown in 2000 in Orkney, from SEERAD statistics, were, (in hectares):

Barley	4004
Oats	133
Mixed grain	8
Potatoes	58
Roots for stock feed	138
Other crops for stock feed	388
Vegetables for human consumption	10
TOTAL	4885

The total area has not changed significantly in the last 20 years, though the proportion of the total devoted to different crops has. The areas of all crop types except barley have declined. The area under barley has increased from 2500 hectares, and the area under oats decreased from 1400 hectares.

2.1 Commercial cereals for harvesting

Most cereal crops, now overwhelmingly spring barley, are managed with inputs of fertiliser and pesticides, and have limited value for biodiversity, though even with these practices spring sowing and leaving stubbles over winter do provide a winter habitat, and thin, weedy crops sometimes result from poor growing conditions. Also, bad weather and field conditions at harvest time quite commonly result in much spilt grain, or even, occasionally, abandonment of the crop.

On a minority of farms cereals continue to be grown extensively with little fertiliser and no pesticide input. This is possible in a mixed farming system with arable crops following grass leys. Rarely, these crops are part of a traditional type of rotation including turnips. The practice continues in the outer isles, in particular North Ronaldsay, but is now uncommon and decreasing. The area is not known. In North Ronaldsay only, some ancient varieties or species of oats are still grown for harvesting with the binder.

2.2 Other crops for stock feed

These are comprised mainly of mixed sowings of cereals, sometimes including peas and vetches, for harvesting as whole-crop silage. They are harvested before ripening and provide little in the way of habitat or feeding for fauna or flora.

2.3 Root crops, oilseeds and vegetables

Commercial growing of potatoes for seed was carried on in Orkney until the mid 1990s. It has now ceased, and ware potatoes only are now grown. A small area of oilseed rape was also grown in the 80s and 90s, but this has also ceased. Vegetables are produced for local consumption. Some farms grow potatoes and vegetables for home consumption in small plots, but the practice is declining rapidly. The area of turnips grown has decreased by 25% in the three years to 2000, and seems set to decline further.

These broad-leaved crops receive agri-chemical inputs to varying degrees, but weed control is less straightforward than for cereals, and they tend to be weedy. Turnips are known to be especially valuable for wintering farmland birds.

2.4 Game and wildlife habitat

These include crops grown and deliberately left unharvested for feeding wintering birds, crops grown for early cover for corncrakes *Crex crex*, and as game cover. Crops grown are various mixtures of cereals, turnips, kale, oilseed rape and mustard.

The RSPB has initiated a project to provide crops of this kind: the total area is 9.6 hectares. From 2002, similar crops are to be provided on farms entered in RSS. Of the 19 farms entered, all, or nearly all, have adopted this option. The area of crop so provided is in the region of 40 hectares.

2.5 Set-aside

Between 15 and 20 farms in Orkney have land in set-aside.

2.6 Other crops

A small area of oats is grown for straw-plaiting for Orkney chairs. Traditionally, black oats has been used for this purpose.

3. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

The species associated have been largely covered in the previous section on *Cereal field margins*. However, weedy arable crops are capable of supporting a greater diversity of species and in much greater numbers too. Winter stubbles and spilt grain notably support wintering flocks of whooper swans *Cygnus cygnus* geese, ducks, rock doves *Columba livia* and small farmland birds, especially skylark *Alauda arvensis*, twite *Carduelis flavirostra* and snow bunting *Plectrophenax nivalis.* The turnip and other *brassica*, vegetable and mixed bird-feeding crops are excellent habitats for the smaller farmland birds, especially twite *Carduelis flavirostra* and reed bunting *Emberiza schoeniclus*. Linnet *Carduelis cannabina*, chaffinch *Fringilla coelebs*, brambling *Fringilla montifringilla* and rarer buntings may be among them. Hen harrier *Circus cyaneus*, kestrel *Falco tinnunculus* and merlin *Falco columbarius* are raptors which especially benefit from all these habitats.
The corn bunting *Emberiza calandra* once very common has recently almost certainly become extinct in Orkney. The yellowhammer *Emberiza citrinella*, always scarce, last bred in the early 1970s.

Lapwing *Vanellus vanellus* nest in cereal crops, and often now curlew *Numenius arquata* in those areas of Orkney where natural breeding habitat is scarce.

Turnip crops provide some of the best conditions for arable weeds, including nationally rare species. Common arable weeds of the labiate family, notably hemp nettle *Galeopsis tetrahit* and red dead-nettle *Lamium purpureum*, are important nectar sources for bumblebees and moths. Many species of pollinating flies visit the *Compositae* family of plants. Predatory hoverflies range over the whole field.

Some ancient and now threatened crop varieties and species are still grown on a very small scale, including bere barley *Hordeum vulgare*, black oats *Avena strigosa* and 'Mirkle' oats, a very old cultivated oat *A. sativa* variety.

Priority species additional to those listed under *Cereal crop margins*

National Priority Species	
Corncrake *Crex crex*	
Local Priority Species	
Snow bunting *Plectrophenax nivalis*	Peregrine *Falco peregrinus*
Teal *Anas crecca*	Whooper swan *Cygnus cygnus*
Mallard *Anas platyrhynchos*	Curlew *Numenius arquata*
Lapwing *Vanellus vanellus*	

4. CURRENT FACTORS AFFECTING THE HABITAT

This habitat has been much reduced as agriculture has changed from small-scale mixed farming to larger, modern, more specialised farming. Important changes are:

- Increased use of pesticides, therefore less weeds and associated fauna;
- Increased use of fertilisers, producing denser crops with less light or space for small plants;
- Mechanisation, accompanied by reduced farm labour, and abandonment of labour-intensive crops (notably, turnips and home-grown produce plots); the apparent rapid decline in turnip crops means a loss of much important habitat;
- Specialisation, with barley replacing a diversity of other arable crops;
- Loss of the old crops, like black oats *Avena strigosa*, and the traditional farming methods that went with them; the loss here is in the cultural or heritage value of the crops themselves, of the varied farmland habitats associated with small-scale cropping, and the absence of stooks and stacks for seed-eating birds.

5. CURRENT ACTIONS AND OPPORTUNITIES

5.1. Management

- SEERAD grants: CPS and RSS provide options to continue or begin traditional arable cropping rotations. 81.54 ha are entered into the 'Extensive Cropping' option of CPS. No figures are yet available for equivalent option taken up in the single RSS year of 2001. RSS provides an additional option, of simply growing crops and leaving them unharvested for birds: this is more in demand. This is a very significant development, set to provide many hectares of a valuable farmland habitat.
- The Arable Area Payments Scheme (CAP payments) administered by SEERAD provides an opportunity to undertake environmental management, by growing of bird-cover crops, on set-aside land. There have been a very few instances of plots being established.
- The Organic Aid Scheme administered by SEERAD provides annual payments to those converting to organic production. An increase in organic farming is already providing new areas of extensively grown crops.
- A scheme funded and put in place by the RSPB in 2000 has resulted in the establishment of 14 mixed-crop plots totalling 9.6 ha. They are primarily for feeding wintering farmland birds and providing early and late cover for corncrakes, but they have great benefits for plants and insects also.
- There are about 10 organic farms in Orkney. It is thought that at least three of these grow substantial areas of cereals, possibly amounting to 25 hectares in 2000.

5.2 Research and Guidance

- Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.
- Guidance on conversion to organic farming is provided by SAC.

6. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Retain the area in commercial extensive cropping.
- Increase the area of targeted bird-feeding crops. **Target: 100 hectares by 2006**
- Increase the area of extensive cropping. **Target: 50 more hectares by 2006**
- Increase the area of farmland under organic production. **Target: double by 2004**

7. ACTION PLAN AGENCIES

Local partners: RSPB; SEERAD; SNH; FWAG; SAC; Orkney College

8. PROPOSED ACTIONS WITH AGENCIES

8.1. Policy and legal status

- Support business projects that depend upon the traditional crop resource, e.g. Orkney straw-back chairs and other niche market products (Orkney Enterprise).
- Aid capital costs associated with organic conversion (SEERAD, Orkney Enterprise).

8.2. Site safeguard and management

- Maintain arable cropping at appropriate sites on RSPB reserves (RSPB).

8.3. Advisory

- Promote organic farming (SAC, NFU).
- Encourage farmers entering agri-environment schemes to take up the RSS 'Unharvested Crops' option (SAC, FWAG).
- Encourage farmers entering agri-environment schemes to take up the RSS 'Extensive Cropping' option (SAC, FWAG).
- Promote a targeted, minimal-use policy (for example the techniques set out in SNH's TIBRE initiative) on pesticides (SAC, FWAG).

8.4. Research and monitoring

- Research the quality of this habitat in Orkney by 2005 (RSPB, Orkney Field Club).
- Research the the potential for new crops and new uses for old ones (Orkney College).

8.5. Promotion and awareness raising

- Raise awareness of biodiversity and management of these habitats through events and farm walks (FWAG).
- Develop training courses on targeted pesticide use by 2004 (SAC, Orkney College, Orkney Training Group, FWAG).
- Identify and use a demonstration site by 2004 (SAC, Orkney College, FWAG).

REFERENCES AND OTHER INFORMATION SOURCES

Orkney FWAG
Orkney Islands Council. (2001). *Orkney Economic Review No 19*. Department of Development and Protective Services, OIC, Kirkwall

5. IMPROVED GRASSLAND — BROAD HABITAT

GENERAL UK DESCRIPTION

This broad habitat type is characterised by vegetation dominated by a few fast-growing grasses on fertile, neutral soils. It is frequently characterised by an abundance of rye-grass *Lolium* spp. and white clover *Trifolium repens*. Improved grasslands are typically either managed as pasture or mown regularly for silage production or in non-agricultural contexts for recreation and amenity purposes; they are often periodically resown and are maintained by fertiliser treatment and weed control. They may also be temporary and sown as part of the rotation of arable crops but they are only included in this broad habitat type if they are more than one year old. Sown grasslands which are less than one year old are included in the 'Arable and horticultural' broad habitat type.

This broad habitat type includes species-poor semi-improved grassland (part of B6 in Phase 1 Survey terminology).

UK PRIORITY HABITATS PRESENT:

None

LOCALLY IMPORTANT HABITATS:

Extensive hay/silage crops.

Other locally occurring habitats: **Improved grassland**

5.1 Improved grassland — local habitat

1. LOCAL HABITAT DESCRIPTION

This is not as a uniform habitat, nor is it lacking in value for biodiversity. Soil, aspect, frequency of re-seeding and amounts of fertilisers and pesticides used provide a range of variation in quality from virtual monoculture to the borderline with semi-improved neutral grassland. Reverted, rushy grasslands will be included in this habitat if species-poor. Some improved grass fields contain winter flood-pools persisting into spring, or steep banks with relics of species-rich habitat, or they may merge at edges and corners into marshy grassland; other fields, though sown with commercial grass varieties may receive low levels of nutrient input. These fragmentary or scarcely noticeable features contribute to the matrix of habitats that support many farmland birds. They are features associated with less intensively managed grassland.

The definition does not include more species-rich permanent grassland, which is included in the *Neutral Grassland* broad habitat type.

2. CURRENT LOCAL STATUS, EXTENT AND DISTRIBUTION

This abundant habitat has value for feeding birds, and in some circumstances for breeding birds.

The habitat is well distributed throughout the isles. In lowland areas it is the dominant habitat. The total area of improved grassland in Orkney was, according to SEERAD census figures, 48916 ha in 2000, 50% of the land area of Orkney. The census figure incorporates grassland of all types, i.e. all agricultural land minus crops and "rough grazings". An unknown quantity, likely to be quite small, of semi-improved neutral grassland is contained in this figure.

3. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Improved grassland with high nutrient levels supports an abundance of common invertebrates and is an important source of food for birds. Large flocks of waders feed there following silage cutting, and in winter. It is also important for geese and ducks in winter, including the flock of up to 1100 barnacle geese *Branta leucopsis* winter resident in South Walls. 20,500 Greylag geese *Anser anser* were counted in November 1999, and 16,700 in November 2000. Greenland White-fronted goose *Anser albifrons* number up to 150 at the Loons, Birsay, 50 in Stronsay and occasional small parties in Tankerness. Numbers of wintering Greylags have increased greatly in the last 20 years, presumably in response to mild winters and an abundance of nutritious improved grass.

Small numbers of waders breed in improved grassland, especially redshank near ditches and any wet hollows. However, the management, whether by cutting or grazing, is unlikely to permit a high breeding success.

Brown hares *Lepus europaeus* occur in improved grassland habitats, but require adjacent semi-natural habitats also.

National Priority Species	
Brown hare *Lepus europaeus*	Skylark *Alauda arvensis*
Local Priority Species	
Barnacle goose *Branta leucopsis*	Whooper swan *Cygnus cygnus*
Wigeon *Anas penelope*	Common gull *Larus canus*
Oystercatcher *Haematopus ostralegus*	Curlew *Numenius arquata*
Lapwing *Vanellus vanellus*	Redshank *Tringa totanus*

Species associated with the *Extensive hay/silage crops* 'Locally Important Habitat' are described in the separate section of this audit, below, relating to that habitat.

4. CURRENT FACTORS AFFECTING THE HABITAT

The recent history of agriculture in Orkney is one of increased production and more intensive grassland management. Agricultural grants, especially headage payments, have favoured intensive production. The pace of this change has slowed in recent years, as a result of quota restrictions, a gradual switch to area-based payments and introduction of premium payments for extensification.
Some accompanying negative factors for biodiversity are:

- Drainage of wet patches;
- Increased use of pesticides to combat weed problems, especially docks, associated with high nutrient inputs and heavy stocking densities;
- An increase in the area of more intensively managed grassland at the expense of semi-improved grassland;
- Heavier stocking rates contributing to birds' nest destruction;
- Slurry-spreading during grassland birds' nesting season, causing nest destruction and chick mortality;
- Loss of spring and autumn cover, a principle cause of decline in corncrake *Crex crex* numbers;
- Heavier silage crops and industrial-sized machinery to harvest them, leading to loss of grassland bird's nest and young, especially those of the corncrake *Crex crex*.

On the positive side, farming intensification and its effects on the grassland habitat have no adverse effect on the winter feeding flocks.

5. CURRENT ACTIONS AND OPPORTUNITIES

While this habitat has not been selected as Locally Important, because it is so common, some improved permanent grass fields can potentially be valuable habitats for breeding grassland birds, but only if conditions are favourable for the successful rearing of young. SEERAD's new RSS scheme provides an opportunity for management with its 'Management of Open Grazed Grasslands for Birds' option. Some permanent grass fields may be suitable for the 'Management of Wet Grassland for Waders' option. However, it is likely that fields selected for these options will be less improved, and of *Neutral grassland* habitat type.

Agriculturally poorer fields can be considered for conversion to a species-richer grassland by extensive management and introduction of plant species, or wholesale re-seeding with appropriate grass-seed mixes. RSS 'Creation and Management of Species-rich Grassland' provides an opportunity.

REFERENCES AND OTHER INFORMATION SOURCES

Orkney Islands Council. (2001). *Orkney Economic Review No 19*. Department of Development and Protective Services, OIC, Kirkwall

5.2 Extensive hay/silage crops — locally important habitat

1. LOCAL HABITAT DESCRIPTION

This is improved grassland managed in such a way as to provide habitat for nesting grassland birds. The management required consists, in summary, of low to moderate inputs of fertiliser, no pesticides, a single late harvesting date, and employment of a bird-friendly cutting method that allows birds (and mammals) to escape from the crop as it is harvested.

It is helpful to divide this habitat into two tiers:

1. tier 1, fields where agri-environment schemes provide the specifications, with some variety of options within and between the various schemes;
2. tier 2, fields where similar, extensive management is carried out in the absence of agri-environment scheme prescriptions, but usually without the 'bird-friendly' harvesting.

More species-rich grasslands managed in the same way are included in the *Neutral grassland* broad habitat.

This HAP has close links with the Corncrake Species Action Plan, to which reference should be made.

2. CURRENT LOCAL STATUS, EXTENT AND DISTRIBUTION

The total area of 'grass for mowing' in Orkney was, according to SEERAD census figures, 16678 ha in 2000. The great majority of this area is not *Extensive hay/silage crops* as defined for this locally important habitat type. The management that defines this habitat is now uncommon in the prevailing farming system, but no figures for the area so managed are available.

The habitat is of great importance for a variety of farmland birds.

The tier 1 area is almost entirely provided by the fields managed according to agri-environment scheme prescriptions. Very few fields are managed in the same way without participation in any agri-environment scheme. Although there are no figures available for the area of fields managed in this way, there are 130 farms in CPS and RSS, the great majority of which have chosen to manage one or more hay or silage fields in this way: it is likely that the area so managed is around 1000 hectares.

The tier 2 area is provided on a very few traditionally-run farms where hay-making prevails, or more commonly, on the more intensive farms by the one or a few fields selected for hay-making. Late single cuts of silage may be the practice on some farms also. There are no figures available for a tier 2 area.

Both tier 1 and 2 habitats are well distributed throughout the isles. A key area for tier 1 is Egilsay, where this habitat is provided on the RSPB Reserve and by agreement with other island landowners. A key area for tier 2 is North Ronaldsay, where the crofting system prevails.

3. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

While this habitat may be botanically poor, it supports common grassland herbs and non-agricultural species of grass, and these being allowed to mature provide seeds and diverse invertebrates as food for nesting grassland birds. The sward structure is favourable for fledgling birds. It is the habitat most associated with the corncrake *Crex crex*.

National Priority Species	
Corncrake *Crex crex*	Skylark *Alauda arvensis*
Brown hare *Lepus europaeus*	
Local Priority Species	
None	

4. CURRENT FACTORS AFFECTING THE HABITAT

The changes in agriculture that have reduced the area of this habitat (tier 2 type) are outlined in the preceding equivalent section on *Improved grassland*. Fodder production from grassland is now characterised by heavy crops produced with the liberal use of fertilisers, early cutting dates (sometimes two consecutive cuts beginning in June) and the use of large, fast machinery.

5. CURRENT ACTIONS AND OPPORTUNITIES

5.1 Management

- SEERAD grants - CPS and RSS provide grants for managing this habitat and adjoining areas of cover provided by field margins and rough vegetation. Almost all of the 130 Orkney farms participating in the schemes manage all or part of their grassland forage in this way.
- SEERAD's Organic Aid Scheme provides incentives for conversion to organic farming: organic methods tend to be more extensive than conventional ones, and provide a richer invertebrate fauna. About 10 farms are organic or in conversion: there is potential for much more organic production.
- The Corncrake Initiative, funded by RSPB and SNH and supported by SCU, has been providing payments to farmers with calling corncrakes on their land to delay cutting until 1st August and cut using corncrake-friendly methods. A project worker has been employed in Orkney each season since 1994.

5.2 Research, Guidance and Promotion

- Advice on management is provided by the RSPB Corncrake Initiative Officer. Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.
- SEERAD and RSPB as the Scottish lead partners for the national corncrake Species Action Plan have organised events for farmers and contractors to demonstrate corncrake-friendly harvesting methods.
- Leaflets and guidance literature on managing grassland for corncrakes has been produced by RSPB and sent to farms participating in CPS by SEERAD.
- The local media are widely used to appeal for information and to broadcast details of the Corncrake Initiative.

6. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Increase the area habitat under tier 1 management. **Target: 200 hectares by 2005**
- Retain the current area under tier 2 management.
- Increase the practice of bird-friendly cutting methods. **Target: 100% of tier 2 type hay and silage fields by 2007**
- Increase the area of farmland under organic production. **Target: double by 2005**

7. ACTION PLAN AGENCIES

Local agencies: RSPB; SEERAD; SNH; FWAG; SAC; NFUS; Orkney College

8. PROPOSED ACTIONS WITH AGENCIES

8.1 Site safeguard and management

- Maintain the habitat at appropriate sites on RSPB reserves (RSPB).

8.2 Advisory

- Encourage farmers entering agri-environment schemes to take up the options to create and conserve this habitat (SAC, FWAG).
- Promote organic farming (SAC, NFUS).
- Promote bird-friendly cutting methods in tier 2 fields (RSPB, FWAG, SAC, SNH).

8.3 Research and monitoring

- Research and develop advice on the economic, technical and agronomic aspects of modifying grassland management for corncrakes and other nesting birds by 2004 (SAC).

8.4 Promotion and awareness raising

- Raise awareness of biodiversity and management of the habitat through events and farm walks (SEERAD, RSPB, SAC, FWAG).
- Develop training on grassland management techniques for nesting birds by 2004 (SAC, FWAG, SNH, RSPB, Orkney College).

REFERENCES AND OTHER INFORMATION SOURCES

Andrews, J., and Rebane, M. (1994). *Farming and Wildlife*. RSPB, Sandy
RSPB. (1998). *Farms, Crofts & Corncrakes*. RSPB leaflet

6. NEUTRAL GRASSLAND — BROAD HABITAT TYPE

GENERAL UK DESCRIPTION

This broad habitat type is characterised by vegetation dominated by grasses and herbs in a range of neutral soils usually with a pH of between 4.5 and 6.5. It includes enclosed dry hay meadows and pastures, together with grasslands that are periodically inundated with water or permanently moist.

Neutral grasslands are sometimes referred to as mesotrophic grasslands. The plant communities on neutral soils are different from those on acid soils (acid or calcifugous grassland) and calcareous soils (calcareous or calcicolous grassland). For the most part neutral grassland communities have few diagnostic indicator species but lack strong calcicoles or calcifuges characteristic of base-rich or acid-rich soils respectively. The National Vegetation Classification describes 12 types of unimproved or semi-improved neutral grassland. These types are used to define the *"Neutral grassland"* broad habitat type.
Unimproved or species-rich neutral grasslands are usually managed traditionally as hay-meadows and pastures. Semi-improved neutral grasslands are also included in this broad habitat type and these grasslands are usually managed for pasture and for silage or hay. Neutral grassland differs from improved grasslands by having a less lush sward, a greater range and higher cover of herbs, and usually less than 25% cover of perennial ryegrass.

Note: the national definition includes some very wet grassland (part of B5 'Marshy grassland' in Phase 1 Survey terms) with meadowsweet *Filipendula ulmaris*, marsh marigold *Caltha palustris* and rushes.

UK PRIORITY HABITATS PRESENT:

None

LOCALLY IMPORTANT HABITATS:

Wet meadow
Species-rich grassland

Other locally occurring habitats:

Semi-natural grassland

LOCAL STATUS

The UK description includes a range of grassland types common in Orkney.

6.1 Wet meadow — locally important habitat

1. LOCAL HABITAT DESCRIPTION

This is a lowland habitat, variable in character and including damp or wet pastureland improved in the past but now 'reverted'; wet grazing meadows never improved by cultivation but modified by grazing use, and probably enriched by nutrients over a long period; also some wetter areas with little agricultural use where grass species are the dominant vegetation. Recently reverted wet grasslands may have abundant tall rushes but be species-poor: these grasslands are included in the *Improved grassland* Broad Habitat.

Dominant species are grasses including creeping and common bent *Agrostis stolonifera* and *A capillaris,* tufted hair-grass *Deschampsia cerpitosa,* rough meadow grass *Poa trivialis,* Yorkshire fog *Holcus lanatus,* marsh foxtail *Alopecurus geniculatus,* with red and white clover *Trifolium pratensis* and *T repens,* buttercup *Ranunculus repens.* Soft and conglomerate rush *Juncus effusus* and *J conglomeratus,* lady's smock *Cardamine pratensis* and marsh marigold *Caltha palustris* are often common. Flag iris *Iris pseudacorus* may be locally dominant. Wetter sites, often with purple moor-grass *Molinia caerulea* and sedges *Carex* species, grade into types of mire that are described under the *"Fen, marsh and swamp"* broad habitat type. Such grasslands occur throughout the isles on soils of heavier clay or with impeded drainage.

2. CURRENT LOCAL STATUS AND EXTENT

The habitat is of importance mainly for its nesting waders.

The habitat is not as extensive as first impressions suggest, as most rushy areas and other damp permanent grass fields of poor diversity, being in a younger state of reversion.

Land Cover of Scotland (1993) estimates 2600 ha of 'smooth grass with rushes: no rocks, no trees'. This includes an unknown extent of unimproved hill grassland, outwith the zones of cultivation, and some species-poor reverted grassland, neither of which is included in this habitat.

3. LOCAL DISTRIBUTION

Quite often forms marginal farmland, on the boundary between agriculturally improved grassland and marsh. There is no information available on distribution, but the more likely areas of occurrence are in the central basin of the West Mainland and the heavier soils of Tankerness and South Ronaldsay. Fragments of the habitat can be found almost everywhere: flag iris *Iris pseudacorus* beds are common also on lighter soils with impeded drainage and are especially common in the north isles.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Heavily grazed wet meadows can support high densities of breeding skylark as well as lapwing and sometimes redshank. Moderately grazed/mown meadows often support good numbers of nesting curlew. In Argyll and Caithness, corncrakes have been recorded in these habitats, but have not been recorded in Orkney. As long as these habitats are not grazed bare they also support voles and hares. Wet meadows provide good hunting terrain for raptors, hen harriers and short-eared owl in particular.

In some areas, occasional tall stands of marsh thistle *Cirsium palustre* are not uncommon. These are highly attractive to seed-eating birds and nectar-feeding insects, the latter notably including bumblebees *Bombus* species.

National Priority Species	
Brown hare *Lepus europaeus*	Skylark *Alauda arvensis*
Linnet *Cauduelis cannabina*	Great yellow bumblebee *Bombus distinguendus*
Corncrake *Crex crex*	
Local Priority Species	
Orkney vole *Microtus arvalis*	Pygmy shrew *Sorex minutus*
Hen harrier *Circus cyaneus*	Short-eared owl *Asio flammeus*
Kestrel *Falco tinnunculus*	Merlin *Falco columbarius*
Meadow pipit *Anthus pratensis*	Redshank *Tringa totanus*
Lapwing, *Vanellus vanellus*	Corncrake, *Crex crex*
Curlew *Numenius arquata*	Snipe *Gallinago gallinago*
Heath carder bee *Bombus muscorum*	Twite *Carduelis flavirostris*
Ingrailed clay *Diarsia mendica orkneyensis*	A brown weevil *Tropiphorus terricola*
Glaucous sedge *Carex flacca*	A leaf beetle *Chrysolina crassicornis*
Yellow rattle *Rhinanthus minor*	Northern marsh orchid *Dactylorhiza purpurella*
Holy grass *Hierochloe odorata*	Grass of Parnassus *Parnassia palustris*
Marsh marigold *Caltha palustris*	Ragged robin *Lychnis flos-cuculi*

5. CURRENT FACTORS AFFECTING THE HABITAT

While the recent history of agriculture in Orkney is one of increased production and more intensive grassland management (though now slowed by changes agricultural support measures) there have always been low-lying fields not suited to agricultural improvement. However there are continuing pressures:

- Drainage: readily drained sites have long since been reclaimed, but remaining sites are often subject to continuing efforts to reduce them in size. Often, the objective is to improve the drainage of surrounding agricultural land that abuts wet sites. Lowered water tables and fragmentation of habitat result. Habitat fragmentation often results in poorer breeding success for wetland birds: conditions for fledglings are not optimal and they are more subject to predation. The RSPB Wetland and Marginal Moorland Sites Survey (which includes some of this habitat as well as others) of 1994 found that the "overall loss of land within site boundaries due to damage was 233 ha (5.3% of the original area)" since the previous survey of 1987. While the areas of separate BAP habitats contained within this total is unknown, it indicates a continuing process in recent times, though less than formerly.
- Fertiliser and slurry application: the diversity of plants in wet meadows is dependent on low inputs of nutrients. Remaining wet meadows have not so far received inputs to any degree: there is a possibility that some may be fertilised in a dry year, or has happened, be used for the disposal of excess slurry.
- Application of herbicides and other pesticides.
- Heavier stocking rates contributing to birds' nest destruction.
- Supplementary stock feeding which can lead to eutrophication as well as localised poaching.
- Agricultural abandonment (reduced grazing, or zero management): either allows rushes to over-dominate or grass litter to build up excessively, both choking biodiversity.
- Tree-planting: these sites may be seen as suitable sites for planting trees. The loss of such habitats by the planting of trees is not compensated by the gain in tree or scrub cover.
- Lack of site designation/protection: few single sites meet the criteria for designation, but taken together, they support important populations of birds.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1 Management

- Sites including this habitat are managed by the RSPB on its Egilsay and Rendall Reserves.
- SEERAD grants: CPS and RSS provide grants for managing this habitat and adjoining areas of cover provided by field margins and rough vegetation. Some of the wettest sites will already be in the total of 496 ha managed under CPS 'Management of Wetland', though much of this total 'wetland' area will be comprised of other BAP habitat types. RSS includes new measures to create early and late cover for corncrakes, especially targeted at iris beds, and a 'Management of Wet Grassland for Waders' option, which should be of great benefit. No figures are yet available for the area of this habitat entered into RSS in 2001.
- LFA support payments to farmers are conditional on observance of a code of good farming practice, including the protection of natural habitats and avoidance of overgrazing: however, these scarcely apply to management of 'in-bye' land, and are not intended to address the detail of habitat management.
- The Orkney Islands Council Development Plan 2000 (Draft) gives the above-mentioned RSPB Wetland and Marginal Moorland Sites Survey sites a degree of protection from development (but not from agricultural development).

6.2 Research, Guidance and Promotion

- Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.
- Guidance on habitat management is provided by FWAG.
- Habitats such as this were covered by the RSPB/FWAG Redshank Project 1997, which was continued into 1998/99. This project promotes the use of conservation measures on sites recognized as significant habitats for wetland breeding birds.
- RSPB has commissioned National Vegetation Classification (NVC) surveys of all its reserves.
- SNH has carried out Phase 1 vegetation surveys of all SSSIs. The main wetland SSSIs have not had NVC surveys.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Maintain the current extent and distribution of wet meadows in Orkney.
- Maintain and where possible enhance the current quality of the habitat in Orkney. **Target: 75% of RSPB Wetland and Marginal Moorland Sites Survey sites in agri-environment schemes by 2010; 100% of farms entering agri-environment schemes to include wet meadow sites for management.**
- Encourage measures that create semi-natural 'buffering' habitats round wet meadow sites. **Target: 50% of farms entering agri-environment schemes to include edge-of-wetland sites for management and/or creation.**

8. ACTION PLAN AGENCIES

Local partners: SNH; SEERAD; OIC; RSPB; FWAG; SAC

9. PROPOSED ACTIONS WITH AGENCIES

9.1. Site safeguard and management

- Ensure as far as possible the conservation of wet meadow sites under LFA cross-compliance rules (SEERAD).
- Protect wet meadow sites from inappropriate developments (OIC).
- Ensure that inappropriate tree-planting is not grant assisted (SEERAD, FA).

9.2 Advisory

- Promote agri-environment scheme options aimed at conserving this habitat, especially sites on the RSPB register (SAC, FWAG).
- Promote agri-environment scheme options aimed at conserving and creating habitats adjoining and linking wet meadow sites (SNH, SAC, FWAG).
- Ensure adequate advice is available and provided to all landowners on best practice (FWAG, SAC, SEERAD).

9.3 Research and monitoring

- Continue to map and review the Wetland and Marginal Moorland Sites register; identify habitat types within the register (RSPB).

9.4 Promotion and awareness raising

- Raise awareness of biodiversity of the habitat through events and farm walks (FWAG, RSPB).

REFERENCES AND OTHER INFORMATION SOURCES

Andrews, J., and Rebane, M. (1994). *Farming and Wildlife*. RSPB, Sandy
RSPB (1995). *Wetland and Marginal Moorland Sites in Orkney 1993-94*. RSPB, Edinburgh
RSPB, EN, and ITE. (1995). *The Wet Grassland Guide: Managing floodplain and coastal wet grasslands for wildlife.* RSPB, Sandy
RSPB. (1998). *Farms, Crofts & Corncrakes.* RSPB leaflet, Edinburgh
Whyte, C., Gray, M. and O'Brien, M. (1995). *Numbers of Breeding Waders on lowland areas of Orkney 1993*. Unpublished RSPB report, Edinburgh

6.2 Species-rich grassland — locally important habitat

1. LOCAL HABITAT DESCRIPTION

This habitat is distinguished firstly from *Wet meadow* on its dryness. Neutral species-rich grassland on drier soils occurs very locally where environmental and other factors including thinner soils, steep hillsides and remote location discourage intensive management. Often referred to as unimproved grassland, these species-rich grasslands are almost all managed by grazing.

The habitat is usually derived from species-rich heath (see *Species-rich heath* in the *Dwarf shrub heath* Broad Habitat), where the dwarf shrub component has been eradicated by grazing and, sometimes, applications of lime and slag. It occurs almost exclusively on calcareous Rousay Flags. It is often herb-rich, with wild thyme *Thymus polytrichus*, lady's bedstraw *Galium verum*, purging flax *Linum catharticum*, bird's-foot trefoil *Lotus corniculatus*, clovers *Trifolium* species, plantain *Plantago* species, primrose *Primula vulgaris*, heath dog-violet *Viola riviniana* and abundant eyebrights *Euphrasia* species. Glaucous sedge *Carex flacca* is often present.

Additionally, there are rare examples of lowland, enclosed fields of species-rich grassland, some of which may be managed as hay meadows. Such fields are not likely to be as species-rich as these grazed hillsides, but are likely to support sedge *Carex* and woodrush *Luzula* species, abundant meadow buttercup *Ranunculus acris*, plantain *Plantago* species, cat's-ear *Hypochaeris radicata* and yellow rattle *Rhinanthus minor*, with self-heal *Prunella vulgaris* and occasional orchid *Dactylorhiza* species. Most enclosed fields that appear on first impression to be 'species-rich' will support a narrow range of herbaceous plants and non-agricultural grasses, and fall into the *Rough grassland* habitat type (see below).

2. CURRENT LOCAL STATUS AND EXTENT

This is a scarce and localised habitat, akin to calcareous grassland, a type not identified as occurring in Orkney. It is of great interest for its richness of plants. Any hay meadows that can be described as this habitat will be rich habitats for birds and invertebrates.

There are no available estimates for its extent. It is a habitat much endangered by changes in agricultural management.

3. LOCAL DISTRIBUTION

The habitat may occur anywhere where the underlying rocks and the management sustain it, but the only known grazed hillside sites are in the West Mainland and Rousay, mainly around Finstown, the Hill of Dwomo in Evie, and some south-facing terraces on the lower slopes of the Rousay hills. Fragments may occur elsewhere on the steep, grazed banks of burns, round disused quarries, or rocky outcrops in enclosed fields, for example in Egilsay, and on ancient monuments.

Rare, species-rich enclosed fields exist where by chance no agricultural improvement has taken place, and where successfully created in agri-environment schemes. An outstanding site is at the Ring of Brodgar, Stenness (to the south of the Ring itself). Not uncommonly, wet meadows have drier patches within them, and these may be the commonest places to find dry species-rich grassland in the lowland landscape.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

This habitat will support a wide range of plant species and some individual areas of species-rich grassland may be very species-rich. One field in Sanday has a good population of cowslip *Primula veris*. The more diverse they are the better they are for biodiversity in general. Floristically rich grasslands will support a wide range of invertebrates including the great yellow bumblebee *Bombus distinguendus*, certainly as a nectar source but possibly as nest sites too. Where management allows a full growing season hay meadows can support corncrake *Crex crex*. Meadows when grazed or managed for hay/silage will support skylark *Alauda arvensis* as well as a range of other farmland waders and small songbirds, providing both nest sites and feeding for invertebrate and seed eating species.

National Priority Species	
Brown hare *Lepus europaeus*	Skylark *Alauda arvensis*
Corncrake *Crex crex*	Great yellow bumblebee *Bombus distinguendus*
Local Priority Species	
Orkney vole *Microtus arvalis*	Pygmy shrew *Sorex minutus*
Meadow pipit *Anthus pratensis*	Short-eared owl *Asio flammeus*
Oystercatcher *Haematopus ostralegus*	Corncrake *Crex crex*
Lapwing *Vanellus vanellus*	Wheatear *Oenanthe oenanthe*
Hen harrier *Circus cyaneus*	Twite *Carduelis flavirostris*
Kestrel *Falco tinnunculus*	Merlin *Falco columbarius*
Heath carder bee *Bombus muscorum*	Common blue *Polyomattus icarus*
Ingrailed clay *Diarsia mendica orkneyensis*	A brown weevil *Tropiphorus terricola*
A leaf beetle *Chrysolina crassicornis*	Glaucous sedge *Carex flacca*
Limestone bedstraw *Galium sterneri*	Primrose *Primula vulgaris*
Yellow rattle *Rhinanthus minor*	Northern marsh orchid *Dactylorhiza purpurella*

5. CURRENT FACTORS AFFECTING THE HABITAT

The habitat is subject to similar pressures as affect *Wet meadow*. Whilst drainage is not an important factor, these habitats are highly vulnerable to changes in agricultural practice, in particular any increased nutrient inputs. Other factors are:

- Use as stock feeding sites: dry ground is often used for feeding livestock in otherwise wet areas: the native plant communities are destroyed by nutrient enrichment and trampling, and undesirable weeds introduced.
- Amenity site management: on amenity and archaeological sites regular mowing is often carried out, and herbicides sometimes used.
- Alien species introduction: ‘wildflower mixes’, sown in gardens, or increasingly on a larger scale as part of agri-environment schemes, will contain both alien species and native species non-native provenance (from other parts of Britain or even Europe). Sowing of such seeds could result in the displacement of distinctive local strains.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1 Management

- SEERAD grants: CPS and RSS provide grants for managing this habitat. 392 ha are entered into the 'Management of species-rich grassland' option of CPS, and 24 ha into 'Creation of species-rich grassland'. The creation option requires re-seeding with an appropriate grass and wildflower seed mix. Much of the management area is likely to be semi-improved grassland under extensive management, rather than notably species-rich grassland, and some is Links or Machair habitat. No figures are yet available for equivalent options taken up in the single RSS year of 2001.
- SEERAD Habitats Scheme - the scheme is now closed, but management agreements remain in place. 'Creation of species-rich grassland' was one of its provisions. No figures are available for the area in process of creation, but 48 Orkney farms are participating in the scheme, many of them with this grassland management option in place.
- LFA support payments to farmers are conditional on observance of a code of good farming practice, including the protection of natural habitats and avoidance of overgrazing: however, these scarcely apply to management of 'in-bye' land, and are not intended to address the detail of habitat management.
- Sites that may include this habitat are managed by the RSPB on its Egilsay Reserve.

6.2 Research, Guidance and Promotion

- Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.
- Guidance on habitat management is provided by FWAG
- RSPB has commissioned National Vegetation Classification (NVC) surveys of all its reserves.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Identify sites in Orkney. **Target: likely areas to be surveyed by 2005**
- Maintain the current extent and distribution of species-rich grassland in Orkney.
- Maintain and where possible enhance the current quality of the habitat in Orkney. **Targets: 100% of farms entering agri-environment schemes to include species-rich grassland sites for management; 100% sites already in schemes to be revisited with management advice by 2004.**

8. ACTION PLAN AGENCIES

Local partners: SNH; SEERAD; OIC; RSPB; FWAG; SAC; Historic Scotland

9. PROPOSED ACTIONS WITH AGENCIES

9.1. Site safeguard and management

- Ensure as far as possible the conservation of species-rich grassland sites under LFA cross-compliance rules (SEERAD)
- Protect species-rich grassland sites from inappropriate developments (OIC)
- Ensure use of local provenance seed for re-creation of species-rich grassland. In its absence, ensure that seed or plants of key sensitive species is not taken in from elsewhere (SEERAD, OIC, SNH, FWAG, All)
- Ensure that inappropriate tree-planting is not grant assisted (SEERAD, FA)
- Identify habitat quality around ancient monuments, and where possible incorporate biodiversity objectives into management (Historic Scotland).

9.2 Advisory

- Promote agri-environment scheme options aimed at conserving this habitat; aim to identify key sites on any farm visit (SAC, FWAG)
- Ensure adequate advice is available and provided to all landowners on best practice (FWAG, SAC, SEERAD)
- Develop and provide advice on use of local provenance seed for habitat creation (FWAG, SAC, SNH)
- Aim to visit sites in agri-environmental schemes and provide managers with advice on habitat conservation and enhancement (FWAG)

9.3 Research and monitoring

- Carry out a survey targeted at finding the best sites for this habitat (FWAG, SNH)
- Maintain a species-rich grassland sites record from farm visits (FWAG)

9.4 Promotion and awareness raising

- Raise awareness of biodiversity of the habitat through events and farm walks (FWAG, RSPB)
- Promote the importance of using seed of local provenance, or in its absence, seed of Scottish provenance.
- Promote the development of plant breeding and seed supply from plants of local provenence (SNH)

REFERENCES AND OTHER INFORMATION SOURCES

As for Wet meadows

6.3 Semi-natural grassland — locally important habitat

1. LOCAL HABITAT DESCRIPTION

This habitat encompasses a variety of only moderately species-rich grasslands, modified by agricultural use or 'reverted'. Hence the habitat is not 'natural', but it differs from *Improved grassland* as defined by the Broad Habitat description, i.e. it is not dominated by the common species of sown agricultural grassland. It differs from the other *Neutral grassland* types in being much less herb-rich than *Species-rich grassland*, and not having the characteristic wetland plant species of *Wet meadow*. Some plant species will be the same as in *Wet meadow*, as some common ones have a wide tolerance of varied conditions, and Orkney's cool, moist climate is conducive to the growth of wet-tolerant plants in a variety of habitats. These grasslands are managed by extensive grazing, or less often, hay-cutting.
Much 'species-rich grassland' deliberately created under one of the agri-environment schemes is really only of this status rather than being *Species-rich grassland* according the BAP habitat definition.

Dominant grasses on semi-improved grassland include crested dog's-tail *Cynosurus cristatus*, creeping red fescue *Festuca rubra* and common bent *Agrostis capillaris*. Herbs, excepting clovers *Trifolium* species, daisy *Bellis perennis*, meadow buttercup *Ranculus acris*, ribwort plantain *Plantago lanceolata*, dandelion *Taraxacum* species and common grassland weeds, will occur only at low frequencies.

2. CURRENT LOCAL STATUS AND EXTENT

As an upland fringe and lowland habitat on the neutral soils of much of Orkney it has value for small mammals and grassland birds, and in turn the birds such as merlin *Falco columbarius* and hen harrier *Circus cyaneus* that prey upon them. Recent declines in breeding hen harrier numbers are almost certain to be related to loss of the moorland fringe habitats.

3. LOCAL DISTRIBUTION

The habitat occurs in enclosed lowland areas and on the upland fringe on less acid soils. It is widely scattered throughout the isles, with no key sites

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

These neutral grasslands are important habitat for birds, especially the priority species skylark *Alauda arvensis*. Lapwing *Vanellus vanellus* can be common. Hayfields are important for corncrake, as in Egilsay, also recently in North Ronaldsay, Westray and Sanday.

National Priority Species	
Brown hare *Lepus europaeus*	Skylark *Alauda arvensis*
Corncrake *Crex crex*	
Local Priority Species	
Orkney vole *Microtus arvalis*	Pygmy shrew *Sorex minutus*
Meadow pipit *Anthus pratensis*	Oystercatcher *Haematopus ostralegus*
Lapwing *Vanellus vanellus*	Corncrake *Crex crex*
Hen harrier *Circus cyaneus*	Twite *Carduelis flavirostris*
Kestrel *Falco tinnunculus*	Merlin *Falco columbarius*

5. CURRENT FACTORS AFFECTING THE HABITAT

The habitat is subject to similar pressures as affect *Wet meadow and Species-rich grassland*. Reference should also be to the habitat statement for *Improved grassland* and the HAP for *Extensive hay/silage crops*, for an outline of the agricultural improvements and operations that impact on the main interest of the habitat.

6. CURRENT ACTIONS AND OPPORTUNITIES

Actions and opportunities for this habitat are similar to those for *Species-rich grassland* and for *Improved grassland* habitat types, to which reference should be made.

- Some SEERAD CPS and RSS grants are especially targeted at enhancing the biodiversity of this habitat. The prescriptions of CPS 'Management of Grassland for Birds' provide suitable nesting conditions for birds in hay and silage fields. 1141 ha are managed in this way, though most of it is likely to be of the Improved grassland type. RSS now provides similar opportunities, and an important new one – 'Management of Open Grazed Grassland for Birds'. Brown hare *Lepus europaeus*, skylark *Alauda arvensis*, lapwing *Vanellus vanellus*, twite *Carduelis flavirostris* and birds of prey are likely to benefit. No figures are yet available for the extent of this habitat entered into RSS in 2001.
- Sites that may include this habitat are managed by the RSPB on its Egilsay and Rendall Reserve.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Increase the current extent, distribution and habitat quality of semi-natural grassland in Orkney. **Targets: 100% of farms entering agri-environment schemes to include suitable grassland sites for management; 100% sites already in schemes to be revisited with management advice by 2004.**

8. ACTION PLAN AGENCIES

Local partners: SNH; SEERAD; RSPB; FWAG; SAC

9. PROPOSED ACTIONS WITH AGENCIES

8.1. Site safeguard and management

None specific to this habitat

9.2 Advisory

- Promote agri-environment scheme options aimed at conserving this habitat; aim to identify key sites on any farm visit (SAC, FWAG).
- Ensure adequate advice is available and provided to all landowners on best practice (FWAG, SAC, SEERAD).
- Aim to visit sites in agri-environmental schemes and provide managers with advice on habitat conservation and enhancement (FWAG).

9.3 Research and monitoring

None specific to this habitat

9.4 Promotion and awareness raising

- Raise awareness of importance of the habitat through events and farm walks (FWAG, RSPB).

REFERENCES AND OTHER INFORMATION SOURCES

As for *Wet meadows*

7. ACID GRASSLAND — BROAD HABITAT TYPE

1. GENERAL UK DESCRIPTION

This broad habitat type is characterised by vegetation dominated by grasses and herbs on a range of lime-deficient soils that have been derived from acidic bedrock and superficial deposits such as sands and gravels. Such soils usually have a low base status, with a pH of less than 5.5. This habitat type includes a range of types from open communities of very dry sandy soils in the lowlands, through closed pastures on red brown earths to damp acidic grasslands typically found on gleys and shallow peats.

Acid grasslands are also referred to as calcifugous swards. The plant species assemblages that develop on acid soils are different from those that develop on neutral soils and calcareous soils and are characterised by the presence of a combination of calcifuge species. The NVC Classification describes six types of acid grassland. These types are used to define the *Acid grassland* broad habitat type. Acid grasslands and snowbed communities which occur exclusively in the montane zone are included in the *Montane habitats* broad habitat type and acid grassland types found on shingle habitats are included in the *Supralittoral sediment* broad habitat type.

Acid grasslands are one of the most extensive semi-natural habitats in the UK, yet surprisingly little is known about their true extent. Large species-poor expanses occur in the uplands. These are generally the product of management, by grazing and burning, of other priority habitats, such as dwarf-shrub heath.

UK PRIORITY HABITATS PRESENT:

None

LOCALLY IMPORTANT HABITATS

None

Locally occurring habitats: **Acid grassland**

7.1 Acid grassland — local habitat

1. LOCAL HABITAT DESCRIPTION

This acid grassland in Orkney exists in mosaic with heathland, from which it is differentiated by a dwarf-shrub component of less than 25%, and as more uniform grasslands. In these situations, and most especially in the latter case, it is the product of management, by grazing and burning. It occurs on thin peat and other poor, leached soils, mainly in the upland areas but also down to the lowest levels. There are acid grasslands in littoral and montane situations, but as stated in the UK broad habitat description, these are included under other habitat types.

Given the range of situations and soils, the characteristic plant communities are somewhat varied. Mat grass *Nardus stricta* and heath rush *Juncus squarrosus* are most characteristic on the peat. Sheep's sorrel *Rumex acetosella* indicates very acid conditions. Slightly less acid and usually more lowland sites may be characterised by Yorkshire fog *Holcus lanatus*, sweet vernal grass *Anthoxanthum odoratum* and heath bedstraw *Galium saxatile*. At this point *Acid grassland* reaches the boundary with the *Neutral grassland* broad habitat type.

2. CURRENT LOCAL STATUS AND EXTENT

Acid grasslands in mosaic with heaths that are well managed for their conservation interest contribute to the overall conservation interest of these heaths. Such heaths and grasslands occur on the higher hills and lower down near the coasts. They are not common in Orkney except where sites are protected for their conservation interest. In these situations, acid grassland almost always occurs in mosaic with heathland types, and forms rather a small proportion of the overall habitat.

Acid grassland formed from grazed-out heath is of much less interest. Whilst so abundant in the much of the rest of Scotland, it is rather uncommon in Orkney, except in Eday and Hoy, as most of the underlying rock elsewhere is less acid and the overlying soils fall into the neutral category. As an intermediate area between hill and low ground, it provides a habitat of some value for small moorland and grassland birds, and predators including hen harrier *Circus cyaneus*. Some smaller areas amongst the improved lower ground also serve as islands of semi-natural vegetation and contribute to overall diversity of habitats.

There are no figures available for the total area of this habitat. RSPB have surveyed 100 ha on their Birsay Moors and Cottasgarth Reserve and 84 ha on their Hoy Reserve.

3. LOCAL DISTRIBUTION

Hoy probably has the largest area of this habitat, both as mosaic with heathland in the high hills and on the fringes of the improved low ground. Other key sites may include South Walls and parts of the Stromness heaths and coasts. Elsewhere, it occurs in the West Mainland Hills and Eday, with some left on the higher ground of East Mainland and South Ronaldsay. It is the dominant habitat of some of the sheep-grazed holms throughout the isles, such as Auskerry, Stronsay; the Green Holms, Eday; and Glimps Holm, Burray.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Though this habitat is not noted for its richness of plant species it does support a variety of insects, mammals and birds.

National Priority Species	
Brown hare *Lepus europaeus*	Skylark *Alauda arvensis*
Pink meadow cap *Hygrocybe calyptriformis*	
Local Priority Species	
Mountain hare *Lepus timidus*	Orkney vole *Microtus arvalis*
Pygmy shrew *Sorex minutus*	White-fronted goose *Anser albifrons*
Meadow pipit *Anthus pratensis*	Short-eared owl *Asio flammeus*
Curlew *Numenius arquata*	Barnacle goose *Branta leucopsis*
Oystercatcher *Haematopus ostralegus*	Wheatear *Oenanthe oenanthe*
Common gull *Larus canus*	Twite *Carduelis flavirostris*
Hen harrier *Circus cyaneus*	Merlin *Falco columbarius*
Kestrel *Falco tinnunculus*	Heath carder bee *Bombus musorum*
Small adder's-tongue fern *Ophioglossum azoricum*	

5. CURRENT FACTORS AFFECTING THE HABITAT

Changes in agricultural practices including fertilizer use and nutrient enrichment (e.g. use of shells and dunging, particularly around feeding areas), ploughing and drainage along with inappropriate grazing regimes have reduced the extent and value of this resource.

8 DWARF SHRUB HEATH BROAD HABITAT TYPE

GENERAL UK DESCRIPTION

This broad habitat type is characterised by vegetation that has a greater than 25% cover of plant species from the heath family (heather *Calluna vulgaris* and heaths *Erica* species and crowberry *Empetrum nigrum*). It generally occurs on well-drained, nutrient poor, acid soils. Heaths do occur on more basic soils but these are more limited in extent and can be recognised by the presence of herbs characteristic of calcareous grassland. Dwarf shrub heath includes both dry and wet heath types and occurs in both the lowlands and the uplands.

This habitat does not include dwarf shrub heath dominated vegetation in which species characteristic of peat-forming vegetation such as cotton grass *Eriophorum* species occur and peat building S*phagna* are abundant, or that which occurs on deep peat (greater than 0.5m) as these are included in the *Bog* broad habitat type. It also does not include heath types which are exclusively alpine in distribution, as these are included in the *Montane habitats* broad habitat type. Heath types on sand dunes are included in the *Supralittoral sediment* broad habitat types and heath types on maritime cliffs and slopes that are influenced by salt spray are included in the *Supralittoral rock* broad habitat type.

UK PRIORITY HABITATS PRESENT:	LOCALLY IMPORTANT HABITATS:
Upland heathland	**Lowland heath** **Treeless woodland and dales** **Maritime heath** ***Empetrum* heath** **Lichen heath** **Species-rich heath**

The Priority Habitat *Lowland Heath* does not occur in Orkney (but see note under *Upland heathland* description).

LOCAL EXTENT OF THE BROAD HABITAT

The area of dwarf shrub heath and other habitats of 'hill' land, in Orkney has been subject to several measurements and estimates in recent decades, with varying degrees and types of breakdown into classes, few of which fit particularly well with the BAP habitat definitions. The MLURI Land Cover of Scotland 1988 (1993) (LCS 88) data set, based on interpretation of air photos, estimated that 29,729 hectares or 29% of the land cover area of Orkney was 'moorland' including grass/heather mosaics and blanket bog. Blocks under 10 ha were not mapped. The earlier SNH National Countryside Monitoring Scheme (1992) (NCMS), based on aerial survey in the 1970s, using different methods of interpretation, estimated a similar 'heather moorland, blanket mire and lowland raised mire' extent of 30,976 ha. There was some reduction in this area in the 1970s and 80s. It seems safe to use an estimate of 30,000 ha for total area, including bog, for this audit.

The above overall total includes *Dwarf shrub heath* and *Bog* Broad Habitats, and some other habitats with a lesser extent of cover, for instance *Montane* habitats. It is necessary to separate areas of each. LCS 88 estimated 15,630 ha of 'heather moorland' divided among five classes, and 10,800 ha of peatland (roughly, *Bog* Broad Habitat) types. The earlier NCMS estimate for these types, using different terminology but similar definitions, had reverse proportions of 'moorland' covered by these types (NCMS 'mire' is very similar to the BAP Broad Habitat *Bog* i.e. peat in excess of 0.5 m deep). The discrepancy between these two estimates is likely to be hidden in the c.13000 hectares of 'undifferentiated heather moorland' recorded by LCS 88. The Macaulay Soil Survey of Scotland (1979) maps support the earlier NCMS estimate, indicating that most of the upland 'moorland' in Orkney at that date, excepting north Hoy, was on peat over 0.5m in depth, and thus Priority Habitat *Blanket bog*. (It is safe to assume that losses to agriculture over the last 30 years will have been from the thinner, drier peats, not the bogs.)
The most recent relevant survey, using satellite imagery, described in the Scottish Blanket Bog Inventory (2000) together with a subsequent report on the northern isles (Johnson *et al*, 2001), also requires interpretation for BAP habitats but supports a conclusion that the Orkney 'moorland' is comprised of more Broad Habitat *Blanket Bog* than *Dwarf shrub heath.*

Using the above sources, the best available estimate of *Bog* Broad Habitat is c.19,000 hectares, leaving a remaining total area of other habitats of c.11,000 ha. This 11,000 ha includes probably 1500 ha of *Montane, Inland Rock* and some *Acid grassland* Broad Habitat types as well as *Dwarf shrub heath*, suggesting a remaining cover, almost all *Dwarf shrub heath*, cover of c.9500 ha.

REFERENCES AND OTHER INFORMATION SOURCES

Johnson, G. & Morris, J.M. (2000). *Scottish Blanket Bog Inventory: Caithness and Sutherland and Orkney – Characterisation of blanket bogs using Landsat Thematic Mapper*. SNH Commissioned Report Series No XX. Perth

Johnson, G.M., Charman.E. & Coupar, A.C. (2001). *Area portfolio of peatland information for Northern Isles*. SNH Commissioned Report (unpublished, available at www.snh.org.uk)

Macaulay Institute for Soil Research. (1979). *Soil Survey of Scotland (map)*. MISR Aberdeen

Macaulay Land Use Research Institute (1993). *The Land Cover of Scotland 1988. Final report*. MLURI Aberdeen

SNH (1992). *National Countryside Monitoring Scheme – Northern Isles*

8.1 Upland heathland — priority habitat

1. UK PRIORITY HABITAT DESCRIPTION

For the purposes of this plan upland heathland is defined as lying below the alpine or montane zone (at about 600-750 m) and usually above the upper edge of enclosed agricultural land (generally at around 250-400 m, but descending to near sea-level in northern Scotland). Lowland heathland occurs below the upper limit of agricultural enclosure and supports a range of birds, reptiles and invertebrates not found on upland heath; this habitat is covered by a separate habitat action plan. Blanket bog and other mires, grassland, bracken, scrub, trees and woodland, freshwater and rock habitats frequently form intimate mosaics with heathland vegetation in upland situations. This plan recognises the importance of this habitat mosaic. Habitat action plans have been produced for some elements of this complex, for example *Blanket bog*.

Upland heath in 'favourable condition' is typically dominated by a range of dwarf shrubs such as heather *Calluna vulgaris*, bilberry *Vaccinium myrtillus*, crowberry *Empetrum nigrum*, and bell heather *Erica cinerea*. In northern areas juniper *Juniperus communis* is occasionally seen above a heath understorey. Wet heath is most commonly found in the wetter north and west and, in 'favourable condition', should be dominated by mixtures of cross-leaved heath *Erica tetralix*, deer grass *Scirpus cespitosus*, heather and purple moor-grass *Molinia caerulea*, over an understorey of mosses often including carpets of *Sphagnum* species. This habitat is distinct from blanket mire which occurs on deeper peat and which usually contains frequent occurrence of hare's-tail cotton-grass *Eriophorum vaginatum* and characteristic mosses. High quality heaths are generally structurally diverse, containing stands of vegetation with heather at different stages of growth. Upland heath in 'favourable condition' also usually includes areas of mature heather.

An important assemblage of birds is associated with upland heath. Some forms of heath also have a significant lower plant interest, including assemblages of rare and local mosses and liverworts that are particularly associated with the wetter western heaths. The invertebrate fauna is especially diverse.

This habitat type is present on an estimated 2,500,000 ha in Scotland. Dwarf shrub heaths are recognised as being of international importance because they are largely confined within Europe to the British Isles and the western seaboard of mainland Europe.

There have been considerable losses of heather moorland in recent times. An estimated 23% was lost in Scotland between the 1940s and 1980s. Much of this loss is attributed to agricultural land improvements, heavy grazing by sheep (and, in certain areas, red deer and cattle), and afforestation. Much loss of heather to acid grassland has also occurred.

2. CURRENT LOCAL STATUS AND EXTENT

Following the *Upland heathland* Priority Habitat definition, heathland in Orkney may be defined as "upland" even though it descends to sea level: it is an upland heath type that does not support a range of mammals, reptiles and birds characteristic of the Priority Habitat *Lowland heathland*. The plant communities are as described for the national priority habitat. (However, a separate, Locally Important habitat, *Lowland heath,* has been defined - see section 8.2). The inevitable overlaps between the national priority habitats *Upland heathland, Montane* heath and *Bog* and the local priority habitats including *Maritime heath* are amply demonstrated in Orkney, where large areas of vegetation are composed of complex mosaics of different types. The maritime influence extends everywhere to some extent, affecting the composition of plant communities. Nevertheless it is possible to see many good examples of the different habitat types, and the HAP objectives and actions are intended to apply to mosaics.

In Orkney upland heathland is a prime habitat for an important suite of birds, most notably including hen harrier *Circus cyaneus* and merlin *Falco columbarius*. SSSI designation of large tracts of moorland including upland heath have been based largely on the protection of these birds' (and others more associated with the blanket bog) habitat. The recent decline in numbers of breeding hen harriers is a matter of great concern.

The extent of the *Dwarf shrub heath* Broad Habitat has been put at c.10,000 ha. In Orkney, all of this is *Upland heathland,* but for those Locally Important habitats separately identified, i.e. *Treeless woodland and dales, Maritime heath, Empetrum heath, Lichen heath* and *Species-rich heath*. It is not possible to give figures for the extent of these sub-habitats; but their combined extent is thought to be much less than that of the *Upland heathland* component. There has been a large reduction in the area of this habitat in the last 100 years, including considerable losses in the years 1932–85, possibly 44% in the West Mainland and 72% in South Ronaldsay (Bennett 1986). These figures must be treated with caution, since they include other hill and bog vegetation types, and probably much easily-reclaimed acid grassland and heather/grassland mosaic. The areas of greatest recent loss, in the 1970s and 80s have been on thin peats in East Mainland and Stromness parish.

3. LOCAL DISTRIBUTION

Large areas of hill vegetation, including *Upland heath*, are confined to the islands of Hoy, Rousay, Eday and Mainland. On the higher ground throughout, distribution much depends on the degree of slope and its aspect: on steep slopes the peat is thin and well-drained, or even absent, and here true *Upland heath* is present; while the gentler cooler slopes retain depths of blanket bog to their feet unless it has been removed by some means. The hills of West Mainland, Rousay, Eday and south Hoy are characterised by a central mass of blanket bog surrounded by heath on the slopes (though in much of West Mainland the heath element has been lost to agricultural improvement). In north and central Hoy montane habitat dominate the tops, surrounded by heath and some blanket bog. On lower ground many, if not most, dwarf shrub communities overlie shallow peat or even shallow stony soils, as in the North and South isles, sometimes in very small fragments but also occurring in some large SSSIs.

The key sites are in Hoy; Orphir and Stenness Hills; small parts of the West Mainland Moorlands; Stromness Heaths and Coasts; and Rousay. Other important sites are in Eday; Rothiesholm, Stronsay; with some notable remnants in East Mainland, Burray and South Ronaldsay.

In sites near the coast, including those listed above there is a gradation into *Maritime heath*, the degree largely dependent on degree of exposure to sea spray. Other significant heathland sites absent from this list may be found under other heathland habitat types.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

A feature of the Orkney upland heathlands is the presence of crowberry *Empetrum nigrum*, although less dominant than on coastal heaths. True grass species are usually absent within the heath but will occur in flushes, banks, and alongside tracks etc., often accompanied by ferns, rushes and sedges. Dwarf juniper *Juniperis communis* and ferns may also occur in such breaks in the heath cover. Moorland spotted orchid, *Dactylorhiza ericetorum* is usually the most conspicuous flower but the tiny lesser twayblade orchid *Listera cordata* is virtually confined to this type of habitat. Less frequent but important plant species may include heath cudweed *Gnaphalium sylvaticum*, stiff sedge *Carex bigelowii*, sheep's-bit *Jasione montana* rare in Orkney and confined to coastal acid heath on the Eday red sandstones, and some interesting bryophytes (mosses and liverworts) and lichens. Where this upland heath type grades into the sub-alpine heaths of the very exposed tops, described under the *Montane* habitat type, an intermediate zone occurs where heather or ling are still the basic vegetation cover, but the most characteristic species is the alpine bearberry *Arctostaphylos alpinus*.

Frequent flushes (localised upwellings of water) are features of the Orkney heathland. Where, as often, they are neutral or base-rich, low-growing, sedge-dominated vegetation may locally dominate. These flushes have been selected as a Locally Important habitat (see *Base-rich flushes* in the *Fen, marsh and swamp* Broad Habitat).

National Priority Species	
Brown hare *Lepus europaeus*	Skylark *Alauda arvensis*
Northern dart *Xestia alpicola alpina*	Juniper *Juniperus communis ssp alpina*
Local Priority Species	
Pygmy shrew *Sorex minutus*	
Mountain hare *Lepus timidus*	Orkney vole *Microtus arvalis orcadensis*
Hen harrier *Circus cyaneus*	Merlin *Falco columbarius*
Kestrel *Falco tinnunculus*	Peregrine falcon *Falco peregrinus*
Buzzard *Buteo buteo*	Short-eared owl *Asio flammeus*
Curlew *Numenius arquata*	Whimbrel *Numenius phaeopus*
Golden plover *Pluvialis apricaria*	Snipe *Gallinago gallinago*
Teal *Anas crecca*	Wigeon *Anas penelope*
White-fronted goose *Anser albifrons*	Red-breasted merganser *Mergus serrator*
Common gull *Larus canus*	Lesser black-backed gull *Larus fuscus*
Twite *Carduelis flavirostris* (SAP)	Meadow pipit *Anthus pratensis*
Stonechat *Saxicola torquata*	Heath carder bee *Bombus muscorum*
Common green grasshopper *Omocestus viridulis*	Meadow grasshopper *Chorthippus parallelus*
Northern arches *Apamea zeta assimilis*	Grey scalloped bar *Dyscia fagaria*
Manchester treble-bar *Carsia sororiata anglica*	Ingrailed clay (a moth) *Diarsia mendica orkneyensis*
Grey scalloped bar *Dyscia fragaria*	Chestnut-coloured carpet *Thera cognata*
Moth *Psyche casta*	Moth *Perizoma flavofasciata*
A spider *Neon reticulatus*	A spider *Araeoncus humilis*
A spider *Erigone capra*	A spider *Meioneta nigripes*
A snail *Leiostyla angelica*	Heath cudweed *Gnaphalium sylvaticum*
Bearberry *Arctostaphylos uva-ursi*	Rowan *Sorbus aucuparia*
Primrose *Primula vulgaris*	Common cow-wheat *Melampyrum pratense*
Mountain male-fern *Dryopteris oreades*	Sheep's-bit *Jasione montana*
Awl-leaved pearlwort *Sagina subulata*	Hay-scented buckler fern *Dryopteris aemula*
Eared willow *Salix aurita*	Wood groundsel *Senecio sylvaticus*
Wild rose *Rosa spp*	Grey willow *Salix cinerea*
A moss *Bryum weigelii*	A moss *Philonotis seriata*
A liverwort *Odontoschisma elongatum*	A moss *Leocobryum glaucum*

5. CURRENT FACTORS AFFECTING THE HABITAT

In other parts of Scotland there are four main impacts to consider: agriculture, grouse shooting; forestry; and red deer. In Orkney only the first of these applies, but its impact has been great. The modernisation and intensification of agriculture, driven by livestock subsidies and other financial assistance has resulted in large increases in livestock numbers, requiring hill land for grazing and conversion to crops and improved grass. Recently, quota controls and extensification incentives have succeeded in halting the increase in stock numbers. The following are the most important factors:

- Reclamation and fragmentation: livestock numbers have increased greatly in the last 50 years, causing much hill land, and especially the thinner, drier peats, to be converted to grassland. While this is historical, the high numbers reached continue to drive a demand for more improved land. There are recent instances of upland heath being ploughed, though there is now little left outside SSSIs of suitable quality for complete reclamation. Upland heath less amenable to complete reclamation is easily improved for agriculture by heavy grazing and feeding of livestock, followed by applications of lime and other fertilisers. This process continues, though much less than formerly.
- Overgrazing: higher stocking levels of sheep lead to heavy grazing of heather and other dwarf shrubs. Inappropriate methods of supplementary feeding contribute to the impacts. While cattle are seldom grazed on heath it is not uncommon for remnant heathland areas to be used as sacrificial feeding areas in the autumn, which leads to near-destruction of the native plant cover within a few years. There are instances of this to be seen in the Orkney hills.
- Less Favoured Area payment (LFA): the area-based payments for grazing land provided by CAP apply only to land that is in agricultural use, thereby encouraging the incorporation of hitherto ungrazed heath into grazed land. Some areas of heath have been fenced and grazed for this reason.
- Extensification payment: extra livestock subsidy payments provided by CAP to producers with low stocking rates are dependent on the availability of extensive grazing areas: this too has encouraged the fencing and utilisation of hitherto ungrazed areas.
- Hill grazing management: in those areas where extensive sheep grazing is practised, almost entirely in Hoy, flock management is not necessarily the best for the vegetation: sheep may gather in numbers on drier or relatively sheltered hillsides, exerting a heavy grazing pressure on dwarf shrubs and scrub.
- Accidental fire: the danger is from accidental or recreational firing at the wrong time of year, possibly causing long-term damage to habitats.
- Climate change: this could potentially lead to changes in vegetation composition and structure, although any increase in temperature may also be accompanied by possible increases in rainfall and wind speeds. The future position is still unclear but one of the dominant heathland species, heather, does have a relatively wide tolerance of temperature and rainfall, providing the overall climate remains oceanic. It is likely that within the time span of this plan other factors will have by far the greatest impact on upland heathland vegetation and species.
- Development: quarries, windfarms, communication masts, access tracks and certain other planning developments can impact directly on wildlife interest.
- Atmospheric pollution: acidification, trophospheric ozone and nitrogen enrichment caused by atmospheric deposition can lead to vegetation changes including a reduction in the lichen and bryophyte interest. Nitrogen deposition can increase the likelihood of insect defoliation of upland heathland. These factors have less impact in Orkney than in southern and eastern parts of Scotland.
- Recreation: localised damage is a possible concern.

The interaction of two or more of the factors listed above often greatly increases the overall impact on upland heathland vegetation.

Loss of moorland area and quality to increased agricultural use have been the main factors: while the rate of such losses is much reduced, the effects of past changes are felt now in the fragmentation of moorland sites and loss of ‘moorland edge’ habitats (by agricultural improvement of semi-natural grasslands and grassy heaths).

6. CURRENT ACTIONS AND OPPORTUNITIES

The UK HAP outlines current action and directs the statutory agencies in their objectives and targets, and gives a conservation direction to the local HAP. Reference should be made to the national HAP.

6.1 Management

- SSSIs including the habitat are Hoy; Rousay; Stromness Heaths & Coasts; Orphir & Stenness Hills; West Mainland Moorlands; Keelylang Hill & Swartabeck Burn, Orphir/Stenness; Doomy & Whitemaw Hill, Eday; and Calf of Eday. Site management statements have been drawn up.
- Of these SSSIs, Hoy is an SPA and cSAC; Orphir & Stenness Hills, West Mainland Moorlands, Keelylang & Swartabeck; Calf of Eday and part of Rousay, are SPAs; and Stromness Heaths & Coasts is a cSAC.
- Mull Head, Deerness is a Local Nature Reserve owned by Orkney Islands Council. Part of the vegetation there is upland heath.
- Hoy and part of Orphir & Stenness Hills are within a NSA.
- The RSPB has extensive moorland reserves that include upland heath in Hoy, Rousay and West Mainland. These reserves are parts of the SSSIs there. A more active policy on grazing and burning management is now being tried.
- The Scottish Wildlife Trust (SWT) has three reserves that include upland heath: East Hill, Shapinsay; Harray Road End; and Hill of White Hamars, South Walls.
- SEERAD grants - CPS and RSS provide annual payments for stock reduction and 'moorland management'; there are less than 10 farms which have entered into these management options, but some substantial areas of hill are so managed.
- The 'Muirburn Code' and its recent supplement 'Prescribed Burning on Moorland' produced by SEERAD - the burning regulations restrict the burning of heather and associated vegetation to specific times of the year, and there are clear recommendations on practice and protection of sensitive habitats within upland heath.
- LFA support payments to farmers are conditional on observance of a code of good farming practice, including the protection of natural habitats and avoidance of overgrazing: these are somewhat weak in relation to interpretation of overgrazing but could be strengthened.
- The Orkney Islands Council Development Plan 2000 (Draft) gives sites on the RSPB Wetland and Marginal Moorland Sites register a degree of protection from development (but not from agricultural development).

6.2 Research and Guidance

- SNH has carried out Phase 1 vegetation surveys of all SSSIs; National Vegetation Classification surveys of Rousay; Stromness Heaths & Coasts; and Calf of Eday; and other extensive research into the condition of Orkney's moorland.
- RSPB has commissioned National Vegetation Classification (NVC) surveys of all its reserves. RSPB has also been carrying out research into Hen Harrier breeding: this has involved investigation of moorland ecology.
- SWT has carried out intensive survey out of its reserves, and this continues: the aim is to have as near complete a record of all species found on these reserves.
- Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

In the context of the national plan, targets and responsibilities will trickle down to the local level. The actions listed below are additional or complementary to those of the national plan, to which reference should be made.

- Maintain the current extent and distribution of *Upland Heathland* in Orkney.
- Maintain and where possible enhance the current quality of all *Upland Heathland* in Orkney. **Targets**: favourable condition status on all *Upland Heathland* SSSIs by 2010: demonstrable improvements in the condition of at least 50% of semi-natural upland heath outside SSSIs by 2010 (these targets taken from national HAP).
- Encourage measures that reverse habitat fragmentation and loss of 'moorland edge' habitats. **Target**: creation of 100 hectares of linking/edge habitats by 2007.

8. ACTION PLAN AGENCIES

8.1. National agencies: SNH; SEERAD; FA; JNCC

8.2. Local partners: OIC; RSPB; Hoy Trust; FWAG; SAC

9. PROPOSED ACTION WITH AGENCIES

9.1. Site safeguard and management

- Ensure the conservation of these habitats under LFA cross-compliance rules (SEERAD).
- Protect upland heathland from inappropriate developments (OIC).
- Promote muirburn and accompanying grazing management where appropriate on selected SSSI sites (SNH).

9.2 Advisory

- Promote agri-environment scheme options aimed at conserving this habitat (SAC, FWAG)
- Promote agri-environment scheme options aimed at conserving and creating habitats adjoining and linking upland heathland sites (SNH, SAC, FWAG).
- Ensure adequate advice is available and provided to all landowners on best practice (FWAG, SAC, SEERAD).

9.3 Research and monitoring

None specific to this habit has been prioritised.

9.4 Promotion and awareness raising

- Raise awareness of biodiversity and farming value of these habitats through events and farm walks (FWAG).

REFERENCES AND OTHER INFORMATION SOURCES

Bennett. A. (1986). An Assessment of Moorland Losses, Orkney. 1932-1985. Unpublished thesis for Hatfield Polytechnic.
Kirkpatrick, A.H., Simpson, I.A., Scott, L., Hanley, N., Oglethorpe, D., Curtis, D.J., Thacker, J.R.M., McCall, D., Watson, A., & Davidson, D.A. (1993). *Moorland Audit and Management in the Northern Isles*. Contract report for SNH, Edinburgh
SEERAD. *The Muirburn Code.*
SEERAD. *Prescribed Burning on Moorland. Supplement to the Muirburn Code: A Guide to Best Practice.*
Macdonald, A., Stevens, P., Armstrong, H., Immirzi, P., & Reynolds, P. (1998) *A Guide to Upland Habitats. Surveying Land Management Impacts.* SNH, Edinburgh
Guidance leaflets and other literature are available from RSPB, SNH, SEERAD, SAC, FWAG

8.2 Lowland heath — locally important habitat

1. LOCAL HABITAT DESCRIPTION

It has been established for this HAP that Orkney dwarf shrub heath, including that occurring at low altitudes, should on the basis of its characteristic plant communities be defined as upland in type. However, because some of it occurs at low altitude this has sometimes in the past been viewed as lowland heath. There are other attractions for this view: heaths that occur at low altitude, as remnants amongst fertile farmland, can be viewed as an integral part of a lowland landscape. What is more, the special biodiversity value of remnant heathland fragments is in danger of being overlooked in the context of the great area and importance of *Upland heathland*.

2. CURRENT LOCAL STATUS AND EXTENT

In the lowland landscape, semi-natural habitats tend to be isolated and remnant. Islands of dwarf shrub heath can be very high in biodiversity, being warmer and more sheltered than the upland sites, and providing essential parts of the overall habitat of many species, including mammals, birds, amphibians and invertebrates, many of these more usually associated with grassland habitats.

There are no available estimates for extent of this habitat. The extent is not great; being confined to those few places that have escaped agricultural improvement, because of remoteness, steepness or other miscellaneous causes. (Larger areas of land with a cover of dwarf shrubs in lowland situations are almost certain to be on deep peat, and hence included in the *Bog* broad habitat.)

3. LOCAL DISTRIBUTION

Remnant areas of heath on low ground can be found almost anywhere in Orkney, excepting some of the North isles, but are concentrated in the parishes of Rendall and Harray.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

As for *Upland heathland*

5. CURRENT FACTORS AFFECTING THE HABITAT

- The habitat is at high risk of degradation and loss from a variety of pressures, mainly agricultural. Too often they are seen as convenient places to feed livestock, to dispose of or store farmyard manure or other bulk organic material, or they may be fenced in with improved grass and subject to heavy grazing or applications of slurry: the transition to semi-improved grassland can be rapid.
- Areas may also be lost in road widening or other civil engineering contract, either directly or from use as a works site.
- Sites may be seen as suitable for tree planting.
- See *Upland heathland* HAP for other factors, including impact of CAP agricultural support measures, development pressures, fire, recreation, climate change and atmospheric pollution.

6. CURRENT ACTIONS AND OPPORTUNITIES

There are few if any current actions and opportunities. This habitat appears to have escaped conservation initiatives and schemes. In the context of the agri-environment schemes, it is an upland habitat, but, because not subject to traditional 'moorland management', not one to which an appropriate management option has been applied.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Maintain the current extent, distribution and quality of all lowland heath in Orkney.
- Enhance the quality of degraded sites. **Target: 50% under positive management by 2010**

8. ACTION PLAN AGENCIES

Local partners: SNH; SEERAD; RSPB; FWAG; SAC

9. PROPOSED ACTION WITH AGENCIES

9.1 Site safeguard and management

- Ensure that an appropriate agri-environment scheme management option becomes available to conserve this habitat (SEERAD).
- Ensure the conservation of the habitat under LFA cross-compliance rules (SEERAD).
- Ensure that sites are not planted with trees, except in part, at low densities, with native species (FA, SEERAD).

9.2 Advisory

- Promote any new agri-environment scheme options aimed at conserving this habitat (SAC, FWAG).
- Ensure adequate advice is available and provided to all landowners on best practice (SAC, FWAG, SEERAD).

9.3 Research and monitoring

None specific to this habit has been prioritised.

9.4 Promotion and awareness raising

- Stimulate public awareness in the habitat (All).

REFERENCES AND OTHER INFORMATION SOURCES

As for *Upland heathland*

8.3 Treeless woodland and dales — locally important habitat

1. LOCAL HABITAT DESCRIPTION

This habitat occurs in sheltered dales of burns draining moorland. Remnants of northern birch/hazel scrub once occurred on sheltered land that was unsuitable for agriculture. Since the formation of peat 3,000 years ago all trees and shrub with the exception of willow have been removed, leaving an unusual plant association which is typical of western birch woods in Scotland, but without the trees. The dale vegetation is distinguished by ferns, tall herb, blaeberry *Vaccinium myrtillus*, woodrush *Luzula sylvatica* and scrub willow *Salix* species.
Similar habitat where willow scrub is dominant is described in the section under the *Willow scrub* local priority habitat.

2. CURRENT LOCAL STATUS AND EXTENT DISTRIBUTION

As the small area of "treeless woodland" in each dale depends partly on its steepness and inaccessibility, and partly on the extent to which it may be grazed by livestock it is impossible to give an accurate assessment of the total area covered. There are, however, at least 30 places with the "dale" element in the name, half of which still retain the characteristic relict ground flora, together with a dozen places with this flora but without the dale name.

3. LOCAL DISTRIBUTION

The greatest concentration is in Hoy and the West Mainland and, to some extent in Rousay, but there are a few examples in the East Mainland, one in South Ronaldsay and even one in Westray. A similar flora also occurs on or below some sheltered cliffs, sometimes with wild roses and willow. True relict woodland, with aspen and rowan also occurs on some sea cliffs.
Good examples occur in the West Mainland: Roundadee, Sandwick; Dee of Durkadale, Birsay; Dale of Cottascarth, Rendall; Syradale, Firth; Russadale, Stenness; Kingsdale, Firth; and Naversdale, Orphir; in the East Mainland: Deepdale, St Ola; in Hoy: Heldale.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Although detailed studies have not been carried out, it is known that there are many species which, while theoretically dependant on woodland, are, in fact, equally at home in the dales. Mosses and lichens are well represented by woodland species e.g. *Polytrichum* species. Ferns are also abundant where grazing is light or absent, but complete absence of grazing may, in the absence of tree cover, lead to a dominance of greater woodrush *Luzula sylvatica*. Of the rarer ferns, northern buckler fern *Dryopteris expansa* is almost invariably confined to dales, especially where blaeberry *Vaccinium myrtillus* is abundant. Native willows are more abundant in fens, but the larger species do occur in dales and would probably be frequent if grazing ceased completely. Naturalised ivy *Hedera helix*, honeysuckle *Lonicera periclymenum* and, in several dales, *Fuchsia magellanica* have become established, the first two almost invariably as introductions although it is highly likely that truly native specimens occurred at one time. The fuchsia grows to a large size and seeds abundantly.

National Priority Species	
Reed bunting *Emberiza schoeniclus*	
Local Priority Species	
Pygmy shrew *Sorex minutus*	Wood mouse *Apodemus sylvaticus*
Hen harrier *Circus cyaneus*	Kestrel *Falco tinnunculus*
Merlin *Falco columbarius*	Sedge warbler *Acrocephalus schoenobaenus*
Willow warbler *Phylloscopus trochilus*	Short-eared owl *Asio flammeus*
Stonechat *Saxicola torquata*	Curlew *Numenius arquata*
A spider *Clubonia comta*	Eared Willow *Salix aurita*
Grey willow *Salix cinerea*	Wild rose *Rosa spp*
Tea-leaved willow *Salix phylicifolia*	Pyramidal bugle *Ajuga pyramidalis*
Primrose *Primula vulgaris*	

5. CURRENT FACTORS AFFECTING THE HABITAT

The dales are situated unenclosed in heathland and are therefore subject to the pressures described in the previous section on *Upland heathland*. Two of the factors outlined there are of lesser consequence: reclamation and fragmentation, though possible, are unlikely to affect these sites given their locations and the protection which most of them receive; and there do exist appropriate management options to protect them within the agri-environment schemes.

An additional significant factor is affecting the habitat: Introduction of alien species. Dales provide suitable sites for tree planting and there have been many attempts to re-introduce trees, which grow very well when fencing is provided. Inevitably, exotic tree species have been introduced although, unlike fuchsia, do not appear to have become truly naturalised. While some trees in the dales would undoubtedly widen the range of habitats for other species, injudicious introductions destroy a virtually unique habitat type: already fuchsia swamps ferns in at least one dale. The quality and character of these sites would also be compromised by planting, of any species, at densities that would shade out the existing flora.

Fire is a particular risk.

6. CURRENT ACTIONS AND OPPORTUNITIES

These are the same as for the *Upland heathland* habitat, to which reference should be made, except in some specifics. These are detailed below.

6.1 Management, research and guidance

- SSSIs including the habitat are, in addition to Hoy; Orphir & Stenness Hills; West Mainland Moorlands; Keelylang Hill & Swartabeck Burn, Orphir/Stenness; Stromness Heaths and Coasts, Sandwick; and Glims Moss & Durkadale, Birsay. Site management statements have been drawn up.
- Of these SSSIs, Hoy is an SPA and cSAC; part of Rousay, Orphir & Stenness Hills, West Mainland Moorlands, Glims Moss & Durkadale and Keelylang & Swartabeck are SPAs.
- Sites within RSPB reserves include West Mainland Moorlands, Keelylang Hill & Swartabeck Burn, and Hobbister.
- Hoy, Stromness Heaths and Coasts and part of Orphir & Stenness Hills are within a NSA.

- SEERAD – the Habitats Scheme, CPS and RSS provide payments for excluding stock from suppressed scrub, which may include sparse scrub and treeless woodland vegetation. 48 farms are entered into the Habitats Scheme and 130 farms into CPS and RSS, but it is thought that few of these include management options to protect this habitat. The 'moorland management' options of these schemes (see under *Upland heath*) may provide some protection by grazing reduction.
- The 'Muirburn Code' and its recent supplement 'Prescribed Burning on Moorland' produced by SEERAD - the burning regulations restrict the burning of heather and associated vegetation to specific times of the year, and there are clear recommendations against burning of sensitive habitats such as treeless woodland and dales.
- Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

While there is no UK HAP for this habitat, the *Upland heathland* HAP is intended to broadly cover a range of habitats associated with it, including this one. Reference should also be made to the *Upland birchwood* and *Willow scrub* HAPs.

- Maintain the current extent, distribution and quality of all Treeless woodland and dales in Orkney.
- Enhance the quality of degraded sites. **Target: 50% under positive management by 2010**

8. ACTION PLAN AGENCIES

Local partners: SNH; SEERAD; RSPB; FWAG; SAC; ONTP; Hoy Trust; Orkney Field Club

9. PROPOSED ACTION WITH AGENCIES

While there is no UK HAP for this habitat, the *Upland heathland* HAP is intended to broadly cover a range of habitats associated with it, including this one. Reference should also be made to the *Willow scrub* HAP.

9.1 Site safeguard and management

- Ensure the conservation of the habitat under LFA cross-compliance rules (SEERAD).
- Ensure that no sites are planted with alien species with assistance of any grant-aided tree-planting schemes by 2002 (FA, SEERAD).
- Ensure that no sites are densely planted, with any species, with assistance of any grant-aided tree-planting schemes by 2002.(FA, SEERAD).
- Ensure that all treeless woodland and dales within SSSIs, RSPB reserves and Hoy Trust land are included within site management plans by 2003 (SNH, RSPB, Hoy Trust).
- Seek to re-establish species of native trees in place of alien species at 2 sites by 2010 (ONTP, FWAG).

9.2 Advisory

- Complete final version of a good practice code in selection of species and species provenance in planting new woodlands by 2002 (ONTP); approve the code (SEERAD, FA).
- Promote agri-environment scheme options aimed at conserving this habitat (SAC, FWAG).
- Ensure adequate advice is available and provided to all landowners on best practice (SAC, FWAG, SEERAD).

9.3 Research and monitoring

- Complete survey of most significant Orkney sites, for species, condition and management by 2005 (SNH, RSPB, Hoy Trust, ONTP).
- Research into the biodiversity of these sites (SNH, OFC).

9.4 Promotion and awareness raising

- Stimulate public interest in the habitat along with native trees through talks, displays, trips etc (SNH, RSPB, ONTP, FWAG, OFC).
- Educate public to avoid planting alien species in dales (ONTP/OFC).

ADDITIONAL REFERENCES AND OTHER INFORMATION SOURCES

Bullard, E.R. & Goode, D.A. (1975). The Vegetation of Orkney, in Goodier, R. (Ed) *The Natural Environment of Orkney* NCC, Edinburgh.

8.4 Maritime Heath — locally important habitat

1. LOCAL HABITAT DESCRIPTION

This is heath strongly influenced by the proximity of the ocean. Its main characteristic is that it includes both cliff-top and heathland plants. On heathland adjoining the sea the presence and extent of the habitat is largely determined by the degree of exposure. On sheltered coasts it may be virtually absent, while on the most exposed it may extend hundreds of metres inland, and be separated from the coastal edge by maritime grassland. It is a heathland rich in species, with nutrients provided by the underlying rock as well as salt deposition. On more sheltered coasts in acid conditions dwarf shrub heath without this richness may extend close to the cliff edge: this type is included in the *Upland Heathland* habitat type.

2. CURRENT LOCAL STATUS AND EXTENT

Although maritime heaths occur along much of the Atlantic coast of Europe and the British Isles, the northern type, characterised by the presence of crowberry *Empetrum nigrum* and several sedge *Carex* species, is confined to thin soils overlying the Old Red Sandstones in North Sutherland, Caithness and Orkney. It is an important and distinctive type of heathland community. It has been intensively analysed and mapped, often in association with studies of the endemic *Primula scotica*.
In many respects this heath, although categorised here as an upland heath, is comparable to the lowland maritime heaths of south-west England (Harris 2001).

This heath was once distributed over much greater areas. Its quality is highly dependent on the way in which it is managed.

3. LOCAL DISTRIBUTION

Maritime heath occurs extensively on many of the cliff-topped coasts in Orkney, especially those oriented to the west and north. Key sites include Stromness Heaths and Coast, West Mainland which is also a cSAC under the EC Habitats Directive for its vegetated sea cliffs, coastal heaths and grasslands and dry heaths; North Hill, Papa Westray; West Westray and Rousay. Maritime heaths also occur on some of the most exposed south and east coasts. A key site is Hill of White Hamars, South Walls. There are several significant areas elsewhere on exposed coasts, as in South Parish, South Ronaldsay; and Burgh Head, Stronsay.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

The main heath species are heather or ling *Calluna vulgaris* and crowberry *Empetrum nigrum*. Creeping willow *Salix repens* may occur but rarely other dwarf shrubs. Shrubs normally form less than 50% of the plant cover, the rest being composed of many small herbs, sedges and grasses, especially glaucous sedge *Carex flacca*, and carnation sedge *C. panicea*. These two give a characteristic and easily recognised appearance to the heath. Other high constancy species include spring squill *Scilla verna*, sea plantain, *Plantago maritima*, wild thyme and tormentil. Mosses and lichens are usually sparse.

An important species is the Scottish primrose *Primula scotica* that is restricted, world-wide to Orkney and the extremities of the northern Scottish Mainland. Although the dwarf shrubs may be important to the *primula* in exposed sites it is usually confined to a mini-habitat within the heath almost without shrubs or to the transitional habitat between the heath and the more coastal sea pink/plantain *Armeria maritima/Plantago* sward. Other variants of maritime heath without the *primula* include a type in which purple moor-grass *Molinia caerulea* may be frequent or another type, usually on western cliff-top sites in Orkney, where glaucous sedge *C flacca* is entirely replaced by carnation sedge *C. panicea.*

National Priority Species	
An eyebright *Euphrasia heslop-harrisonii*	Skylark *Alauda arvensis*
Pink meadow cap *Hygrocybe calyptriformis*	
Local Priority Species	
Brown hare *Lepus europaeus*	Mountain hare *Lepus timidus*
Pygmy shrew *Sorex minutus*	Orkney vole *Microtus arvalis orcadensis*
Wood mouse *Apodemus sylvaticus*	
Kestrel *Falco tinnunculus*	Merlin *Falco columbarius*
Short-eared owl *Asio flammeus*	Peregrine falcon *Falco peregrinus*
Herring gull *Larus argentatus*	Great black-backed gull *Larus marinus*
Common gull *Larus canus*	Lesser black-backed gull *Larus fuscus*
Twite *Carduelis flavirostris*	Meadow pipit *Anthus pratensis*
Ringed plover *Charadrius hiaticula*,	Dunlin *Calidris alpina*
Oystercatcher *Haematopus ostralegus*	Arctic tern *Sterna paradisea*
Wheatear *Oenanthe oenanthe*	Eider duck *Somateria mollissima*
Arctic skua *Stercorarius parasiticus*	Great skua *Stercorarius skua*
Heath carder bee *Bombus muscorum*	Common blue *Polyommatus icarus*
Ingrailed clay *Diarsia mendica orkneyensis*	Glaucous sedge *Carex flacca*
Grass of Parnassus *Parnassia palustris*	Scottish primrose *Primula scotica*

5. CURRENT FACTORS AFFECTING THE HABITAT

For more general factors affecting all heathland types, see equivalent section in the *Upland Heathland* HAP.

Maritime heath habitats are probably the most vulnerable to agricultural improvement of the heath types, because they are on well-drained mineral soils or thin peat. In addition, maritime heath plant communities are very sensitive to nutrient enrichment and grazing management. Great areas have been converted to improved grassland by cultivation and re-seeding, while still others have been converted, and continue to be converted, more gradually by management practices. These include:

- nutrient enrichment, either directly by application of fertilisers or other nutrients, including, in Westray, fish factory waste; or indirectly by transfer of nutrients in the dung of livestock (with access to grazing or supplementary feed on combined areas of improved grassland and heathland);

- grazing management, particularly all year grazing which has converted some coastal heath into coastal grassland and altered cliff top zonations. Sensitively timed grazing is an important component of maritime heath management (see following section 6).

6. CURRENT ACTIONS AND OPPORTUNITIES

See equivalent section in the *Upland Heathland* HAP.

6.1 Management

- SSSIs including the habitat are Rousay; Stromness Heaths & Coasts; West Westray; Holm of Papay and North Hill, Papa Westray; and Pentland Firth Islands. Site management statements have been drawn up.
- Of these SSSIs, Stromness Heaths & Coasts is an cSAC; West Westray, North Hill and Holm of Papay, Papa Westray, part of Rousay and Pentland Firth Islands are SPAs.
- North Hill and part of West Westray (but not the important heathland) are RSPB reserves.
- Mull Head, Deerness, a Local Nature Reserve owned by Orkney Islands Council, includes some maritime heath.
- SWT has three reserves which include some maritime heath: Hill of White Hamars, South Walls; East Hill, Shapinsay; and Linga Holm, Stronsay.
- Much maritime heath is included in the Hoy and West Mainland National Scenic Area.
- SEERAD grants - CPS and RSS provide annual payments for timed, managed grazing of 'coastal heath' (the definition being somewhat broader than the one adopted by this audit). This management option has been widely adopted by farmers: most of the important maritime sites and many other 'coastal heath' sites in Orkney are now under CPS or RSS management.
- LFA support payments to farmers are conditional on observance of a code of good farming practice, including the protection of natural habitats and avoidance of overgrazing: these are somewhat weak in relation to interpretation of overgrazing but could be strengthened.

6.2 Research and guidance

- The Scottish Wildlife Trust's Hill of White Hamars reserve and The Loft in South Walls have been and continue to be sites of intensive survey and study into grazing management techniques carried out by Roy Harris and Mary Jones. Autumn/winter grazing followed by no summer grazing on their scheme (see Further Reading) has resulted in marked improvements in habitat quality over maritime heath and grasslands and associated wetlands. However, in general it is a much quicker process to convert maritime heath into maritime grassland through over-grazing than it is to reverse the process through carefully controlled grazing.
- Guidance on management, drawing on the work of Harris and Jones, and entry into agri-environment schemes is provided by FWAG and SAC.
- SNH has carried out Phase 1 vegetation surveys of all SSSIs and National Vegetation Classification surveys of Rousay; Stromness Heaths & Coasts; North Hill; West Westray; and Swona (part of Pentland Firth Islands).
- RSPB has commissioned National Vegetation Classification (NVC) surveys of all its reserves. RSPB has also been carrying out research into Hen Harrier breeding: this has involved investigation of moorland ecology.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Maintain the current extent and distribution of maritime heath in Orkney.
- Maintain and wherever possible enhance the current quality of all maritime heath in Orkney. **Targets**: **favourable condition status on all maritime heath SSSIs by 2010: demonstrable improvements in the condition of at least 50% of maritime heath outside SSSIs by 2010**
- Encourage measures to recreate maritime heath on poor quality improved and semi-improved grassland at coastal sites. **Target**: **measures initiated to recreate of 50 hectares by 2007**

8. ACTION PLAN AGENCIES

Local partners: SNH, SEERAD, OIC; RSPB; SWT; FWAG; SAC

9. PROPOSED ACTION WITH AGENCIES

9.1. Site safeguard and management

- Ensure the conservation of these habitats under LFA cross-compliance rules (SEERAD).
- Protect maritime heath from inappropriate developments (OIC).
- Seek to improve the management of any sites where needed by 2005 (SNH, RSPB).
- Seek to begin recreation of 50 ha of maritime heath at suitable sites by 2007 (SNH, SWT, FWAG).

9.2 Advisory

- Promote agri-environment scheme options aimed at conserving this habitat (SAC, FWAG).
- Promote agri-environment scheme options that can provide buffer-zones of semi-natural habitat fringing and linking areas of maritime heath: the obvious options include 'creation and management of species-rich grassland', but other options may be used creatively in this respect (SAC, FWAG).
- Ensure adequate advice is available and provided to all landowners on best practice (FWAG, SAC, SEERAD).

9.3 Research and monitoring

None specific to this habit has been prioritised.

9.4 Promotion and awareness raising

- Raise awareness of biodiversity and farming value of these habitats through events and farm walks (SWT, FWAG).

ADDITIONAL REFERENCES AND OTHER INFORMATION SOURCES

Harris, R.A. and Jones, R. M. (1992). *Draft Management Plan, Hill of White Hamars SWT Reserve*. Unpublished report for SWT

Harris, R.A. (1993). *Maritime Heath Monitoring, Orkney: an initial assessment of some major maritime heath sites in Orkney*. Unpublished report for SNH, Kirkwall

Harris, R.A. and Jones, R. M. (1998). *The Nature of Grazing*. SNH/SWT/Leader II

8.5 *Empetrum* heath — locally important habitat

1. LOCAL HABITAT DESCRIPTION,

This is heath dominated by crowberry *Empetrum nigrum*. *Empetrum* is rarely completely absent from any type of heath in Orkney or from dwarf shrub communities on bogs. Almost pure stands of *Empetrum* occur. They are sometimes thought to be a temporary phase where heath has been subjected to severe burning and where it would be replaced, eventually by heather *Calluna vulgaris*; in Orkney these *Empetrum* dominated stands appear to persist for many years. In many species-poor, wet heathlands on hills, the proportion of *Empetrum* among the dwarf shrubs may increase according to exposure to the prevailing wind and especially to wind from the sea. The most important *Empetrum* heaths however are those where lichens play a major role, where other ericaceous shrubs are rare and other vascular plants are scarce, perhaps only a few grass and sedge species and such herbs as tormentil *Potentilla erecta*. Examples occur on some small islands, and in Hoy on the flatter parts of high ground where both lichens and mosses are co-dominant with the *Empetrum*, although these probably belong to *Montane* habitat type.

2. CURRENT STATUS AND EXTENT

Heath dominated by crowberry *Empetrum nigrum* has been identified as a locally important habitat because it has a specifically high importance in the European context, and in the U.K. is confined to the far north.
There are no figures or estimates for the area of this heath. Though not uncommon as a heathland habitat in Orkney, the total area is probably not in excess of 200 hectares.

3. LOCAL DISTRIBUTION

Uninhabited sheep-grazed islands such as Eynhallow, Auskerry, Linga Holm, the Hen of Gairsay and others all have areas, usually on their higher ground, dominated by *Empetrum* but interesting variations occur especially in the amount of lichen present (see *Lichen Heath* HAP). In 1974, when North Ronaldsay sheep had just been introduced to Linga Holm, the areas of *Empetrum* heath had abundant moss. But very grassy or sedgy heath where *Empetrum* was the dominant shrub have also been seen on the cliff-tops between Weather Ness and Barth Head in Westray and in wetter conditions at Barth Head in South Ronaldsay, at the Mull Head in Deerness and Hobbister, Orphir. In South Ronaldsay north of Barth Head increasing amounts of bell-heather *Erica cinerea* appear in the heath as the land is drier. On the west coast of Hoy there is a strip of heath where *Empetrum* is co-dominant with sedges.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Bird and animal species are as for *Upland heathland* and *Maritime heath*.
The number of bryophytes (mosses and liverworts) found in this type of heath far outnumber the important vascular plants species but the British Scarce Species small adder's-tongue fern, *Ophioglossum azoricum* seems confined to small grassy patches within *Empetrum* heaths, usually those on uninhabited, sheep-grazed islands.
Small adder's-tongue fern, *Ophioglossum azoricum* is a Local Priority Species.

Information, objectives, targets and action for this HAP are subsumed within the *Upland Heathland* HAP, with additions as below.

5. CURRENT FACTORS AFFECTING THE HABITAT

Management, Research and Guidance

- Several of these heaths are in sites that have conservation designation for other reasons, which may mean their particular interest and value is not perceived or provided for in conservation management agreements such as CPS and RSS.

6. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Maintain the current extent and distribution of *Empetrum* heath in Orkney.
- Maintain and wherever possible enhance the current quality of all *Empetrum* heath in Orkney.

7. ACTION PLAN AGENCIES

Local partners: SNH, SEERAD, OIC; RSPB; SWT; FWAG; SAC; Orkney Field Club

8. PROPOSED ACTION WITH AGENCIES

Research and Monitoring

- Carry out research into this little-known heathland community and associated bryophytes (OFC, SNH).

REFERENCES AND OTHER INFORMATION SOURCES

As for *Upland heathland*

8.6 Lichen Heath — locally important habitat

1. LOCAL HABITAT DESCRIPTION

These heaths with abundant or dominant lichen usually have crowberry *Empetrum nigrum* as the dominant dwarf shrub, with herbs such as tormentil, *Potentilla erecta*, sea plantain, *Plantago maritima*, ribwort plantain, *Plantago lanceolata* and sorrel, *Rumex acetosa* and often limited grass and sedge species. They appear on cliff-tops and inland from maritime heath (in which lichens are scarce), in very stressed environments but without the fullest exposure to sea spray. They have a different species composition to montane lichen heaths. For an example, Coppins and Coppins (1999) decided, on the basis of species composition, that the lichen heath at Hill of White Hamars is a distinctive northern coastal type and "not a montane heath occurring at sea level".

Other heaths with abundant lichen on some of the Hoy summits, notably St John's Head, with a somewhat different species composition characterised as 'montane' by Ratcliffe (1963) are not included in this HAP. They are included in the *Montane* broad habitat.

Lichen, especially *Cladonia* species, without being dominant, is often an important component of mixed dwarf shrub heath in exposed conditions in Orkney. Although it has been assumed that lichen species will be associated with heaths with easterly aspects while bryophytes (mosses and liverworts) will replace them in westerly exposures, the distinction, while it does occur, is less obvious in Orkney: there are good examples where both lichens and mosses are abundant in mixed heath regardless of aspect.

2. CURRENT LOCAL STATUS AND EXTENT

Heath with abundant or dominant lichen, known as lichen heath, has been identified as a locally important habitat because it is a scarce and localised heath type in Britain, and the Orkney maritime-influenced lichen heaths appear to be an unusual type.

The full extent of the habitat is not known, though inspection or survey of all the likeliest sites has been carried out (Duke 1991). The total extent cannot amount to more than a few hectares, this concentrated at a few key sites. The SSSI at Ward Hill Cliffs, South Ronaldsay has been notified for the lichen heath.

3. LOCAL DISTRIBUTION

As noted, there is an easterly bias to the distribution, with the key site being east facing slopes between Bigore Head, the Kame of Stews and some way south thence back towards the Ward Hill in South Ronaldsay. There are other smaller sites scattered along the east side of South Ronaldsay, notably at Halcro Head and Grimness Head; then northwards to Roseness, Holm; East Hill Shapinsay; Burgh Hill, Stronsay; and North Hill, Papa Westray. Moving south-westwards, there are examples at Saquoy Head, Rousay; Eynhallow; Stromness Heaths and Coasts SSSI; and Hill of White Hamars.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Bird and animal species are as for *Upland heathland* and *Maritime heath*.
The sites show some variation in associated plant communities. In the outstanding example at Ward Hill, South Ronaldsay and nearby, the dwarf shrub is mainly crowberry with sedges and wavy hair-grass *Deschampsia flexuosa*. At Burgh Hill, Stronsay however, lichen dominates a species-rich heath including both *Erica* spp, heather *Calluna vulgaris* and crowberry *Empetrum nigrum* and many species of herbs, grasses and sedges and with base-rich flushes in depressions in the heath. At Saquoy Head, part of the SSSI there is wind-terraced, lichen-dominated heath with some ablation areas. The lichen *Cladonia zopfii*, recorded at East Hill, Shapinsay is a Nationally Scarce Species.

Other plants, birds and animals are as found generally in upland heath in Orkney

Information, objectives, targets and action for this HAP are subsumed within the *Upland Heathland* HAP, with additions as below.

5. CURRENT FACTORS AFFECTING THE HABITAT

5.1 Management, Research and Guidance

- SSSIs are Eynhallow, Rousay, Stromness Heaths and Coasts, Ward Hill Cliffs and North Hill (Papa Westray). Site management plans exist.
- The sites at Hill of White Hamars and East Hill are managed as SWT reserves. Site management plans exist. The lichens here have been well surveyed.
- Several of these heaths are in sites that have conservation designation for other reasons, which may mean their particular interest and value is not perceived or provided for in conservation management agreements such as CPS and RSS.
- Lichen-dominated heath is fragile and easily damaged by grazing stock. The lichen heath at North Hill is probably suppressed by grazing.
- Muirburn or accidental fire would be very damaging.

6. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Maintain the current extent and distribution of lichen heath in Orkney.
- Maintain and wherever possible enhance the current quality of all lichen heath in Orkney.

7. ACTION PLAN AGENCIES

Local partners: SNH; SEERAD; OIC; RSPB; SWT; FWAG; SAC

8. PROPOSED ACTION WITH AGENCIES

Advisory

- Ensure that favourable management for this habitat is put in place at sites included in agri-environment scheme agreements (SEERAD, SAC, FWAG).

REFERENCES AND OTHER INFORMATION SOURCES

As for *Upland heathland*, and
Coppins, A.M. & Coppins, B.J. (1999) *Hill of White Hamars (SWT Reserve) Lichen Survey*. Report for SWT.
Duke, Trevor. (1991) *Lichen Survey of Ward Hill Cliffs SSSI, Orkney and other sites*. Report for SNH, Edinburgh
Ratcliffe, D. A. (1963) *The Hill Vegetation of North Hoy*. Report for NCC, Peterborough

8.7 Species-rich heath — locally important habitat

1. LOCAL HABITAT DESCRIPTION

This heath type has close affinities both to maritime heath and to montane heath, sharing many of the species. The dwarf-shrub components are usually heather *Calluna vulgaris*, crowberry *Empetrum* and bell heather *Erica cinerea*. If cross-leaved heath *Erica tetralix* is present it will often be seen to occupy tussocks above the influence of ground water. Creeping willow *Salix repens* is often an additional dwarf shrub. The ubiquitous *Plantago maritima* is usually present but in lesser abundance than in maritime heath, and the two "blue-grey sedges", glaucous sedge *Carex flacca* and carnation sedge *C. panicea* will be less conspicuous. However, species-rich heath will include other small sedges and a large number of small grass species. Herbs include several species of orchids, tormentil *Potentilla erecta*, one or more speedwell *Veronica* species, heath milkwort *Polygala serpyllifolia*, eyebrights *Euphrasia* species and alpine bistort *Persicaria vivipara*. Base-rich indicators include wild thyme *Thymus polytrichus*, purging flax *Linum catharticum*, limestone bedstraw *Galium sterneri*, bird's-foot trefoil *Lotus corniculatus*, clovers *Trifolium* species and heath dog-violet *Viola riviniana*.

2. CURRENT LOCAL STATUS AND EXTENT

This heath has been identified as a locally important habitat because of its abundance of species, many of which are more usually associated with base-rich soils and others with montane habitats. Heathland associated with these soils and with such a rich variety of species amongst the dwarf shrubs is unusual in Britain.
There are no figures or estimates for the area of this heath.

3. LOCAL DISTRIBUTION

Several of the places mentioned above under *Empetrum heath* and *Lichen heath* and also in *Maritime heath* grade into species-rich heath either inland or into greater shelter. Species-rich heath rarely occurs in large parcels, but it may also appear in purely artificial conditions where road verges on otherwise acid heath or bog are enriched and drained by road grit. Three excellent and (usually) protected "artificial" examples are the verges of the Hillside Road in the west Mainland, the Rackwick Road in Hoy and Olad Brae in South Ronaldsay.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Bird and animal species are as for *Upland heathland* and *Maritime heath*.
The small white orchid *Pseudorchis albida* and the smaller of the fragrant orchids *Gymnadenia conopsea* ssp. *borealis* are almost confined to species-rich heath in Orkney. It is a favoured habitat of alpine bistort *Persicaria vivipara*. The abundance of flowering herbs probably makes these heaths especially good for invertebrates.

Information, objectives, targets and action for this HAP are subsumed within the *Upland Heathland* HAP, with additions as below.

5. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Maintain the current extent and distribution of species-rich heath in Orkney.
- Maintain and wherever possible enhance the current quality of all species-rich heath in Orkney.

6. ACTION PLAN AGENCIES

Local partners: SNH; SEERAD; OIC; RSPB; SWT; FWAG; SAC

9. FEN, MARSH AND SWAMP — BROAD HABITAT TYPE

GENERAL UK DESCRIPTION

This broad habitat is characterised by a variety of vegetation types that are found on minerotrophic (groundwater-fed), permanently, seasonally or periodically waterlogged peaty soils, or mineral soils. Fens are peatlands that receive water and nutrients from groundwater and surface run-off, as well as from rainwater. Flushes are associated with lateral water movement, and springs with localised upwelling of water. Marsh is a general term usually used to imply waterlogged soil; it is used more specifically here to refer to fen meadows and rush-pasture communities on mineral soils and shallow peats. Swamps are characterised by tall emergent vegetation. Reedbeds (i.e. swamps dominated by stands of common reed *Phragmites australis*) are also included in this type.

This habitat does not include neutral and improved grasslands on flood plains and grazing marshes which are included in the '*Neutral grassland'* and *'Improved grassland'* broad habitat types respectively, nor ombrotrophic (rainwater-fed) mires (blanket, raised and intermediate bogs) as these are included in the '*Bogs'* broad habitat type. It also does not include areas of carr (fen and woodland dominated by species such as willow *Salix* spp., alder *Alnus glutinosa* or birch *Betula* spp.) as these are covered in '*Broadleaved mixed and Yew Woodland'* broad habitat type unless the cover is less than 30%.

UK PRIORITY HABITATS PRESENT:	**LOCALLY IMPORTANT HABITATS:**
Fens	**Marsh**
Reedbeds	**Base-rich flush**
	Base-rich fen

LOCAL STATUS

These habitats are very well represented in Orkney, and are key habitats supporting a rich fauna and flora.

LCS 88 (MLURI 1993) estimated a 'wetlands' land cover in Orkney of 1150 ha. No breakdown of this figure into the different categories of wetlands is available. The figure probably underestimates the amount of wetland currently in Orkney because a considerable (but declining) area of ground of this nature still exists in the form of tiny patches scattered through the improved and rough grassland areas of the islands. Attempts, successful and unsuccessful, to drain many wet areas have been carried out in Orkney for centuries, especially in the post WWII years when substantial grant aid was available for the purpose, and many of the studies carried out in fens and basin bogs show that these were often open water at one time. Sometimes with neglect of drains etc. these areas revert to wetland.

Swamp vegetation, generally inundated for a large part of the year, occurs very commonly within all these wetland types.

These wetlands often grade into damp meadows frequently used for grazing but too wet for cultivation. These are described under the Locally Important Habitat *Wet meadow* within the *Neutral grassland* Broad Habitat. It is necessary to distinguish between this **grassland** habitat, which can be very wet and might loosely be termed 'wetland', and the *Fen, marsh and swamp* habitats.

SPECIES ASSOCIATED WITH THE BROAD HABITAT

Otters *Lutra lutra* find shelter and prey in many wetland habitats

Diverse wetlands are important habitats for birds in Orkney. Priority species such as the reed bunting *Emberiza schoeniclus* occur, whilst the red-necked phararope *Phalaropus lobatus* is locally extinct but may perhaps recolonise such areas in the future. Many priority wildfowl and wader species are present. Of the dabbling ducks, mallard *Anas platyrhynchos* is common, while teal *A. crecca*, shoveler *A. clypeata* and wigeon *A. penelope* all have important populations. The gadwall *A. strepera* is confined to a few pairs on North Ronaldsay and Shapinsay, but it is the pintail *A. acuta* for which Orkney is so important in a British context. Of the known national breeding population of some 40 pairs, no fewer than 25 (62%) occur in Orkney; the wetlands of the West Mainland, Shapinsay and Stronsay hold the majority of birds. Breeding mute swans *Cygnus olor*, tufted ducks *Aythya fuligula* and red-breasted mergansers *Mergus serrator* complete the list of important wetland wildfowl, while coot *Fulica atra* and water rail *Rallus aquaticus* are other species dependent on the habitat in summer.

Wintering wildfowl are more dependent on fresh-water habitat rather than wetlands but Greenland white-fronted geese *Anser albifrons* are one species for which the wetlands are important. The small flocks found in Birsay, Tankerness and Stronsay all feed to a certain extent in such habitat.

Recent (1993/4) work on Orkney's waders has indicated that the islands are second only to the Western Isles in terms of breeding populations. Of the 5 common wader species, 3 are dependant on wetlands, 2 almost exclusively so. Lapwings, *Vanellus vanellus* (5,400 pairs, 3% British population) though breeding on arable and grassland areas, require wetlands on which to feed. The redshank *Tringa totanus* (1,700 pairs, 5% British population) and snipe *Gallinago gallinago* (3,100 pairs 6% British population) both breed and feed in the wetlands, although a proportion of the latter utilise the moorlands as well. Orkney's breeding dunlin *Calidris alpina*, are found mainly on peatlands but some are found on wetland/rough grassland. 1-2 pairs of black-tailed godwit *Limosa limosa* breed in this habitat each year and are of particular note as apart from 2-3 pairs in Shetland, these are the only black-tailed godwits of the Icelandic race breeding in Britain.

Black-headed gull *Larus ridibundus* is the only gull solely dependant on wetlands for breeding; the Orkney population in the late 1980s was 2700 pairs (1.6% British population). Apart from the reed bunting mentioned above, the other passerine of wetlands is the sedge warbler *Acrocephalus schoenobaenus*, in Orkney at the northern limit of its range.

Corncrake *Crex crex* seek the cover of tall wetland vegetation when they arrive in spring to breed.

The large heath butterfly *Coenonympha tullia* has important populations in some wetland areas.

9.1 Marsh — locally important habitat

1. LOCAL HABITAT DESCRIPTION

This local habitat encompasses a wide range of wetland sites in Orkney where the dominant vegetation is not grass. It includes the periodically inundated extended margins of many large and smaller lowland lochs, and the remains of partially drained swamps and former milldams. Some marshes are probably successional products of the natural or artificial drying out of lochs and other water bodies. Others are derived from cut-over peat bog although the influence of non-acidic ground water is obvious.

The description applies to those wetlands in Orkney excepting the deep peat bogs and the five more narrowly-defined National Priority and Locally Important habitats within the *Fen, Marsh and Swamp* Broad Habitat type. The distinctions can sometimes be difficult to make in practice, given the mingling of these habitats at some sites, especially the larger ones. It does not include the wetlands that occur within the Sanday machair, but it can include wetlands and swamps that frequently occur on the landward side of smaller areas of links. It is not easy to distinguish the difference between *Fen* and *Marsh* but the former has deep peat while the latter is confined to mineral soils and shallow peat. Marsh vegetation is usually, but not always, rather tall so is visually distinct from both acidic mires on peat, the usually rather short vegetation of base-rich fens and flushes.

A transition habitat between wet neutral or acid grassland and marsh occurs commonly. This is a semi-natural habitat often derived from failed drainage or silting of disused milldams. It is a widespread habitat that fluctuates depending on the state of the drainage.

Swamps and pools frequently occur within this habitat, as well as in *Fens* and *Reedbeds*.

Some of the large sites with a diversity of soils and water inputs are rich in plant species, others only moderately so. A great variety of wetland birds is associated.

This HAP has close links with the HAP for *Wet meadow*, to which reference should be made.

2. CURRENT LOCAL STATUS AND EXTENT

Many of the plants that give the Orkney countryside its distinctive appearance are dependent upon these habitats, as are many species of wetland birds. The associated bird species (see section 4 below) show that this is one of the most important habitats in Orkney.

The area of habitat has probably stabilised after centuries of land improvement and reclamation, but the quality, particularly of many smaller sites is often adversely affected by human impacts.

The total area cannot be differentiated from the overall Orkney *Fen, marsh and swamp* total.

3. LOCAL DISTRIBUTION

There are very few if any parts of Orkney without their share of wetland of some kind. Some of these can be differentiated by type into one or more of the other National Priority or Locally Important habitat types, and many may be included in the *Neutral Grassland* Broad Habitat. This still leaves many swampy areas and loch margins. Examples are the Mill Dam, Shapinsay; and Aikers Loch, South Ronaldsay. No key sites are identified but reference should be made to the RSPB inventory of Wetland and Marginal Moorland Sites (1995), for an indication of sites outwith SSSIs that may fall into this wetland category.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

The habitat supports a wide range of plant species. Shorter vegetation may include northern marsh orchid *Dactylorhiza purpurella*, marsh marigold *Caltha palustris*, lesser spearwort, *Ranunculus flammula*, bog stitchwort *Stellaria uliginosa*, ragged robin *Lychnis flos-cuculi*, marsh cinquefoil *Potentilla palustris* and yellow rattle *Rhinanthus minor*. Willow scrub may develop, often in abandoned peat cuttings, or jungle-thick meadowsweet *Filipendula ulmaria*, or water avens *Geum rivale* and several species of rush. In wetlands on mineral soils yellow flag *Iris pseudacorus* often dominates species-poor stands. Marsh marigold *Caltha palustris* has an excellent ability to survive intermittent disturbances such as ultimately unsuccessful attempts at drainage and the branched bur-reed *Sparganium erectum* and the coarser grasses are also good survivors. Where small shallow lochs and pools have filled in by more natural means - bogbean *Menyanthes trifoliata* is especially good at collecting silt among its thick roots - marshes akin to base-rich fens appear.
What appear to be purely natural "rush meadows" dominated by soft rush *Juncus effusus*, sharp rush *J. acutiflorus* and jointed rush *J. articulatus*, with a scattering of marsh bedstraw *Galium palustre* may be seen occasionally, sometimes below the steeper hills.

More acidic wetlands often overlying thin peat or peaty gleys may have a thin carpet of bog pondweed *Potamogeton polygonifolius*, marsh pennywort *Hydrocotyle vulgaris* with sparse grasses and sedges and a little moss including sphagna.

Swamps occur as marginal vegetation to some lochs and by pools in marshes, occasionally alongside larger burns or even at the inland edge of saltmarsh. They include reedbeds, but also clubrush *Schoenoplectus* species, (scarce in Orkney), bottle sedge *Carex rostrata*, water horsetail *Equisetum fluviatile*, brooklime *Veronica beccabunga*, water speedwell *V. anagallis-aquatica* and mare's-tail *Hippuris vulgaris*. The curiously rare in Orkney lesser water-parsnip *Berula erecta* is confined to single sites in Birsay and Sanday.
The introduced great reedmace *Typha latifolia* is spreading in one swamp in Evie.

Birds and other species associated are indicated in the Broad Habitat description.

National Priority Species	
European otter *Lutra lutra*	Reed bunting *Emberiza schoeniclus*
Red-necked phararope *Phalaropus lobatus*	Corncrake *Crex crex*
Brown hare *Lepus europaeus*	

Local Priority Species	
Orkney vole Microtus *arvalis orcadensis*	Common toad *Bufo bufo*
Pygmy shrew *Sorex minutus*	Wood mouse *Apodemus sylvaticus*
Hen harrier *Circus cyaneus*	Short-eared owl *Asio flammeus*
White-fronted goose *Anser albifrons*	Mute swan *Cygnus olor*
Red-breasted merganser *Mergatus serrator*	Teal *Anas crecca*
Tufted duck *Aythya fuligula*	Wigeon *Anas penelope*
Mallard *Anas platyrhynchos*	Gadwall *Anas strepera*
Black-headed gull *Larus ridibundus*	Coot *Fulica atra*
Redshank *Tringa totanus*	Lapwing, *Vanellus vanellus*
Dunlin *Calidris alpina*	Curlew *Numenius arquata*
Water rail *Rallus aquaticus*	Snipe *Gallinago gallinago*
Sedge warbler *Acrocephalus schoenobaenus*	Black-tailed godwit *Limosa limosa*
Common blue damselfly *Enallagma cyathigenum*	Blue-tailed damselfly *Ischnura elegans*
Four-spot chaser *Libellula quadrimaculata*	A beetle *Hydrothassa hannoveriana*
A brown weevil Tropiphorus terricola	Marsh marigold *Caltha palustris*
Ragged robin *Lychnis flos-cuculi*	Northern marsh orchid *Dactylorhiza purpurella*
Glaucous bulrush *Schoenoplectus tabernaemontani*	Bulrush *Schoenoplectus lacustris*
Lesser water-parsnip *Berula erecta*	Greater pond sedge *Carex rostrata*
Greater tussock sedge *Carex paniculata*	Yellow rattle *Rhinanthus minor*
Holy grass *Hierochloe odorata*	Brookweed *Samolus valerandi*

5. CURRENT FACTORS AFFECTING THE HABITAT

Wetlands were, and perhaps still are, the most threatened of all Orkneys major habitat types.

This is a habitat associated with lowland farmland, therefore agriculture is the main impact to consider, though there are others. The modernisation and intensification of agriculture, driven by livestock subsidies and other financial assistance has resulted in large increases in livestock numbers, requiring land for grazing and conversion to crops and improved grass. Recently, quota controls and extensification incentives have succeeded in halting the increase in stock numbers. The following are the most important factors:

- Drainage: despite the current paucity of grants, drainage and improvement still occur. The RSPB Wetland and Marginal Moorland Sites Survey (which includes some moorland fringe and coastal heath sites as well as wetlands of all types) of 1994 found that the "overall loss of land within site boundaries due to damage was 233 ha (5.3% of the original area)" since the previous survey of 1987. While the areas of separate BAP habitats contained within this total is unknown, it indicates a continuing process in recent times, though less than formerly.
- Enrichment or eutrophication (increased plant nutrient levels): agriculture involves the rapid cycling of plant nutrients and losses are inevitable. More intensive systems, however efficient, as recently developed in Orkney involve greater losses and certain practices sometimes exacerbate the process: these may include misjudged use and poor timing of fertiliser and slurry application and inadequate waste management and storage. Most losses are via drainage systems to watercourses, lochs or the sea, but ditches often discharge on the way into diverse wetlands, where resulting enrichment has strong effects on plant communities.
- Overgrazing: or timing of grazing to sensitive periods in the year (e.g. nesting) may have a detrimental effect on the plant and animal communities present. Sometimes, though rather rarely, wetlands may be included in sites used for feeding cattle in autumn or winter: poaching effects can then be severe and damaging to plant communities.
- Extensification payment: extra livestock subsidy payments provided by CAP to producers with low stocking rates are dependent on the availability of extensive grazing areas: this too has encouraged the fencing and utilisation of hitherto ungrazed areas.

- Tree-planting: sometimes these sites are seen as 'waste ground' on the farm, and therefore as suitable sites for planting trees. The loss of such wetland habitats by the planting of any more than the odd clump of willow scrub (which may well enhance some sites) is not compensated by the gain in tree or scrub cover.
- Landfill: such land is sometimes seen as having potential as landfill sites for both waste material generated *in situ* and imported from elsewhere.
- Lack of site designation/protection: the fact that many of these wetlands are small makes them difficult to protect via reserve status or statutory processes. Few single sites meet the criteria for designation, but taken together, they support important populations of birds and are a major characteristic of the Orkney landscape.
- Agricultural abandonment (reduced grazing, or zero management): many sites have been subject to extensive grazing use and their diversity is dependent on some level of continued use. Abandonment either allows rushes to over-dominate or grass litter to build up excessively, both choking biodiversity. Occasionally this has happened to sites entered in agri-environment schemes, as a result of misunderstanding of habitat management.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1 Management

- The RSPB reserve at Mill Dam, Shapinsay is the only individual site with status protected by Government or other agency. However, there will be areas of the habitat in some wetland SSSIs.
- SEERAD grants - CPS and RSS provide grants for conservation grazing management of wetlands. The wetland management options of these schemes have probably had more uptake than any of the other options. With 130 Orkney farms so far in these schemes, wetlands have been protected in most of these.
- LFA support payments to farmers are conditional on observance of a code of good farming practice, including the protection of natural habitats and avoidance of overgrazing: however, these are weak in relation to management of 'in-bye' wetlands but could be strengthened.
- The Orkney Islands Council Development Plan 2000 (Draft) gives the above-mentioned RSPB Wetland and Marginal Moorland Sites Survey sites a degree of protection from development (but not from agricultural development).

6.2 Research and Guidance

- Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.
- Habitats such as this were covered by the RSPB/FWAG Redshank Project 1997, which was continued into 1998/99. This project promotes the use of conservation measures on sites recognized as significant habitats for wetland breeding birds.
- RSPB has commissioned National Vegetation Classification (NVC) surveys of all its reserves.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Maintain the current extent and distribution of these wetlands in Orkney.
- Maintain and where possible enhance the current quality of the habitat in Orkney. **Target**: 75% of RSPB Wetland and Marginal Moorland Sites Survey sites in agri-environment schemes by 2010; 100% of farms entering agri-environment schemes to include wetland sites for management.
- Encourage measures that create semi-natural 'buffering' habitats round wetland sites. **Target**: 50% of farms entering agri-environment schemes to include edge-of-wetland sites for management and/or creation.

8. ACTION PLAN AGENCIES

Local partners: SNH; SEERAD; OIC; RSPB; FWAG; SAC; FA; SEPA; Orkney College

9. PROPOSED ACTIONS WITH AGENCIES

9.1. Site safeguard and management

- Ensure the conservation of marsh sites under LFA cross-compliance rules (SEERAD).
- Protect marsh sites from inappropriate developments (OIC).
- Ensure that all significant areas of marsh are given protection from development through identification as areas of at least local nature conservation importance in Orkney Islands Statutory Development Plan (OIC).
- Ensure that inappropriate tree-planting is not grant assisted (SEERAD, FA).

9.2 Advisory

- Promote agri-environment scheme options aimed at conserving this habitat (SAC, FWAG).
- Promote agri-environment scheme options aimed at conserving and creating habitats adjoining and linking marsh sites (SNH, SAC, FWAG).
- Ensure adequate advice is available and provided to all landowners on best practice (FWAG, SAC, SEERAD).

9.3 Research and monitoring

- Continue to map and review the Wetland and Marginal Moorland Sites register; identify habitat types within the register (RSPB).
- Investigate use of the marshes with least wild-life value for the cultivation of willows for fuel and/or basketry, or reedgrass *Phalaris arundinacea* for fuel (Orkney College).
- Investigate the potential use of specially created marshes to cope with dried treated sewage, organic effluent, and fertiliser run-off (SEPA).

9.4 Promotion and awareness raising

- Raise awareness of biodiversity and farming value of these habitats through events and farm walks (FWAG).

REFERENCES AND OTHER INFORMATION SOURCES

Meek, E.R (1993). The Status of the Pintail in the Orkney Islands. *Scottish Birds* 17:1:14-19.
Whyte, C., Gray, M. and O'Brien, M. (1995). *Numbers of Breeding Waders on lowland areas of Orkney 1993*. Unpublished RSPB report, Edinburgh
RSPB (1995). *Wetland and Marginal Moorland Sites in Orkney 1993-94*. Unpublished report, RSPB, Kirkwall
Wetland Habitats on Mainland Orkney. Aberdeen Centre for Land Use.
Bunting, M J.(1996) Vegetation history of Orkney, Scotland: pollen records from two small basins in west Mainland. *New Phytol.* 128: 771-792.
RSPB, EN, and ITE. (1995). *The Wet Grassland Guide: Managing floodplain and coastal wet grasslands for wildlife.* RSPB, Sandy

9.2 Fens — priority habitat

1. UK PRIORITY HABITAT DESCRIPTION

Fens are peatlands which receive water and nutrients from the soil, rock and ground water as well as from rainfall: they are minerotrophic. Two types of fen can broadly be distinguished: topogenous and soligenous. Topogenous fens are those where water movements in the peat or soil are generally vertical. They include basin fens and floodplain fen. Soligenous fens, where water movements are predominantly lateral, include mires associated with springs, rills and flushes in the uplands, valley mires, springs and flushes in the lowlands, trackways and ladder fens in blanket bogs and laggs of raised bogs.

Fens can also be described as 'poor-fens' or 'rich-fens'. Poor-fens, where the water is derived from base-poor rock such as sandstones and granites occur mainly in the uplands, or are associated with lowland heaths. They are characterised by short vegetation with a high proportion of bog mosses Sphagnum spp. and acid water (pH of 5 or less). Rich-fens are fed by mineral-enriched calcareous waters (pH 5 or more) and are mainly confined to the lowlands and where there are localised occurrences of base-rich rocks such as limestone in the uplands. Fen habitats support a diversity of plant and animal communities. Some can contain up to 550 species of higher plants, a third of our native plant species; up to and occasionally more than half the UK's species of dragonflies, several thousand other insect species, as well as being an important habitat for a range of aquatic beetles.

Notes

(i) The above UK priority Habitat description of *Fens* uses the term 'mire', which in BAP terminology is now reserved for the *Bog* Broad Habitat. The Priority Habitat definition was written earlier and the Broad Habitat definition uses revised terminology (see section 10. *Bog*).

(ii) For the purposes of this BAP, springs, rills and flushes are included in other Locally Important Habitat types, not in *Fens*.

2. CURRENT LOCAL STATUS AND EXTENT

The UK priority habitat description needs some interpretation for the local context.

There are many wetland sites in valleys and basins in Orkney that have the superficial appearance of 'rich fens': they are thoroughly waterlogged, have similar vegetation and are much influenced by base-rich flushing within them and around the edges. However, they cannot all be classified as fens in the sense of the UK priority habitat definition. This is because they are not based on fen peat but on some other substrate or mixture of substrates, including silt, or a waterlogged humic layer over boulder clay; and they may have developed from drained bogs or lochs. Such habitats are included in other *Fen, marsh and swamp* Broad Habitat types, or if they are becoming dried-out and grassy they are described in the *Wet meadow* Locally Important Habitat within the *Neutral grassland* Broad Habitat type. This HAP deals with those few examples of what appear to be fens in Orkney.

Water that percolates into Orkney fens comes from a variety of sources, both base-rich and base-poor, and hence the fens are themselves 'rich-fens' or 'poor-fens', or most commonly, a mixture. The local sandstones from which the water is derived are frequently base-rich, and in this respect the generalisation about base-poor sandstones in the uplands in the UK priority habitat description is misleading. Base-rich Stromness and Rousay Flags underlie much of Orkney, while acid Eday Sandstones underlie Eday and frequently outcrop elsewhere in the eastern half of Orkney. Complexities in geology mean that some base-rich water can be found almost everywhere. Water running off the blanket bog is acidic.

The effect of these influences on already diverse wetlands, where additional modifications have almost always brought about by human interference, mean that these fens are very varied and it is common to see plants that indicate base-rich and acid conditions growing in close proximity.

Fens comprise some of the most species-rich of all Orkney habitats. Together with swamp and areas of shallow open water they support a large and varied population of wetland birds (though many of these are equally to be found in a variety of other wetland habitats). Further description is given in section 4 'Associated species and links with action plans'.

There are no available estimates as to the extent of this habitat within the broad wetland total. Some of the larger wetland areas have not been classified as to type.

3. LOCAL DISTRIBUTION

True fen is probably confined to rather few sites, though further survey is needed to determine the status of some of the larger fen-like wetlands. The outstanding site is the Dee of Durkadale, Birsay, with its variety of base-enriched habitats including sedge meadow. Part of the Loons, Birsay is a fen (bog is also present). Blows Moss, South Ronaldsay is probably another, though much modified by peat-cutting and drainage. The Loch of Banks SSSI is a complex wetland habitat with extensive areas of base-rich fen (see section 9.3), rich in plant and bird species, but is based on mineral soils, though there may be areas of *Fen* habitat within it.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

These are as listed above in the *Marshes* habitat description. Locally important plants species particularly associated with this habitat include lesser pond sedge *Carex diandra* and the hybrid Carex *riparia x rostrata*, the latter only known in the UK from Durkadale.

5. CURRENT FACTORS AFFECTING THE HABITAT

These are the same as for the *Marsh* Locally Important Habitat, to which reference should be made. An additional factor for the *Fen* habitat is the particular sensitivity to changes in water levels brought about by drainage.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1 Management

- SSSIs including the habitat are Glims Moss & Durkadale and Loch of Isbister & the Loons. Site management statements have been drawn up.
- Of these SSSIs, Glims Moss & Durkadale is an SPA; Loch of Isbister & the Loons is a cSAC.
- Loch of Isbister & the Loons and part of Glims Moss & Durkadale are within RSPB reserves.
- SEERAD grants - CPS and RSS provide grants for conservation grazing management of wetlands. While the wetland management options of these schemes have probably had more uptake than any of the other options it is not known how many or how much of the habitat is so protected and managed: probably little, as these sites will often not be subject to current agricultural use, and therefore disbarred from such schemes.

- LFA support payments to farmers are conditional on observance of a code of good farming practice, including the protection of natural habitats and avoidance of overgrazing: however, these are weak in relation to management of 'in-bye' wetlands, and are not intended to address impacts of existing drainage works.
- The Orkney Islands Council Development Plan 2000 (Draft) gives sites on the RSPB Wetland and Marginal Moorland Sites Survey register a degree of protection from development (but not from agricultural development).

6.2 Research and Guidance

- Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.
- Habitats such as this were covered by the RSPB/FWAG Redshank Project 1997, which was continued into 1998/99. This project promoted the use of conservation measures on sites recognized as significant habitats for wetland breeding birds: one of the larger *Fen* sites was included in this effort, and probably smaller sites that may yet be identified as *Fen* habitat.
- RSPB has commissioned National Vegetation Classification (NVC) surveys of all its reserves.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

The UK HAP directs the statutory agencies in their objectives and targets, and gives a conservation direction to the local HAP. Targets and responsibilities will therefore trickle down from the national plan. The actions listed below are additional or complementary to those of the national plan, to which reference should be made.

- Maintain the current extent and distribution of Fen habitat in Orkney.
- Maintain and where possible enhance the current quality of the habitat in Orkney. **Target**: 50% of *Fen* sites in agri-environment schemes by 2010; 100% of farms entering agri-environment schemes to include sites for management.
- Encourage measures that create semi-natural 'buffering' habitats round wetland sites. Target: 50% of farms entering agri-environment schemes to include Fen edge sites for management and/or creation.

8. ACTION PLAN AGENCIES

8.1. National agencies: SNH; SEERAD; SEPA

8.2. Local partners: RSPB; FWAG; SAC; FA; OIC

9. PROPOSED ACTIONS WITH AGENCIES

9.1. Site safeguard and management

- Identify all rich fen sites in Orkney by 2005 (SNH).
- Ensure the conservation of *Fen* sites under LFA cross-compliance rules, paying particular attention to land drainage affecting water levels (SEERAD).
- Protect *Fen* sites from inappropriate developments (OIC).
- Ensure that all significant *Fen* sites are given protection from development through identification as areas of at least local nature conservation importance in Orkney Islands Statutory Development Plan (OIC).
- Ensure that inappropriate tree-planting is not grant assisted (SEERAD, FA).
- Ensure appropriate water quality and quantity for the continued existence of all SSSI fens by 2005 (SEPA).

9.2 Advisory

- Promote agri-environment scheme options aimed at conserving this habitat (SAC, FWAG).
- Promote agri-environment scheme options aimed at conserving and creating habitats adjoining and linking *Fen* sites, especially wetland creation options (SNH, SAC, FWAG).
- Ensure adequate advice is available and provided to all landowners on best practice (FWAG, SAC, SEERAD).

9.3 Research and monitoring

- Examine the conservation status of all *Fen* sites and the potential for restoration of some key sites (SNH).

9.4 Promotion and awareness raising

- Raise awareness of biodiversity and farming value of these habitats through events and farm walks (FWAG).

REFERENCES AND OTHER INFORMATION SOURCES

As for *Fen, marsh and swamp*

9.3 Base-rich flushes — locally important habitat

1. LOCAL HABITAT DESCRIPTION

Flushes are associated with water movement. They occur on gently sloping ground, are often linear or triangular and may include small watercourses. They may be quite extensive or very small. They are distinguished by the absence of dominant grasses and the presence of small sedges, rushes and bryophytes (mosses and liverworts).

The water may be acid, acid-neutral or basic. This local habitat type is comprised specifically of 'base-rich' flushes. Springs and seepages are very common features in Orkney. A great many are base-rich and show themselves as distinctive areas of short, species-rich vegetation amongst taller or species-poor vegetation. They occur in a variety of situations and habitats, sometimes as obvious springs on upland heathland, in maritime heath, the montane zone or treeless dales, on wet sea-banks or even as unimproved wet patches within semi-improved grassland. They are also commonly evident around the edges of lochs and basins, where they may form sedge meadows. In some places close to links or machair there is a calcareous influence from blown shell sand, which can produce a similar result in the vegetation to that produced by diffuse base-rich flushing. Some occur in the vicinity of small springs on hillsides and may be the most floristically rich habitat in Orkney with more than 50 different species to be found in one square metre. Other heavily flushed areas may have much bare stony soil or rock exposed and carry a sparse but highly important vegetation.

(Acid flushes are more rarely present in some areas, particularly over the Eday sandstones. They are evidenced by typically acid-loving bog plants such as sphagnum and bog asphodel *Narthecium ossifragum*).

Where there is a marked supply of calcareous water the vegetation will include black bog-rush *Schoenus nigricans* (a so-called '*schoenus* flush') and a rich and distinctive accompanying flora. Where other plant nutrients are lacking, brown mosses may become dominant. At some of these moss sites calcium becomes encrusted on the mosses, forming deposits of 'tufa' (calcareous mineral deposits encrusted upon characteristic moss species).

Many wetland areas in Orkney display vegetation similar to that described above, diffused over wider areas and not especially localised at obvious sites of water movement. They are often in mosaic with other vegetation types. They cannot be called flushes and they are included in the Locally Important Habitat *Base-rich fens* (see section 5)

2. CURRENT LOCAL STATUS AND EXTENT

These are unusual and important flush types. Tufa is a rare community that has EU priority habitat status.
There are no available estimates as to the extent of these habitats within the Broad Habitat total. It has not been possible to quantify the combined area of small and widely distributed flushes.

3. LOCAL DISTRIBUTION

Base-rich flushes are virtually ubiquitous. They can be found within a wide variety of other broad habitats, as noted in the habitat description. Their occurrence is closely related to the distribution and arrangement of different types of sandstones, as noted in the habitat description for the *Fens* Priority Habitat. Sites are scattered over much of Orkney especially near the foot of hills, except in areas either over more or less acidic rock, e.g. Eday sandstones, or over very deep boulder clay. Excellent examples of *Schoenus* flushes with base-loving sedges and flowering plants can be found even within farmed land.

Tufa-forming springs with brown mosses occur in Hoy and in two or three Mainland dales.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Where there is a marked supply of calcareous water the vegetation will include black bog-rush *Schoenus nigricans* with a rich accompanying flora which may include alpine meadow-rue *Thalictrum alpinum*, bog pimpernel *Anagallis tenella*, knotted pearlwort *Sagina nodosa*, lesser clubmoss *Selaginella selaginoides*, dioecious sedge *Carex dioica*, few-flowered spike-rush *Eleocharis quinqueflora*, marsh horsetail *Equisetum palustre*, other small sedges and rushes and a variety of herbs. More extreme base status will include stoneworts *Chara* species, a reduction of the rushes and sedges to merely *Carex dioica* and *Eleocharis quinqueflora*, the "brown mosses" including *Drepanocladus revolvens* and *Cratoneuron commutatum*, much bare ground with tufa formation and, in Hoy, the yellow mountain saxifrage *Saxifraga aizoides.*

The following are priority species most associated with the *Base-rich flush* habitat, though others listed above in the *Marsh* Locally Important Habitat may occur.

National Priority Species	None
Local Priority Species	
Black bog rush *Schoenus nigricans*	Alpine meadow-rue *Thalictrum alpinum*
Grass of parnassus *Parnassia palustris*	Yellow mountain saxifrage *Saxifraga aizoides*
Broad-leaved cotton-grass *Eriophorum latifolium*	

5. CURRENT FACTORS AFFECTING THE HABITAT

These are the same as for the *Marsh* Locally Important Habitat, to which reference should be made. An additional factor for the *Base-rich flush* habitat is its greater sensitivity to trampling and grazing, and increased nutrient levels. The associated plant communities are dependent on base-rich conditions coupled with low phosphate and nitrogen status, and plants such as black bog-rush *Schoenus nigricans* are exceptionally vulnerable to heavy trampling and grazing: thus the small flushes within farmed land have no protection and are likely to be lost if left unfenced.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1 Management

- As base-rich flushes occur so widely, it is probable that they are to be found in nearly every designated national and local site and RSPB reserve, with the exception of the geological and palaeontological sites, machair, and possibly some coastal and small island sites. One of the notified features of the Hoy cSAC is the Eu priority habitat 'petrifying springs with tufa formation'.
- Other actions are as for the *Marshes* HAP.

6.2 Research and Guidance

- As for *Marshes* HAP.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Maintain the current extent and distribution of *Base-rich flushes* in Orkney.
- Maintain the current quality of the habitat in Orkney. **Target**: 75% of RSPB Wetland and Marginal Moorland Sites Survey sites in agri-environment schemes by 2010; 100% of farms entering agri-environment schemes to include *Base-rich flush* sites for management.
- Encourage measures that create semi-natural 'buffering' habitats round wetland sites. **Target**: 50% of farms entering agri-environment schemes to include edge-of-wetland sites for management and/or creation.

8. ACTION PLAN AGENCIES

Local partners: SNH; SEERAD; OIC; RSPB; FWAG; SAC; SEPA; FA

9. PROPOSED ACTIONS WITH AGENCIES

- As for *Marsh*

REFERENCES AND OTHER INFORMATION SOURCES

As for *Fen, marsh and swamp*

9.4 Base-rich fen — locally important habitat

1. LOCAL HABITAT DESCRIPTION

A distinctive species-rich habitat, termed and listed 'alkaline fen' under the EC Habitats Directive, here called 'base-rich fen' occurs frequently within marshes on base-enriched shallow peat and mineral gley. It is rich in sedge *Carex* and small rush *Juncus* species, often with purple moor-grass *Molinia caerulea*, mosses and liverworts, early marsh orchid *Dactylorhiza incarnata*, butterwort *Pinguilica vulgaris* and black-bog-rush *Schoenus nigricans*.

Base-rich fens are associated with moving water and the characteristic plant communities are the same as in base-rich flushes, but base-rich fens are larger features. They occur extensively in some wetlands in complex mosaics with other fen and marsh types. Such fens occur mainly in the north and west of Scotland where some underlying rocks are basic.

In spite of its similar name, this habitat is quite different from the *Fen* National Priority Habitat, which occurs on deep peat.

The habitat bares close similarities to *Base-rich flushes,* and reference should be made to that HAP.

2. CURRENT LOCAL STATUS AND EXTENT

The EC Habitats Directive listing recognises the naturalness and unusualness of the plant communities of this fen type. While base-rich fens are quite common in parts of Orkney they are not common elsewhere. They are in fact a very special feature of the Orkney environment, nationally recognised as such but probably not given National Priority Habitat status because of their localised occurrence.

There are no available estimates as to the extent of this habitat within the Broad Habitat total.

3. LOCAL DISTRIBUTION

These fens occur mainly in the West Mainland, where they are a component of several of the extensive wetland sites. The best-known and most accessible area is at the Loch of Banks, easily visible from the public road. Here tussock formation creates an interesting example of the contrast between vegetation receiving ground water and that, on the top of the tussocks, only precipitation.

Some wetland sites adjacent to basin bog have marshes with large mineral flushed areas, probably due either to the ancient marl under the present peat or to mineral-rich springs, examples being in the Dee of Durkadale and The Loons. There are significant areas of base-rich fen outside designated sites.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

These are the same as for *Base-rich flushes*.

5. CURRENT FACTORS AFFECTING THE HABITAT

These are the same as for *Base-rich flushes*.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1 Management

- SSSIs including the habitat are Glims Moss & Durkadale; Loch of Isbister & the Loons; and Loch of Banks. Site management statements have been drawn up.
- Of these SSSIs, Glims Moss & Durkadale is an SPA; Loch of Isbister & the Loons is a cSAC. These are also RSPB reserves.
- Loch of Isbister & the Loons and part of Glims Moss & Durkadale are within RSPB reserves.
- Other actions are as for the *Marshes* HAP.

6.2 Research and Guidance

- As for *Marshes* HAP.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Maintain the current extent and distribution of *Base-rich fen* in Orkney.
- Maintain the current quality of the habitat in Orkney. **Target: 75% of RSPB Wetland and Marginal Moorland Sites Survey sites in agri-environment schemes by 2010; 100% of farms entering agri-environment schemes to include *Base-rich fen* sites for management.**
- Encourage measures that create semi-natural 'buffering' habitats round wetland sites. **Target: 50% of farms entering agri-environment schemes to include edge-of-wetland sites for management and/or creation.**

8. ACTION PLAN AGENCIES

Local partners: SNH; SEERAD; OIC; RSPB; FWAG; SAC; SEPA; FA

9. PROPOSED ACTIONS WITH AGENCIES

As for *Marsh*

REFERENCES AND OTHER INFORMATION SOURCES

As for *Fen, marsh and swamp*

9.5 Reedbeds priority habitat

1. UK PRIORITY HABITAT DESCRIPTION

Reedbeds are wetlands dominated by stands of the common reed *Phragmites australis*, where the water table is at or above ground level for most of the year. They tend to incorporate areas of open water and ditches, and small areas of wet grassland and carr woodland may be associated with them. There are about 5000 ha of reedbeds in the UK, but of the 900 or so sites contributing to this total, only about 50 are greater than 20 ha, and these make a large contribution to the total area. Reedbeds are amongst the most important habitats for birds in the UK. They support a distinctive breeding bird assemblage including nationally rare Red Data Birds, provide roosting and feeding sites for migratory species and are used as roost sites for several raptor species in winter.

2. CURRENT LOCAL STATUS AND EXTENT

The birds for which this habitat has been prioritised are not known to occur in Orkney reedbeds, and their importance for migratory birds is not especially notable, but they are important as roosts for raptors.

The larger reedbeds in Orkney are found in two distinct habitats - as the emergent or marginal vegetation of several lochs, or as part of fen vegetation. Perhaps only the former habitat is intended to be included in the National Priority habitat type.

There are some substantial reedbeds but in many cases the area dominated by reed is small and hardly conforms to the description "reedbed". The equally tall and conspicuous reed canary-grass *Phalaris arundinacea* may also confuse the extent of true reed with which it often grows.

There are no figures available for area of this habitat

3. LOCAL DISTRIBUTION

Reed *Phragmites australis* has been reliably recorded in all the major islands and parishes in Orkney with the exception of Eday. The largest reedbeds are at the Loch of Banks, Birsay; Graemeshall Loch, Holm; and Bea Loch, Sanday. There are many smaller sites, some in loch or swamp habitats but others in varied situations including coastal sites where reed grows just above the shore, at the mouth of a burn or at the base of wet cliffs. Unusually, there are at least two sites where reed is growing on wet heath with a heather *Calluna vulgaris* understorey. Some smaller reedbeds may be found at Durkadale and the Loch of Isbister, Birsay; and Manse Loch and Welland, Egilsay.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Reed *Phragmites australis*, as an emergent species is often associated with other emergent plants, e.g. the club-rushes *Schoenoplectus* species. In fens and marshes it is often accompanied by the tea-leaved willow *Salix phylicifolia* (Durkadale, Loch of Banks). These mixed willow/reed habitats are a favourite winter roost for the hen harrier. Other associated plants may be mare's-tail *Hippuris vulgaris*, bog-bean *Menyanthes trifoliata* and horsetails *Equisetum* spp.

The following are priority species most associated with the reedbed habitat, though others listed above in the *Marsh* Locally Important Habitat may occur.

National Priority Species	
European otter *Lutra lutra*	Reed bunting *Emberiza schoeniclus*
Local Priority Species	
Hen harrier *Circus cyaneus*	Coot *Fulica atra*
Water rail *Rallus aquaticus*	Sedge warbler *Acrocephalus schoenobaenus*
Lesser water-parsnip *Berula erecta*	Bulrush *Schoenoplectus lacustris*

5. CURRENT FACTORS AFFECTING THE HABITAT

These are the same as for the *Marsh* Locally Important Habitat, to which reference should be made. Reference should also be made to the national HAP for *Reedbeds*, which refers additionally to the small total area of the habitat, and the demise of traditional management leading to drying out of the habitat. The ending of any traditional management that did occur in Orkney, associated with the use of reed and other materials for thatching, is not a factor to consider. Graemeshall Loch was once managed for duck shooting, which required the clearance or cutting of emergent vegetation to maintain open water: the area of reedbed there has increased since those times.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1 Management

- SSSIs including the habitat are Loch of Banks, Glims Moss & Durkadale and Loch of Isbister & the Loons. Site management statements have been drawn up.
- Of these SSSIs, Glims Moss & Durkadale is an SPA; Loch of Isbister & the Loons is a cSAC.
- Loch of Isbister & the Loons and part of Glims Moss & Durkadale are within RSPB reserves.
- SEERAD grants - CPS and RSS provide grants for fencing off extended burn margins and for conservation grazing management of wetlands, including, specifically, reedbeds. While these management options of have probably had more uptake than any of the other options it is not known how many or how much reedbed habitat is so protected and managed: it is known that parts of the Loch of Banks reedbed are so protected.
- LFA support payments to farmers are conditional on observance of a code of good farming practice, including the protection of natural habitats and avoidance of overgrazing: however, these are weak in relation to management of 'in-bye' wetlands, and are not intended to address impacts of existing drainage works.
- The Orkney Islands Council Development Plan 2000 (Draft) gives sites on the RSPB Wetland and Marginal Moorland Sites Survey register a degree of protection from development (but not from agricultural development).
- There have been attempts by OIC to create reedbeds for water treatment at Dounby.

6.2 Research and Guidance

- Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.
- RSPB has commissioned National Vegetation Classification (NVC) surveys of all its reserves.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

The UK HAP directs the statutory agencies in their objectives and targets, and gives a conservation direction to the local HAP. Targets and responsibilities will therefore trickle down from the national plan. The actions listed below are additional or complementary to those of the national plan, to which reference should be made.

- Maintain the current extent and distribution of *Reedbed* habitat in Orkney.
- Identify any larger areas of *Reedbed* in need of rehabilitation. **Target: sites identified by 2007**.
- Re-assess the potential for reedbed creation for effluent treatment. **Target: assessment by 2004, trial by 2005.**

8. ACTION PLAN AGENCIES

8.1. National agencies: SNH; SEERAD; SEPA

8.2. Local partners: RSPB; FWAG; SAC; Orkney College; OIC

9. PROPOSED ACTIONS WITH AGENCIES

9.1. Site safeguard and management

- Ensure the conservation of reedbed sites under LFA cross-compliance rules, paying particular attention to land drainage affecting water levels (SEERAD).
- Protect reedbed sites from inappropriate developments (OIC).
- Ensure that all significant reedbed sites are given protection from development through identification as areas of at least local nature conservation importance in Orkney Islands Statutory Development Plan (OIC).

9.2 Advisory

- Promote agri-environment scheme options aimed at conserving this habitat (SAC, FWAG).
- Promote agri-environment scheme options aimed at conserving and creating habitats adjoining and linking Fen sites, especially wetland creation options (SNH, SAC, FWAG).
- Ensure adequate advice is available and provided to all landowners on best practice (FWAG, SAC, SEERAD).

9.3 Research and monitoring

- Examine the conservation status of all reedbed sites and the potential for restoration of some key sites by 2005 (SNH).
- Trial reedbed effluent treatment: possibilities are for a rural settlement, a process works using a large quantity of water, and a farm (SEPA, SEERAD, SAC, NoSWA).

9.4 Promotion and awareness raising

None specific to this habitat

REFERENCES AND OTHER INFORMATION SOURCES

As for *Fen, marsh and swamp*

10. BOG — BROAD HABITAT TYPE

GENERAL UK DESCRIPTION

This broad habitat type covers wetlands that support vegetation that is usually peat-forming and which receive mineral nutrients principally from precipitation rather than ground water. This is referred to as ombrotrophic (rain-fed) mire. Two major bog types are identified, namely, raised bog and blanket bog. These two types are for the most part fairly distinctive but they are extremes of what can be considered an ecological continuum and intermediate (or mixed) types occur.

The vegetation of bogs which have not been modified by surface drying and aeration or heavy grazing is dominated by acidophilus species such as bog-mosses *Sphagnum* spp., cotton-grass *Eriophorum* spp. and cross-leaved heath, *Erica tetralix*. The water-table on these types of bogs is usually at or just below the surface.

This habitat also includes modified bog vegetation that essentially resembles wet or dry dwarf shrub heath but occurs on deep acid peat that would have once supported peat-forming vegetation. Modified bog also includes impoverished vegetation dominated by purple moor-grass *Molinia caerulea* or hare's-tail cotton-grass *Eriophorum vaginatum*. Although there is no agreed minimum depth of peat that can support ombrotrophic vegetation, unmodified bog can be identified floristically by the presence of characteristic species such as cotton-grass *Eriophorum* spp. and peat-forming sphagna. Peat depth, although somewhat arbitrary, is used as the primary criterion to separate types of modified bog vegetation from the '*Dwarf shrub heath'* broad habitat type and certain types of '*Fen, marsh and swamp*' broad habitat type. Therefore vegetation dominated by dwarf shrubs, cotton-grass *Eriophorum* spp., or purple moor-grass *Molinia caerulea* vegetation on peat greater than 0.5m deep is classified as bog for the purposes of the Broad Habitat Classification.

In lowland areas with predominantly acid substrata there are examples of valley and basin mires that receive acid seepage, which gives rise to vegetation similar to that of bogs. However, these types are covered in the '*Fen marsh and swamp* broad habitat types.

UK PRIORITY HABITATS PRESENT:	**LOCALLY IMPORTANT HABITATS:**
Blanket bog	**Basin bog**

10.1 Blanket bog — priority habitat

1. UK PRIORITY HABITAT DESCRIPTION

Blanket bog is a globally restricted peatland habitat confined to cool, wet, typically oceanic climates. It is, however, one of the most extensive semi-natural habitats in the UK and ranges from Devon in the south to Shetland in the north. Peat depth is also very variable, with an average of 0.5-3 m being fairly typical but depths in excess of 5 m not unusual. There is no agreed minimum depth of peat that can support blanket bog vegetation. It includes the EC Habitats Directive priority habitat 'active' blanket bog, the definition of active being given as 'still supporting a significant area of vegetation that is normally peat forming'.

Although most widespread in the wetter west and north, blanket bog also occurs in eastern upland areas. Blanket bog peat accumulates in response to the very slow rate at which plant material decomposes under conditions of waterlogging. It is not, however, confined to areas of poor drainage but rather can cloak whole landscapes, even developing on slopes of up to 30°.

Many of the typical blanket mire species, such as heather *Calluna vulgaris*, cross-leaved heath *Erica tetralix*, deer grass *Trichophorum cespitosum*, cotton grass *Eriophorum* species and several of the bog moss *Sphagnum* species, occur throughout much of the range of the habitat, although their relative proportions vary across the country. Other communities, such as flush, fen and swamp types, also form an integral part of the blanket bog landscape. The presence, extent and type of surface patterning is another important feature of blanket bogs. This can range from a relatively smooth surface, with the only irregularities being those created by vegetation features to the extreme patterning associated with suites of bog pools and the intervening ridges.

The total extent of blanket peat in the UK amounts to just under 1.5 million ha, of which 1,060,000 is in Scotland. Significant proportions of peat soil, probably in excess of 10%, no longer support blanket bog vegetation.

2. CURRENT LOCAL STATUS AND EXTENT

Almost all bog in Orkney is classified as blanket bog, the upper layers composed of mixture of dwarf shrubs, sphagnum and cotton-grass *Eriophorum* species, but sometimes with evidence of sedge peat at deeper levels although the lowest layers may be too humidified for easy recognition of species. The peat blanket is sometimes shallow but may reach 1m or more, especially where it has slumped at the base of slopes. It would appear that following the initiation of peat in Orkney some 3000 years ago, it spread everywhere except on exceptionally well-drained soils or shell sand deposits. Occasionally excavation, for drainage or other reasons, will bring up deposits of peat in areas where surface evidence has long since disappeared. Under-sea peat is found in a number of shallow bays in Orkney.

Blanket bog in Orkney shows a range of the characteristic features indicated in the UK description. Patterning with bog pools occurs, especially in Hoy. The habitat supports important populations of some scarce bird species, including species listed under the EC Birds Directive.

Estimates for extent of various ‘moorland’ habitats are given in the section on the *Dwarf shrub heath* Broad Habitat. Most recently, the Scottish Blanket Bog Inventory (2000), together with a subsequent report on the northern isles (Johnson *et al*, 2001), give detailed information on the extent of various ‘mire’ (National Vegetation Classification terminology) vegetation types, together with comparisons with earlier survey data. These mire types equate mainly to Broad Habitat *Blanket bog* but also include a wet heath element of *Dwarf shrub heath*. Examination of the various data sources suggests a *Bog* Broad Habitat area of 19,000 ha. There are no estimates for separate areas of *Blanket bog* and *Basin bog* habitats, but that of *Blanket bog* is much the greater. RSPB have surveyed 1052 ha on their Birsay Moors and Cottasgarth Reserve, 1350 ha at Hobbister and 380 ha on their north Hoy Reserve.

The area of blanket bog appears to have changed little in historical times, excepting at the Whitemoss, Tankerness (partly basin bog), where there has been extensive reclamation. Much has been cut over. Of the areas of moorland reclaimed in the last five decades, much more has been *Dwarf shrub heath* than *Bog*.

3. LOCAL DISTRIBUTION

The largest areas of blanket peat occur in the West Mainland and south Hoy and in the big moorland SSSI's of the West Mainland Moorlands, Keelylang, the Orphir and Stenness Hills and Glims Moss and Durkadale, also at Hobbister and Veness but much cut-over with drying and fissures. Much smaller patches occur in Tankerness, Rousay, Eday and Calf of Eday. Measured solely on the Macauley ".0.50 m depth of peat" figure, there appear to be some 3500 ha of *Blanket bog* in Hoy, mostly south and east of the line Santoo Head to Scad Head. Some areas, for example, close to St. John's Head, and more or less within the montane zone, are lichen dominated in which *Cladonia impexa* is the dominant species yet the average depth of the peat there is >100cms.

Smaller areas of peat are surprisingly well distributed thoughout the isles; for instance some small offshore islands e.g. Auskerry and Linga Holm (on different sides of Stronsay) have cappings of peat well in excess of 0.5 m depth.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Some characteristic bog species are given in the priority habitat description. Others include round-leaved sundew *Drosera rotundifolia*, bog asphodel *Narthecium ossifragum*, lesser twayblade, *Listera cordata*, and many species of liverwort and moss, notably woolly fringe-moss *Racomitrium lanuginosum*. Other communities, such as flush, fen and swamp types, also form an integral part of the blanket bog landscape. In addition, most of the larger areas of blanket bog are dissected by burns, often sunken enough to provide almost ravine-like shelter and here the vegetation changes abruptly.

Bog pools are an important habitat for dragonflies.

National Priority Species	
	None
Local Priority Species	
Pygmy shrew *Sorex minutus*	Mountain hare *Lepus timidus*
Meadow pipit *Anthus pratensis*	Buzzard *Buteo buteo*
Dunlin *Calidris alpina*	Merlin *Falco columbarius*
Kestrel *Falco tinnunculus*	Snipe *Gallinago gallinago*
Common gull *Larus canus*	Lesser black-backed gull *Larus fuscus*
Whimbrel *Numenius phaeopus*	Golden plover *Pluvialis apricaria*
Great skua *Stercorarius skua*	Red-throated diver *Gavia stellata*
Large heath *Coenonympha tullia*	Manchester treble-bar *Carsia sororiata anglica*
Ingrailed clay (a moth) *Diarsia mendica orkneyensis*	Northern arches *Apamea zeta assimilis*
A moth *Psyche casta*	Grey scalloped bar *Dyscia fragaria*
Common hawker *Aeshna juncea*	Meadow grasshopper *Chorthippus parallelus*
Black darter *Sympetrum danae*	Four-spotted chaser *Libellula quadrimaculata*
A spider *Hilaira pervicax*	Large red damsel *Pyrrhosoma nymphula*
A spider *Araeoncus humilis*	A spider *Erigone capra*
A spider *Neon reticulates*	A spider *Hypselistes jacksonii*
Serrated wintergreen *Orthilia secunda*	a snail *Leiostyla angelica*
Bog orchid, *Hammarbya paludosa*	Round-leaved wintergreen, *Orthilia secunda*
Great sundew *Drosera anglica*	Heath cudweed *Gnaphalium sylvaticum*
Sphagnum magellanicum	

5. CURRENT FACTORS AFFECTING THE HABITAT

Factors affecting blanket bog are in general terms similar to those outlined for the *Upland heathland* Priority Habitat, to which reference should be made. Nationally, afforestation has been by far the greatest threat to this habitat. Not so in Orkney, where factors are mainly related to peat-cutting and agriculture, including fragmentation and reclamation, over-grazing, the effects of Government subsidies, also fire, atmospheric pollution, development and recreation. Climate change may be the greatest factor in the future, but it is likely that within the time span of this plan other factors will have by far the greatest impact on blanket bog vegetation and species.

Some local factors, and some more particular to the blanket bog component of moorland, are listed below.

- Uncontrolled burning of heather and over-grazing: this leads to hagging (erosion causing large fissures and sometimes the loss of underlying soil) and the loss of characteristic bog mosses.
- Peat-cutting: many reasonably level and accessible areas of peat in Orkney have been cut over to some extent, although this is not always obvious. The resource has a degree of protection as much lies within the SSSI network in Orkney. Commercial peat extraction for sale for fuel or horticultural use has been proposed; although actual loss has not been very great in Orkney, schemes have been promoted in the past that would have resulted in the complete extraction of peat from several sites in Mainland. Peat has already been removed to a considerable extent in Eday. At some larger extraction sites, cutting peat across the contour rather than ion the level, together with cutting of access roads has led to erosion.

There is evidence that blanket peat was at one time much deeper, even 1.25m on the summits of the higher hills but in several locations severe hagging is taking place and there is also evidence of soil erosion either before or subsequent to the initiation of peat, so that much peat lies directly on bedrock or on a matrix of stones. Recent experiments have shown that, provided proper techniques are followed, regeneration will commence soon after normal hand cutting. Various proposals have been made for the commercial use of peat, either extracted mechanically or modified for cultivation.

The White Moss in Tankerness extended as blanket peat with some basin peat to as much as 125 ha less than 50 years ago but has now been largely reclaimed for agriculture.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1 Management

- SSSIs including the habitat are Hoy; Rousay; Orphir & Stenness Hills; West Mainland Moorlands; Keelylang Hill & Swartabeck Burn, Orphir/Stenness; and Doomy & Whitemaw Hill, Eday; and Calf of Eday. Site management statements have been drawn up.
- Of these SSSIs, Hoy is an SPA and cSAC; Orphir & Stenness Hills, West Mainland Moorlands, Keelylang & Swartabeck; and Calf of Eday are SPAs.
- Hoy is within a NSA.
- The RSPB has extensive moorland reserves that include blanket bog in Hoy, Rousay and West Mainland. These reserves are parts of the SSSIs there.
- SEERAD grants - CPS and RSS provide annual payments for stock reduction and ‘moorland management’; there are less than 10 farms which have entered into these management options, but some substantial areas of blanket bog are so managed.
- The ‘Muirburn Code’ and its recent supplement ‘Prescribed Burning on Moorland’ produced by SEERAD - the burning regulations restrict the burning of heather and associated vegetation to specific times of the year, and there are clear recommendations against burning of sensitive habitats such as bogs.
- LFA support payments to farmers are conditional on observance of a code of good farming practice, including the protection of natural habitats and avoidance of overgrazing: these are somewhat weak in relation to interpretation of overgrazing but could be strengthened.
- Highland Park Distillery is currently undertaking extensive restoration works on heathland damaged by peat extraction activities at Hobbister, and has devised a management plan in close liaison with SNH and RSPB.

6.2 Research and Guidance

- SNH has carried out Phase 1 vegetation surveys of all SSSIs, and other extensive research into the condition of Orkney's moorland.
- RSPB has commissioned National Vegetation Classification (NVC) surveys of all its reserves. RSPB has also been carrying out research into Hen Harrier breeding: this has involved investigation of heath and bog ecology.
- Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Maintain the current extent and distribution of blanket bog in Orkney.
- Maintain and where possible enhance the current quality of all blanket bog in Orkney. **Targets: favourable condition status on all blanket bog SSSIs by 2010**
- Encourage measures to improve the condition of degraded but restorable blanket bog. **Target: measures adopted on two sites by 2010**

8. ACTION PLAN AGENCIES

8.1. National agencies: SNH; SEERAD; FA; JNCC

8.2. Local partners: OIC; RSPB; FWAG; SAC

9. PROPOSED ACTION WITH AGENCIES

The UK HAP directs the statutory agencies in their objectives and targets, and gives a conservation direction to the local HAP. Targets and responsibilities will therefore trickle down from the national plan. The actions listed below are additional or complementary to those of the national plan, to which reference should be made.

9.1. Site safeguard and management

- Presume against planning permission for any new commercial peat extraction (OIC).
- Protect blanket bog from other inappropriate developments (OIC).
- Ensure the conservation of these habitats under LFA cross-compliance rules (SEERAD).

9.2 Advisory

- Promote methods of peat extraction conducive to peat regeneration, and restoration at current sites by 2010 (OIC, SNH).
- Promote agri-environment scheme options aimed at conserving this habitat (SAC, FWAG)
- Promote agri-environment scheme options aimed at conserving and creating semi-natural habitats adjoining blanket bog sites (SNH, SAC, FWAG).
- Ensure adequate advice is available and provided to all landowners on best practice (FWAG, SAC, SEERAD).

9.3 Research and monitoring

None specific to this habit has been prioritised.

9.4 Promotion and awareness raising

- Raise awareness of biodiversity and farming value of these habitats through events and farm walks (FWAG).

REFERENCES AND OTHER INFORMATION SOURCES

Everingham, F & Mayer, P. (1990). *A Peatland Survey of Orkney*. Contract report for NCC

Johnson, G. & Morris, J.M. (2000). *Scottish Blanket Bog Inventory: Caithness and Sutherland and Orkney – Characterisation of blanket bogs using Landsat Thematic Mapper*. SNH Commissioned Report Series No XX. Perth

Johnson, G.M., Charman.E. & Coupar, A.C. (2001). *Area portfolio of peatland information for Northern Isles*. SNH Commissioned Report (unpublished, available at www.snh.org.uk)

Kirkpatrick, A.H., Simpson, I.A., Scott, L., Hanley, N., Oglethorpe, D., Curtis, D.J., Thacker, J.R.M., McCall, D., Watson, A., & Davidson, D.A. (1993). *Moorland Audit and Management in the Northern Isles*. Contract report for SNH, Edinburgh

Macdonald, A., Stevens, P., Armstrong, H., Immirzi, P., & Reynolds, P. (1998) *A Guide to Upland Habitats. Surveying Land Management Impacts.* SNH, Edinburgh

Macaulay Institute for Soil Research. (1979). Soil Survey of Scotland (map). MISR Aberdeen

SEERAD. *The Muirburn Code.*

SEERAD. *Prescribed Burning on Moorland. Supplement to the Muirburn Code: A Guide to Best Practice.*

Tickner, M. (1999). *NVC Survey of Orkney Reserves at Hobbister, Birsay Moors and Cottasgarth*. Report for RSPB

10.2 Basin bog — locally important habitat

1. LOCAL HABITAT DESCRIPTION

Deep peat sometimes accumulates in basins and can become much deeper than in that in blanket bog, up to 5.5.m. Lower layers, 2 m or more in depth, may be dominated by sedges and include wood fragments. These basin bogs may in turn overlie marl deposits. They may support vegetation, including scarce *Sphagna* species, similar to those found on raised bogs. Although the locations of some are well known, the Macauley soil maps show up unsuspected pockets of other peat of basin bog formation. In most cases later blanket peat will have spread over the bog, giving it many of the characteristics of that habitat type.

Choosing the appropriate term to describe these bog habitats in Orkney is problematic. In the past, some have been termed 'raised bogs'. Raised bog is a type of ombrotrophic mire, i.e. a peatland that is fed exclusively by precipitation and generally found in valleys of floodplains. It consists of a dome of peat, which is produced entirely by peat growth. It is a matter of debate whether such a bog type occurs in Orkney: local deep peat bogs in lowland basin situations do not appear to be dome-shaped. The term 'basin bog' has been chosen to describe them for this HAP.

Peat accumulation preserves a unique record of plant and animal remains and some atmospheric deposits from which it is possible to assess historic patterns of vegetation and climate change and human land-use. Tree remains are often preserved in Orkney bogs.

2. CURRENT LOCAL STATUS AND EXTENT

Basin bogs are more complex environments than blanket bogs, and richer in species. They are of special interest. Two are in SSSIs and have been the subjects of some study. Basin bogs are akin to raised bogs, a national Priority Habitat for which an Action Plan has been written. Raised bogs are one of Europe's rarest and most threatened habitats, also one of the most damaged.

The total area has not been estimated.

There has been some loss of the habitat in recent times, especially in Tankerness. Drainage and peat-cutting have severely modified some sites.

3. LOCAL DISTRIBUTION

Although three known basin bogs in Orkney have been partially studied for various reasons, the location of others is less well known. They appear to be widely scattered over the West Mainland with very few in Hoy and elsewhere. Basin bogs occur in Glims Moss in Birsay, probably the largest area of uncut basin bog in Orkney, the Loons, Birsay seems to have been cut over at various times in the past (both sites also include areas of fen) and the White Moss in Tankerness. An interesting pool and hummock, active bog has developed in a hollow enclosed by moraines at the Moss of the Whitestanes near Rackwick in Hoy. The dominant plants are several *Sphagna* species, including *S.magellicum* and other bryophytes (mosses and liverworts). This example is comparable with the western Scottish blanket bog vegetation.

The Glims Moss, Birsay, bog is the outstanding site. It has frequently been described as a raised bog.

Other basin or lowland peat formations occur at Whitemire, Birsay; Quholm and Cruland, Sandwick; Winksetter, Firth; Caldale, St Ola; Ocklester, Holm; very extensively round Blubbersdale, Stenness; and at many smaller sites including Skaill, Eday; and Dale Moss, South Ronaldsay. The character and habitat type of these bogs or acid fens is not clear.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Species are as for *Blanket bog*, but, especially in the deep peat which has never been cut over and has been too wet to be seriously damaged by muirburn, some of the more unusual species of sphagnum may be found. Basin bogs support a range of animals including many wetland birds e.g. Curlew and dragonflies. Rare and localised invertebrates such as the local priority large heath butterfly *Coenonympha tullia* are also found. Other rare invertebrates are associated with raised bogs but they are not so far known from Orkney. A local priority plant, bog myrtle *Myrica gale* is now known from one site only in Orkney, in Eday.

5. CURRENT FACTORS AFFECTING THE HABITAT

Factors affecting basin bog are similar to those outlined for the *Blanket bog* Priority habitat, to which reference should be made. However, as these basin bogs are similar to raised bogs, the hydrology - the balance between rainfall and water loss - is the critical factor in their existence: it follows that alteration of the drainage is damaging.

Some specific factors particular to basin bog are listed below.

- Peat-cutting: the deep peat with good burning quality on these more accessible bogs is more cut-over than on the upland blanket bog. There are few if any not modified in this way. Various proposals have been made for the commercial use of peat, either extracted mechanically or modified for cultivation.
- Drainage: major drainage systems of valleys and basins including much improved agricultural land as well as basin bogs has inevitably lowered watertables or caused greater seasonal fluctuations, with consequences for the conservation status of these bogs.
- Reclamation: although not easily reclaimed, drainage and improvement of surrounding land has worked on the fringes of sites, and led to the eventual disappearance of some smaller ones. Much of the bog, including blanket and basin, of the White Moss, Tankerness has been reclaimed for agriculture and the pool system reduced.
- Lack of management options appropriate for basin bog sites in CPS: options were not available for isolated areas of moorland of any kind not being used as part of hill sheep farming units, i.e. the typical situation of basin bogs. It is not known, but improbable, that any basin bogs have been brought under management via CPS.
- The commercial extraction of marl is a possible threat.
- Little information appears to be available about the composition of the lower layers of the peat or if some are of lacustrine origin. More detailed study of the flora and fauna of local basin bogs is required.

6. CURRENT ACTIONS AND OPPORTUNITIES

These are similar to those listed for *Blanket bog*.

6.1 Management

- SSSIs including the habitat are Glims Moss & Durkadale, and Hoy. Site management statements have been drawn up.
- Of these SSSIs, Hoy is an SPA and cSAC; Loch of Isbister & the Loons is a cSAC; Glims Moss & Durkadale is a SPA.
- Hoy is within a NSA.
- Part of the Glims Moss site and the Hoy site are within RSPB reserves.
- SEERAD grants - RSS may now be able to provide annual payments for conserving these sites. RSS includes a management option for Raised Bog, and since this is a term used by vegetation surveyors for SNH and its predecessor NCC to describe at least some of Orkney's basin bogs, it may be that this option will be applicable to the Orkney basin bogs.
- The 'Muirburn Code' and its recent supplement 'Prescribed Burning on Moorland' produced by SEERAD - the burning regulations restrict the burning of heather and associated vegetation to specific times of the year, and there are clear recommendations against burning of sensitive habitats such as basin bog.
- LFA support payments to farmers are conditional on observance of a code of good farming practice, including the protection of natural habitats and avoidance of overgrazing: these are somewhat weak in relation to interpretation of overgrazing but could be strengthened.
- Recent experiments have shown that, provided proper techniques are followed, regeneration will commence soon after normal hand cutting.

6.2 Research and Guidance

- SNH has carried out Phase 1 vegetation surveys of all SSSIs, and other extensive research into the condition of Orkney's moorland.
- RSPB has commissioned National Vegetation Classification (NVC) surveys of all its reserves.
- Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.
- SWT has collected the practical aspects of peatbog management together and Scotland has a number of sites where experimental management is going on. This could be of practical value in the Orkney situation.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Maintain the current extent and distribution of basin bog in Orkney.
- Encourage measures to improve the condition of degraded but restorable basin bog. **Target: measures adopted on two sites by 2010**

8. ACTION PLAN AGENCIES

Local partners: SNH; SEERAD; OIC; RSPB; FWAG; SAC

9. PROPOSED ACTION WITH AGENCIES

Similar to those for *Blanket bog*. The actions listed below are additional to those listed for *Blanket bog*.

9.1. Site safeguard and management

- For the purpose of RSS management and capital grants, regard Orkney basin bog habitat as equivalent to RSS 'Raised Bog', thus allowing the application of suitable management prescriptions to basin bog sites in Orkney (SEERAD, SNH).

9.2 Advisory

None additional

9.3 Research and monitoring

None additional

9.4 Promotion and awareness raising

None additional

ADDITIONAL REFERENCES AND OTHER INFORMATION SOURCES

Crawford, R. M. M. (1975). *The Loons, Birsay.* Contract Report for NCC

11. STANDING OPEN WATER AND CANALS — BROAD HABITAT TYPE

GENERAL UK DESCRIPTION

This type includes natural systems such as lochs and pools, as well as man-made waters such as reservoirs, ponds and quarry pits. It includes the open water zone and water fringe vegetation where this is less than 5 m wide. Small areas of open water in a predominately terrestrial habitat such as bog pools or temporary pools on heaths will be included in the appropriate terrestrial broad habitat type. This definition provides scope for overlap with other habit descriptions and action plans, including reedbed, fen, rushy pasture and willow scrub, habitats considered more fully in their own HAPs. It is important to recognise the transition between them and refer where necessary to the appropriate HAPs.

Standing waters are usually classified according to their nutrient status and this can change naturally over time or as a result of pollution. There are three main types of standing waters, namely: oligotrophic (nutrient poor), eutrophic (nutrient rich), and mesotrophic (intermediate). These types exist along an environmental gradient and intermediate types occur. Other types of lake include dystrophic (highly acidic, peat-stained water) and temporary water bodies.
The range of standing open water types included in this broad category means that only a general overview of the some of the issues is possible within this broad habitat statement. The broad habitat includes UK and local priority habitats that are discussed in more detail in their individual HAPs

Saline lagoons are excluded from this habitat type.

Note on brackish waters
Coastal 'ayre' lochs in Orkney are separated from the sea by a natural sedimentary barrier. Many if not all of these lochs are affected by salinity but the degree is very variable, depending on a number of factors at each site. Some of these lochs, where plant communities present reflect high salinity (from seawater percolation through the barrier and/or frequent over-topping), are included in the *Saline lagoons* Priority Habitat type. However, other lochs are little influenced by seawater percolation and were classified as eutrophic freshwaters on the basis of their plant communities by the 1986 NCC Orkney Loch Survey (Charter and Van Houten 1989). They are 'Type 7' lochs in the classification System for Evaluating Standing Waters for Conservation (SESWACON) i.e. eutrophic waters typical of coastal northern Britain. They are included in the *Standing open waters* Broad Habitat type.

Additionally, there are some pools and even small lochs where the water is highly saline due to great exposure to sea spray. The cliff-top lochs at Aikerness, Westray are the best example. Such sites have escaped classification in the UK BAP process, but is suggested that they are included in the *Standing open waters* Broad Habitat type (Hennessy 2002). Their existence and importance as habitats that may support unusual plant and animal communities are noted here.

UK PRIORITY HABITATS PRESENT:	LOCALLY IMPORTANT HABITATS:
Eutrophic Standing Waters	**Oligotrophic and Dystrophic Lochs**
Mesotrophic Standing Waters	**Ponds and Milldams**

LOCAL STATUS

Orkney is very rich in Standing Open Water habitat. The habitat has been surveyed recently: the Orkney Lochs Survey of 1986 (of almost all freshwater sites), identified 151 lochs and lochans (and 15 brackish lochs and lagoons), though some of these were little more than pools. Harray Loch has been the subject of several separate surveys and reports. There is an especially rich array of eutrophic and mesotrophic lochs for which Orkney is important in a national context. It would be hard to overstate the local importance of this range of habitats.

REFERENCES AND OTHER INFORMATION SOURCES

Barne. J. H., Robson, C.F., Kaznowska, S.S., Doody, J.P., Davidson, N.C. and Buck, A.L. (eds) (1997). *Coasts and Seas of the United Kingdom. Region 2. Orkney*. JNCC, Peterborough
Barnes, R.S.K. (1980) *Coastal Lagoons*. CUP, Cambridge
Bullard, E.R. (1972). *Lagoons and Oyces in Orkney*. Bull. Orkney Field Club 1972
Charter, E. & Van Houten, A. (1989). *Survey of Orkney Lochs 1986*. Report for NCC
Heppleston P. B. (1983). How salty are Orkney's lochs? *Bull. Orkney Fld Club 1983*
Hennessy M. M. et al (1996). *Water Quality monitoring in the Orkney Isles: Harray, Stenness, Boardhouse, Kirbister, Bea, Burness and Saintear*. Report for SNH
Hennessy M. M., JNCC. (2002). Pers.comm.
Stewart, N.F. (1995), A Survey of Orkney Stoneworts. *Bull. Orkney Fld Club 1995*
Stewart, N.F. (1995), *A Survey of Orkney Stoneworts.* Unpublished report for SNH
SEERAD – *Code of Good Practice for the Prevention of Environmental Pollution from Agricultural Activity (PEPFAA Code)*
SEPA (1999) – *Improving Scotland's Water Environment*. State of the Environment Report
SEPA - 1998 Environmental Strategy
SEPA policy no. 21 – *Strategy for Implementing Actions under the UK Biodiversity Action Plan*
SEPA (2000*) Ponds, Pools and Lochans: Guidance on good practice in the management and creation of small waterbodies in Scotland.* Produced by the Habitat Enhancement Initiative
Williams, P. et al. (1999). *The Pond Book: a guide to the management and creation of ponds*. Ponds Conservation Trust, Oxford.
Guidance leaflets and other literature are available from RSPB, SNH, SEPA, SEERAD, SAC, FWAG, SEERAD Freshwater Fisheries Laboratory and WWF, either directly or via their web sites.

11.1 Eutrophic standing waters — priority habitat

Eutrophic lochs were identified by the UK biodiversity group as a key habitat that requires specific work over and above that detailed in the *Standing Open Waters and Canals* habitat statement. Note also comments in the *Mesotrophic Lochs* HAP in this audit on the intermediate status of some water bodies and the need to treat the HAPs for eutrophic and mesotrophic water bodies as complementary.

1. UK PRIORITY HABITAT DESCRIPTION

These are lochs that have relatively high levels of nutrients, including total phosphorus (typically at least 0.35 mg/l) and total inorganic nitrogen (at least 0.5 mg/l). Many of these water bodies are characterised by dense populations of algae in summer, making the water green. Many lowland water bodies in the UK have much higher levels of nutrients: these are polluted and biodiversity is depressed. In their more natural state eutrophic waters have high biodiversity.

In the UK HAP it is proposed that eutrophic water bodies in the UK should be nationally classified into three tiers distinguished on the grounds of naturalness, biodiversity and restoration potential. The exact criteria for these categories have yet to be agreed and the total number of sites falling into each Tier confirmed. It is likely that most Orkney eutrophic lochs will be in Tier 1, unless excluded on grounds of size.

There are no accurate estimates for the amount of eutrophic standing waters in the UK but is considered to be in the region of 1785 km² of which approximately 15% (360 km²) occur in Scotland.

2. CURRENT LOCAL STATUS AND EXTENT

Orkney has a high proportion of Scotland's naturally eutrophic lochs, an increasingly rare habitat. The occurrence of coastal eutrophic lochs in the north and west of Britain is noted in the UK HAP. They are an especially important local habitat.

Eutrophic lochs were the most frequent type identified in the 1986 Loch Survey in Orkney. 74 were recorded, of which 55 were noted as species-rich and 19 were noted as a species-poor habitat variant. The total area of these is 609 ha. Harray loch was not included in the 1986 survey, and is also included here as a eutrophic loch. It has an area of 1,138 ha. It has been the subject of a number of surveys and reports that variously point to it being borderline eutrophic/ mesotrophic, or eutrophic.

A great many of these lochs are coastal, and some of them are ayre lochs, where there is some saline influence from sea spray and/or seepage. These influences, and occasional deposits of storm-thrown seaweed, raise the trophic status of these lochs. These are an unusual eutrophic loch type.

3. LOCAL DISTRIBUTION

These Lochs are scattered throughout the islands except Hoy, and include notable groups in Egilsay, Sanday, North Ronaldsay and Stronsay. The largest is Harray Loch at 1,138 ha, followed by the Loch of Kirbister, Orphir (100 ha), Loch of Skaill (63 ha), North Loch, Sanday (41 ha), Loch of St Tredwell, Papa Westray (39 ha) and Bea Loch, Sanday (37 ha). Other important sites include Lochs of Wasbister and Scockness, Rousay; Meikle Water, Stronsay; Loch of Sabiston, Mainland; Bea Loch, Sanday; Egilsay Lochs. Of the ayre lochs, Echnaloch, Burray, has been noted for its range of invertebrate species, and is a haven for wintering waterfowl.

Clearly, Harray Loch is the outstanding site, but the above and many others, including the small coastal ones, are important sites that should be highlighted in the parish and island action plans.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Harray Loch, which together with Stenness Loch is an SSSI, is the largest eutrophic loch in Orkney and is particularly notable for the large number of *Potamogeton* species (nine) it supports. Invertebrate interest of the loch is also high and includes a rare caddis fly *Ylodess reuteri* and the only Scottish locality for the snail *Theodoxus fluviatilis*.

National Priority Species	
European otter *Lutra lutra lutra*	Mossy stonewort *Chara rudis*
Lesser bearded stonewort *Chara curta*	Medicinal leech *Hirudo medicinalis*
Local Priority Species	
Common toad *Bufo bufo*	Trout *Salmo trutta*
Pintail *Anas acuta*	Shoveler *Anas clypeata*
Teal *Anas crecca*	Wigeon *Anas penelope*
Mallard *Anas platyrhynchos*	Gadwall *Anas strepera*
Pochard *Aythya ferina*	Tufted duck *Aythya fuligula*
Scaup *Aythya marila*	Goldeneye *Bucephala clangula*
Whooper swan *Cygnus cygnus*	Mute swan *Cygnus olor*
Coot *Fulica atra*	Red-throated diver *Gavia stellata*
Black-headed gull *Larus ridibundus*	Red-breasted merganser *Mergus serrator*
Great silver water beetle *Hydrophilus piceus*	A water beetle *Coelambus novemlineatus*
A water beetle *Potamonectes griseostriatus*	Blue-tailed damselfly *Ischnura elegans*
Four-spotted chaser *Libellula quadrimaculata*	A caddis fly *Ylodes reuteri*
A caddis fly *Triaenodes reuteri*	A snail *Theodoxus fluviatilis*
Lesser water-parsnip *Berula erecta*	Long-stalked pondweed *P. praelongus*
Slender-leaved pondweed *P. filiformis*	A hybrid pondweed *P. x suecicius*
Bulrush *Schoenoplectus lacustris*	Glaucous bulrush *Schoenoplectus tabernaemontani*
Autumnal water-starwort *Callitriche hermaphroditica*	A green algae *Cladophora sauteri*

5. CURRENT FACTORS AFFECTING THE HABITAT

There are many pressures on the aquatic environment resulting from population, agriculture, industry, quarrying, construction and other human activity. These can cause particular environmental impacts. In general, smaller, lowland lochs are most at risk. Some more significant factors are outlined below. Many of these factors result in cases of serious deterioration in water quality in southern Britain. While there is no evidence that this is the case in Orkney, there are indications of eutrophication in some lochs.

- Pollution: sewage effluent, diffuse and point source from agriculture, urban drainage and industrial effluent are all potentially involved. In Orkney, agriculture is the most important source, and the greatest effect is enrichment by nutrient loads i.e. increased eutrophication leading to enhanced plant production, the potential for loss of macrophyte species and the possibility of algal blooms. Phosphorus is the key nutrient. The processes involved are long-term and complex, but changes may be sudden. This loch type is especially at risk from increased nutrient loads.

  Some of the practices associated with diffuse pollution from agriculture are worth detailing in this context. These include application of inappropriate quantity and quality of plant nutrients, poor timing of nutrient application and soil cultivation, slurry or fertiliser spilling into ditches and water margins, soil erosion from bare or poached land, and cattle poaching of water margins. Soil under-drainage exacerbates run-off. Point-source pollution has been much reduced by regulation and investment in improved farm waste management, but some management systems and storage facilities remain imperfect and liable to leakage, especially of dilute wastes.

  There is likely to be some agri-chemical input, but this will not be high under Orkney farming systems.

  Town sewage and private septic tanks discharge into eutrophic lochs.

Harray Loch is affected by eutrophication and was the subject of a study in 1989-1991 after a Canadian pondweed *Elodea canadensis*/enrichment problem. Monitoring of water quality (by OIC) in feeder burns continued after the study. Dounby sewage now goes through a reed bed system, not untreated into the loch. The Loch of Saintear, Westray has been affected by algal blooms which are likely to be related to nutrient enrichment. Other similar sites, i.e. small, shallow lochs in catchments with intensively managed grassland, are vulnerable.

- Water abstraction and drainage. Where water abstraction occurs, eutrophication may be enhanced by reduced water flow through the loch (residence), and fluctuating water levels often adversely affect shoreline vegetation and fauna. Drainage of the habitat is especially destructive, likewise in-filling of smaller water bodies. Public water supply is abstracted from Loch of Kirbister; Stromness Reservoir; Bea Loch, Sanday; and Lochs of Saintear and Burness, Westray. In many other lochs, water levels are kept low to dry surrounding farmland, and many smaller ones have been drained completely in the past. There are some recent instances of loch drainage.
- Damage to shoreline. This may be from excessive trampling by livestock, and erosion, or cultivation close to edges. Road and other developments can have similar effects.
- Species introduction. Introduced plants, in particular Canadian pondweed *Elodea canadensis*, may alter the balance. Invasive alien plants and animals can displace native species. In most cases human action, whether deliberate or not, is required. Trout *Salmo trutta* have been widely introduced, including into an SSSI loch in Sanday. Canadian pondweed *E.canadensis* is very common in Harray. Explosive growth of this weed and subsequent die-back has occurred, probably in response to nutrient enrichment. The plant is now also in the Loch of Bosquoy.
- Recreational pressure. Excessive disturbance for some species may occur from fishing, shooting, boating and dog-walking.
- Climate change. This may alter the character of water bodies e.g. by a rise in temperature or throughput of fresh water and could produce effects such as accelerated plant growth and colonisation by non-native species.

The Orkney Loch Survey of 1986 identified loch edge trampling in 40% of the sites surveyed, water abstraction in 13% and agricultural pollution in 12%. Some also had sewage inflow, disturbance by shooting and levels lowered by drainage. The alien Canadian pondweed is now present in several lochs, and likely to have been spread on fishermen's boats. Since this survey the extent of these activities may have altered: point-source pollution may be reduced, while diffuse pollution continues; major sewage inflows are much reduced; water abstraction is predicted to increase; demand for grazing land and the structure of agricultural support measures has led to drainage of some lochs.

6. CURRENT ACTIONS AND OPPORTUNITIES

The UK HAP outlines current action and directs the statutory agencies in their objectives and targets, and gives a conservation direction to the local HAP. Reference should be made to the national HAP. Actions include measures to rehabilitate nutrient enriched lakes and the development of a national strategy for the control of eutrophication. Research continues into methods of reversing eutrophication. The Scotland and Northern Ireland Forum for Environmental Research (SNIFFER), whose members include SEPA and SEERAD, is considering research needs in Scotland and NI.

The actions listed below are additional or complementary to those of the national plan, to which reference should be made.

6.1 Management

- Eutrophic lochs in SSSIs are, in addition to Harray; North Loch, Loch of Langamay and Loch of Rummie in Northwall; Loch of Isbister; and the small Loch of the Stack, West Westray. Site management statements have been drawn up.
- Of these SSSIs, Loch of Isbister and The Loons is a cSAC; and West Westray is an SPA.
- Loch of Isbister & the Loons is also an RSPB reserve. (Loch of the Stack is not within the West Westray RSPB reserve there.)
- SEERAD grants: CPS and RSS provide annual payments for management of water margins (essentially, fencing off a no grazing zone around loch edges). 33.85 ha are entered into this option. No figures are yet available for equivalent option taken up in the single RSS year of 2001. The management allows for the development of tall emergent and bank-side vegetation and provides a physical barrier against potentially harmful agricultural operations.
- SEERAD grant conditions: support payments to farmers are conditional on observance of a code of good farming practice, including the protection of natural habitats. Of the highest importance among these is the avoidance of pollution.
- LERAPs: Local Environmental Risk Assessment for Pesticides provide a practical framework for complying with the anti-pollution laws, including mapping and categorizing streams, ponds and rivers on the farm and observing buffer zones.
- SEPA grants: SEPA has grants available for habitat enhancement. There has been no known uptake in Orkney.
- Environmental Impact Assessments are required for developments with a significant impact.
- The Orkney Trout Fishing Association (OTFA) is a repository of advice and guidance on local fisheries management, and exerts influence to maintain water quality and fish habitat.

6.2 Research and Guidance

- SEPA water monitoring: SEPA carries out comprehensive chemical analysis of Harray Loch and Loch of Kirbister on a monthly basis, these lochs being selected according to criteria set out in the Scottish Standing Waters Classification Scheme (mainly on the basis of size).
- NOSWA monitoring: the North of Scotland Water Authority constantly monitors water quality at its pumping stations at Loch of Kirbister; Stromness Reservoir; Bea Loch, Sanday; Lochs of Saintear and Burness, Westray.
- Harray monitoring: a study of the impacts of agriculture on water quality of Harray Loch was carried out in 1989-90. Much other research into water quality and biodiversity of Harray Loch has been carried out (see references). A new study of the status of and the factors affecting the Harray and Stenness Lochs is being carried out for SNH in 2001-2002.
- Nutrient balancing: research has been carried out by FWAG in Orkney into nutrient inputs and balances, especially in the catchment of the Lochs of Saintear and Burness in Westray (both eutrophic lochs), and guidance given to landowners to help minimise the impact of agriculture on sensitive catchments.
- Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.
- Codes of practice: SEERAD publishes a code, the Code of Good Practice for the Prevention of Environmental Pollution from Agricultural Activity (PEPFAA Code), and issues it to farmers. It is a comprehensive and well-presented code, but there are doubts as to how well it is observed.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

In the context of the national plan, targets and responsibilities will trickle down to the local level. Introduction of the EU Water Directive Framework will provide a stronger mechanism for the protection and enhancement of eutrophic standing waters than has previously existed. New statutory objectives will exist for their ecological status. The national HAP directs statutory agencies to classify eutrophic waters on the basis of current condition and develop plans for ensuring or improving their condition.

The actions listed below are additional or complementary to those of the national plan, to which reference should be made.

- Maintain the water quality of eutrophic standing waters in Orkney.
- Maintain the characteristic plant and animal communities of eutrophic standing waters in Orkney.
- Identify and implement remedial action to address nutrient enrichment and pollution in Orkney eutrophic standing waters.
- Encourage measures that create semi-natural 'buffering' habitats round lochs. **Target: 75 % of farms with loch edge habitats entering agri-environment schemes to include edge sites for management and/or creation.**

8. ACTION PLAN AGENCIES

8.1. National agencies: SNH; SEERAD; SEPA

8.2. Local partners: RSPB; FWAG; SAC; NOSWA; Orkney Trout Fishing Association; OIC

9. PROPOSED ACTION WITH AGENCIES

9.1 Site safeguard and management

- Ensure that eutrophic lochs meet EU Directives in terms of biodiversity and water quality (SEPA, SNH).
- Implement management plans and maintain condition of all tier 1 sites (SNH, SEPA, SEERAD, NoSWA).
- Implement management plans for tier 2 lochs by 2010 and improve condition by 2020 (SNH, SEPA, SEERAD, NoSWA).
- Ensure that local planning mechanisms take into account the particular wildlife interest of eutrophic lochs (OIC).
- Where need established, prepare catchment management plans on a prioritised basis. Involve statutory and non statutory organisations (OIC, SEPA, SNH, NOSWA).
- Ensure management at abstraction lochs avoids any sudden changes in water level, and that the effects of any increased abstraction are minimised (NOSWA, SEPA).
- Review practice on introductions of trout to waters without trout (Orkney Trout Fishing Association).

9.2 Advisory

- Promote adherence to PEPFAA code (SEERAD).
- Promote best practice management techniques, especially farm nutrient management and protection of sensitive habitats (SEERAD, SAC, FWAG).
- Promote agri-environment scheme options aimed at conserving this habitat (SAC, FWAG).
- Develop nutrient budgeting advice to farmers as a business and environmental management tool (SAC, FWAG).

9.3 Research and monitoring

- Establish monitoring programme to identify 3 tiers of sites (SEPA, SNH).
- Promote research into the biodiversity of these lochs (SEPA, SNH, OFC).
- Undertake and afterwards periodically review a freshwater fish survey of all Orkney freshwaters (SNH).

9.4 Promotion and awareness raising

- Promote widespread awareness, especially to loch users and catchment residents, of biodiversity significance of and threats to eutrophic lochs (All).
- Promote good practice among fishermen relating to avoidance of transfer of plants between waterbodies (OTFA).

REFERENCES AND OTHER INFORMATION SOURCES

Hennessy M. M. et al (1995) *Water Quality in Lochs of Harray and Stenness February – April 1995*. Report for OIC
Birkinshaw. D. (1994) *Macrophyte Survey of the Loch of Harray*. Report for SNH
Sinclair et. al (1992) *The Impact of Agriculture on Water Quality in Loch of Harray and Feeder Burns – Report for OIC*. SAC and University of Aberdeen

11.2 Mesotrophic lochs — priority habitat

Mesotrophic lochs were identified by the UK biodiversity group as a key habitat that requires specific work over and above that detailed in the *Standing Open Waters and Canals* habitat statement. Note also comments in the *Eutrophic Standing Waters* HAP in this audit on the intermediate status of some water bodies and the need to treat the HAPs for eutrophic and mesotrophic water bodies as complementary. Much of what is stated there about the conservation of eutrophic lochs applies equally to the mesotrophic and is not repeated below.

1. UK PRIORITY HABITAT DESCRIPTION

These are lochs in the middle of the trophic range, characterized by their relatively narrow range of nutrients, mainly inorganic nitrogen (0.3-0.65mg/l) and phosphorus (0.01-0.01mg/l). They hold the highest diversity of macrophytes (larger plants, excluding plankton etc.) of any type of loch and also a relatively high proportion of rare and scarce plants. They should also hold high numbers of invertebrates, especially dragonflies, water beetles, stoneflies and mayflies.
These lochs are increasingly rare due to human-induced changes in water chemistry. Few UK sites have natural species assemblages, as a consequence of introductions.
Eutrophic and mesotrophic waterbodies exist along an environmental gradient and intermediate types occur. As the upper end of the mesotrophic scale merges into the eutrophic, status may change as the result of nutrient inputs, the action plans for mesotrophic and eutrophic are complementary, and their implementation should be co-ordinated.

2. CURRENT LOCAL STATUS AND EXTENT

37 sites were identified as mesotrophic in the 1986 Loch Survey. The total area was 713 ha. Mesotrophic water bodies being infrequent in the UK, these Orkney sites are of great importance. The fact that many sites in Orkney are unaffected by species introduction (but see exceptions below), contributes to their importance. One site in Orkney, the Muckle Water, Rousay was in 1986 classified separately from the others as 'species-rich mesotrophic'.

3. LOCAL DISTRIBUTION

Distribution is concentrated in the West Mainland, the South Parish of South Ronaldsay, and North Ronaldsay. Only 4 sites are outwith these areas.

The largest sites are the Loch of Boardhouse (227 ha), Loch of Swanney (224 ha), Loch of Hundland (97 ha), Loch of Tankerness (67 ha), Muckle Water, Rousay (44ha), and Loch of Clumly (23 ha). Some of the remainder are substantial lochans, others quite small pools. In addition to the 29 surveyed, a further 10 quarries and pools were identified as mesotrophic.

Most notable lochs include the Muckle Water, Rousay; Loch Swannay, with a high diversity of open water plant species; Graemston Loch; The Loons; Loch of Boardhouse, Loch of Wasdale and Loch of Hundland, all of which support seven *Potamogeton* species. Muckle Water, Rousay was defined as the most species-rich of the mesotrophic lochs in the 1986 Loch Survey.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Particularly characteristic of this trophic state are shining pondweed *Potamogeton lucens*, autumnal water-starwort *Callitriche hermaphroditica* and stonewort species *Characeae*. The latter in turn support numerous invertebrates and are associated with populations of trout *Salmo trutta*.

The UK Priority Species bird's-nest stonewort *Tolypella nidifica* is a very rare species that has been recorded from the Loch of Boardhouse, though recent attempts have failed to re-find it.

National Priority Species	
European otter *Lutra lutra*	Mossy stonewort *Chara rudis*
Lesser bearded stonewort *Chara curta*	Medicinal leech *Hirudo medicinalis*
Bird's-nest stonewort *Tolypella nidifica*	
Local Priority Species	
Common toad *Bufo bufo*	Trout *Salmo trutta*
Red-throated diver *Gavia stellata*	Shoveler *Anas clypeata*
Pintail *Anas acuta*	Wigeon *Anas penelope*
Teal *Anas crecca*	Gadwall *Anas strepera*
Mallard *Anas platyrhynchos*	Tufted duck *Aythya fuligula*
Pochard *Aythya ferina*	Goldeneye *Bucephala clangula*
Scaup *Aythya marila*	Mute swan *Cygnus olor*
Whooper swan *Cygnus cygnus*	Red-breasted merganser *Mergus serrator*
Coot *Fulica atra*	Great silver water beetle *Hydrophilus piceus*
Black-headed gull *Larus ridibundus*	A water beetle *Coelambus novemlineatus*
A water beetle *Potamonectes griseostriatus*	Blue-tailed damselfly *Ischnura elegans*
Four-spotted chaser *Libellula quadrimaculata*	A snail *Theodoxus fluviatilis*
Common blue damselfly *Enallagma cyathigenum*	A hybrid pondweed *P.x suecicus*
Slender-leaved pondweed *Potamogeton filiformis*	Glaucous bulrush *Schoenoplectus tabernaemontani*
Bulrush *Schoenoplectus lacustris*	Autumnal water-starwort *Callitriche hermaphroditica*
A green algae *Cladophora sauteri*	

5. CURRENT FACTORS AFFECTING THE HABITAT

The principal factors are outlined in the *Eutrophic standing waters* HAP, to which reference should be made. Some factors with particular effects for Orkney mesotrophic lochs are:

- Pollution: the unusual character of lowland mesotrophic lochs – their relatively low trophic status in the lowland situation – is at some risk from increased nutrient loads. Small sites are especially at risk. An example of such a site is the Mill Dam of Rango, being small, shallow and surrounded by agricultural land.
- Water abstraction and drainage: public water supply is abstracted from Loch of Boardhouse, and the quantity abstracted may increase in future. Abstraction also affects Muckle Water, Rousay, and causes considerable fluctuation in water level. Water levels in many other lochs are kept low to dry surrounding farmland, and many smaller ones have been drained completely in the past. There are recent instances also.
- Species introduction: the natural integrity of mesotrophic lochs is altered by introduction of species. Introduced fish, including trout, can alter the structure of the food web, reducing invertebrate numbers with knock-on effects on the grazing of algae. Rarer invertebrates may be lost. The stone loach *Barbatula barbatulus*, a species native to Britain but not north Scotland, has become established and is now common in the Lochs of Boardhouse and Hundland and their catchments (Booth 1996).
  Introduced plants, in particular Canadian pondweed *Elodea canadensis*, may alter the balance. It is present in Loch of Boardhouse. Invasive alien plants and animals can displace native species. In most cases human action, whether deliberate or not, is required.
- Recreational pressure.
  For some species, notably breeding birds, it is likely that excessive disturbance is occurring.

6. CURRENT ACTIONS AND OPPORTUNITIES

The UK HAP outlines the national framework of actions to rehabilitate nutrient enriched mesotrophic lakes and the development of a national strategy for the control of eutrophication. Research continues into methods of reversing eutrophication.
The actions listed below are additional or complementary to those of the national plan, to which reference should be made.

6.1 Management

- Sites within SSSIs are the Muckle Water, Rousay; The Loons; and some pools at Saquoy Head, Rousay, and North Hill, Papa Westray.
- Of these SSSIs, Loch of Isbister and The Loons is an SAC.
- Loch of Isbister & the Loons is also an RSPB reserve.
- Remaining actions (SEERAD grants, SEPA grants, LERAPs, Environmental Impact Assessments and OTFA): see Eutrophic standing waters HAP.

6.2 Research and Guidance

- See Eutrophic standing waters HAP.
- SEPA water monitoring: SEPA carries out comprehensive chemical analysis of Boardhouse, Hundland and Swannay Lochs on a monthly basis, these lochs being selected according to criteria set out in the Scottish Standing Waters Classification Scheme (mainly on the basis of size).
- NOSWA monitoring: the North of Scotland Water Authority constantly monitors water quality at its pumping stations at Swannay Loch and Wideford Reservoir.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

In the context of the national plan, targets and responsibilities will trickle down to the local level. Introduction of the EU Water Directive Framework will provide a stronger mechanism for the protection and enhancement of mesotrophic lochs than has previously existed. New statutory objectives will exist for their ecological status. The national HAP directs statutory agencies classify mesotrophic waters on the basis of current condition and develop plans for ensuring their protection and ensuring or improving their condition.

The actions listed below are additional or complementary to those of the national plan, to which reference should be made.

- Maintain the water quality of eutrophic lochs in Orkney.
- Maintain the characteristic plant and animal communities of eutrophic lochs in Orkney.
- Identify and implement remedial action to address nutrient enrichment and pollution in Orkney eutrophic lochs.
- Encourage measures that create semi-natural 'buffering' habitats round lochs. **Target: 75 % of farms with loch edge habitats entering agri-environment schemes to include edge sites for management and/or creation.**

8. ACTION PLAN AGENCIES

8.1. National agencies: SNH; SEERAD; SEPA

8.2. Local partners: RSPB; FWAG; SAC; NOSWA; Orkney Trout Fishing Association; OIC

9. PROPOSED ACTION WITH AGENCIES

9.1 Site safeguard and management

- Establish whether larger mesotrophic lochs meet EU Directives in terms of biodiversity and water quality (SEPA, SNH).
- Establish any need for remedial action and where necessary prepare management plans (SEPA, SNH).
- Ensure that local planning mechanisms take into account the particular wildlife interest of mesotrophic lochs (OIC).
- Where need established, prepare catchment management plans on a prioritised basis. Involve statutory and non statutory organisations (OIC, SEPA, SNH, NOSWA).
- Ensure management at abstraction lochs avoids any sudden changes in water level, and that the effects of any increased abstraction are minimised (NOSWA, SEPA).

9.2 Advisory

- Promote adherence to PEPFAA code (SEERAD).
- Promote best practice management techniques, especially farm nutrient management and protection of sensitive habitats (SEERAD, SAC, FWAG).
- Promote agri-environment scheme options aimed at conserving this habitat (SEERAD, SAC, FWAG).
- Develop nutrient budgeting advice to farmers as a business and environmental management tool (SAC, FWAG).

9.3 Research and monitoring

- Review water quality data to determine current status of monitored sites (SEPA).
- Promote research into the biodiversity of these lochs (SEPA, SNH, OFC).

9.4 Promotion and awareness raising

- Promote widespread awareness, especially to loch users and catchment residents, of biodiversity significance of and threats to eutrophic lochs (All).
- Promote good practice among fishermen in relation to avoidance of transfer of plants between sites (OTFA).

REFERENCES AND OTHER INFORMATION SOURCES - format and complete

See under *Standing Open Waters and Canals, and*
Booth, C. J. (1996). Fish in Orkney – 1996. *Bull. Orkney Fld Club 1997*

11.3 Oligotrophic and dystrophic lochs — locally important habitat

1. LOCAL HABITAT DESCRIPTION

These are lochs with low nutrient levels, clear water and few plants. Dystrophic types are highly acidic and peat-stained. pH is mainly below 5. Dystrophic systems most often occur on blanket bog and may include isolated seasonal pools, random collections of irregularly-shaped waters and ordered linear or concentric arrays of pools and lochans. They are generally small (less than 5ha in extent) and shallow and contain a limited range of flora and fauna.

It is understood that O*ligotrophic lochs* are being considered for national Priority Habitat status by the Scottish Biodiversity Steering Group.

2. CURRENT LOCAL STATUS AND EXTENT

This loch type is the dominant one in upland areas of Scotland but less common in Orkney. There is less human impact than on other types. They have a distinct ecology and support some specialised and less common species.

The Loch Survey 1986 recorded 29 lochs and lochans of this type in Orkney. Hoglinns Water and Water of Wicks, Hoy, escaped survey and should be added to this total. Some of these are small peaty lochans. The total area measured was 133 ha.

3. LOCAL DISTRIBUTION

They are on Hoy (most acid), Rousay, Eday and Gairsay as well as in upland areas of Mainland. They include notable groups on North Hoy and central Rousay. The largest are Heldale Water (63 ha) and Hoglinns Water, Hoy; and Peerie Water, Rousay (14 ha).

Key sites include the pools and lochans in Hoy, comprising one of the most diverse groups of dystrophic waters in Orkney; Sands Water in Hoy; Peerie Water in Rousay for submerged plants; Mill Loch, Eday for red-throated divers *Gavia stellata*.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Typical plants of oligotrophic and dystrophic lochs include bog pondweed *Potamogeton polygonifolius*, alternate water-milfoil *Myriophyllum alterniflorum*, bulbous rush *Juncus bulbosus*, bogbean *Menyanthes trifoliata*, cotton-grass *Eriophorum angustifolium*, and bladderworts *Utricularia* species. Bog pools are often dominated by *Sphagnum* species. Whilst nutrient levels are low, and plants not abundant, these lochs and pools are often rich in invertebrates, especially mayflies and caddisflies, and most notably, dragonflies. These lochs and lochans are the preferred habitat for breeding red-throated divers *Gavia stellata*.

Heldale Water, Hoy, used to hold a population of Arctic char *Salvelinus alpinus*, but none could be found in a search in 1997.

The following list of priority species includes those most commonly associated with this loch type. Note that some bird species listed for eutrophic and mesotrophic waters have been omitted but may sometimes be found.

National Priority Species	
European otter *Lutra lutra*	
Local Priority Species	
Common toad *Bufo bufo*	Trout *Salmo trutta*
Red-throated diver *Gavia stellata*	Wigeon *Anas penelope*
Red-breasted merganser *Mergus serrator*	Great silver water beetle *Hydrophilus piceus*
Four-spotted chaser *Libellula quadrimaculata*	Common hawker *Aeshnia juncea*
Common blue damselfly *Enallagma cyathigenum*	Golden-ringed dragonfly *Cordulegaster boltonii*
Large red damselfly *Pyrrhosoma nymphula*	Black darter *Sympetrum danae*
Shining pondweed *Potamogeton lucens*	Quillwort *Isoetes lacustris*

5. CURRENT FACTORS AFFECTING THE HABITAT

The principal factors are outlined in the *Eutrophic standing waters* HAP, to which reference should be made. Some particular effects for oligotrophic and dystrophic waters of the factors already outlined are noted below.

- Pollution: the situation of these lochs, in upland hill areas, means the risks from pollution are otherwise low. There is enrichment from bird colonies (gulls particularly). A probable exception to this generally favourable status is the situation of lochs in peaty basins amongst farmland, where nutrient run-off can occur from a variety of sources. Some of the Eday and West Mainland and South Ronaldsay Lochs may be at risk.
- May be subject to acidification. Water analysis for the 1986 loch survey suggested moderate aluminium levels (0.100 mg/L).
- Water abstraction and drainage: public water supply is abstracted from Heldale Water, Hoy, resulting in significant fluctuations in the water level.
- Damage to shoreline: not likely to occur at these lochs, with possible exception of small South Ronaldsay lochs.
- Species introduction: the introduction of trout *Salmo trutta* to at least one of these lochs has occurred in the past. It has been suggested (Side, 1997) that the disappearance (as yet unproven) of arctic charr *Salvelinus alpinus* from Heldale Water may possibly have been caused by past large-scale introductions of trout *Salmo trutta*. However, changes in water level due to water abstraction may be implicated.

6. CURRENT ACTIONS AND OPPORTUNITIES

These are the same as for mesotrophic lochs, with the following changes to sections 6.1 and 6.2.

6.1 Management

- Lochs within SSSIs are Heldale Water, Hoglinns Water, Sands Water, Sandy Loch and numerous hill lochans, all in Hoy; Mill Loch, Eday; Peerie Water and hill lochans, Rousay.
- Sandy Loch and hill lochans, Hoy, are within the RSPB reserve.

6.2 Research and Guidance

- NOSWA monitoring: the North of Scotland Water Authority monitors water quality at its pumping station at Heldale water.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Maintain the characteristic plant and animal communities of current oligotrophic and dystrophic lochs in Orkney.

8. ACTION PLAN AGENCIES

Local partners: SNH; SEERAD; SEPA; OIC; RSPB; FWAG; SAC; NOSWA; Orkney Trout Fishing Association

9. PROPOSED ACTION WITH AGENCIES

9.1 Site safeguard and management

- Establish whether the largest oligotrophic and dystrophic lochs meet EU Directives in terms of biodiversity and water quality (SEPA, SNH).
- Establish any need for remedial action and where necessary prepare management plans (SEPA, SNH).
- Review practice on introductions of trout to waters without trout (Orkney Trout Fishing Association).
- Ensure that local planning mechanisms take into account the particular wildlife interest of oligotrophic and dystrophic lochs (OIC).
- Where need established, prepare catchment management plans on a prioritised basis. Involve statutory and non statutory organisations (OIC, SEPA, SNH, NOSWA).
- Ensure management at abstraction lochs avoids any sudden changes in water level, and that the effects of any increased abstraction are minimised (NOSWA, SEPA).

9.2 Advisory

- Promote adherence to PEPFAA code (SEERAD).
- Promote best practice management techniques, especially farm nutrient management and protection of sensitive habitats (SEERAD, SAC, FWAG).
- Promote agri-environment scheme options aimed at conserving this habitat (SEERAD, SAC, FWAG).

9.3 Research and monitoring

- Review water quality data to determine current status of monitored sites (SEPA).
- Establish monitoring programme for key sites (SEPA, SNH).
- Promote research into the biodiversity of these lochs (SEPA, SNH).

9.4 Promotion and awareness raising

- Promote widespread awareness, especially to loch users and catchment residents, of biodiversity significance of and threats to oligotrophic and dystrophic lochs (All).
- Promote good practice among fishermen in relation to avoidance of transfer of plants between sites (OTFA).

REFERENCES AND OTHER INFORMATION SOURCES

See under *Standing Open Waters and Canals*
Side, J. (1997) *The Biodiversity of Orkney Fishes.* Paper presented at Orkney Science Festival. ICIT, Orkney

11.4 Ponds and Milldams — locally important habitat

1. LOCAL HABITAT DESCRIPTION

The best commonly agreed definition of ponds is that of the Pond Conservation Group (Williams et al, 1999) as "man-made or natural waterbodies between 1 m^2 and 2 ha which hold water for 4 months of the year or more". This definition is deliberately broad and includes even very small waterbodies that can have high conservation value. The definition specifically *includes* semi-seasonal and temporary ponds that often dry up in summer but can support specialized and valuable pond communities.

Some narrowing of the above definition is needed for this Locally Important Habitat type. In Orkney, man-made as well as natural waterbodies well under 2 ha in area have been included in the Charter and van Houten survey of all waterbodies (1989) and defined by trophic status. These are therefore included in one of the preceding open water habitat types. This HAP is directed at smaller, man-made ponds of less than 0.5 ha which have escaped other classification. It does include temporary ponds.

'Milldams' were formerly a very common feature of the Orkney landscape, but all have fallen into disuse in the last century. Almost all have been drained, if imperfectly. The term 'milldam' is still commonly used for some areas of marsh and wet grassland that were once open water. Some smaller milldams do survive as open water, usually by deliberate preservation, and it is only these that are included in this Locally Important Habitat type.

Ponds in Orkney are comprised of disused milldams, old quarry holes, and pools created for cattle drinking, amenity and wildlife.

2. CURRENT LOCAL STATUS AND EXTENT

While ponds are not habitats of the highest priority in a landscape already so rich in high quality waterbodies, they can on the local scale be important habitats for invertebrates particularly, also as part of the overall habitat for birds and mammals. Certainly the presence of well-constructed and well-managed ponds can add greatly to the biodiversity of areas that lack other waterbodies. Some ponds are ancient and of archaeological interest. One milldam is a scheduled archaeological monument.

No figures are available for the extent of this habitat. It is thought that ponds are rather scarce. Some at least of the 140 farms entered in the CPS and RSS schemes have created or restored ponds.

While no data is available, anecdotal evidence suggests that the number of man-made ponds has decreased greatly along with their traditional uses. Some new ones have been created for amenity and biodiversity.

3. LOCAL DISTRIBUTION

There is no available information on distribution.
There is known to be at least three milldams with substantial areas of open water in Orphir.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Ponds are capable of supporting a large and wide range of species. One study has found more species of invertebrates, especially waterbeetles and dragonflies, associated with ponds than with rivers (Williams et al 1999). Dragonflies have been found at man-made ponds in Orkney. Otters make considerable use of ponds. Wading birds visit their margins. Frogs and toads use ponds for breeding. The nationally scarce pintail *Anas acuta* has also been known to breed in a pond in Stronsay. Water-filled quarries have in the past been some of the richest sites for aquatic plants, including water crowfoots *Ranunculus* species, water starworts *Callitriche* species, and the fine-leaved pondweeds *Potamogeton* species. Ivy-leaved water crowfoot *Ranunculus hederaceus*, a scarce plant which has in the past been listed as Nationally Scarce, occurs in disturbed pond margins.

The following priority species can be associated with ponds. Other species listed for the various loch types may on occasion occur at ponds.

National Priority Species	
European otter *Lutra lutra*	
Local Priority Species	
Common toad *Bufo bufo*	Trout *Salmo trutta*
Pintail *Anas acuta*	Mallard *Anas platyrhynchos*
A water beetle *Coelambus novemlineatus*	A water beetle *Potamonectes griseostriatus*
Common hawker *Aeshna juncea*	Four-spotted chaser *Libellula quadrimaculata*
Large red damselfly *Pyrrhosoma nymphula*	Common blue damselfly *Enallagma cyathigenum*
Blue-tailed damselfly *Ischnura elegans*	Slender pondweed *Potamogeton filiformis*

5. CURRENT FACTORS AFFECTING THE HABITAT

Ponds are subject to the same pressures as the loch types. These are not repeated here, except where the particular conditions of small and man-made waterbodies require mention. Smaller waterbodies are in general more vulnerable to pressures and physical damage from a variety of causes, being less able to withstand pollution incidents or poor water quality and algal blooming, more prone to water level fluctuation and more easily disturbed. This does not mean that they cannot be valuable habitats, but more deliberate management is usually needed at some time.

Some particular factors affecting ponds include:

- Deliberate in-fill: ponds may be seen as a danger, or become redundant as drinking-holes or duck ponds, or lose their perceived diversity and value over time, or fall victim to land improvement schemes. Quarries are often used as land-fill sites, or filled in with builders' rubble and earth.
- Drying out: in the natural course of events, ponds gradually fill with vegetation and dry out. They will at some time require management. It is vital that this is done in such a way as to leave a refuge for their inhabitants.
- 'Restoration': deepening, sediment removal and bank alteration can actually do great harm to the biodiversity of a seemingly dull and uninteresting pond: this particularly applies to shallow ponds that seasonally dry out, since such ponds have their own specially adapted fauna and flora, including scarce species.
- Poor design of new ponds: there are many examples of new ponds that could have been created better, in terms of shape, bank profiling, depth and choice of aquatic and emergent species.
- Fish introduction: introduction of fish into small ponds can have a devastating impact on a wide range of pond animals which are not adapted to co-exist with fish, including many water-beetles and dragonflies.
- Ducks: too many ducks can have a severe impact on a freshwater ecosystem, from pollution, trampling and grazing.
- Invasive plants, whether alien or native: complete domination of shallow water, and loss of diversity, can occur, usually in the presence of high levels of plant nutrients.
- Absence of adjoining marginal habitat: the presence of marginal vegetation, and preferably, some extent of adjoining semi-natural habitat is necessary to attract or sustain a significant diversity of animals.

6. CURRENT ACTIONS AND OPPORTUNITIES

These relate directly to the management issues outlined above. Good management and good advice is essential.

6.1 Management

- SEERAD grants - CPS and RSS provide capital payments for pond creation and restoration. The number created is not known, but it is thought that a rather small proportion of the 130 farms participating in these schemes have taken up this option. It is not known how well constructed these new ponds or in what ways old ones have been restored. These schemes also provide annual payments for fencing off water margins, and this has been applied to some small ponds, both natural and man-made.
- SEERAD grant conditions: support payments to farmers are conditional on observance of a code of good farming practice, including the protection of natural habitats. These conditions are weak in relation to the protection of ponds.

6.2 Research and Guidance.

- Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.
- Guidance on pond creation and management is provided by FWAG.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Maintain the number of existing ponds, and wherever possible flooded quarries, in Orkney.
- Maintain the characteristic plant and animal communities of ponds and qaurries in Orkney.
- Ensure that new ponds are well-constructed and well-managed.

8. ACTION PLAN AGENCIES

Local partners: SEERAD; FWAG; SAC

9. PROPOSED ACTION WITH AGENCIES

9.1 Site safeguard and management

- Ensure that the biodiversity importance of flooded quarries is assessed when in-fill is proposed (OIC).

9.2 Advisory

- Promote best practice management techniques for construction, restoration and management of ponds (SEERAD, SAC, FWAG).
- Ensure that the biodiversity of flooded quarries is highlighted in the course of farm visits and surveys (SAC, FWAG).
- Promote agri-environment scheme options aimed at conserving this habitat (SAC, FWAG).

9.3 Research and monitoring

None specific to this habit has been prioritised.

9.4 Promotion and awareness raising

- Develop and promote training courses for pond creation and management (SEERAD, FWAG, SAC).

REFERENCES AND OTHER INFORMATION SOURCES

Williams, P., Biggs, J., Whitfield, M., Bryant, S., Fox, G. & Nicolet, P. (1999). *The Pond Book: a guide to the creation and management of ponds*. Ponds Conservation Trust, Oxford

12. RIVERS AND STREAMS — BROAD HABITAT TYPE

GENERAL UK DESCRIPTION

This broad habitat type covers rivers and streams from bank top to bank top or, where there are no distinctive banks, or banks are never overtopped, it includes the extent of the mean annual flood. This includes the open channel (which may contain submerged, free floating or floating leaved vegetation) water fringe vegetation and exposed sediments and shingle banks. Adjacent semi-natural wetland habitats such as unimproved floodplain grasslands, marshy grassland, wet heath, fens bogs, flushes, swamps and wet woodland, although intimately linked with the river, are covered in other broad habitat types.

UK PRIORITY HABITATS PRESENT:

None

LOCALLY IMPORTANT HABITATS:

Burns and canalised burns

12.1 Burns and canalised burns — locally important habitat

1. LOCAL HABITAT DESCRIPTION

The local description includes both burns that run substantially in their natural courses, and those that have been canalised. The canalised burns are included because they retain in some cases a high level of biodiversity, thought the quality is very variable. The distinction between wholly artificial ditches and canalised burns can be unclear. Canalised burns can usually be discerned by at least some stretches of natural watercourse. Some burns have been canalised for their entire length, but even then their natural origin may be deduced from their situation in the landscape. Small ditches with a bed width of less than 0.6 metres that run dry in summer are not included: they are in the *Boundary and linear features* broad habitat. The upper reaches of natural burns, which may have a lesser width and sometimes run dry in summer, are included in this habitat.

2. CURRENT LOCAL STATUS AND EXTENT

The Orkney land mass does not give rise to substantial watercourses. Nevertheless the small burns and some of canalised burns do support a wide range of species, including a UK priority one. They are also an important resource for recreation and tourism. There are many pressures on the burns environment resulting from population, agriculture, industry, quarrying, construction and other human activity, and many, perhaps most Orkney burns in the lowland districts are not managed favourably for conservation.

Harbinson (1998) studied the burns in the Scapa Flow catchment. Other than that, the burns in Orkney are not well surveyed. The only available estimate of extent of the habitat is that of the National Countryside Monitoring Scheme (1992), which was based on sampling from aerial survey data. It found 490 kilometres of "running natural water" and 672 kilometres of "running canalised water", although some difficulties were encountered in interpreting the aerial survey data.

3. LOCAL DISTRIBUTION

On the Mainland the most important (and longest) burn system is that which drains the West Mainland via the Burn of Durkadale into the lochs of Hundland and Boardhouse, eventually entering the sea at Birsay. As the Hillside Burn from its source to its entry into the Loch of Hundland it is approximately 8 kilometres long, and largely natural too.

The Netherbrough Burn, Dounby Burn and Burn of Corrigall, issuing into the Harray Loch, are approximately 6 kilometres long. In the East Mainland, Graemeshall Burn is the only substantial one at approximately 5 kilometres long. Other larger burns are those issuing into the Loch of Brochan, Evie; the Stenness burns issuing into Harray and Stenness lochs and Bay of Ireland; and those issuing into the Loch of Kirbister (Orphir). All these are more or less canalised.
In Hoy, the burn system entering the sea at Rackwick is the largest and most important. Harbinson (op cit.) surveyed 12 eastward-flowing burns in Hoy. In the North Isles, the only substantial burn is the Suso Burn in Rousay.

Very small watercourses are numerous everywhere, as evidenced by the estimated total length of all types of over 1000 kilometres.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Few aquatic species associated with running water are listed in the audit, but many species of water and wetland birds, in particular, utilise running water at times for feeding, and bank vegetation is potentially a very important habitat for many species of invertebrates, animals and birds. Many studies of trout populations and behaviour have shown the importance of bank vegetation in determining volume and variety of insect prey. Notable species present in addition to the listed species are the river limpet *Ancylus fluviatile* and freshwater shrimp *Gammarus pulex*. Many colourful and attractive plants grow alongside burns and ditches, including forget-me-nots *Myosotis* species, yellow flag iris ('segs') *Iris pseudacorus*, water-cress *Rorippa nasturtium-aquatica*, water speedwells *Veronica* species and water mint *Mentha aquatica*. The interesting introduced species Magellan ragwort *Senecio smithii*, scarce but widespread in northern Scotland, is often found by ditches and burns. Mosses, liverworts and stoneworts are also found.

National Priority Species	
European otter *Lutra lutra*	Reed bunting *Emberiza shoeniclus*
Local Priority Species	
Trout *Salmo trutta*	Atlantic Salmon *Salmo salmo*
Redshank *Tringa totanus*	Teal *Anas crecca*
Golden-ringed dragonfly *Cordulegaster boltonii*	Sedge warbler *Acrocephalus schoenobaenus*
Tea-leaved willow *Salix phylicifolia*	Autumnal water-starwort *Callitriche hermaphroditica*
Eared willow *Salix aurita*	Lesser water-parsnip *Berula erecta*
Primrose *Primula vulgaris*	Marsh marigold *Caltha palustris*

5. CURRENT FACTORS AFFECTING THE HABITAT

Burns that flow through moorland, fen and bog have a high degree of 'naturalness' and support a diversity of species. The quality of the habitat provided by burns flowing through farmland, whether canalised or not, is highly dependent on the management of the burn courses and their banks. Canalised burns are deficient in some of the qualities that comprise a varied and rich habitat. These qualities include diversity of steam-bed features, stability of flow, clean water, bankside cover and good practice in drainage maintenance. Harbinson (op cit.) in a study of sea-trout habitat in part of mainland Orkney, found that 68% of total burn length had been canalised at some time, and that the quality and extent of the habitat had deteriorated in the last 50 years. The figure for Hoy was 9%, with little sign of recent change.

Factors affecting this habitat include:

- Pollution: point-source pollution from agriculture, especially silage effluent, but also deficient storage and handling of animal manures; diffuse pollution from agriculture, including fertiliser and slurry spillage and drift, fertiliser run-off, pesticide drift; pollution from domestic septic tanks; point-source and diffuse pollution from industry and vehicles. Though there is general increased awareness of these factors, they continue to affect the quality of the habitat.
- Fish hatcheries: commercial salmon hatcheries have been established on a number of major and minor burns, most notably in Hoy and Rousay. There is the danger of enrichment from fish waste, though these sites are subject to SEPA Discharge Consents and are regularly monitored.
- Marine fish farms: these pose a variety of threats to migratory salmonids, the seriousness of which is highly contentious. Among them are infestation of wild fish by sea-lice from farmed salmon, and loss of diversity of localised strains of wild fish by interbreeding with escaped farm fish.
- Course modification and habitat simplification: canalisation causing loss of in-stream features such as gravel beds, riffles, eddies, pools; consigning of parts of burns to culverts; dams and other works impassable to fish, bank re-inforcement and excessive 'gardening' of banks. While most of these works have been carried out in the past, the process continues to this day.
- Water abstraction: dams, and abnormal flow rates in water outflows from lochs supplying water, notably Kirbister and Boardhouse.
- Ditch maintenance: periodic cleaning, sometimes deepening, is commonly carried out by clearing both sides of substantial lengths of canalised burns. The effect of sudden habitat loss is localized loss of biodiversity and slow recovery.
- Damage to banks: excessive grazing and trampling by livestock, leading to erosion, loss of bank-side vegetation and increased turbidity.
- Field drainage: Rapid run-off causing sudden rise and fall in water levels.
- Species introduction: Introduced fish, including trout, can alter the structure of the food web. Rarer invertebrates may be lost. The stone loach *Barbatula barbatulus*, a species native to Britain but not north Scotland, has become established and is now common in the Hillside Burn system (Booth 1996). It is used by anglers as bait and may also be kept in aquariums. (Other parts of Britain have suffered from very damaging introductions – mink and signal crayfish).
- Introduced plant species include monkeyflower *Mimulus* species. The plant spreads rapidly downstream once established, displacing native species.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1 Management

- SSSIs including significant burn courses are Hoy; Rousay; Orphir & Stenness Hills; West Mainland Moorlands; Keelylang Hill & Swartabeck Burn; Orphir/Stenness. Site management statements have been drawn up.
- Of these SSSIs, Hoy is an SPA and cSAC; Orphir & Stenness Hills, West Mainland Moorlands, and Keelylang & Swartabeck are part of one SPA.
- Hoy and part of Orphir & Stenness Hills are within a NSA.
- The RSPB has extensive moorland reserves that include significant burns in Hoy, Rousay and West Mainland. These reserves are parts of the SSSIs there.
- SEERAD grants: CPS and RSS provide annual payments for management of water margins (essentially, fencing off a no grazing zone along burn sides): a high proportion of the 130 farms participating in these schemes have taken up this option. The management allows for the development of tall emergent and bank-side vegetation and provides a physical barrier against potentially harmful agricultural operations.
- SEERAD grant conditions: support payments to farmers are conditional on observance of a code of good farming practice, including the protection of natural habitats. Of the highest importance among these is the avoidance of pollution.
- SEERAD waste-management grants: agricultural investment grants for improved waste management.

- LERAPs: Local Environmental Risk Assessment for Pesticides provide a practical framework for complying with the anti-pollution laws, including mapping and categorizing streams, ponds and rivers on the farm and observing buffer zones.

6.2 Research and Guidance

- Burns with discharge consents are subject to regular biological monitoring by SEPA. In addition, some other randomly chosen, larger burns are monitored.
- Guidance on management and protection of habitats, and entry into agri-environment schemes is provided by FWAG and SAC.
- Advice on management of freshwater habitat is available from SNH.
- A demonstration 'otters and sea trout' burn enhancement project was initiated by FWAG in 2000, but not carried through.
- Habitat enhancement grants may be available through the SEPA.
- Education in agriculture, including environmental protection, is provided at Orkney College.
- Orkney Trout Fishing Association – advice and guidance; fisheries management: works have been carried out on at least one burn to improve the fish habitat.
- Research into Orkney burns has been carried out by MSc students at the International Centre for Island Technology, Stromness. Articles on the biodiversity of burns have appeared in the Orkney Field Club Bulletin.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Maintain the present water quality of burns and canalised burns.
- Maintain the present channel and riparian quality of burns and canalised burns. **Target: no loss of extent or quality**
- Improve the conservation management of burns and canalised burns. T**arget: demonstration project by 2005**

8. ACTION PLAN AGENCIES

Local partners: SEERAD; SEPA; FWAG; SAC; Orkney College

9. PROPOSED ACTIONS WITH AGENCIES

9.1. Site safeguard and management

- Continue monitoring water quality in burns and watercourses and address incidents of pollution (SEPA).
- Ensure the conservation of these habitats under LFA and agri-environment scheme cross-compliance rules (SEERAD).
- Ensure that local planning mechanisms take into account the particular wildlife interest of burns and canalised burns (OIC).
- Ensure that burns and canalised burns are not damaged by road and other public engineering works, or are re-instated (OIC).
- Prevent introduction of alien species (All).

9.2 Advisory

- Promote adherence to PEPFAA code (SEERAD).
- Promote best practice management techniques, including farm nutrient management, protection of sensitive habitats, ditch maintenance and, where possible, enhancement of habitat quality (SEERAD, SAC, FWAG).
- Promote best practice management techniques, especially farm nutrient management and protection of sensitive habitats (SEERAD, SAC, FWAG).
- Promote agri-environment scheme options aimed at conserving this habitat (SAC, FWAG).

9.3 Research and monitoring

- Complete a quality assessment of all Orkney burns, following Harbinson (1998) by 2006 (SNH, ICIT).
- Undertake and afterwards periodically review a freshwater fish survey of all Orkney freshwaters (SNH).
- Further research into biodiversity of burns, (OFC, ICIT).

9.4 Promotion and awareness raising

- Initiate a demonstration and management project focussing on the biodiversity of burns and associated freshwaters (SNH, FWAG).
- Promote good practice relating to alien fish introduction among fishermen (OTFA).
- Promote widespread awareness of biodiversity and fishing value of Orkney's burns and canalised burns (All).

REFERENCES AND OTHER INFORMATION SOURCES

Harbinson, Colin. (1998). *Sea Trout Management*. Unpublished MSc thesis for Heriot-Watt University (ICIT Stromness)

Kirby, Peter. (1992*). Habitat Management for Invertebrates: a practical handbook.* RSPB

SEPA policy no. 4 - *The Consent Conditions Manual*

SEPA policy no. 21 – *Strategy for Implementing Actions under the UK Biodiversity Action Plan*

RSPB, NRA & RSNC (1994). *The New Rivers and Wildlife Handbook*

MAFF (2000). Local Environmental Risk Assessments. MAFF poster

MAFF/Pesticides Safety Directorate. (1999). *Risk Assessments for Pesticides – A Practical Guide*. MAFF Publications, London

Guidance leaflets and other literature are available from RSPB, SNH, SEPA, SEERAD, SAC, FWAG, SEERAD Freshwater Fisheries Laboratory and WWF, either directly or via their web sites.

13. MONTANE HABITATS — BROAD HABITAT TYPE

GENERAL UK DESCRIPTION

This broad habitat type includes a range of vegetation types that occur exclusively in the montane zone* such as prostrate dwarf shrub heath, snow-bed communities, sedge and rush heaths, and moss heaths. The distinction between the sub-montane and the montane zone is often blurred and the two usually merge through a band of transitional vegetation. Montane habitat types can be recognised by their floristic composition and their physiognomy (prostrate vegetation). Widespread arctic-alpine species such as stiff sedge *Carex bigelowii*, crowberry *Empetrum nigrum ssp hermaphroditum*, trailing azalea *Loiseleuria procumbens*, dwarf willow *Salix herbacea*, and alpine clubmoss *Diphasiastrum alpinum* in association with frequent to abundant woolly fringe-moss *Rhacomitrium lanuginosum* or cladonia lichens *Cladonia* spp. and the macro lichens such as *Cetraria islandica* are useful indicators of montane communities.

Calcareous grasslands including those dominated by mountain avens *Dryas octopetala*, fens and springs, blanket bog and rock habitat which occur in the montane zone are not included in this habitat type but in the *"Calcareous grassland"*, *"Fen, marsh and swamp"*, *"Bog"* and *"Inland rock"* broad habitat types respectively. This type also does not include dwarf shrub heaths and grasslands that straddle the notional boundary of the former tree line with little change in floristics and physiognomy and these should be treated as components of other broad habitat types.

*An altitude limit is not a suitable marker for the start of the montane zone as the lower altitude limit of the zone varies in different parts of the UK. Therefore the presence of arctic-alpine species is used to define these types.

More than 90% of the total area of this habitat in the UK occurs in Scotland.

UK PRIORITY HABITATS PRESENT:
There are no UK priority habitats

LOCALLY IMPORTANT HABITATS:
Montane habitats

13.1 Montane habitats — locally important habitat

It is understood that *Montane heath* is being considered for National Priority Habitat status by the Scottish Biodiversity Steering Group.

1. LOCAL HABITAT DESCRIPTION

Montane vegetation is restricted to high altitude montane regions but occurs at successively lower altitudes further north. These montane plant communities may be composed of prostrate and semi-prostrate dwarf-shrub heaths, moss and lichen heaths and grasslands, and include elements of alpine flora and snow-bed communities. In Orkney this type of habitat is almost totally confined to Hoy, where, however, it extends almost to sea level. Extreme exposure on the hilltop areas has produced extensive wind-eroded areas of blocky detritus in a matrix of fine crumbly erosion material. The differential effects of frost and wind action here give rise to a range of ground pattern features including turf-banked terraces, wind stripes and hill dunes.

These areas are characterised by a range of plant communities including internationally significant types such as oceanic and southern outliers of arctic-alpine assemblages. Frequently-lying snow patches have characteristic moss and lichen communities. Montane lichen heaths occur very locally: Ratcliffe (1963) characterised the St John's Head lichen heath as montane, though different from the dry montane heaths of the Cairngorms.

It should be noted that although much of the vertical or near-vertical rock exposure in Hoy, Rousay and even Westray has a distinct arctic/alpine element it must here be included under the broad habitat *Inland rock.*

2. CURRENT LOCAL STATUS AND EXTENT

The Ward Hill on Hoy is one of the key sites in Britain for the illustration of ground features caused by extreme exposure. The complex of montane habitats with strong oceanic influence in north and central Hoy makes this an area of national importance. According to Ratcliffe (1963) at St John's Head the "The lichen here is as good (in completeness of cover) as any other examples seen in Scotland."

The MLURI Land Cover of Scotland 1988 (1993) estimated a montane habitats area, including rock outcrops, of c.900 ha in Orkney, almost all of it in Hoy. An RSPB survey of North Hoy Reserve recorded 60 ha of inland rock: this is likely to be most of the inland rock area of Orkney (excluding quarries), suggesting a total montane habitats area of about 850 ha. The survey recorded 250 ha of lichen heath in North Hoy, which would have been in the montane zone.

There are no indications of recent decreases in the area, or of changes in habitat quality.

3. LOCAL DISTRIBUTION

In Orkney this type of habitat is almost totally confined to Hoy, where, however, it extends almost to sea level. Habitat with some montane characteristics (see below) also occurs on exposed summits in Westray and Rousay.

The finest examples of species-rich montane heath can be found on the summits of the Cuilags, the Ward Hill and the Knap of Trowieglen.

4 ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

The sparse vegetation of the most exposed situations on the Ward Hill, Cuilags, Knap of Trowieglen and other summits consists of a discontinuous prostrate mat of heather *Calluna vulgaris*, crowberry *Empetrum nigrum ssp nigrum* (*Empetrum nigrum ssp hermaphroditum* is absent in Orkney and Shetland although it occurs in Caithness and Faroe), dwarf willow *Salix herbacea*, fir clubmoss *Huperzia selago*, wavy hair-grass *Deschampsia flexuosa*, viviparous fescue *Festuca vivipara*, carnation sedge *Carex panicea*, pill sedge *C. pilulifera*, deer-grass *Trichophorum cespitosum*, heath bedstraw *Galium saxatilis*, tormentil *Potentilla erecta*, woolly fringe-moss *Rhacomitrium lanuginosum*, lichens Iceland moss *Cetraria islandica* and *Cladonia* spp. Shelter in the form of slight depressions or the deeper soils of hill dunes supports a much richer and very beautiful prostrate heath which includes the former species with the addition of black bearberry, *Arctostaphylos alpinus*, blaeberry, *Vaccinium myrtillus*, bog blaeberry *V. uliginosum* with occasional plants of trailing azalea *Loiseleuria procumbens*, juniper *Juniper communis ssp alpina*, common cow-wheat *Melampyrum pratense* or stiff sedge *Carex bigelowii* with a wider range of bryophytes. Woolly fringe-moss alone forms extensive carpets in some areas. Although snow lie in Orkney is rarely of long duration, some of these slight depressions carry patches of obvious mat-grass, known as *Nardus* snow-beds. It appears their snow quickly becomes discoloured by wind-blown particles and escapes easy detection. A different type of prostrate heath dominated by *Calluna* develops on steep shaded slopes on the east side of the Ward Hill (and perhaps elsewhere) where the mixed hepatic mat beneath the heather includes *Herberta aduncus* ssp. *hutchinsiae, Pleurozia purpurea, Scapania gracilis, Bazzania tricrenata, Plagiochila carringtonii* and *P. spinulosa*.

Where there is a greater accumulation of peat (but see broad habitat *Bog*) wood-rush *Luzula sylvatica* acquires dominance on parts of the summits and has increased with the decline in grazing, but shining mats of bearberry *Arctostaphylos uva-ursi* are more prominent on the fellfield facing west between Rackwick and the Old Man of Hoy.

Woolly fringe-moss *Rhacomitrium lanuginosum* occurs in many other exposed parts of Orkney, also wind ridging and some bare stoney patches, almost feldfield, with least willow *Salix herbacea* in Westray and Rousay, and, in the latter, black bearberry *Arctostaphylos alpinus* although there on blanket bog.
These montane plant communities may be composed of prostrate and semi-prostrate dwarf-shrub heaths, moss and lichen heaths and grasslands, and include elements of alpine flora and snowbed communities.

Very few birds are associated with the truly montane habitat of Hoy; the hill dunes are sometimes used by the great skua *Steracorarius skua* as vantage points from which to hunt, otherwise only occasional pairs of skylark *Alauda arvensis* and wheatear *Oenanthe oenanthe* utilise the area for nesting. Species of higher plants, mosses, lichens and liverworts, and invertebrates, associated with the habitat are of special interest.

National Priority Species	
Skylark *Alauda arvensis* (SAP)	Juniper *Juniperus communis ssp nana*
Northern dart *Xestia alpicola alpina*	
Local Priority Species	
Mountain hare *Lepus timidus*	Buzzard *Buteo buteo*
Peregrine falcon *Falco peregrinus*	Kestrel *Falco tinnunculus*
Wheatear *Oenanthe oenanthe*	Heath carder bee *Bombus muscorum*
A moth *Entephria flavicinctata*	A moth *Eudonia alpina*
Alpine bearberry *Arctostaphylos alpinus*	Bearberry *Arctostaphylos uva-ursi*
Alpine clubmoss *Diphasiastrum alpinum*	Bog blaeberry *Vaccinium uliginosum*
Trailing azalea *Loiseleuria procumbens*	Interrupted clubmoss *Lycopodium annotinum*
Common cow-wheat *Melampyrum pratense*	Cloudberry *Rubus chamaemorus*
Yellow saxifrage *Saxifraga aizoides*	A liverwort *Plagiochila carringtonii*
A moss *Bryum weigelii*	A moss *Orthothecium rufescens*
A liverwort *Gymnomitrium crenulatum*	A liverwort *Herbertus stramineus*
A liverwort *Lepidozia pearsonii*	A liverwort *Plagiochila spinulosa*

5. CURRENT FACTORS AFFECTING THE HABITAT

This habitat is subject to the same factors as outlined for the *Upland heath* Action Plan, to which reference should be made, but it is a more fragile habitat where any recovery from damage is extremely slow. At the same time, all of this habitat is in SSSIs where more or less benign management is in place.

Historical records suggest that erosion has been occurring over a very long time and that the hill dunes may indicate a greater depth of soil in the distant past.

In other parts of Scotland there are three main impacts to consider: agriculture, recreation, and red deer, as well as climate change. In Orkney also there are possible impacts from all of these except red deer. The following are the most important factors:

- Overgrazing: high stocking levels of sheep lead to grazing of dwarf shrubs with extremely slow recovery rates, of other rare plants with small populations and slow reproduction rates, and physical damage to sparse vegetation on unstable soils.
- Accidental fire: the danger is from accidental or recreational firing at the wrong time of year, possibly causing long-term damage to habitats. In Hoy there have been attempts at deliberate burning or through attempts to revive ancient "fire festivals".
- Recreation: localised damage is a possible concern. Any activity which might accelerate erosion would be undesirable. Visitor numbers to the Hoy montane habitats do not at present represent a threat. Rousay and Westray are even less visited.
- Climate change: this could potentially lead to changes in vegetation composition and structure, although any increase in temperature may also be accompanied by possible increases in rainfall and wind speeds. The future position is still unclear but it is likely that within the time span of this plan other factors will have by far the greatest impact on montane vegetation and species.
- Development: quarries, windfarms, communication masts, access tracks and certain other planning developments can impact directly on wildlife interest.
- Atmospheric pollution: acidification, trophospheric ozone and nitrogen enrichment caused by atmospheric deposition can lead to vegetation changes including a reduction in the lichen and bryophyte interest. These factors have less impact in Orkney than in southern and eastern parts of Scotland.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1 Management

- SSSIs including the habitat are Hoy; Rousay; and West Westray. Hoy is also an SPA and cSAC, and within a NSA. West Westray is an SPA, but the designation does not relate to the montane habitat. The Rousay SPA does not include that part of the SSSI with the montane habitat.
- The Hoy sites are within the RSPB reserve.
- SEERAD grants - CPS and RSS provide annual payments for habitat management which could apply in Westray, the ‘Coastal heath’ option being the likely applicable one. (CPS and RSS would be unlikely to apply to RSPB reserves in Hoy and Rousay.)
- The ‘Muirburn Code’ and its recent supplement ‘Prescribed Burning on Moorland’ produced by SEERAD - the burning regulations restrict the burning of heather and associated vegetation to specific times of the year, and there are clear recommendations against burning of sensitive habitats such as montane heath.
- LFA support payments to farmers are conditional on observance of a code of good farming practice, including the protection of natural habitats and avoidance of overgrazing: however, there are no specific actions required in relation to the unusual sensitivity of montane heaths.

6.2 Research and Guidance

- SNH has carried out Phase 1 vegetation surveys of all SSSIs, and other extensive research into the condition of Orkney’s upland and montane habitats.
- RSPB has commissioned National Vegetation Classification (NVC) surveys of all its reserves.
- Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

The UK HAP, once published, will direct the statutory agencies in their approach, and give a conservation direction to the local HAP. Targets and responsibilities will therefore trickle down from the national plan. Reference should be made to the national HAP.

- Maintain the current extent and distribution of montane habitats in Orkney.
- Encourage measures to improve the condition of any montane habitats where the status is unsatisfactory. **Target: policies in place by 2003, measures taken by 2004**

8. ACTION PLAN AGENCIES

Local partners: SNH; SEERAD; OIC; RSPB; FWAG; SAC

9. PROPOSED ACTIONS WITH AGENCIES

9.1. Site safeguard and management

- Seek to protect all vulnerable sites from over-grazing by 2005 (SNH).
- Protect montane habitats from inappropriate developments (OIC).
- Seek to protect all vulnerable sites from fire (SNH, RSPB, Hoy Trust).
- Ensure the conservation of this habitat under LFA cross-compliance rules (SEERAD).

9.2 Advisory

- Promote agri-environment scheme options aimed at conserving this habitat (SAC, FWAG).
- Ensure adequate advice is available and provided to all landowners on best practice (FWAG, SAC, SEERAD).
- Promote awareness of the fragility of the habitat and the possible threats to it among recreational users (SNH, RSPB, Hoy Trust).

9.3 Research and monitoring

- Monitor effects of recreational access (SNH, OIC).

9.4 Promotion and awareness raising

- Raise awareness of the unusual biodiversity and fragility of this habitat (All).

REFERENCES AND OTHER INFORMATION SOURCES

RSPB. (2000) *Draft management plan for Hoy Reserve.* RSPB, Orkney
Prentice and Prentice (1975). *The Hill Vegetation of North Hoy; New Phytol.* 75: 313-367.
Bullard, E.R.& Goode, D.A. (1975). *The Vegetation of Orkney. In the Natural Environment of Orkney>* Goodier, R (ed). NCC, Edinburgh
Ratcliffe, D.R. (1963). *The Hill Vegetation of North Hoy*. Unpublished report for NCC

14. INLAND ROCK — BROAD HABITAT TYPE

GENERAL UK DESCRIPTION

This broad habitat type covers both natural and artificial exposed rock surfaces which are greater than 0.25 ha, such as inland cliffs, caves, and screes (but not montane snow-bed communities) and limestone pavements as well as various forms of excavations and waste tips such as quarries and quarry waste.

A number of vegetation types associated with rock habitats are also included in this broad habitat type. There are: chasmophytic vegetation (plant communities that colonise the cracks and fissures of rock faces); claminarian grassland (a grassland type which is found on soils which have levels of heavy metals, such as lead, chromium and copper, that are toxic to most land species); and certain types of tall herb and fern vegetation, which as a result of grazing pressure are much reduced in extent and confined to areas inaccessible to grazing animals such as cliff faces and ledges, and to a lesser extent, on lightly-grazed steep rocky slopes and boulder fields.

UK PRIORITY HABITATS PRESENT:
None

LOCALLY IMPORTANT HABITATS:
Inland Rock

14.1 Inland Rock — locally important habitat

1. LOCAL HABITAT DESCRIPTION

Natural inland rock occurs in many places in Orkney where the horizontal bedding of the Old Red Sandstone allows exposures of vertical rock or "hammars". On the steeper hills in Westray, Rousay and especially Hoy the exposed rock faces cover considerable areas well in excess of 0.25 ha.

Many other sites are much smaller, less than 0.25 ha, and therefore included within other habitat types. However, these smaller outcrops of vertical rock are important in a county lacking limestone as they provide a habitat otherwise unavailable for certain plants and invertebrates (even Ancient Monuments provide a special habitat for one or two fern species): these smaller habitats are noted here because of their local importance.

There are some large quarry sites.

2. CURRENT LOCAL STATUS AND EXTENT

This habitat is especially important for a range of alpine plant species in the montane zone.

The MLURI Land Cover of Scotland 1988 (1993) estimated a ‘rock and cliffs’ area of 210 ha. The figure includes coastal as well as inland rock, and LCS 1988 also includes some discontinuous rock exposure in other habitats. Perhaps the figure is not useful for this HAP. The National Countryside Monitoring Scheme (1992) estimated 130 ha of inland ‘cliff/rock’. An RSPB survey North Hoy Reserve recorded 60 ha of inland rock: this is likely to be most of the inland rock area of Orkney. LCS 1988 estimated 130 ha of ‘quarry and opencast’.

There are no indications of recent decreases in the area, or of changes in habitat quality.

3. LOCAL DISTRIBUTION

Hoy has three small but well-gullied corries, several deep gullies occur outwith the corries and there is much steep, broken rock on the shoulders of the hills. Smaller areas occur in Westray and Rousay. Throughout the lowland area also are small rock outcrops well under 0.25 ha. In addition there are several quarries, mostly disused, where the area of exposed rock covers several hectares as at Stanger Head in Flotta and Cruady in the West Mainland.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Of the three corries in Hoy - the Enegars, the Nowt Bield and Quoyawa - it is the last which now has the richest and most luxuriant tall herb and fern flora and also the biggest range of arctic/alpine species. However, records show that this may have come about only since the end of WWII. Before that time it seems that sheep and cattle had free access. The steepness of the gullies allows frequent shifts in the rock fall and scree deposits. This constant shifting of material exposing fresh un-leached rock allows for a wide diversity of lime-loving and lime-hating plants. Noteworthy among the very long list recorded in Quoyawa are holly fern *Polystichum lonchitis* (up to 100 specimens), alpine meadow-grass *Poa alpina* at one time >100 flowering spikes were counted but now declined, and mountain avens *Dryas octopetala.* Several of the Hepatics on the priority list have also been found here. Another remarkable feature here and along the cliffs to the north of the corrie are the large clumps of freely flowering alpine saw-wort *Saussurea alpina*. Further examples of this flora continues round the east and into the Glen of Greer where the myrtle-leaved willow *Salix myrsinites* survives on a crumbling ledge. Facing almost due south and badly damaged during the fire of 1984 the Nowt Bield has a far less luxuriant rock face flora and very little tall herb and fern vegetation but the fire also showed how weathered rock compares unfavourably with fresh exposures in the availability of lime - after the fire there was a temporary abundance of the calcicole moss campion *Silene acaulis* and purple saxifrage *Saxifraga oppositifolia*, the former even appearing on small rock outcrops in the burn almost as far down as the road bridge. By contrast the north-facing Enegars have more acid-loving species such as dwarf cornel *Cornus suecica* and carpets of the liverwort *Diplophyllum albicans*. The very complex gullies here have probably not been examined thoroughly and lack of full botanical information also applies to the very wet Dwarfie Hammars. Very dry conditions apply to the seaward facing outcrops of the Ward Hill, in Rousay, favouring limestone bedstraw *Galium sterneri* but those facing the Muckle Water carry an excellent fern flora including the dwarf male fern *Dryopteris oreades.* Inland rock provides safe breeding sites for several raptor species. Golden eagles *Aquila chrysaëtes* nested in Hoy from 1966 - 1982. Ravens *Corvus corax*, although mainly coastal in Orkney also utilise a few inland crags. Orkney's only Manx shearwater *Procellaria puffinus* colony is found on the steep back wall of one of the Hoy corries. Fulmars *Fulmarus glacialis* having occupied most of the available sea-cliff ledges have now colonised inland crags in some localities.

Quarries have developed interesting fern flora, but lack the diversity of the natural rock faces, though some small ancient quarries do contain a diversity of plants on dry ledges and wet vegetated crevices, including limestone bedstraw *Galium sterneri* and primrose P*rimula vulgaris.* They provide nest sites for a number of pairs of ravens *Corvus corax* and kestrels *Falco tinnunculus.*

Tall herb and fern communities occur, though in Orkney these can be found in abundance in much more accessible places – the *Treeless Woodland and Dales* Locally Important habitat included in the *Dwarf Shrub Heath* Broad Habitat.

National Priority Species	
Juniper *Juniperus communis ssp nana*	
Local Priority Species	
Peregrine falcon *Falco peregrinus*	Buzzard *Buteo buteo*
Wheatear *Oenanthe oenanthe*	Kestrel *Falco tinnunculus*
Mountain male-fern *Dryopteris oreades*	Hoary whitlowgrass *Draba incana*
Dwarf cornel *Cornus suecica*	Limestone bedstraw *Galium sterneri*
Mountain avens *Dryas octopetala*	Wild strawberry *Fragaria vesca*
Mountain male-fern *Dryopteris oreades*	Wilson's filmy fern *Hymenophyllum wilsonii*
Hawkweed species *Hieracium orcadense*	Holly fern *Polystichum lonchitis*
Alpine meadow-grass *Poa alpina*	Myrtle-leaved willow *Salix myrsinites*
Aspen *Populus tremula*	Moss campion *Silene acaulis*
Alpine saw-wort *Saussurea alpina*	Starry saxifrage *Saxifraga stellaris*
Purple saxifrage *Saxifraga oppositifolia*	Moss campion *Silene acaulis*
Yellow saxifrage *Saxifraga aizoides*	

5. CURRENT FACTORS AFFECTING THE HABITAT

Much, but not all, of this habitat lies in the montane zone and reference should be made to the HAP for that habitat.

By the nature of the habitat, factors affecting it are few, but not insignificant. They include the following:

- Grazing: although the absence of grazing has contributed to the richness and diversity of the flora it has probably contributed to the very heavy and apparently recent growth of woodrush *Luzula sylvatica* which threatens to smother small species. Away from Hoy, most inland rock outcrops are subjected to some grazing - the rare, in Orkney, hart's-tongue fern *Phyllitis scolopendrium* is regularly chewed back to stumps in the low outcrops it occupies in Eynhallow.
- Accidental fire: the danger is from accidental or recreational firing at the wrong time of year, possibly causing long-term damage to habitats.
- Recreation: because of their very unstable nature the plants of the steeper cliffs and gullies will always be at risk from natural causes but too much human pressure, especially in early spring after winter frost can also be damaging. Any activity which might accelerate erosion would be undesirable.
- Climate change: this could potentially lead to changes in vegetation composition and structure, although any increase in temperature may also be accompanied by possible increases in rainfall and wind speeds. The future position is still unclear but it is likely that within the time span of this plan other factors will have by far the greatest impact on inland rock vegetation and species.
- Atmospheric pollution: acidification, trophospheric ozone and nitrogen enrichment caused by atmospheric deposition can lead to vegetation changes including a reduction in the lichen and bryophyte interest. These factors have less impact in Orkney than in southern and eastern parts of Scotland.
- Fulmars: the huge increase in numbers of fulmars *Fulmarus glacialis* in the last 100 years has led to them colonising many inland rock faces for nest sites. They add more nitrogen than is good for alpine plants.
- Development: in the more populated areas disused quarries are used unofficially for dumps and were used for official land-fill and often contain alien plant species. Rocky summits may be sites for telecommunications masts.
- Species introduction: as well as inadvertent introductions of plants such as fuchsia, cotoneaster species and New Zealand willowherb *Epilobium brunnescens* through dumping of spoil, alien plants have frequently been introduced to quarries to beautify them. Such introductions can create interesting sheltered habitats, but there is a risk of some introduced species escaping into the natural environment.
- Pesticides: this relates only to the ancient monuments where some rarer species of ferns are found. They have on occasion been treated with herbicide.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1 Management

- SSSIs including the habitat are Hoy; Rousay; and West Westray. Hoy is also an SPA and cSAC, and within a NSA. West Westray is an SPA, but the designation does not relate to the inland rock habitat. The Rousay SPA does not include that part of the SSSI with the inland rock. Hoy cSAC also includes calcareous rocky slopes with chasmophytic vegetation as a notified feature.
- The Hoy sites are within the RSPB reserve.
- The 'Muirburn Code' and its recent supplement 'Prescribed Burning on Moorland' produced by SEERAD - the burning regulations restrict the burning of heather and associated vegetation to specific times of the year, and there are clear recommendations against burning of sensitive habitats such as inland rock. .
- SEERAD grants - CPS and RSS provide annual payments for habitat management which could apply in Westray, the 'Coastal heath' option being the likely applicable one. (CPS and RSS would be unlikely to apply to RSPB reserves in Hoy and Rousay.)
- LFA support payments to farmers are conditional on observance of a code of good farming practice, including the protection of natural habitats and avoidance of overgrazing: however, there are no specific actions required in relation to the unusual sensitivity of the smaller inland rock outcrops.
- Species recovery: the solitary female myrtle-leaved willow *Salix myrsinites* in the Glen of Greer has now been successfully propagated and the resultant new plants pollinated by males from outwith Orkney – a useful beginning to a recovery plan for this species.

6.2 Research and Guidance

- SNH has carried out Phase 1 vegetation surveys of all SSSIs, and other extensive research into the condition of Orkney's upland, montane and inland rock habitats.
- RSPB has commissioned National Vegetation Classification (NVC) surveys of all its reserves.
- Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Encourage measures to conserve the condition of any inland rock habitats where the status is unsatisfactory. **Target: policies in place by 2003**

8. ACTION PLAN AGENCIES

Local partners: SNH; SEERAD; OIC; RSPB; FWAG; SAC

9. PROPOSED ACTIONS WITH AGENCIES

9.1. Site safeguard and management

- Seek to protect all vulnerable sites from over-grazing by 2005 (SNH).
- Protect inland rock habitats from inappropriate developments (OIC).
- Seek to protect all vulnerable sites from fire (SNH, RSPB, Hoy Trust).
- Ensure the conservation of this habitat under LFA cross-compliance rules (SEERAD).

9.2 Advisory

- Promote agri-environment scheme options aimed at conserving this habitat (SAC, FWAG).
- Ensure adequate advice is available and provided to all landowners on best practice (FWAG, SAC, SEERAD).
- Promote awareness of the fragility of the habitat and the possible threats to it among recreational users (SNH, RSPB, Hoy Trust).

9.3 Research and monitoring

- Monitor effects of recreational access (SNH).

9.4 Promotion and awareness raising

- Raise awareness of the unusual biodiversity and fragility of this habitat (All).

REFERENCES AND OTHER INFORMATION SOURCES

As for *Montane habitats*

15. BUILT UP AREAS AND GARDENS — BROAD HABITAT TYPE

GENERAL UK DESCRIPTION

This broad habitat type covers urban and rural settlements, farm buildings, caravan parks and other man made built structures such as industrial estates, retail parks, waste and derelict ground, urban parkland and transport infrastructure. It also includes domestic gardens and allotments. This type does not include amenity grassland and golf courses, which should be included in one of the grassland habitat types.

UK PRIORITY HABITATS PRESENT:

There are no UK priority habitats

LOCALLY IMPORTANT HABITATS:

Built-up areas and gardens

15.1 Built-up areas and gardens — locally important habitat

1. LOCAL HABITAT DESCRIPTION

These habitats are defined as green spaces and associated ecological niches found within built-up areas, of which gardens are a very important element. The habitats can be man-made, semi-natural or entirely natural, usually on a very small scale. The Action Plan covers various built and developed areas from the small settlements to the main towns, including derelict land, industrial areas and disused wartime aerodromes and other constructions. Mature, isolated broad-leaved trees and habitat provided by the actual buildings, which can act as sheltered cliff faces, are important elements of the urban setting.
Gardens provide a mosaic of habitat types, including walls, hedges, buildings, lawns, cultivated soil and flowering plants. Larger gardens can be diverse habitats supporting many species.

2. CURRENT LOCAL STATUS AND EXTENT

Built-up areas contain remnants of other habitats as well as those manufactured habitats that are specific to built-up areas: gardens. Mature trees are an important aspect. Gardens and other habitats in built-up areas are important for their biodiversity - they support two national priority species – and for the familiar, everyday link between people and the natural environment. While very small in terms of the land area of the county covered, they are important both in terms of the aesthetic contribution to everyday life, and in terms of the material providing food and cover for passage migrants and garden birds.

Gardens represent a way in which almost everyone can make a contribution to the maintenance of biodiversity through the use of appropriate plants and provision of niches for all forms of life. The great variety of artificial habitat found within gardens could make it an area of great importance to the maintenance of biodiversity.

The town fabric also includes public “parkland” managed and maintained by the Islands Council. Much of this has been designed and is maintained without thought as to how it could contribute to biodiversity objectives.

The Land Cover of Scotland (1993) estimated 570 ha of ‘Built up’ land area, with a further 830 ha of ‘Rural development’ including factory, cemetery, airfield and golf course. Of the latter, only the factory and cemetery area of 150 ha can be included in the *Built up areas and gardens* habitat type, giving a total of 720 ha.

3. LOCAL DISTRIBUTION

The towns of Stromness, Kirkwall, St. Margaret's Hope and Finstown are the main areas where urban habitats are found. Gardens are of course ubiquitous. Especially important are the bigger gardens or designed landscapes, notably Melsetter, Hoy; Trumland and Westness, Rousay; Balfour Castle, Shapinsay; Binscarth, Firth; Woodwick, Evie; and Gyre, Orphir.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Gardens provide islands of shelter with flower-, seed- and fruit-bearing plants and associated insects - areas of of importance to passage migrants and garden birds. Gardens provide havens for pollen and nectar feeding insects and their predators, especially at seasons when flowering wild plants are scarce, and when the open countryside is exposed to poor weather conditions. Gardens support priority species, such as the song thrush *Turdus philomelos* which has experienced a massive UK population decline in recent years. The pipistrelle bat *Pipistrellus pipistrellus* roosts in buildings (only for certain at Melsetter) and hunts among the shelter of trees. Swallows *Hirundo rustica*, house martins *Delichon urbica* and sometimes kestrels *Falco tinnunculus* nest in or on buildings, including derelict war buildings. Waste ground, often associated with industrial sites and dumps, and gardens are often a refuge for weeds becoming rare in agricultural land. Ephemerals such as thale cress *Arabidopsis thaliana* and common whitlow-grass *Erophila verna* are more abundant in town than in rural areas and the sea pearlwort *Sagina maritima* occurs as a pavement weed in Kirkwall. Angelica *Angelica archangelica* is interesting as a naturalised alien in Pierowall, Westray: it was possibly brought there by Norse colonists. Walls are a prime habitat for lichens.
Towns support a greater range of exotic tree and shrub species than anywhere else in the county.

National Priority Species	
Pipistrelle *Pipistrellus pipistrellus*	Song thrush *Turdus philomelos*
Purple ramping fumitory *Fumaria purpurea*	
Local Priority Species	
Pygmy shrew *Sorex minutus*	Wood mouse *Apodemus sylvaticus*
Greenfinch *Carduelis chloris*	Kestrel *Falco tinnunculus*
Pied wagtail *Motacilla alba*	Swallow *Hirundo rustica*
Ingrailed clay moth *Diarsia mendica orkneyensis*	Dunnock *Prunella modularis*
Northern dead-nettle *Lamium confertum*	Northern knotgrass *Polygonum boreale*
Angelica *Angelica archangelica*	Shaggy ink cap fungus *Coprinus comatus*

5. CURRENT FACTORS AFFECTING THE HABITAT

Miscellaneous factors may affect the quality of the habitat. They include:

- Loss of existing features from development: these include tree-felling, clearing up of waste ground, and loss of sections of watercourse. Some loss is inevitable for a variety of reasons including safety, but effects may be ameliorated and new features created in compensation. Many of the trees now being removed are approaching old age and felling is necessary, but replacement planting has not occurred in the past and the result is now that there are few trees replacing those being lost, especially in the historic town centres.
- Pollution and road-kills by vehicles;
- Use of pesticides in gardens and timber;
- Litter: cartons and plastic fibre may trap or injure small birds and mammals;
- Introduction of alien species: New Zealand flatworm and Japanese knotweed are examples that damage or destroy native species.
- Persecution: including egg-collecting, destruction of bees and wasps nests;
- Damage to wall habitats: use of pesticides and re-pointing of old walls which support mosses and lichens and provide niches for rock plants and insects.

6. CURRENT ACTIONS AND OPPORTUNITIES

Built-up areas provide opportunities for more positive action for biodiversity than almost anywhere, by gardeners, allotment holders, Council departments, schools, industrial estates, Health Board, garden centers, and others. Most especially, the 'wildlife friendliness' of gardens and their contribution to biodiversity depends on the species planted. Moves towards 'informal' gardens with wild corners, rotting deadwood, bird tables and ponds rather than formal gardens, and organic gardening have contributed to the value of gardens for biodiversity.

6.1 Management

- The Orkney Native Tree Project (ONTP): the project has promoted a number of new plantings at many town village and school sites. This project, with its employed adviser, has been behind most of projects with a strong biodiversity focus in the built-up environment in recent years. Major amenity planting at Glaitness/Muddiesdale has taken place (this is included in the *Broadleaved plantations and policy woodlands* habitat). The project has been financially supported by OIC, FA, SNH, and Millennium Forest for Scotland. The project has succeeded by strong local support and involvement.
- Town renewal: several projects to enhance the appearance of town areas have been initiated, for instance in Stromness, where biodiversity has been a major consideration: for example, native shrubs have been used in the plantings.
- School grounds and Community Centres: several projects to enhance grounds have been undertaken, for instance at Sanday Junior Secondary school and Firth Primary School (the latter including an Orkney Native Tree Project Site).
- Tree preservation: Orkney Islands Council have adopted the use of Tree Preservation Orders to secure retention and replacement of trees within St Margarets Hope and Finstown. In Kirkwall and Stromness Conservation Areas a similar protective policy operates.
- Industrial estates: some tree and shrub planting has taken place, both at Hatston, and near the Stromness estate (the latter another Orkney Native Tree Project Site).

6.2 Research and Guidance

- The Orkney Native Tree Project: in the most recent phase of this project, part of the focus and the project officer's remit has shifted to the conservation and replacement of town trees, whether native or exotic.
- Both the RSPB and SNH promote wildlife friendly gardening practices. SNH have produced a series of leaflets 'Plant for wildlife' which gives advice on wildlife friendly gardening methods (although are unable to grant aid 'domestic' projects). The RSPB also promotes wildlife friendly gardening through the production of publications although these have a southern bias. RSPB have undertaken an audit of mature trees on Council land and suggested a management regime for them.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Survey all built up area habitats. **Target: survey by 2005**
- Protect important sites.
- Increase the use of design and management for biodiversity in the everyday work of the statutory bodies, especially in the management of council property and green spaces. **Target: publish management guidelines by 2005**
- Ensure that management of built up area habitats is done in such a way as to contribute to biodiversity objectives. **Target: publish management guidelines by 2005**
- Increase the involvement of local people and businesses in managing for biodiversity. **Target: set up awareness raising programme by 2003**

8. ACTION PLAN AGENCIES

Local partners: OIC; OE; SNH; RSPB; SWRI; Orkney Horticultural and Industrial Association

9. PROPOSED ACTION WITH AGENCIES

9.1. Site safeguard and management

- Protect trees from destruction: ensure the protection of mature urban trees out with the Conservation Areas by the use of Tree Preservation Orders. Where loss is inevitable, replace (OIC).
- Continue to support the ONTP project with its widened, town environment, remit and the employment of a project officer (OIC, SNH, OE).
- Protect sites identified as of value for wildlife from change in land use (OIC).
- Take opportunities to enhance biodiversity of public spaces, for instance by wildlife gardening (e.g. choice of species attractive to birds, bees and butterflies; leaving cover and dead wood; organic gardening or least use of pesticides) (OIC).

9.2 Advisory

- Train Council staff in biodiversity awareness and management, for instance in distinguishing real pest species from harmless ones, in recognition of common and locally uncommon species in the town environment (OIC).
- Promote good practice in avoidance of spread of alien species, notably New Zealand flatworm (OIC, SNH).

9.3 Research and monitoring

- Survey and evaluate the full range of urban habitats in terms of their importance in maintaining wildlife interest (OIC).

9.4 Promotion and awareness raising

- Provide awareness training for local individuals, institutions and businesses, for instance schools, golf courses, hotels, guesthouses, industrial site owners and employees (All).
- Make more widely available both the SNH and RSPB leaflets of Wildlife friendly gardening, especially at point of sale of gardening products (SNH, RSPB).
- Promote the concept of wildlife gardening to preserve local biodiversity within the Orkney Horticultural and Industrial Association and other special interest groups. (OHIA, OFC, SWRI).

REFERENCES AND OTHER INFORMATION SOURCES

OIC Development Plan 2001

Coastal Habitats and Marine Habitats

Although the area of individual coastal habitat types in Orkney is a small proportion of those of the UK they form an exceptionally high proportion of the total area of Orkney. Coastal types represented are "hard coast" consisting mainly of cliff, "soft coast" consisting of beaches, sand dunes, salt marsh etc. and what is known in Orkney as "sea banks". The accounts given below follow the revised UK BSG classification systems for coastal and marine habitats. A full account of offshore marine habitats has not proved possible for this audit update and will depend on a clearer differentiation of the aggregated offshore habitat types presently proposed by the UK BSG.

16. SUPRALITTORAL ROCK — BROAD HABITAT TYPE

GENERAL UK DESCRIPTION

Supralittoral Rock includes those habitats with a rock substrate that lie above the high water mark but are nevertheless strongly influenced by salt spray from the splash zone. Features that may be present include vertical rock, boulders, gullies, ledges and pools, depending on the wave exposure of the site and its geology. On the south-western and northern coasts of the UK where, due to the long fetch and onshore prevailing winds, wave exposure is greatest, salt spray can be carried onto cliff faces and cliff tops. The vegetation of coastal cliffs or slopes forms a transition from maritime species to terrestrial communities further inland.

UK PRIORITY HABITATS PRESENT:	LOCALLY IMPORTANT HABITATS:
Maritime Cliff and Slopes	**Maritime grassland**

16.1 Maritime cliff and slopes — priority habitat

1. UK PRIORITY HABITAT DESCRIPTION

Maritime cliffs and slopes comprise sloping to vertical faces on the coastline where a break in slope is formed by slippage and/or coastal erosion. There appears to be no generally accepted definition of the minimum height or angle of slope which constitutes a cliff, but the zone defined as cliff-top (also covered in this plan) should extend landward to at least the limit of maritime influence (ie limit of salt spray deposition), which in some exposed situations may continue for up to 500 m inland. This plan may therefore encompass entire islands or headlands, depending on their size. On the seaward side, the plan extends to the limit of the supralittoral zone and so includes the splash zone lichens and other species occupying this habitat. Approximately 4000 km of the UK coastline has been classified as cliff.

Maritime cliffs can broadly be classified as 'hard cliffs' or 'soft cliffs', though in practice there are a number of intermediate types. Hard cliffs are vertical or steeply sloping; they are inclined to support few higher plants other than on ledges and in crevices or where a break in slope allows soil to accumulate. Soft cliffs are formed of rocks such as shales or in unconsolidated materials such as boulder clay; being unstable they often form less steep slopes and are therefore more easily colonised by vegetation.

The vegetation of maritime cliff and slopes varies according to several factors: the extent of exposure to wind and salt spray, the chemistry of the underlying rock, the water content and stability of the substrate.

Vegetation of a strictly maritime nature occurs where exposure to the waves and winds is at its greatest. In the UK, such conditions are found principally on the northern and south-western coasts. In extreme conditions saltmarsh vegetation can occur on cliff-tops. On exposed hard cliffs giving little foothold to higher plants, lichens are often the predominant vegetation. Ledges on such cliffs support a specialised flora. Maritime grasslands occur on cliffs and slopes. On cliffs and slopes which are more sheltered from the prevailing winds and salt spray, the vegetation communities are more similar to those found inland, and are increasingly influenced by the chemistry of the substrate. The upper sections and cliff-tops of hard cliffs on acidic rocks may support maritime heaths characterised by heather *Calluna vulgaris*. Mobile soft cliffs support a wide range of vegetation from pioneer communities on freshly exposed faces through ruderal and grassland communities to scrub and woodland. Wet flush vegetation commonly occurs on soft cliffs where groundwater issues as seepage.

Maritime cliffs are often significant for their populations of breeding seabirds, many of which are of international importance.

2. CURRENT LOCAL STATUS AND EXTENT

This priority habitat is the most extensive and widely distributed in Orkney. It is immensely varied, and supports a wide range of the species and sub-habitats indicated in the national priority habitat description, and nationally important concentrations of seabirds. The soft cliffs of Orkney support a large, widely distributed area of ungrazed lowland vegetation: the habitats this comprises, including some scarce relicts, have elsewhere in Orkney been modified, fragmented and reduced: the soft cliffs are a very valuable habitat type, in themselves and also as part of the overall habitat for mammals, birds and invertebrates.

A host of sub-habitats are included within the general heading of maritime cliff and slopes, for example bare ground, spray-zone lichen-covered rock, rock crevice, cliff ledge, seabird colony, maritime heath and grassland, neutral grassland and even perched salt marsh. In places, water seepage produces a base-rich flush, and even a tufa formation (calcareous mineral deposits encrusted upon characteristic moss species). The extent and variety of this habitat cannot be encompassed in a single plan: it incorporates elements of many other habitats described in this audit, and in many parts of lowland Orkney it is the most extensive and important semi-natural habitat, and one that Orcadians value most highly. For this reason, reference should be made to other HAPs, including *Species-rich Grassland, Base-rich Flush*, and the various habitats included in the *Dwarf Shrub Heath* Broad Habitat. The zone defined as cliff-top in the Priority Habitat extends inland to the limit of salt-spray deposition, but in the exposed situations such as prevail on Orkney's west coast this zone is often greater than can be reasonably accommodated in the *Maritime cliff and slope* habitat (much greater than 500 m). Because of this, the characteristic Orcadian *Maritime Heath*, though present in the supralittoral zone is not included here but in the *Dwarf Shrub Heath* Broad Habitat; and its conservation issues and actions are similar to those for other heathland types.

Tufa and vegetated seacliffs are habitats listed in the EC Habitats Directive.

According to Barne et al (1997) The Orkney cliff coastline is comprised of

Vertical cliff > 20 m high	84 km
Vertical cliff < 20 m high	84 km
Non-vertical cliff > 20 m high	14 km
Non-vertical cliff < 20 m high	65 km

The low cliffs include varied forms influenced by exposure, type of rock, strata and overlying material. Long stretches of the Orkney coastline are intermediate between high cliff and soft coast, and there are a number of wide bays and 'wicks'.

3. LOCAL DISTRIBUTION

Mather, Ritchie, and Smith (1974) mapped the distribution of "hard cliff over 15 m high". It is concentrated on the west side, notably Hoy, Mainland and Westray, though there are significant stretches on the east side of Stronsay, Deerness, Holm and South Ronaldsay. South Ronaldsay has a higher proportion of its coastline composed of this higher cliff than any other island.

Low rocky shores are found round most of the remainder of the Mainland and North Isles. Low till cliffs occur most commonly round Scapa Flow, also in Shapinsay.

Tufa deposits may be found where exceedingly calcareous water is seeping through the rock face. There are few sites, and the only known ones of any size are at Waulkmill Bay and near Northfield, Burray.

Key sites include the great seabird nesting colonies as on the Noup in Westray, at Marwick Head and Copinsay; the puffin colony numbering over 60000 pairs on remote Sule Skerry; Orkney's only gannetry, of some 5000 pairs, nearby on the even less accessible Sule Stack; and the vegetated sea cliffs of Hoy cSAC and Stromness Heaths and Coasts cSAC.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

R.M.M.Crawford (in Berry, 2000) provides a succinct summary of the vegetational characteristics of Orkney's sea-cliff habitats. 'Working upwards from the base of the cliffs, a succession of plant communities can often be observed. Lichens, in particular the bright orange *Xanthoria parietina*, are found immediately above the high water mark. Above this, the crevices and ledges provide a habitat for sea plantain *Plantago maritima*, rose-root *Sedum rosea* and sea aster *Aster tripolium*. Cliff faces are the preferred habitat of species that can tolerate sea spray and summer drought but not inundation or competition. Such species include thrift *Armeria maritima*, sea campion *Silene uniflora* and Scots lovage *Ligusticum scoticum*. All these are common in most parts of Orkney, either in rock crevices on the cliffs or in the boulder-strewn debris below. Towards the upper areas of cliffs and extending onto the cliff-top, particularly where there is no grazing (as on sea stacks) there may be a tall herb community with wild angelica *Angelica sylvestris*, red campion *Silene dioica*, common primrose *Primula vulgaris*, foxglove *Digitalis purpurea*, and sorrel *Rumex acetosa*. Later in the summer grass of parnassus *Parnassia palustris* appears. In more sheltered gullies and away from sea spray, as high on the Hoy cliffs, there are a number of species more typical of woodlands with large stands of greater woodrush *Luzula sylvatica* and honeysuckle *Lonicera periclymenum*. Sometimes, as in The Pinnacles and cliffs around Waulkmill Bay, woody species such as rowan *Sorbus aucuparia* and even aspen *Populus tremula* are found. On drier cliffs like the sandstone block cliffs facing Scapa Flow, a heath-type vegetation can be found with heather *Calluna vulgaris*, bell heather *Erica cinerea*, crowberry *Empetrum nigrum*, wood sage *Teucrium scorodonium* and golden rod *Solidago virgaurea*.'

Soft cliffs or 'sea banks' often support a somewhat rank, tall grass and herb vegetation influenced by water seepage, soil slippage and some enrichment from nesting birds and now ceased agricultural use. Meadowsweet *Filipendula ulmaris*, yellow flag iris *Iris pseudacorus* and docks *Rumex* species are common. Red campion *Silene dioica* and lesser celandine *Ranunculus acris* are characteristic of these places. The hawkweed *Hieracium maritimum*, which is endemic to Orkney, Caithness and possibly Shetland, occurs in cliff grassland in South Walls, together with other hawkweeds. These damp neutral grasslands are often surprisingly sheltered and provide good environments for invertebrates, many of these not especially associated with maritime habitats. Some sheltered sites have scrub and woodland understorey, including honeysuckle *Lonicera periclymenum*, wild rose *Rosa* species, tall bracken *Pteridium aquilinum* and foxgloves *Digitalis purpurea*.

Seabird colonies abound on Orkney's cliffs. Some species such as Fulmar *Fulmarus glacialis* are found scattered around most of the coastline but other such as Guillemots *Uria aalge* and Kittiwakes *Rissa tridactyla* congregate in enormous 'seabird cities'.

The leaf beetle *Chrysolina crassicornis*, endemic to Orkney, Shetland and Argyll, has been found on sea plantain *Plantago maritima* at Yesnaby, Sandwick.

National Priority Species	
Great yellow bumblebee *Bombus distinguendus*	Pink meadow cap *Hygrocybe calyptriformis*

An eyebright *Euphrasia heslop-harrisonii*	
Local Priority Species	
Pygmy shrew *Sorex minutus*	Wood mouse *Apodemus sylvaticus*
Razorbill *Alca torda*	Rock pipit *Anthus petrosus*
Twite *Carduelis flavirostris*	Sand martin *Riparia riparia*
Peregrine falcon *Falco peregrinus*	Kestrel *Falco tinnunculus*
Puffin *Fratercula arctica*	Storm Petrel *Hydrobates pelagicus*
Herring Gull *Larus argentatus*	Lesser black-backed gull *Larus fuscus*
Common gull *Larus canus*	Shag *Phalacrocorax aristotelis*
Pied wagtail *Motacilla alba*	Cormorant *Phalacrocorax carbo*
Wheatear *Oenanthe oenanthe*	Kittiwake *Rissa tridactyla*
Eider *Somateria mollissima*	Arctic skua *Stercorarius parasiticus*
Great skua *Stercorarius stercorarius*	Common tern *Sterna hirundo*
Arctic tern *Sterna paradisea*	Guillemot *Uria aalge*
A leaf beetle *Chrysolina crassicornis*	A brown weevil *Tropiphorus terricola*
Common blue butterfly *Polyommatus icarus*	Netted pug moth *Eupithecia venosata ochraceae*
Sheep's-bit *Jasione montana*	Sea aster *Aster tripolium*
Hemp agrimony *Eupatorium cannabinum*	Aspen *Populus tremula*
Honeysuckle *Lonicera periclymenum*	Wild roses *Rosa species*
Early purple orchid *Orchis mascula*	A moss *Amblyodon dealbatus*

Other species most associated with *Maritime Grassland* and *Maritime Heath* are listed under those habitat types.

5. CURRENT FACTORS AFFECTING THE HABITAT

Cliffs and slopes are amongst the least modified of terrestrial habitats. The national HAP refers to the major factors of coastal protection systems, built development, recreational use and introduced species, none of which is considered to be an important factor in Orkney.

The only part significantly affected by human pressure is the cliff-top zone, especially along its inner boundary. The factors affecting this zone are described in the HAPs for *Maritime Heath*, which is included in the *Dwarf shrub heath* Broad Habitat type, and for *Maritime grassland* (see section 16.2 below). However, a variety of other grassland, heathland, wetland and bare rock habitats exist along cliff-tops, and there are factors affecting all:

- Agricultural improvement: semi-natural habitats are often squeezed into a narrow strip between cliff edge and agricultural land. The diversity and overall quality of the cliff and slope habitat is diminished. Much of the land reclaimed in most recent times was exposed maritime grassland and heath, of poor agricultural quality. Its reclamation represents a major loss of habitat.
- Grazing: there are instances of heavy grazing which impacts on native plant communities, though most cliffs are not grazed. There are many plant species growing on cliffs and cliff-tops which are not adapted for grazing. There are also pockets of aged, species-rich heathland where the introduction of grazing would be damaging.
- Recreation: activities such as climbing can directly degrade maritime cliff habitat and but the only regularly climbed site in Orkney is the Old Man of Hoy.

6. CURRENT ACTIONS AND OPPORTUNITIES

The UK HAP outlines current action and directs the statutory agencies in their objectives and targets, and gives a conservation direction to the local HAP. Reference should be made to the national HAP. Reference should also be made to the HAPs for *Maritime Heath*, *Maritime grassland* and *Semi-natural grassland.*

6.1 Management

- Three geological/geomorphological SSSIs have been designated on Orkney cliffs: Denwick, Deerness; Muckle Head & Selwick, Hoy; and Mill Bay, Stronsay.
- SSSIs which include this habitat are Hoy; Marwick Head; Stromness Heaths and Coast; Copinsay; part of Rousay; Calf of Eday; West Westray; North Hill & Holm of Papay; Ward Hill Cliffs; Auskerry; Pentland Firth Islands; Switha; and Sule Stack; although the designations do not in all cases relate to the *Maritime Cliff and Slope* interests.
- Of these SSSIs, Hoy is a cSAC and SPA; Stromness Heaths & Coasts is a cSAC; all of the rest except Ward Hill Cliffs are SPAs.
- Much maritime cliff and slope is included in the Hoy and West Mainland National Scenic Area
- RSPB reserves are part of Hoy; Marwick Head; part of West Westray; Copinsay; and North Hill.
- Mull Head, Deerness is a Local Nature Reserve owned by OIC.
- SEERAD grants - CPS and RSS provide annual payments for timed, managed grazing of 'coastal heath', which encompasses much semi-natural cliff-top habitat in Orkney. The area so managed under CPS in Orkney is 570 ha, but little of this is comprised of narrow cliff-top strips. Such areas are usually not grazed (which is often an appropriate management) and outside the scope of agri-environment schemes.
- LFA support payments to farmers are conditional on observance of a code of good farming practice, including the protection of natural habitats and avoidance of overgrazing: these are somewhat weak in relation to interpretation of overgrazing and in any case not intended to address the detail of positive habitat management.

6.2 Research and Guidance

- SNH has carried out Phase 1 surveys of all SSSIs and National Vegetation Classification (NVC) surveys of Marwick Head; Stromness Heaths and Coast; Copinsay; part of Rousay; Calf of Eday; West Westray; North Hill; Auskerry; and Swona (part of Pentland Firth Islands).
- RSPB has carried out NVC surveys of all its reserves.
- Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

In the context of the national plan, targets and responsibilities will inform local policy. In the case of this HAP, it is these national strategies that will inform actions.

- Maintain the current quality of maritime cliff and slope habitats in Orkney.
- Seek to recreate maritime heath and grassland habitats. **Targets: (see relevant HAPs for *Maritime heath, Maritime grassland* and *Semi-natural grassland*)**

8. ACTION PLAN AGENCIES

8.1. National agencies: SNH; SEERAD; SEPA; JNCC

8.2. Local partners: RSPB; FWAG; SAC; OIC

9. PROPOSED ACTION WITH AGENCIES

9.1. Site safeguard and management

None additional to national HAP

9.2 Advisory

- Promote agri-environment scheme options wherever these can benefit the habitats of *Maritime cliff and slope*. (SAC, FWAG).
- Ensure adequate advice is available and provided to all landowners on best practice (FWAG, SAC, SEERAD).

9.3 Research and monitoring

None additional to national HAP

9.4 Promotion and awareness raising

- Raise awareness of the processes and management requirements of this habitat (All).

REFERENCES AND OTHER INFORMATION SOURCES

Barne, J.H., Robson, C.F., Kaznowska, S.S., Doody, J.P., Davidson, N.C. & Buck, A.L. (eds.). (1997). *Coasts and Seas of the United Kingdom*. Coastal Directories Series, JNCC, Peterborough

Bullard, E.R. & Goode, D.A. (1975). *The Vegetation of Orkney.* In *The Natural Environment of Orkney*. Goodier, R. (ed.). NCC, Edinburgh.

Crawford, R.M.M. (2000). *Land plants in an oceanic environment.* In *Orkney Nature*. Berry, R.J. Academic Press

Mather, A.S., Ritchie, W. & Smith, J.S. (1974). *Beaches of Orkney*. Dept. of Geography, Aberdeen

Mather, A.S., Ritchie, W. & Smith, J.S. (1975). *An introduction to the morphology of the Orkney coastline*. In *The Natural Environment of Orkney*. Goodier, R. (ed). NCC, Edinburgh

Meek, E.R. (1988). The Seabird Colony Register in Orkney 1985-87. In *Orkney Bird Report 1988*. Booth, C., Cuthbert, M., Meek, E (eds).

16.2 Maritime grassland — locally important habitat

1. LOCAL HABITAT DESCRIPTION

This is grassland very strongly influenced by the proximity of the ocean. It occurs on exposed cliff tops and coastal slopes. *Maritime heath* habitat (see section 8.3) occurs here also, or just inland of the maritime grassland. Whether the maritime vegetation zone supports maritime heath or maritime grassland depends on the degree of exposure and the severity of grazing impacts, both past and present. The grassland band may extend many metres inland where exposure to salt spray is greatest, while in more sheltered places it may be confined to the coastal edge. Grazing animals can suppress the dwarf shrub element of maritime heath, thus producing a grassland.

A variety of grassland vegetation communities may be present. Some of these communities are as much dominated by herbs or sedges as by grasses. Typical herbs are thrift *Armeria maritima* and sea plantain *Plantago maritima* in the most exposed zone, with plants such as wild thyme *Thymus praecox*, bird's-foot trefoil *Lotus corniculatus*, lady's bedstraw *Galium verum* and spring squill *Scilla verna* slightly further inland. Underlying rocks also exert a strong influence on the vegetation: relatively calcareous rocks like the Rousay and Stromness Flags often support a wider band of grassland or grassy heath than the acidic rocks like the Eday Beds, where dwarf shrub-dominated heath may extend close to the cliff edge.

This local habitat type does not include species-poor semi-improved grassland, or the other vegetation types described in the *Maritime Cliff and Slopes* habitat type such as rock crevice vegetation and the taller vegetation of more sheltered soft cliffs.

Fragments of other habitats and other features often occur within maritime grassland, such as temporary pools, flushes, rabbit holes and disturbed soil, and bare rock: these provide niches for a variety of other species.

2. CURRENT LOCAL STATUS AND EXTENT

This habitat type is locally important because of the richness of calcicole species it supports in an unusual environment, i.e. the combination of high oceanic exposure and thin, base-rich soil. It also supports some unusual fungi and insects. Its quality is also dependent on the way in which it is managed.

There are no good figures or estimates available for its extent. The Land Cover of Scotland (1993) estimates an area of 3350 ha of 'maritime grassland', but this seems much too high an estimate for the habitat type here described; it appears that the LCS land cover definition includes grassy maritime heath and probably some other semi-improved grasslands in coastal locations. If the entire Orkney coastline consisted of a 10-metre band of *Maritime grassland* the extent of the habitat would be c.247 ha: the actual distribution is much more uneven.

3. LOCAL DISTRIBUTION

Potentially, maritime grassland can occur along a high proportion of the 247 km of the Orkney coastline. However, it has been a neglected habitat and most has been lost to agricultural improvement or inappropriate grazing management.

Maritime grassland occurs extensively on many of the cliff-topped coasts in Orkney, especially those oriented to the west and north. Distribution mirrors that given for *Maritime heath* habitat. Key sites include Stromness Heaths and Coast (West Mainland), which is also a candidate Special Area of Conservation under the Habitats Directive for its vegetated sea cliffs and dry heaths; North Hill, Papa Westray; West Westray and Rousay. Maritime grasslands occur on some of the most exposed south and east coasts. A key site is Hill of White Hamars, South Walls.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Exposed cliff top grassland when managed for it biodiversity can support a dense herb-rich turf with as many as 38 species of vascular plant species per 4 sq m. Such grassland is akin to inland calcareous grassland. Species include kidney vetch *Anthyllis vulneraria*, wild thyme *Thymus praecox*, fairy flax *Linum catharticum*, field gentian *Gentianella campestris*, common milkwort *Polygala vulgaris*, frog orchid *Coeloglossum viride*, eyebrights *Euphrasia* species and red clover *Trifolium pratense* with an abundance of fine grasses and sedges. Several notable species of eyebrights *Euphrasia* occur, and the scarce endemic Scottish primrose *Primula scotica*. The latter is often quoted as a constituent of maritime heath, but most of its populations occur in maritime grassland. In wetter grassland, grass of Parnassus *Parnassia palustris*, northern fen orchid *Dactylorhiza purpurella* and autumn hawkbit *Leontodon autumnalis* are often abundant.

The scarce small adder's-tongue fern *Ophioglossum azoricum* appears to occur more frequently in Orkney than elsewhere in Britain. The scarce northern yellow-cress *Rorippa islandica* has a similar distribution: it grows in the mud of dried up winter pools in a variety of coastal habitats.

This is possibly a nationally important habitat for waxcap fungi, which can be locally abundant. Flower-rich grasslands may support good populations of butterflies and all of Orkney's bumblebee species.

National Priority Species	
Skylark *Alauda arvensis*	Great yellow bumblebee *Bombus distinguendus*
An eyebright *Euphrasia heslop-harrisonii*	Pink meadow cap *Hygrocybe calyptriformis*
Local Priority Species	
Pygmy shrew *Sorex minutus*	Orkney vole *Microtus arvalis orcadensis*
Kestrel *Falco tinnunculus*	Merlin *Falco columbarius*
Peregrine falcon *Falco peregrinus*	Storm petrel *Hydrobates pelagicus*
Herring gull *Larus argentatus*	Great black backed gull *Larus marinus*
Common gull *Larus canus*	Lesser black-backed gull *Larus fuscus*
Twite *Carduelis flavirostris*	Meadow pipit *Anthus pratensis*
Ringed plover *Charadrius hiaticula*,	Oystercatcher *Haematopus ostralegus*
Wheatear *Oenanthe oenanthe*	Arctic tern *Sterna paradisea*
Arctic skua *Stercorarius parasiticus*	Great skua *Stercorarius skua*
Heath carder bee *Bombus muscorum*	A weevil *Apion ryei*
Common blue *Polyommatus icarus*	Ingrailed clay *Diarsia mendica orkneyensis*
A leaf beetle *Chrysolina crassicornis*	An eyebright *Euphrasia marshallii*
Rush-leaved fescue *Festuca arenaria*	An eyebright *Euphrasia ostenfeldii*
Grass of Parnassus *Parnassia palustris*	Glaucous sedge *Carex flacca*
Yellow rattle *Rhinanthus minor*	Scottish primrose *Primula scotica*
Primrose *Primula vulgaris*	Northern fen orchid *Dactylorhiza purpurella*
Small adder's-tongue fern *Ophioglossum azoricum*	Spring squill *Scilla verna*
Northern yellow-cress *Rorippa islandica*	Limestone bedstraw *Galium sterneri*
A moss *Sanionia orthothecioides*	

This habitat is closely associated with *Maritime heath*. Subsequent sections of this HAP closely follow the factors, objectives and actions outlined for the *Maritime heath* HAP.

5. CURRENT FACTORS AFFECTING THE HABITAT & 6. CURRENT ACTIONS AND OPPORTUNITIES

Refer to equivalent section in the *Maritime heath* HAP.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Maintain the current extent and distribution of maritime grassland in Orkney.
- Maintain and wherever possible enhance the current quality of all maritime grassland in Orkney. **Targets**: **favourable condition status on all maritime grassland SSSIs by 2010: demonstrable improvements in the condition of at least 50% of maritime grassland outside SSSIs by 2010**

8. ACTION PLAN AGENCIES

Local partners: SNH; SEERAD; OIC; RSPB; SWT; FWAG; SAC

9. PROPOSED ACTION WITH AGENCIES

Refer to equivalent section in the *Maritime heath* HAP.

REFERENCES AND OTHER INFORMATION SOURCES

Harris, R.A. and Jones, R. M. (1992). *Draft Management Plan, Hill of White Hamars SWT Reserve*. Unpublished report for SWT

Harris, R.A. (1993). *Maritime Heath Monitoring, Orkney: an initial assessment of some major maritime heath sites in Orkney.* Unpublished report for SNH

Harris, R.A. and Jones, R. M. (1998). *The Nature of Grazing*. SNH/SWT/Leader II:

17 SUPRALITTORAL SEDIMENT — BROAD HABITAT TYPE

GENERAL UK DESCRIPTION

This broad habitat type occurs above high water mark, but in areas influenced by wave splash and sea spray. Salt-tolerant species are the characteristic colonisers of this broad habitat type and the communities present are strongly influenced by the sediment size as well as degree of wave exposure of the shore. Strandline communities are often present on moderately exposed sandy shores, particularly on flat, slightly mobile beaches with little or no human disturbance. On the upper margins of the shore, three major supralittoral sediment habitat types occur, namely coastal vegetated shingle, sand dune, and machair.

Shingle beaches tend to form in high-energy environments when the sea can move and pile up pebbles on the shore above the tide line. The five types of shingle beach that have been recognised are the fringing beaches, spits, barriers, cuspate forelands and barrier islands. Vegetation will establish on shingle beaches where there is a matrix of finer material such as sand or silt, and where the structure is stable. Sand dunes are formed by wind blown sand. Distinct features within dune systems are fore dunes, yellow dunes, dune grassland, dune slacks, dune heath and dune scrub. Machair is a distinctive sand dune formation that is only found in the north and west coast of Scotland and in western Ireland. The soils are made up of wind deposited shell-sand blown inland from coastal beaches and mobile dunes, and lie over impermeable rock.

Scotland is especially important for these habitats, with two thirds of the global machair habitat being found here. Of special significance in Orkney as well is the rare aeolianite habitat which occurs adjacent to some coastal sand dunes.

UK PRIORITY HABITATS PRESENT:

Coastal Sand Dunes
Machair
Coastal Vegetated Shingle

LOCALLY IMPORTANT HABITATS:

Links
Aeolianite
Coastal strandline

Other locally occurring habitats: Storm beach

LOCAL STATUS

The JNCC survey (Barne et al 1997) found 2,150 ha of dune and dune grassland in Orkney.

The habitats and other features are very well represented in Orkney: they are diverse, extensive and some are of national importance.

Management of these features has a long history, including grazing, cultivation, introduction and harvesting of rabbits for meat and skins, harvesting of sea grasses for basketry, and sand extraction. In some places, notably around Tofts Ness, Sanday, ancient field systems and even cultivation profiles lie buried under the mantle of blown sand. It would appear from historic botanical lists and accounts that the total area of vegetated sand in Orkney has declined. Typical dune species have also declined, some over the last fifty years.

17.1 Coastal sand dunes — priority habitat

1. UK PRIORITY HABITAT DESCRIPTION

Sand dunes form where there is a supply of medium grained sand in the inter-tidal zone and prevailing onshore winds. The critical factor is a sufficiently large area of beach where the surface dries between tides, allowing the sand to be blown inland. The forces of the wind, wave and tide can form dunes in many different ways. There are bay dunes between headlands, spit dunes at the mouth of estuaries and hindshore dunes where sand is blown inland. There are also climbing dunes where sand is blown onto higher ground and tombolos where a neck of sand is deposited out to an island. Dune vegetation is dependant on both the stability of the sand and the time period since the last deposition.
Embryonic or mobile dunes lack vegetation cover altogether, while semi-fixed dunes, as their name implies, are partially stabilized by grass, principally marram grass *Ammophila arenaria* and more locally lyme grass *Leymus arenarius*. Fixed dune grassland forms largely closed swards where accretion is no longer taking place and some soil development is taking place, and the vegetation is usually comprised of fescue *Festuca* grasses, eyebrights *Euphrasia* species, lady's bedstraw *Galium verum*, and a variety of other species. Dune slack vegetation occurs in wet depressions between and behind dune ridges.

There are approximately 23,000 hectares of sand dune in England, Wales and Northern Ireland. The ongoing Sand Dune Vegetation Survey of Scotland indicates there may be as much as 48,000 ha of dune and machair in Scotland, of which 33,000 is dune. Major dune systems are widely distributed within the UK. In Scotland they are found on all coasts but are less frequent in the north-west and in Shetland.

2. CURRENT LOCAL STATUS AND EXTENT

The definition of *Coastal sand dunes* includes a range of dune, wetland, heath and grassland types. The Priority habitat *Machair*, occurring in northwest Scotland only, has also been defined, though in terms of plant and animal communities, and most of the physical features, it could broadly be defined within the *Coastal sand dunes* habitat. It occurs in Sanday (see section 17.2). Also in Orkney there are many areas of 'links' or dune grassland not, or scarcely, associated with dune formation. For the Orkney LBAP, *Links* have also been defined separately, as a Locally Important habitat. There are therefore many overlaps in the descriptions, defined areas, factors affecting the habitat and actions. These should be borne in mind when reading this HAP.

There are no extensive dune systems in Orkney comparable with those of the Scottish mainland. Where dunes occur they are usually in the form of single ridge. Dune material in Orkney is derived from wind-blown offshore deposits of sand, mainly derived from glacial till and seashells and therefore high in lime. Insufficient studies have been made, so far, of these offshore deposits. The only present area of active accretion is at No. 4 Barrier and it is believed that some of this sand is the result of coastal sand depletion elsewhere rather from original sources. Offshore glacial till and eroded sandstone add to the sand. In some bays, e.g. Rackwick, inland glacial deposits also contribute a fine-grained mineral material to the sand. The varying proportions of lime in the sand of different sites depends on the proportions of shell sand and mineral sand.

Bay dunes are the commonest type in Orkney with the seaward face often steeply eroded.

Dune habitats listed in Annex 1 of the EC Habitats Directive include: embryonic dunes, coastal dune heathland, fixed dunes with herbaceous vegetation (grey dunes), humid dune slacks, dunes with creeping willow *Salix repens*. Examples of all of these occur in Orkney.

The JNCC survey found 6 ha of strand and embryo dune, and 481 ha of mobile and semi-fixed. Much of this is in the Sanday machair area (and HAP).

The extent and quality of dune habitat appears to have been reduced significantly, particularly in the last 50 years, mainly as a result of sand extraction, but also from other factors.

3. LOCAL DISTRIBUTION

Some 84 separate dune sites have been recorded by JNCC, the most common of which are undoubtedly bay dunes. The greatest area of dune and machair occurs in the North isles, particularly in Sanday.

Elsewhere spit dunes build up at the mouths of rivers or estuaries, but only a few small examples are present in Orkney e.g. Bay of Newark and Sty Wick (Sanday): these are in the latter stages of their lifespan. They evolved when sea levels were lower than present; they are sediment-starved and prone to erosion as sea levels continue to rise.

Coastal dune heathland on acid sand dune is rare in Orkney, the only known locations being Rackwick (Hoy) and Doomy (Eday). Dunes with creeping willow *Salix repens* also occur at Rackwick.

The outstanding sites for dunes are in Sanday, where the Central Sanday SSSI has been notified for its complex of landforms, including dunes and machair. Elsewhere in Sanday is the only example of climbing dunes, on Warsetter Hill. Further extensive sand areas are present in Burray, Stronsay, Eday, Westray and North Ronaldsay. Bu Links, Burray, has proved notable for its invertebrate species.

An unusual feature for Orkney are the bay dunes developed beside the Churchill Barriers of Scapa Flow, which have developed since their construction in the Second World War: it is unusual to have a definite date for the onset of dune formation. This process has created a fine example of vegetation succession in an accreting shingle/dune system and is a major site for oyster plant *Mertensia maritima.*

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

The diversity of dune types strongly influences the vegetation communities that can thrive on them. On mobile and semi-fixed dunes the number of plants species is restricted. Sand–binding species that predominate are lyme-grass *Elymus arenarius*, marram *Ammophila arenaria*, sand sedge *Carex arenaria* and sand couch *Elytrigia juncea.* Perennial sowthistle *Sonchus arvensis* is often present. On the more stable fixed dunes an increasing number of species occur in the vegetation including ragwort *Senecio jacobaea*, hogweed *Heracleum sphondylium*, red fescue *Festuca rubra*, bird's-foot trefoil, white clover *Trifolium repens*, lesser meadow-rue *Thalictrum minus* and, at one site only, sea bindweed *Calystegia soldanella*. Primrose *Primula vulgaris* is common at a very few sites. Completely stabilized dunes, merging into links, may support a herb-rich pasture, the species composition highly dependent on the level of the water table and on the grazing management. Species include the nationally scarce curved sedge *Carex maritima*, which has an arctic-alpine distribution. Three other nationally scarce species normally associated with other habitats are also found on dunes in Orkney; oyster plant *Mertensia maritima* (more typical of shingle), limestone bedstraw *Galium sterneri* (varied habitats) and Scottish primrose *Primula scotica* (more typical of maritime heath and grassland). It is likely that further studies of the eyebright *Euphrasia* genus, so abundant in dune habitats, and often so difficult to identify to species level, will reveal the occurrence of new rarities. A variety of additional plant species give local character to individual sites. Primose *Primula vulgaris* occurs abundantly at a few sites.

The lichen flora of dunes has not been closely studied but it is believed that at least one rare species does occur in Orkney.

There have been no detailed studies on the animal populations of regional sand dune systems. However, otter *Lutra lutra* is closely associated with this coastal habitat. No dune site is outstanding in terms of Invertebrate Site Register records, but a few dunes have a small number of notable species e.g. archers dart moth *Agrotis vestigialis*, and the sawfly *Nematus stichi*. Bu Links, Burray is known as the only remaining Orkney site for the dark green fritillary *Argynnis aglaja scotica*, and more common butterfly species occur there with unusual abundance. Eight species of bumblebee and cuckoo-bumblebee can also be found at Bu Links, including the nationally rare great yellow bumblebee *Bombus distinguendus*.

Bird species most associated with dunes are twite *Carduelis flavirostris* and shelduck *Tadorna tadorna*.

National Priority Species	
European otter *Lutra lutra*	Skylark *Alauda arvensis*
Great yellow bumblebee *Bombus distinguendus*	
Local Priority Species	
Pygmy shrew *Sorex minutus*	Orkney vole *Microtus arvalis orcadensis*
Wood mouse *Apodemus sylvaticus*	Short-eared owl *Asio flammeus*
Twite *Carduelis flavirostris*	Meadow pipit *Anthus pratensis*
Ringed plover *Charadrius hiaticula*	Oystercatcher *Haematopus ostralegus*
Wheatear *Oenanthe oenanthe*	Eider *Somateria mollissima*
Dark green fritillary *Argynnis aglaja scotica*	Archers dart moth *Agrotis vestigialis*
Heath carder bee *Bombus muscorum*	Common blue *Polyommatus icarus*
Ingrailed clay *Diarsia mendica orkneyensis*	Coast dart *Euxoa cursoria*
A sawfly *Nematus stichi*	A leaf beetle *Chrysolina crassicornis*
Marram *Ammophila arenaria*	Curved sedge *Carex maritima,*
Sea bindweed *Calystegia soldanella*	Common stork's-bill *Erodium cicutarium*
Baltic rush Juncus balticus	Oysterplant *Mertensia maritima*
Grass of Parnassus *Parnassia palustris*	Northern fen orchid *Dactylorhiza purpurella*
Scottish primrose *Primula scotica*	Yellow rattle *Rhinanthus minor*
Primrose *Primula vulgaris*	Limestone bedstraw *Galium sterneri*
Northern yellow-cress *Rorippa islandica*	Heart's-ease pansy *Viola tricolor ssp curtisii*
A moss *Distichium inclinatum*	A moss *Dreplanocladus lycopodioides*
A liverwort *Riccia cavernosa*	A moss *Brachythecium mildeanum*
A liverwort *Riccia cavernosa*	
An earth tongue *Geoglossum arenarium*	

5. CURRENT FACTORS AFFECTING THE HABITAT

Although, in general, sand dunes are among the least modified of terrestrial habitats, this does not fully apply to those in Orkney. As mentioned in the introduction to this section, old accounts and botanical lists seem to indicate an overall loss. In the UK as a whole, there are a number of major impacts on dunes, including recreation, sea defences, erosion, grazing, scrub invasion, forestry and military use: some of these apply in Orkney, but there is another more important local factor, sand extraction, and other minor ones.

The following are the most important factors:

- Sand extraction: several sites have been degraded by sand and shingle extraction, with major impacts at Evie; Burray Links; Melberry Links, South Walls; and Scrimpo, Rousay in the early 1970s, and similar activities have aggravated coastal erosion problems in Bay of Skaill. At Burray Links the habitat has been so extensively damaged that the previous SSSI was de-notifed. The possibly unique form of dark green fritillary butterfly *Argynnis aglaja scotica* that breeds there is now much reduced in numbers. Natural sources of building sand are rare in Orkney, and heavy extraction occurred during both World Wars, and during the 1970s for oil related developments. Shell sand is used for agricultural liming, and scarce, localised resources are often quite heavily used, with damaging effects, as at Bu, Stronsay, and East Side South Ronaldsay. Small-scale extraction of sand and shingle from beaches as traditionally practised has less impact, but can lead to blow-out and local degradation.

- Grazing: cattle (less often sheep) graze links areas and dunes. At moderate stocking levels in summer this is likely to have little impact on the dune vegetation, but the practice of out-wintering has a very marked effect: where the dune area enclosed includes the seaward edge, marram *Ammophila arenaria* can be grazed to the ground, and the dune de-stabilised, leading to blow-outs. Rabbits seem encouraged to move in and burrow once the coarse vegetation is removed by cattle, and this combines with the treading action of cattle to break up areas of vegetation cover. On more stable dunes where cattle shelter from the weather, the vegetation can be transformed by nutrient enrichment, hogweed *Heracleum sphondylium* often becoming abundant. Stock feeding sites often become weed-infested.
- Dumping: sand extraction sites and coastal blowouts have often been used for dumping, especially of vehicles and farm waste in the north isles (where bulk waste disposal is difficult and/or expensive). The effect on the habitat is mainly one of appearance, but attempts to prevent further erosion from blow-outs is usually unsuccessful: turbulent winds simply scour the sand in new ways.
- Recreation: localised damage is a possible concern. Newly accreted sand on the seaward side of dunes is colonised by pioneer plants. Excessive surface disturbance can halt the process, though other more important factors are usually involved in the accretion or erosion process. Recreational pressure on most dune systems is low, with the only area recorded with a serious impact being at Bay of Skaill, close to Skara Brae but recreational wheeled traffic has caused damage elsewhere.
- Fire: deliberate firing has occurred in the past, in the early spring, apparently by tradition, but seems less common nowadays. The effect on vegetation is not known, but clearly would be damaging to early nesting birds.
- Erosion: dunes systems are not static. The seaward edges are usually highly mobile. In the UK, most are subject to erosion and net sand loss, and the same is probably true of Orkney. While this is a natural process (though now exacerbated by sea level rise and other effects of climate change), it increases the potential effects of localised management. Erosion is likely to be related also to insufficient sand supply: in this case the removal of sand from beaches, as at Bu, Burray, would have an effect.

6. CURRENT ACTIONS AND OPPORTUNITIES

The UK HAP outlines current action and directs the statutory agencies in their objectives and targets, and gives a conservation direction to the local HAP. Reference should be made to the national HAP.

6.1 Management

- Central Sanday is the only SSSI that includes dunes (Northwall SSSI, Sanday, has machair vegetation but no dunes). A management statement exists. The European Natura designations of Sanday sites do not include the dune areas or dune interest.
- All sand extraction is subject to planning controls. Orkney Islands Council is developing a policy on mineral extraction, including sand. Small-scale extraction for farm use is usually permitted, but not from mobile or semi-fixed dune sites. Larger-scale extraction is subject to environmental conditions and requirements for re-instatement.
- SEERAD grants - CPS and RSS provide grants for conservation grazing management of 'species-rich grassland', which would include dunes if they were grazed as part of a links or machair area. By the terms of these schemes, the feeding of livestock on the habitat is not permitted, or in certain circumstances, severely restricted. The area of species-rich grassland managed under CPS in Orkney is 391 ha, but it is thought that little dune area is included in that figure. Figures for areas under RSS management (2000 alone) are not yet available.
- LFA support payments to farmers are conditional on observance of a code of good farming practice, including the protection of natural habitats and avoidance of overgrazing: however, these are weak in relation to management of grazing or other farm operations on dunes.

6.2 Research and Guidance

- SNH carried out National Vegetation Classification (NVC) vegetation surveys of all dunes and links in Orkney in 1996, and a geomorphological survey of Central Sanday SSSI in 1994.
- Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.
- Orkney Islands Council is developing a policy on mineral extraction, including sand.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

In the context of the national plan, targets and responsibilities will trickle down to the local level. The actions listed below are additional or complementary to those of the national plan, to which reference should be made.

- Maintain the current extent of coastal sand dunes in Orkney. **Target: no further losses from sensitive and key sites**
- Maintain the current quality of coastal sand dunes in Orkney. **Target: policies in place by 2005**
- Seek opportunities for restoration. **Target: 10 sites restored by 2010**

8. ACTION PLAN AGENCIES

8.1. National agencies: SNH; SEERAD; SEPA; JNCC

8.2. Local partners: FWAG; SAC; ICIT; OIC

9. PROPOSED ACTION WITH AGENCIES

Note: actions relating to the fixed dune grassland of machair and links plain are included in the relevant HAPs sections 17.2 and 17.3.

9.1. Site safeguard and management

- Develop policies and procedures to prevent further losses of sand dune habitats: in context, consider some control of 'own use' where damaging to any key sites or leading to erosion (OIC).
- Develop policies and procedures on reinstatement of extraction sites (OIC).
- Develop policies with local communities to clear or bury dumped material in dunes (OIC).

9.2 Advisory

- Develop and provide advisory service and materials on reinstatement of extraction sites; restoration of blow-outs (simple strategies such as correct grading of sides and re-seeding methods can be very effective); and replacement of ineffective anti-erosion barriers (OIC, SNH).
- Promote agri-environment scheme options aimed at conserving this habitat, particularly excluding wintering livestock from semi-fixed dunes (SAC, FWAG).
- Ensure adequate advice is available and provided to all landowners on best practice (FWAG, SAC, SEERAD).

9.3 Research and monitoring

- Monitor erosion and accretion at key sites (SNH, OIC).
- Research marine supply processes (ICIT).

9.4 Promotion and awareness raising

- Raise awareness of the processes and management requirements of this habitat (All).

REFERENCES AND OTHER INFORMATION SOURCES

Barne, J.H., Robson, C.F., Kaznowska, S.S., Doody, J.P., Davidson, N.C. & Buck, A.L. (eds.). (1997). *Coasts and Seas of the United Kingdom*. Coastal Directories Series, JNCC, Peterborough

Dargie, T.C.D. (1993). *Sand dune vegetation survey of Great Britain; a national inventory. Part 2: Scotland*. JNCC, Peterborough

Mather, A.S., Ritchie, W. & Smith, J.S. (1974). *Beaches of Orkney*. Dept. of Geography, Aberdenn

Northern Archaeological Services. (1996). *Re-instatements of Sand pits and Quarries in Coastal Dune and Machair Systems of the Minch Area. A Summary of the Report produced for the Minch Project.* Northern Ecological Services in association with Arch Henderson & Partners, Aberdeen

Ranwell, D.S. & Boar, R. (1986) *Coastal dune management guide*. HMSO, London

17.2 Machair — priority habitat

1. UK PRIORITY HABITAT DESCRIPTION

Machair is a distinctive type of coastal grassland found in the north and west of Scotland, and in western Ireland. It is associated with shell sand, blown inland by very strong prevailing winds from beaches and mobile dunes. The Gaelic word *Machair* is the only name for this major habitat type in Britain.

In its strict sense, 'machair' refers to a relatively flat and low-lying sand plain formed by dry and wet (seasonally water-logged) short turf grasslands above impermeable bedrock, a habitat termed 'machair grassland'. However, it can also cover the beach zone, mobile and semi-fixed foredunes, dune slacks, fens, swamps, lochs (some of them brackish), saltmarsh and sand blanketing adjacent hillslopes, together forming the 'machair system'.

It is estimated that 'machair grassland' is restricted to about 25,000 hectares in world-wide extent, with 17,500 ha in Scotland and the remainder in western Ireland, so that the world distribution is very restricted. The largest extents in Scotland are in the Western Isles (10,000 ha)

The large breeding wader populations of the Uists, Tiree and Coll are associated with machair and are claimed as the most important in the north-west palaearctic.

2. CURRENT LOCAL STATUS AND EXTENT

The national habitat action plan refers only to the machair in the west of Scotland. There is debate about whether any Orkney links can be considered to be machair. As well as being a recognisable landform, machair is a 'cultural landscape' where much of the biodiversity is associated with a particular traditional management system, including cultivation for crops. The only 'machair systems' with all the major features are in Sanday, and there the traditional management is no longer practised, though something similar may have been in the past. (Traditional management practices will be included in the national HAP for machair.)

For the purposes of this plan, the extensive links in central, north and east Sanday are considered to be machair. Others links sites are included in the *Links* Locally Important Habitat type.

As Orkney lacks true limestone, machair is the main habitat for calcicole plants and their associated wildlife. Some of the Sanday machair is rich in plant species, though much of it is poorer. Dunes or machair plain are a sufficient barrier to drainage in places to form small areas of standing water termed machair lochs. The wetlands and shallow lochs of Sanday are rich habitats for wetland and aquatic plants and breeding waders.

The habitat is at present little affected by change from human impacts, though the management is often less than ideal for the biodiversity.

The Central Sanday and Northwall SSSIs area is 823 ha, including open water principally at North Loch. There is additional area of habitat in Sanday that could be defined as machair, giving an approximate total of 1400 ha. Other survey estimates are not useful: the JNCC (1997) total for dune and dune grassland in Orkney of 2150 ha excludes wetland, swamp, and, presumably, much enclosed farmland, while Land Cover of Scotland 1988 (1993) estimated only 370 ha of "links area: grass".

3. LOCAL DISTRIBUTION

There are three areas in Sanday: the Plain of Fidge and the extensive plain west of Cata Sand; Northwall/Westayre at the north-east extremity of the island; and Whitemill/Northskaill in the north-west. In addition, the Backaskaill links might also be considered to be machair. Central Sanday and Northwall SSSIs encompass much of the area. Outwith the SSSIs are substantial areas in Northwall, at the north side of the Plain of Fidge, Whitemill/Northskaill and Backaskaill. There are several other places in Sanday with links grassland and climbing dunes that are not being considered as machair.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Species associated with this type of habitat include those already listed in *Coastal Sand Dunes* HAP. Machair includes more habitat types than dunes, though, including shallow lochs, wetlands and extensive plains of short, herb-rich grassland. This description will focus on the grassland plains, with some reference to the wetlands and open water. Reference should be made to the HAPs for these habitat types.

On these plains the commonest plants are generally creeping red fescue *Festuca rubra*, sand sedge *Carex arenaria*, white clover *Trifolium repens*, meadow buttercup *Ranunculus acris*, eyebrights *Euphrasia* species, ragwort *Senecio* species, ribwort plantain *Plantago lanceolata* and daisy *Bellis perennis*. Other common constituents are bird's-foot trefoil *Lotus corniculatus*, felwort *Gentianella amarella*, wild thyme *Thymus praecox*, lady's bedstraw *Galium verum*, meadow woodrush *Luzula campestris*, milfoil *Achillea millefolium*, purging flax *Linum catharticum* and heart's-ease pansy *Viola tricolor ssp curtisii*. A notable feature of this machair is the abundance of limestone bedstraw *Galium sterneri*. Damper conditions are indicated by more sedges, most commonly glaucous sedge *Carex flacca*, orchids including northern fen orchid *Dactylorhiza purpurella* and early marsh orchid *D incarnata*, and often abundant grass of Parnassus *Parnassia palustris*. The scarce curved sedge *Carex maritima* sometimes occurs here also.

Dune slacks and marshes are extremely rich. The plant communities resemble those of calcareous or base-rich fen. The wetland continuum from damp dune slack to seasonally flooded, sedge-rich fen to quaking mire and stony loch margin is influenced throughout by minute local variations in wetness, base-richness and even saline influence. It is too varied to describe in a single HAP. Among plants not yet mentioned, the abundance of knotted pearlwort *Sagina nodosa* and occurrence of several stonewort *Characeae* species are noteworthy. Most notable species are included in the local priority species list below. These sites are extraordinary for their numbers of breeding waders. For instance, at Whitemill at the last count (RSPB 1994) there were 36 pairs of lapwing *Vanellus vanellus*, 17 pairs of snipe *Gallinago gallinago*, 12 pairs of redshank *Tringa totanus* and 4 pairs of dunlin *Calidris alpina*.

These machair systems support good populations of otters *Lutra lutra*.

One, or perhaps two "new to Britain" species of *Euphrasia* found on Orkney machair await formal publication.

The shallow lochs and their margins are sites for breeding birds. They are rich in aquatic plants, including uncommon stoneworts.

National Priority Species	
European otter *Lutra lutra lutra*	Skylark *Alauda arvensis*
Reed bunting *Emberiza scoeniclus*	Great yellow bumblebee *Bombus distinguendus*
Local Priority Species	
Pygmy shrew *Sorex minutus*	Orkney vole *Microtus arvalis orcadensis*
Wood mouse *Apodemus sylvaticus*	Short-eared owl *Asio flammeus*
Pintail *Anas acuta*	Shoveler *Anas clypeata*
Teal *Anas crecca*	Wigeon *Anas penelope*
Mallard *Anas platyrhynchos*	Meadow pipit *Anthus pratensis*
Dunlin *Calidris alpina*	Twite *Carduelis flavirostris*
Mute swan *Cygnus olor*	Snipe *Gallinago gallinago*
Ringed plover *Charadrius hiaticula*	Oystercatcher *Haematopus ostralegus*
Common gull *Larus canus*	Lesser black-backed gull *Larus fuscus*
Bar-tailed godwit *Limosa lapponica*	Black-tailed godwit *Limosa limosa*
Red-breasted merganser *Mergus serrator*	Pied wagtail *Motacilla alba*
Wheatear *Oenanthe oenanthe*	Eider *Somateria mollissima*
Arctic tern *Sterna paradisaea*	Common tern *Sterna hirundo*
Shelduck *Tadorna tadorna*	Redshank *Tringa totanus*
Water rail *Rallus aquaticus*	Lapwing *Vanellus vanellus*
Heath carder bee *Bombus muscorum*	Archers dart moth *Agrotis vestigialis*
Common blue *Polyommatus icarus*	Ingrailed clay *Diarsia mendica orkneyensis*
A sawfly *Nematus stichi*	A leaf beetle *Chrysolina crassicornis*
A weevil *Apion ryei*	Curved sedge *Carex maritima*,
Marram *Ammophila arenaria*	Common stork's-bill *Erodium cicutarium*
Baltic rush *Juncus balticus*	Oysterplant *Mertensia maritima*
Grass of Parnassus *Parnassia palustris*	Northern fen orchid *Dactylorhiza purpurella*
Scottish primrose *Primula scotica*	Yellow rattle *Rhinanthus minor*
Primrose *Primula vulgaris*	Limestone bedstraw *Galium sterneri*
Northern yellow-cress *Rorippa islandica*	Heart's-ease pansy *Viola tricolor ssp curtisii*
Glaucous bulrush *Schoenoplectus tabernaemontani*	Ragged robin *Lychnis flos-cuculi*
A moss *Distichium inclinatum*	A moss *Dreplanocladus lycopodioides*
A liverwort *Riccia cavernosa*	A moss *Brachythecium mildeanum*
Clustered stonewort *Tolypella glomerata*	Rugged stonewort *Chara rudis*

For the rest of this plan, there are few factors and actions to be considered that are different from those in the *Coastal sand dunes HAP*, to which reference should be made. Little reference was made there however to stabilised dune grassland, which receives attention here. Machair also contains naturally eutrophic lochs and diverse wetlands: reference should be made to the HAPs for those habitats.

5. CURRENT FACTORS AFFECTING THE HABITAT

Factors affecting dune grassland:

- Grazing: out-wintering of cattle and its effects on semi-fixed dune have already been noted. For the species-rich, nutrient-poor grasslands, the effects of out-wintering cattle can be destructive. Nutrient enrichment and trampling alter the plant communities in favour of weedy species. Weed and grass seeds are also brought in with hay and silage. Heavy grazing by sheep, which is uncommon but does occur at at least one site, may impoverish the plant communities, but the effects are not clear. Some grazing regime (in addition to rabbits) is probably necessary to maintain the plant communities of machair sites, and at the winter grazing fulfills the function. How these requirements are to be reconciled is not clear.
- Reclamation: considerable areas outwith SSSIs have been ploughed for crops of barley and re-seeding with agricultural grasses. Reversion to 'wild' grass is usually swift, but native plant communities are lost.
- Fertiliser and slurry: some areas are treated in this way. Slurry is sometimes applied to dry land in winter simply because farm storage capacity is too small. Native plant communities are destroyed or severely modified thereby. There is a particular risk for species-rich swards, the richest of which are uncommon.
- Traditional cropping: it is thought that a traditional rotational cultivation, grazing and fallowing system was practised on some of the machair, as the Western Isles. The practice has died out, though there are occasional instances of cultivation. Whether cropping was truly an established practice or whether it was occasional is not known. Its end will have contributed to a loss of biodiversity on the machair.
- Drainage: there have been some attempts at drainage, or deepening of existing drains, with effects for wet machair vegetation and loch margins, potentially opening it to increased grazing or even reclamation. However, drainage is difficult on these flat plains that are scarcely above sea level, and reversion to the previous state generally occurs within a few years. The process has been repeated many times previously.
- Military use: many sites were used in the World Wars, for defences and camps. Foundations, a few derelict buildings and hard standings remain. It seems that that the effects have been short term: native plant communities are re-established.

6. CURRENT ACTIONS AND OPPORTUNITIES

The UK HAP outlines current action and directs the statutory agencies in their objectives and targets, and gives a conservation direction to the local HAP. Reference should be made to the national HAP.

Reference should also be made to the *Coastal sand dunes* HAP. Actions considered here relate only to additional factors noted in section 5.

6.1 Management

- Central Sanday and Northwall are SSSIs that include machair. Site management statements have been drawn up.
- The European Natura citations for Sanday sites do not include the machair interest.
- More significant wet sites are listed in the RSPB Wetland and Marginal Moorland Sites register of machair.

6.2 Research and Guidance

There is nothing to add to actions outlined for the *Coastal sand dunes* HAP.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

In the context of the national plan, targets and responsibilities will trickle down to the local level. However, some of the objectives of the national plan are specifically related to the Western Isles, where decline of traditional cropping and lack of cattle are seen as principal threats to the habitat. For differing reasons, neither is seen as a primary factor in Orkney. Therefore, the objectives and proposed actions for machair in Orkney are these:

- Enhance the current quality of machair in Orkney. **Target: All Sanday farms entering agri-environment schemes to undertake conservation grazing management of machair**
- Research the potential for habitat management and enhancement for restoration. **Target: research project and pilot undertaken by 2005**

8. ACTION PLAN AGENCIES

8.1. National agencies: SNH; SEERAD; OIC; SEPA; JNCC

8.2. Local partners: Sanday Community Council; FWAG; SAC

9. PROPOSED ACTION WITH AGENCIES

9.1. Site safeguard and management, advisory

- Seek to ensure that species-rich areas of machair are afforded protection when drawing up RSS scheme applications (FWAG, SAC).
- Ensure that farm waste management plans identify machair sites as unsuitable for slurry disposal, excepting any sites already in frequent use and lacking species of interest. (SAC, SEERAD).

9.2 Research and monitoring

- There is a need to understand the cultural history of the Sanday machair, and develop conservation management policies and advice on best practice. To these ends a research project and ensuing pilot management and monitoring project should be set up by 2005 (SNH, RSPB).
- As a short-term priority, identify the most species-rich machair areas outside SSSIs (already surveyed), to inform conservation priorities by 2005.

9.3 Promotion and awareness raising

- Involvement of the Sanday community and school in any project should be sought. Links with existing proposals for a Sanday heritage centre should be investigated (OIC, SNH, RSPB).

REFERENCES AND OTHER INFORMATION SOURCES

As for *Coastal sand dunes*

17.3 Links — locally important habitat

1. LOCAL HABITAT DESCRIPTION

This local habitat refers to all those short turf grasslands on coastal sand accretions that are not covered by the *Machair* HAP. Mobile and semi-fixed dune is described in the *Coastal sand dunes* HAP.
These are smaller sites without the range of features encompassed by the machair system. In particular they lack the quality and diversity of wetland habitats associated with Sanday machair.

2. CURRENT LOCAL STATUS AND EXTENT

Links are an important habitat for many species, the best sites approaching the quality of those in Sanday. However, the conservation status of many links sites is poor: they have been mined for sand or, because they are dry in winter, used for variety of damaging agricultural, military and industrial purposes.

It is difficult to arrive at a figure for the area of links (see section 2 in the HAP for *Machair*). The total area of the main sites extends to several hundred hectares.

3. LOCAL DISTRIBUTION

Almost every island and parish in Orkney has its stretches of links, however small or modified by human use some of these may be. There are larger sites in Westray (Grobust/Rackwick and Mae Sand), North Ronaldsay; Papa Westray; Deerness; Burray; Evie; Sandwick; Birsay and in Sanday outside the machair areas. Landward areas of links, enclosed and cultivated in historical times occur extensively in Westray, Sanday and Sandwick.
Key sites are the Moclett Links, Papa Westray, the only links or machair site in Orkney for Scottish primrose *Primula scotica*, and Bu and Norton Links, Burray, which though mainly a degraded dune site, still retains an outstanding diversity of plants and invertebrates.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Species associated with this type of habitat include those already listed in *Machair* HAP, although the list should only include species of fixed dune and dry and damp sandy plain habitats, not the whole range of machair features. However there are many areas of degraded, species-poor links.

Three notable and local priority species are recorded from links but not on the Sanday machair, Scottish primrose *Primula scotica* in Papa Westray; cowslip *Primula veris* in Evie; and sea bindweed *Calystegia soldanella* which appears to have migrated from an original strandline colony onto fixed dune grassland at Newark Bay, South Ronaldsay .

Subsequent sections of this HAP follow from the factors, objectives and actions outlined for the *Coastal sand dunes* and *Machair* HAP

5. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Where possible, enhance the current quality of links in Orkney.

6. ACTION PLAN AGENCIES

Local partners: SNH; SEERAD; OIC; SEPA; FWAG; SAC

17.4 Aeolianite — locally important habitat

1. LOCAL HABITAT DESCRIPTION

Aeolianite is blown sand cemented by calcium carbonate derived from dissolved shell and from sub-surface water. It is quite unusual in northern climates, being found mainly along the Mediterranean coast and in the Middle East. In Britain they are rare and confined to a dozen localities scattered around the northern and western coasts of Scotland.

2. CURRENT LOCAL STATUS AND EXTENT

Nowhere else in Britain are the outcrops as thick or as extensive as they are at Aikerness, making it one of the most important landforms in Orkney.

3. LOCAL DISTRIBUTION

In addition to the outstanding example at Aikerness other examples of aeolianite occur in Stromness, South Ronaldsay and elsewhere.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Aeolianite outcrops support typical machair or links vegetation (see 17.2 and 17.3 for *Machair* and *Links* HAPs). Aeolianite supports a sparse but highly characteristic vascular plant and moss flora. Plant communities include eyebright *Euphrasia* spp, thyme *Thymus praecox*, orchids and, notably, the usually southern stiff sand grass, *Catapodium marinum.*

Additional national Priority Species

None known

Additional local Priority Species

Stiff sand grass *Catapodium marinum*

Factors, objectives and actions for Aeolianite are closely linked to those outlined for the *Coastal sand dunes* and *Machair* HAPs, to which reference should be made. Only additional items are listed below.

5. CURRENT FACTORS AFFECTING THE HABITAT

Aeolianite is confined to a few small sites some of which may be at risk from destruction by sand extraction or other operations that disturb the site. From a management point of view, an aeolianite site is similar to an ancient monument, where a list of damaging operations and factors includes:

- Vehicle traffic;
- Feeding of stock, especially placement of ring feeders;
- Fencing through or close to the site (which can cause heavy trampling by livestock);
- Ploughing, mole-ploughing or other ground disturbance;
- Planting of trees or other deep-rooting plants.

6. CURRENT ACTIONS AND OPPORTUNITIES

- The key site at Aikerness belongs to OIC and is protected and managed as a conservation site.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Ensure the retention and conserve the quality of all aeolianite sites.

8. ACTION PLAN AGENCIES

Local partners: SNH; SEERAD; OIC; SEPA; FWAG; SAC

9. PROPOSED ACTION WITH AGENCIES

9.1. Site safeguard and management, advisory

- Ensure that no sites are damaged by sand extraction (OIC).

9.2 Research and monitoring

- Identify all Aeolianite sites by 2005 (SNH).

9.3 Promotion and awareness raising

- None additional

REFERENCES AND OTHER INFORMATION SOURCES

As for *Coastal sand dunes*

17.5 Coastal vegetated shingle — priority habitat

1. UK PRIORITY HABITAT DESCRIPTION

Shingle is defined as sediment with particle sizes in the range 2-200mm. It is a globally restricted sediment type with few occurrences outside northwest Europe, Japan and New Zealand. Shingle beaches are widely distributed round the coast of the UK, where they develop in high-energy environments. Shingle structures take the form either of spits, barriers or barrier islands formed by longshore drift, or of cuspate forelands where a series of parallel ridges pile up against the coastline.

Most of the length of shingle coastline of the UK consists of simple fringing beaches within the reach of storm waves, where the shingle remains mobile and vegetation is restricted to temporary and mobile strandline communities. This plan addresses only structures sufficiently stable to support perennial vegetation. Such structures are rare even in the UK, and have been subject to considerable exploitation and damage.

Shingle habitats are listed in the Annex 1 of the EC Habitats Directive and include perennial vegetation of stony banks, and annual vegetation of drift lines.

2. CURRENT LOCAL STATUS AND EXTENT

Orkney has no major shingle structures, but there are considerable lengths of shingle shoreline including spits and barrier beaches (ayres), as well as about 22.5 km of fringing bay head beaches. Some of the shingle ayres are sand-covered. Many of the ayres have developed perennial vegetation, and comprise much of the priority habitat in Orkney. In some exposed situations, substantial shingle banks have been thrown up by concurrences of great storms and high tides: they are seldom wave-washed and have developed perennial vegetation.
At some sites, boulders well in excess of 200 mm in diameter have been piled up: because of the size of the boulders these banks cannot be included in this priority habitat type (see section 17.6 *Storm beach*). Most simple fringing beaches do not develop perennial vegetation and these cannot be considered as part of the priority habitat.

All the shingle features in Orkney are derived from the underlying sandstone and associated volcanics. Virtually all of the shingle resource has been derived from erosion of glacial deposits such as till. Current coastal erosion processes produce a negligible amount of shingle.

The Orkney shingle resource is finite. This is not obvious because shingle is continuously being redistributed by natural processes. Most of the shingle sites are in good condition, but some damage and loss have occurred from extraction. Several ayres have roads on them.

3. LOCAL DISTRIBUTION

Shingle barriers forming ayre lochs, or occasionally just wetlands, occur almost entirely on the eastern side of Orkney and in the north isles. Some notable examples are Roos Loch, Sanday; Straenia water, Stronsay; Loch of the Graand, Egilsay; Loch of Carness and Work, St Ola; Ayre of Hestecruive, Tankerness; and Loch of Liddle, South Ronaldsay.

Shingle spits are much less common. There is one at Mikady, Deerness, and several within the Central Sanday SSSI.

Vegetated shingle banks on exposed shores are scarce but widely distributed, occurring on low rocky shores with a high, but not extreme degree of exposure. They are mainly in the north isles, for example at Holms of Ire, Sanday; and the holms of Copinsay.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Typical plants of fairly stable shingle include sea campion *Silene maritima*, corn sowthistle *Sonchus arvensis*, cleavers *Galium aparine*, Scots lovage *Ligusticum scoticum*, curled dock *Rumex crispus*, stinging nettle *Urtica dioica* and occasionally the nationally rare oysterplant *Mertensia maritima*. Orkney holds about 50% of the UK population at about 21 separate locations, thus making the islands a very important area for this plant. Scots lovage *Ligusticum scoticum* is restricted in Britain to Scottish and north Irish cliffs and shingle. It was long believed that the coastal cushion form of the herb robert, *Geranium robertianum* spp *maritimum* only occurs on a shingle ridge in St. Ola but even if this is not correct, the species, which is otherwise a weed of cultivation, is certainly native here. Cleavers *Galium aparine* in Orkney is significant for the large size of its seeds, which enable it to establish more easily within the large interstices between the pebbles. Skullcap *Scutellaria galericulata*, is a local rarity known at only 3 sites in Orkney. It is found solely on beaches on the Holm of Scockness; Loch of the Graand, Egilsay; and the Holms of Ire, Sanday; though it is common elsewhere in the UK and Europe.

Where greater stability is established, barrier beaches, spits and bars may have in addition, red fescue *Festuca rubra*, false oat grass *Arrhenatherum elatius*, the hybrid couch, *Elytrigia x laxa*, field forget-me-not *Myosotis arvensis*, pink campion *Silene dioica* and thrift *Armeria maritime.* This stable shingle normally supports a rich development of crustose and foliose lichens, especially *Cladonia* spp. Backshore shingle vegetation, further from the maritime influence, is dominated by false-oat grass, couch-grass *Elytrigia repens*, its hybrid, (which is often dominant), hogweed *Heracleum sphondylium*, curled dock *Rumex crispus*, meadow vetchling *Lathyrus pratensis*, silver weed *Galium aparine* and clovers.

Organic enrichment of the shingle habitat occurs where seals haul out, or large quantities of birds nest or roost. This results in a community of sea mayweed, curled dock *Rumex crispus*, chickweed *Stellaria media*, common mouse-ear *Cerastium fontanum*, procumbent pearlwort *Sagina procumbens*, white clover *Trifolium repens*, sea plantain *Plantago maritima* and annual meadow-grass *Poa annua*. Some of the higher shingle ridges, particularly on the smaller islands (e.g. Corn Holm) have become nesting sites for fulmars. Arctic terns *Sterna paridisaea* may breed on shingle, with a large colony on Swona partly on this type of habitat. Sometimes colonies have common terns *Sterna hirundo* among them. Ringed plovers *Charadrius hiaticula* are widespread on shingle sites.

National Priority Species	
None known	
Local Priority Species	
Ringed plover *Charadrius hiaticula*	Oystercatcher *Haematopus ostralegus*
Wheatear *Oenanthe oenanthe*	Common tern *Sterna hirundo*
Arctic tern *Sterna paradisaea*	Oysterplant *Mertensia maritima*
A dolichopodid fly *Aphrosylus raptor*	A fly *Rhamphomyia morio*
Skullcap *Scutellaria galericulata*	

5. CURRENT FACTORS AFFECTING THE HABITAT

Shingle structures are subject to natural mobility, storm events in particular. There are human impacts too. There are few designated sites for the habitat (none for ayre barriers):

- Extraction operations: small-scale operations to remove shingle for local farm road and construction use is not uncommon, especially in the north isles. In most cases damage is negligible, but an instance of breaching of the ayre barrier has occurred at Scockness, Rousay.
- Grazing: rabbits graze many of the sandy shingle areas, and grazing by sheep and cattle influences the shingle communities on all the inhabited islands.
- Vehicle traffic: this is usually on defined tracks where little damage is caused.
- Recreation: breeding birds may be subject to undue disturbance.
- Oil spills, coast defence and road building: these are other potential threats

6. CURRENT ACTIONS AND OPPORTUNITIES

The UK HAP outlines current action and directs the statutory agencies in their objectives and targets, and gives a conservation direction to the local HAP. Reference should be made to the national HAP.

6.1 Management

- East Sanday Coast and Central Sanday are SSSIs that include vegetated shingle. Almost all the coastal edge of the eastern half of Sanday is included in the East Sanday Coast SPA and Sanday cSAC. Site management statements have been drawn up.
- Commercial shingle extraction (but not small-scale farm use) is subject to planning controls. Orkney Islands Council is developing a strategy on mineral extraction, including shingle.
- SEERAD grants - CPS and RSS provide grants for conservation management of varied habitats which can, rarely, include shingle banks. At least two such sites are thought to be managed by reduced, timed grazing and restriction of other potentially damaging activities.

- LFA support payments to farmers are conditional on observance of a code of good farming practice, including the protection of natural habitats and avoidance of overgrazing: however, these are weak in relation to management of grazing or other farm operations on dunes.
- Oil spill contingency plans are in place.

6.2 Research and Guidance

- Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

In the context of the national plan, targets and responsibilities will trickle down to the local level. The actions listed below are additional or complementary to those of the national plan, to which reference should be made.

- Prevent any loss of important shingle structures in Orkney (other than natural losses). **Target: policies in place by 2005**
- Maintain the current quality of plant communities of shingle sites in Orkney.

8. ACTION PLAN AGENCIES

8.1. National agencies: SNH; SEERAD; SEPA; JNCC

8.2. Local partners: OIC; FWAG; SAC; ICIT

9. PROPOSED ACTION WITH AGENCIES

9.1. Site safeguard and management

- Develop policies and procedures to prevent damage to shingle structures: in context, consider some control of 'own use' where damaging to any key sites (OIC).

9.2 Advisory

- Promote agri-environment scheme options wherever these can benefit the plant communities of shingle banks (SAC, FWAG).
- Ensure adequate advice is available and provided to all landowners on best practice (FWAG, SAC, SEERAD).

9.3 Research and monitoring

- Research loss and supply processes and marine resource in Orkney (ICIT).

9.4 Promotion and awareness raising

- Raise awareness of the processes and management requirements of this habitat (All).

REFERENCES AND OTHER INFORMATION SOURCES

Barne, J.H., Robson, C.F., Kaznowska, S.S., Doody, J.P., Davidson, N.C. & Buck, A.L. (eds.). (1997). *Coasts and Seas of the United Kingdom*. Coastal Directories Series, JNCC, Peterborough

Bullard, E.R. & Goode, D.A. (1975). *The Vegetation of Orkney*. In *The Natural Environment of Orkney*. Goodier, R. (ed.). NCC, Edinburgh.

Mather, A.S., Ritchie, W. & Smith, J.S. (1974). *Beaches of Orkney*. Dept. of Geography, Aberdenn

17.6 Coastal strandline — locally important habitat

1. LOCAL HABITAT DESCRIPTION

Strandline vegetation is mainly annual vegetation that colonises accumulations of drift material rich in nitrogenous organic matter at or near the high water mark. Strandlines are open in nature and support few species.

Orkney strandline plant communities are often dominated by orache *Atriplex* species. Sea rocket *Cakile maritima* is locally dominant. The accumulations of rotting organic matter support various invertebrates, including some unusual species. Many species of shorebirds feed on strandline invertebrates and other detritus.

2. CURRENT LOCAL STATUS AND EXTENT

Orkney strandlines in some places support nationally important concentrations of wintering waders.

There is no estimate of the amount of strandline within the UK. Apart from steep slopes and cliffs strandlines occur on nearly all supralittoral habitats including sand and shingle beaches, saltmarshes and in locally sheltered areas on rocky coasts.

3. LOCAL DISTRIBUTION

All sloping beaches can potentially develop strandline vegetation, but the most extensive well-vegetated beaches appear to be in the north isles, where the long, broad beaches of sand and fine shingle with plentiful deposits of rotting seaweed sometimes support extensive stands of annual plants.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Species include sea mayweed *Triplospermum maritimum*, orache *Atriplex* species, sea rocket *Cakile maritime* and sea sandwort *Honkenya peploides*. Frosted orache *Atriptex lasciniata* is a scarce species in Orkney. Just above the strandline, the nationally scarce oysterplant *Mertensia maritima* sometimes occurs. On more sheltered beaches, other perennial or biennial plants may grow down to the strandline, including sea mayweed *Tripleurospermum maritimum*, silverweed *Galium aparine*, curled dock *Rumex crispus*, and at one site only, sea bindweed *Calystegia soldanella.* Very large numbers of adult kelp flies *Coelpa* species and their larvae frequent strandlines with rotting seaweed, and many species of predatory flies, including some unusual species, are associated with these and the midges of rock pools. Large numbers of turnstone *Arenaria interpres* and purple sandpiper C*alidris maritima* can be found on some beaches, particularly in the north isles. Rock pipit *Anthus petrosus* are common. Twite *Carduelis flavirostris* search the strandline for drift seeds in winter. Other birds not usually associated with the shore move to the strandline in frosty weather.

National Priority Species	
None known	
Local Priority Species	
Ringed plover *Charadrius hiaticula*	Dunlin *Calidris alpina*
Bar-tailed godwit *Limosa lapponica*	Sanderling *Calidris alba*
Curlew *Numenius arquata*	Redshank *Tringa totanus*
Twite *Carduelis flavirostris*	A fly *Rhamphomyia morio*
A dolichopodid fly *Aphrosylus raptor*	Sea bindweed *Calystegia soldanella*
Oysterplant *Mertensia maritima*	

5. CURRENT FACTORS AFFECTING THE HABITAT

This important local habitat is common and not affected in Orkney by the most important adverse factors in more populated regions of the UK – human disturbance, regular cleaning of popular beaches and sea defence works. However, there are these:

- The potential for oil spills
- Litter, almost all washed up from the sea. Large quantities accumulate at certain beaches. Litter is more unsightly than actually harmful to biodiversity, but some polluting materials can be washed up, including spent oil and chemicals in drums, and nets and twine that they may trap animals and birds.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1 Management

- East Sanday Coast, Central Sanday, Copinsay, Faray & Holm of Faray, Auskerry and Waulkmill are SSSIs that include strandline. Almost all the coastal edge of the eastern half of Sanday is included in the East Sanday Coast SPA and Sanday cSAC. Site management statements have been drawn up.
- Nearly all beaches where debris accumulates are cleaned of debris once every year by teams from local voluntary groups. The effort, called 'Bag the Bruck' is organised by Environmental Concern Orkney (ECO) and supported by OIC.
- Some local shipping operators, including Pentland Ferries and Orkney Ferries, have waste management policies to back up statutory regulations on disposal of waste at sea
- Oil spill contingency plans are in place.

6.2 Research and Guidance

None known

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

- Maintain the high quality of the habitat in Orkney.

8. ACTION PLAN AGENCIES

Local partners: OIC; SEPA; ECO; Orkney Fishermen's Association; Orkney Fish Farmers' Association

9. PROPOSED ACTION WITH AGENCIES

9.1. Site safeguard and management

- Continue with 'Bag the Bruck' (ECO, OIC).

9.2 Promotion and awareness raising

- Actively promote adherence to regulations on disposal of waste at sea (OIC, SEPA, Orkney Fishermen's Association, Orkney Fish Farmers' Association).

REFERENCES AND OTHER INFORMATION SOURCES

JNCC. (1997). *Coasts and Seas of the United Kingdom*. Coastal Directories Series, JNCC, Peterborough

17.7 Storm Beach — local habitat

1. LOCAL HABITAT DESCRIPTION

This habitat type includes beaches comprising large rocks and boulders. They are a common feature of the Orkney coastline, resulting partly from the islands' sandstone geology, partly from the severe exposure to the sea in winter. Those fringing beaches exposed to very high-energy situations have large class sizes of shingle merging to boulders. In some cases the presence of large boulders above high tide level is partly the result of readjustment of land level in relation to sea level.
The stability of these beaches is variable in relation to the degree of exposure. Vegetation cover varies in relation to stability, size of boulders and presence of mixed finer material.

This habitat is not included in the Priority Habitats *Maritime cliff and slope* or *Coastal vegetated shingle*.

2. CURRENT LOCAL STATUS AND EXTENT

This beach type is of most interest for its breeding seabirds. Some unusual sites have become well vegetated. There are no available figures for its extent.

3. LOCAL DISTRIBUTION

Storm beaches with large boulders (in excess of the 200 mm size which defines shingle) occur at Melberry, South Walls; the Bay of Skaill, Sandwick; Rackwick Bay, Hoy; Kilns of Brin-noven, Rousay and Aikerness, Westray. Some beaches in North Ronaldsay, Sanday and Auskerry may also be termed storm beaches. There is a fine example at the Bay of Brough, Sanday. Boulder deposits partly resulting from sea level change are less common: an example is at Sandwick Bay, South Ronaldsay.
Sule Skerry SSSI and SPA is a key site for this habitat.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

In Orkney these habitats host a variety of plants depending largely on the stability of the environment. On unstable storm beaches there is usually very little vegetation at all. More stable environments with mixed finer material can support plant communities as described in the HAP for *Coastal vegetated shingle* (see section 17.5). A site at Kirk Ness, South Ronaldsay has oysterplant *Mertensia maritia*, sea campion *Silene uniflora* and sea spurrey *Spergularia media* growing amongst large boulders.

This is an important nesting habitat for some seabirds, including some local priority species. Black guillemots *Cepphus grylle* and storm petrels *Hydrobates pelagicus* use the holes and tunnels beneath the rocks in which to nest. On Sule Skerry cliff-nesting seabirds such as razorbills *Alca torda* and puffins *Fratercula arctica* utilize flatter rock-strewn terrain for nesting. Also on Sule Skerry may nest that most enigmatic of seabirds, Leach's petrel *Oceanodroma leucorrhoa*. Other bird species of conservation concern utilising such boulder and rock habitat for breeding are eider *Somateria mollissima*, oystercatcher *Haematopus ostralegus*, ringed plover *Charadrius hiaticula*, rock pipit *Anthus petrosus* and wheatear *Oenanthe oenanthe*.

National Priority Species	
Local Priority Species	
Black guillemots *Cepphus grylle*	Storm petrel *Hydrobates pelagicus*
Razorbills *Alca torda*	Puffin *Fratercula arctica*
Leach's petrel *Oceanodroma leucorrhoa*	Wheatear *Oenanthe oenanthe*
Eider *Somateria mollissima*	Rock pipit *Anthus petrosus*
Fulmar *Fulmarus glacialis*	A dolichopodid fly *Aphrosylus raptor*
Wheatear *Oenanthe oenanthe*	A fly *Rhamphomyia morio*
Oysterplant *Mertensia maritima*	

18. LITTORAL SEDIMENT — BROAD HABITAT TYPE

GENERAL UK DESCRIPTION

The broad habitat type of littoral sediment describes all littoral biotopes not included in "littoral rock". By far the greatest proportion of such sediments can be found in estuaries and inlets where it can cover extensive areas. It includes mudflats, sandflats and sandbanks, and beaches. Four UK priority habitats are identified by UKBAP: *Coastal saltmarsh*, *Mudflats*, *Seagrass beds (Zostera noltei)* and *Sheltered muddy gravels*. The UK habitat action plan for mudflats notes the UK has roughly 15% of the north-west European estuarine habitat and estimates about 270,000 ha of intertidal flats in the UK. Most of this occurs in large estuaries.

UK PRIORITY HABITATS PRESENT:	LOCALLY IMPORTANT HABITATS:
Coastal saltmarsh	**To be reviewed**
Mudflats	
Sheltered muddy gravels	

(Although there has been a claimed record of *Zostera noltii* in Orkney its authenticity is in serious doubt and work undertaken by Emma Jackson of Heriot-Watt University on Orkney seagrasses suggested that this species is not present here.)

LOCAL STATUS

Orkney possesses several areas of comparatively extensive intertidal flat, often closely associated with adjacent areas of coastal saltmarsh. The area of these is very small in comparison with the UK total.

18.1 Coastal saltmarsh — priority habitat

1. UK PRIORITY HABITAT DESCRIPTION

Coastal saltmarshes comprise the upper, vegetated portions of the intertidal zone. For the purposes of this plan, however, the upper limit of saltmarsh is defined as one metre above Mean High Water Springs. Saltmarsh vegetation develops in sheltered waters, such as estuaries, where fine sediment can accumulate. A natural saltmarsh system shows a zonation of vegetation according to the frequency of tidal inundation: few species are adapted to frequent inundation, so the lower levels are species-poor, while the opposite is the case for the upper-mid marsh. At the upper tidal limits, true saltmarsh communities are replaced by transitional communities, which can only withstand occasional inundation.
Saltmarshes are an important resource for wading birds and wildfowl.
Transitional areas between saltmarsh and freshwater are particularly important for invertebrates.

There are approximately 45,000 ha of saltmarsh in Britain, of which 6747 ha are in Scotland. It is estimated that only 3% of the Scottish coastline consists of saltmarsh vegetation.

2. CURRENT LOCAL STATUS AND EXTENT

While the geography of Orkney does not provide for the development of large areas of saltmarsh there are many fragments, some of them showing the full range of vegetation zonation, with rich upper and transitional zones. Transitions are quite scarce in England but still comparatively common in Scotland.

British saltmarshes are grouped into 3 types and all the salt marshes in Orkney belong to Type C. Type C saltmarshes are characterised by a limited number of plant communities, but with higher species diversity in the upper marsh. This characteristic is a result of the modification of the upper marsh area, either by the influence of freshwater seepage or because of a natural transition into a non-tidal area.

Shimwell (1985), from a detailed survey of Orkney saltmarshes, estimated a total extent of 80.5 ha. The JNCC (1997) figure for area is 76 ha.

3. LOCAL DISTRIBUTION

Saltmarshes are concentrated in 3 main areas; the sheltered bays and strands of Scapa Flow (particularly Hoy), the Mainland's north east coastline, and the island of Sanday. Much of the coast is exposed, and saltmarshes are restricted to sites that provide some shelter. Most of the larger sites are found in shallow bays protected by a sand or shingle bar (locally known as an ouse, that at Finstown is an example). The many smaller sites tend to be at the head of beaches within embayments, either at the mouth of a stream or the base of a cliff from which drainage seeps on to the beach. Some saltmarshes are enclosed behind man-made features such as roads, with tidal water entering through a natural channel. In addition to these sites, vegetation showing many similarities to saltmarsh is widespread on rock platforms, reefs and low cliffs.

Though the total area is small, there are about 30 main saltmarsh sites (Shimwell 1985), widely distributed around the coastline. There are eight sites of more than 2.5 ha: Tor Ness and Quivals Creek, Cata Sand, and Little Sea, all in Sanday; the Ouse at Veantrow Bay, Shapinsay; the Ouse Finstown; Bay of Suckquoy, St Andrews; Waulkmill, Orphir; and Cummi Ness, Stenness.
The more important sites are the larger examples, which tend to be structurally and botanically diverse. The two outstanding sites are Little Sea and Cata Sand, Sanday (Shimwell 1985). There are some diverse transitional zones in Sanday particularly. An interesting example is at Black Rock, Sanday, where the transition is into freshwater swamp and wet machair.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

A typical saltmarsh zonation in the region comprises only small areas of pioneer and low-mid marsh. The main pioneer species is sea blite *Suaeda maritima* and the low-mid marsh zone is usually a species-poor common saltmarsh grass *Puccinellia maritima* community. The dominant species in the mid to upper marsh are mud rush *Juncus gerardii* and common saltmarsh grass. Other widespread species are sea milkwort *Glaux maritima*, thrift *Armeria maritima*, common scurvy grass *Cochlearia officinalis*, orache *Atriplex* species, autumnal hawkbit *Leontodon autumnalis*, greater sea-spurrey *Spergularia media*, sea plantain *Plantago maritima*, red fescue *Festuca rubra*, and sea arrow grass *Triglochin maritima*. Glassworts *Salicornia* species occur in channels at a few Orkney sites.

On the upper levels of the saltmarsh, in wet depressions and where it is flushed, there are strands of saltmarsh flat-sedge *Blysmus rufus*, very occasionally with slender spike-rush *Eleocharis uniglumis*. These two species are both northern elements in the British saltmarsh flora, found mainly on the west coast of Britain from mid-Wales northward and whilst neither is nationally scarce as a species, their extent as a vegetation type on British saltmarsh is very limited. There are several sites with this vegetation in Orkney, but it is less widespread than on the north-west coast of Scotland, the Western Isles and Shetland. Conversely, the southern species, long-bracteate sedge *Carex extensa* also occurs in several Orkney saltmarshes. A nationally scarce species found on the saltmarshes is the eyebright *Euphrasia foulaensis*.

At the landward edge of saltmarsh there are transitions to other habitats such as hay meadows, wet grasslands, freshwater marsh, shingle, dune pasture, and low cliffs. Such areas are often of particular ecological interest with a high diversity of both plants and invertebrates.

National Priority Species	
Local Priority Species	
Redshank *Tringa totanus*	Dunlin *Calidris alpina*
Lapwing *Vanellus vanellus*	An eyebright *Euphrasia foulaensis*
Sea aster *Aster tripolium*	

5. CURRENT FACTORS AFFECTING THE HABITAT

Saltmarshes will be affected by any rise in sea level but generally there are few threats at present from human activities in Orkney. They include the following:

- Road, culvert, and sea-defence works could affect tidal flows into saltmarsh areas loss of or damage to habitats.
- Drainage: drainage works mainly date from the 19th century, with more recent attempts to prevent re-entry of seawater by fitting of sluice gates. There have been some attempts at deepening of existing drains, with effects for wet machair vegetation and loch margins in the transitional zone, potentially opening it to increased grazing or even reclamation. Some saltmarshes are found in situations where flooding by tidal waters is through a narrow or restricted entrance and therefore they are particularly vulnerable to changes in their tidal regime through drainage works or the construction of culverts and embankments.
- Reclamation: The upper edges of several saltmarshes have in the past been re-seeded considerable areas.
- Grazing: grazing has a marked effect on the structure and composition of saltmarsh vegetation. Over-grazing accompanied by poaching of the soft ground would be damaging, but is not known to be a significant factor in Orkney. Abandonment of grazing on traditionally grazed saltmarshes could lead to the formation of rank, tussocky grassland, but this is not known to be occurring in Orkney.
- Fertiliser and slurry: any applications of these would be highly damaging to plant communities, but is not known to occur.
- Dumping: some sites have been affected by tipping.
- Oil spills are a potential threat.

6. CURRENT ACTIONS AND OPPORTUNITIES

The UK HAP outlines current action and directs the statutory agencies in their objectives and targets, and gives a conservation direction to the local HAP. Reference should be made to the national HAP.

6.1 Management

- Waulkmill, East Sanday Coast and Central Sanday are SSSIs that include some of Orkney's best areas of saltmarsh. Almost all the coastal edge of the eastern half of Sanday is included in the East Sanday Coast SPA and Sanday SAC. Site management statements have been drawn up.
- SEERAD grants - CPS and RSS provide grants for conservation management of wetlands that may include saltmarsh. The area of wetland managed under CPS in Orkney is 391 ha, but it is thought that little saltmarsh area is included in that figure. Figures for areas under RSS management (2000 alone) are not yet available.
- LFA support payments to farmers are conditional on observance of a code of good farming practice, including the protection of natural habitats and avoidance of overgrazing: these are weak in relation to management of grazing, but could be strengthened.
- Oil spill contingency plans are in place.

6.2 Research and Guidance

- SNH has carried out Phase 1 and National Vegetation Classification (NVC) vegetation surveys of Central Sanday SSSI.
- Guidance on management and entry into agri-environment schemes is provided by FWAG and SAC.

7. ACTION PLAN OBJECTIVES AND PROPOSED TARGETS

In the context of the national plan, targets and responsibilities will trickle down to the local level. The actions listed below are additional or complementary to those of the national plan, to which reference should be made. The national HAP lays heavy stress on the need to create new areas of saltmarsh.

- Maintain the current extent of saltmarsh, including transitional zones.
- Maintain the current quality of plant communities of saltmarsh in Orkney. **Target: 10 ha of saltmarsh under RSS wetland management by 2007**

8. ACTION PLAN AGENCIES

8.1. National agencies: SNH; SEERAD; SEPA; JNCC

8.2. Local partners: FWAG; SAC; OIC

9. PROPOSED ACTION WITH AGENCIES

9.1. Site safeguard and management

- Protect saltmarsh sites from inappropriate developments (OIC).
- Ensure that road and culvert works do not adversely affect tidal flows into saltmarshes (OIC).

9.2 Advisory

- Promote agri-environment scheme options wherever these can benefit saltmarshes (SAC, FWAG).
- Promote the potential for creation and extension of saltmarsh through the wetland creation option of RSS if appropriate opportunities arise (SAC, FWAG).
- Ensure adequate advice is available and provided to all landowners on best practice (FWAG, SAC, SEERAD).

9.3 Research and monitoring

- Research the conservation status and management of saltmarsh sites by 2007 (SNH).

9.4 Promotion and awareness raising

- Raise awareness of the processes and management requirements of this habitat (All).

REFERENCES AND OTHER INFORMATION SOURCES

Barne, J.H., Robson, C.F., Kaznowska, S.S., Doody, J.P., Davidson, N.C. & Buck, A.L. (eds.). (1997). *Coasts and Seas of the United Kingdom*. Coastal Directories Series, JNCC, Peterborough

Bullard, E.R. & Goode, D.A. (1975). *The Vegetation of Orkney*. In *The Natural Environment of Orkney*. Goodier, R. (ed.). NCC, Edinburgh.

Shimwell, D.M. (1985). *Salt-marshes of Orkney*. Report to NCC, Peterborough

General references for terrestrial and coastal habitats

Andrews, J., and Rebane, M. (1994). *Farming and Wildlife*. RSPB, Sandy

Berry, R. J. (1985). *The Natural History of Orkney*. Collins

Berry, R. J. (2000). *Orkney Nature*. Academic Press, London

Booth, C, Cuthbert, M and Reynolds, P. (1985). *The Birds of Orkney*. The Orkney Press

Booth, C. and Booth, J. (1994). *The Mammals of Orkney*. C. Booth, Kirkwall

Bullard, E.R. (1995). *Wildflowers in Orkney. A New Checklist*. Bullard, Kirkwall

Charter, E. (1995). *Farming with Wildlife in Mind*. Orkney FWAG, Kirkwall

Gray, M., Babbs, A., Whyte, C., Meek, E.R., O'Brien, M. *Wetland and Moorland Marginal Sites in Orkney 1993-94*. RSPB, Edinburgh

Harris, R.A. and Jones, R. M. (1998). *The Nature of Grazing*. SNH/SWT/Leader II

Jackson. D.L. (2000). *Guidance on the interpretation of the Biodiversity Broad Habitat Classification (terrestrial and freshwater types): Definitions and the relationship with other Habitat classifications*. JNCC, Peterborough

Macaulay Land Use Research Institute (1993). *The Land Cover of Scotland 1988. Final report*. MLURI Aberdeen

Orkney Field Club. Annual Bulletins published in Orkney contain many articles and records relating to habitats and species

Orkney Biodiversity Records Centre: holds a comprehensive database of species and habitats

Orkney Bird Reports – annual reports published in Orkney by the editors

SEERAD: HQ, Pentland House, Edinburgh is the source of data on land entered into agri-environment schemes.

SEERAD. *The Countryside Premium Scheme*. (1998). HMSO Edinburgh

SEERAD. *The Rural Stewardship Scheme*. (2000). HMSO Edinburgh

Sirell, D. & Phillips, D.S. (1999). *Local Biodiversity Action Plans – Technical Information on Species. III. Invertebrate animals.* Report for SNH

SNH (1992). *National Countryside Monitoring Scheme – Northern Isles.* SNH, Edinburgh

UK Steering Group. (1995). *Biodiversity: The UK Steering Group Report*

UK Biodiversity Group. (1998-1999). *UK Biodiversity Group: Tranche two action plans*

Ward, S.D. (1999). *Local Biodiversity Action Plans – Technical Information on Species. I. Cryptogamic Plants and Fungi.* Report for SNH

18.2 Mudflats — priority habitat

Current status and extent
Mudflats occur in low energy coastal environments by the deposition of silts and clays. There is an intimate link between mudflat habitats and adjacent areas of saltmarsh as they are critical to the dissipation of wave energy providing protection, from erosion, of established saltmarsh vegetation.

Scottish/UK significance
An indication of the relative importance of local mudflats can be gauged from the account provided above for saltmarshes in Orkney. Most mudflats are associated with estuaries and the UK percentage represented by this Orkney habitat is very small indeed.

Local distribution
The distribution of the larger areas of mudflats (though the term intertidal flat may more precisely describe the coarser and sometimes mixed sediments deposited in Orkney sites) follows closely that described for saltmarsh above. St Peter's Pool could be added to this list, although in this rather more sublittoral, and coarser grained sediment, the principal habitat type represented here, that of a *Zostera marina* meadow, is recorded in the habitat description for sublittoral sediment seagrass beds (see section 23.3 below). Other smaller areas of mudflat are found seaward of some saline lagoons.

Associated species and key sites
Key sites are those associated with larger areas of saltmarsh - see above.

18.3 Sheltered muddy gravels — priority habitat

Current UK status and extent
Sheltered muddy gravels are extensive in UK waters but predominate in estuaries and other low salinity areas where protection from wave action and tidal streams is most commonly found. Their occurrence in fully marine conditions, however, is much more limited. There are three recognised biotopes that fall within this priority habitat: (1) where the association of *Venerupis senegalensis* and *Mya truncata* dominates in the lower shore and infralittoral muddy gravel; (2) *Mya arenaria* and polychaetes dominate in muddy gravelly shore (more typical of areas where there is a freshwater influence); and (3) the association of *Mytilis edulis* and *Fabricia stellaris* on poorly sorted muddy sand or muddy gravely shores. Only the first biotope is known to occur in Orkney; further survey may yield the occurrence not only of more sites for this biotope but also occurrences of the other two. There are a number of closely related biotopes occurring on sheltered mixed sediments in fully marine areas that probably also warrant further investigation. The UKBSG notes that "good quality examples of this habitat are very scarce". The communities represented on these habitats are very variable, depending on the actual mixed sediment composition (and salinity) but are highly diverse, and fully marine ones, which tend to be far more patchy, are very scarce and very important for this reason.

Local distribution
The only known location for the fully marine *Venerupis senegalensis* and *Mya truncata* biotope is a very shallow infralittoral area just north of the holms at Grimbister in the Bay of Firth. This area is protected from wave action and experiences only a slight tidal stream yet is fully marine. There are a number of other candidate sites in Orkney coastal waters with comparable features but none have been surveyed and it is recognized by the UKBSG that considerable difficulties exist in acquiring comprehensive survey data for this (and closely related) biotopes. Further survey of such habitats would be worthwhile and may yield a better understanding of closely related biotopes in addition. This area of the Bay of Firth is unusual and a more thorough survey may yield other mixed sediment biotopes of particular interest.

Associated species and example key site
At the present time the only site known is that in the Bay of Firth. Further details of the species composition and general description of this site may be available with the publication of the JNCC MNCR data for Orkney.

Threats and opportunities
The most significant threat would be the development of a fishery for *Venerupis senegalensis*. Given the small area presently known this is very unlikely but should be discouraged. Other threats could arise from alteration of the pattern of tidal flow in the Bay of Firth, organic enrichment or the introduction of alien species. Under the proposed regulating order there is the opportunity to restrict fishing for *Venerupis senegalensis*.

Information sources
JNCC (M Dalkin, Pers. Comm.)
UKBSG (1999). Tranche 2: Action Plans, (Volume V - Maritime species and habitats) contains a costed UK habitat action plan for sheltered muddy gravels.

19. INSHORE SUBLITTORAL ROCK — BROAD HABITAT TYPE

Current local status and extent

Throughout the UK the seabed of the inshore waters is dominated by soft sediments. Sublittoral rock habitats tend to be close to the shore where wave action keeps the substrate free of sediment. In Orkney the strong tidal currents and large areas of wave swept sublittoral mean that this broad habitat type is well represented. The major governing factors are the degree of exposure to water movement and available daylight. In the photic zone under exposed conditions a widespread community is often found, dominated by red algae and charactersied by a dense canopy of *Lamonaria hyperborea*. Under more sheltered conditions brown and green algae are more abundant with a top layer formed by *Laminaria saccharina* and *Saccorhiza polyschides*. In the aphotic zone under exposed conditions there are many variant communities, with either *Pomatoceros triqueter* and *Alcyonium digitatum*, or bryozoans and hydrozoans dominant. Under more sheltered conditions as the limits of light penetration are reached the community is dominated by encrusting red algae.

The UK priority habitats falling within this broad habitat type are: "sublittoral chalk reefs", "*Sabellaria spinulosa* reefs", "tidal rapids", and "*Modiolus modiolus* beds". There is no sublittoral chalk in Orkney, and although *Sabellaria spinulosa* can be found in a number of Orkney's tidal sounds (Rousay Sound, Wyre Sound, Hoy Sound and elsewhere) it does not appear to form the extensive areas of reef (up to 60 cm above the seabed and extending hundreds of metres) that have been observed elsewhere in the UK, but rather in Orkney waters patchy areas are encrusted, perhaps later being disturbed by storms which prevent further reef colonisation and establishment. The UK priority habitat action plan for *Sabellaria spinulosa* reefs excludes such crusts as they do not appear to provide a stable habitat condusive to the establishment of associated species. The two priority habitats that are well represented in Orkney coastal waters are tidal rapids and *Modiolus modiolus* beds.

19.1 Tidal rapids — priority habitat

Current UK status

Tidal rapids is a UK priority habitat type which appears to aggregate any high energy sublittoral environment. It includes deep and shallow channels subject to strong tidal flows and tide swept areas of sublittoral substrate. The result of this aggregation is that many biotope classifications are found within this priority habitat and all are well represented in Orkney coastal waters.

Local distribution

Under the present classification such areas are ubiquitous throughout the Orkney archipelago and include most of the fast flowing sounds between islands and between the outer islands and the Mainland, and, additionally, areas to the west and north where although tidal streams may be less the influence of coastal wave action on the substrate is severe. The aggregating of these biotopes into a single priority habitat type makes the distinguishing of local areas of particular importance rather difficult, and more work is required to do this. Also, in Orkney, it is the mosaic of these and associated habitats that is particularly striking with often intimate and unusual relationships between "tidal rapids" habitats and other adjacent biotopes that appear to depend on these strong tidal flows for success, notably areas of living and dead maerl and *Modiolus modiolus* beds. Some truly unique associations also occur where shelter is provided in very close proximity to strong tidal streams. Thus one finds for instance off Eynhallow an extraordinary association of *Alaria esculenta* (characteristic of high energy environments) and *Zostera marina* (characteristic of much more sheltered conditions) which is not found elsewhere in the UK. A much clearer understanding is required of the mosaic of biotopes associated with the priority habitat "tidal rapids".

Threats and opportunities

The construction of the Churchill barriers has resulted in the most significant loss of this habitat type in Orkney and provides a clear indication of the dangers associated with the physical alteration of flow through tidal channels. Tidal power generation where the construction of a physical barrier is envisaged (or causeways with a similar construction) seem to pose the greatest threat today. The potential for local exploitation of both coastal wave and tidal stream energy is great but for reasons noted above such projects must give careful consideration to the environmental impacts that may arise from reduced or altered tidal flows or wave exposure.

Further information
UKBSG (1999). Tranche 2: Habitat Action Plans (Volume V – maritime species and habitats) contains a costed UK habitat action plan for tidal rapids

19.2 *Modiolus modiolus* beds — priority habitat

Current status and extent
The horse mussel *Modiolus modiolus* is common in Orkney waters and elswhere, but may under certain circumstances form dense biogenic reefs which appear as mounds often with steep faces up to a metre or more high that extend for many metres. The term "bed" is used to describe these recessed and semi-recessed accumulations, continuously raised accumulations, and scattered clumps where these cover expansive areas of seabed. The species is long lived (up to 25 years) but recruitment appears often to be sporadic and juvenile mortality is high. Once established, however, the beds are stable with living animals and dead shells bound together. They occur over moderately tide swept areas and provide a unique series of marine biotopes all of which exhibit extremely diverse associated fauna. Like all biogenic reefs they are very susceptible to phyiscal damage and once damaged may take years to recover if at all.

Local distribution
The distribution of individuals of the species is widespread but areas of dense accumulations are less frequently found in Orkney and are usually associated with habitats adjacent to tidal rapids but which themselves are more moderately exposed. Some of the best examples of *M. modiolus* beds are found in the north and west of Scotland and in Shetland and Orkney. Specifically in Orkney there are extensive beds to the south of Shapinsay, between Houton and the Barrel of Butter and smaller patches off north-west Sanday. Other beds around the islands are certain to occur.

Threats and Opportunities
The biggest potential impact as with any biogenic reef is from physical damage to the structure of the reef itself. Obvious possibilities are bottom trawling (and most damaging, scallop dredging), cable and pipeline laying. There is a small fishery for this species elsewhere and although the areas around the String off Shapinsay were once exploited in Orkney by fishermen for bait (Rendall, 1956) there appears to be no likelihood of a targetted fishery for this species. The most likely source of damage is thus from bottom trawling or scallop dredging, and elsewhere in the UK some *M. modiolus* beds have been protected by fisheries regulations that prevent the use of mobile gear. Under the proposed Regulating Order there is the opportunity to prohibit fishing for this species and seek agreement to avoid more damaging towed fishing gears in areas where *M. modiolus* beds are known to occur.

Further information
Rendall R. (1956). *Mollusca Orcadensia*. Proceedings of the Royal Society of Edinburgh.
UKBSG (1999). Tranche 2: Habitat Action Plans (Volume V – maritime species and habitats) contains a costed UK habitat action plan for *Modiolus modiolus* beds

20. INSHORE SUBLITTORAL SEDIMENTS — BROAD HABITAT TYPE

General UK description
The seabed of the inshore waters (defined as extending up to 6 nautical miles) is predominantly sediment in the UK. In this respect Orkney is perhaps unusual in having rather less littoral sediment and rather more hard substrate than many other areas of the UK.

20.1 Seagrass beds (*Zostera marina* and *Zostera angustifolia*) — priority habitat

Current local status and extent
Only these *Zostera* species (*Zostera marina* and *Z. angustifolia*) occur in Orkney, with the former making up the majority of what are called seagrass beds or meadows. They are commonly known as eelgrass and slender eelgrass (respectively) with the former known locally in Orkney as mella or mallow. They are, however, not grasses, but marine angiosperms, more closely linked to the lily family of flowering terrestrial plants. The 59th parallel is near to the northern most boundary of *Zostera*, but the influence from the Gulf Stream allows them to flourish in Orkney. Seagrass beds are amongst some of the most productive yet dynamic ecosystems on the planet. *Zostera angustifolia* beds are found intertidally (and thus might be best included in the broad habitat type of "littoral sediments"), but those of *Zostera marina* commonly extend into or are limited to the subtidal. The depth to which they extend is unconfirmed although they are definitely present down to 10m. Elsewhere they are known to reach down to 30mif conditions are ideal. Owing to the fact that these plants are perennial and the marine environment very dynamic, the extent of the seagrass beds at certain locations will fluctuate annually. Seagrass is only found on soft sediments, such as sand and mud, or mixed sediment.

Scottish/UK significance
The importance of sea grass is only noticed once it has disappeared from a region by pollution, disturbance or disease. They are critical to the early life stages of many, some commercially important, marine organisms. Associated with the sea grass beds is a rich and diverse fauna. On occasion the weight of those organisms that are attached to the blades can equal the entire weight of the plant. Other organisms reside in these habitats for only part of their lifespan such as turbot, plaice, cod, flounder and numerous crustaceans. In addition many birds e.g. wigeon, feed on the blades of the sea grass. Some organisms use the beds as protection from the harsh marine environment, or as a place to avoid predators, while others use it as a place to hunt prey. Sea grass beds are locally critical for the stabilisation of sediments in an otherwise fluid environment. The root systems stabilise the sand and extensive meadows can dissipate wave energy. If a bed or meadow is destroyed it can take a significant amount of time for its full recovery, during which the sediment may have become unstable and altered sediment transport may prevent subsequent re-colonisation. All attempts at transplanting seagrasses have met with failure.

Local distribution
Recent surveys have been incomplete in surveying the whole of Orkney. However the work done so far has found several significant sites of seagrass meadows. These are typically in protected bays, estuaries and away from particularly strong winds.

Threats and Opportunities
The presence of seagrass beds in an area is not always obvious throughout the year. The seagrass leaves remain attached until September and do not reappear until March. Thus areas of importance may be excluded by inappropriate timing of surveys when the presence of sea grass is not obvious. While the root systems are always present, these can go unnoticed. Threats to sea grass come from a variety of sources: physical; biological environmental and human impacts. They include long periods of elevated sea temperature, extremes of rainfall, low levels of insolation and the long-term cycles in oceanic circulation. All of these factors will be affected to different degrees by global warming. Additionally, wasting diseases, similar to that of the 1930s, can decimate local populations by 99-100%.

Direct man-induced impacts included dredging and bottom trawling in areas where seagrass is present. This can tear out the root systems, essential to the community's survival. Boat anchors have the same effect if inappropriately deployed or left to drag. Sewage inputs and the eutrophication of coastal waters from farmland runoff disturbs the balance of the low nutrient environment that seagrass requires. Seagrass communities are simply out-competed by other species and lost if eutrophication is not carefully controlled. Herbicides also can have toxic effects where coastal runoff results in high concentrations, particularly in the sediments. Runoff can also increase turbidity decreasing the sea grasses ability to compete with other species.

Protecting seagrass beds and meadows is also important for other aspects of Orkney's marine environment. Extensive areas of seagrass stabilise benthic sediments and provide protection from coastal erosion in addition to providing important nursery grounds for commercially important fishes. The exploitation of seagrass in bygone days utilised the blades that were swept up onto the beaches and the historic importance of seagrass should not be forgotten. It was once used to place over manure to prevent smells spreading, as a substitute for horsehair for padding, as feed for ruminants and for thatching roofs of Orkney's humbler dwellings. The future holds possibilities for the use of seagrass in the treatment of sewage.

Information sources

Jackson E. (1998) MSc dissertation : Distribution and Importance of *Zostera* in Orkney. ICIT, Heriot-Watt University, Stromness.
Short F.T., Ibelings B.W., Den Hartog C. (1988) Comparison of a current eelgrass disease to the wasting disease of the 1930s. Aquatic Biology (30): 295-304.
Thyer G.W., Wolfe D.A., Williams R.B. (1975) The Impact of Man on Seagrass Systems. American Scientist (**63**):288-296.
Urquhart, J.T. (1824) On the preparation of the *Zostera* or Sea-Grass in Orkney. Prize Essays and Transactions of the Highland Society of Scotland. (**6**): 588-593.

20.2 Maerl beds — priority habitat

Current local status and extent

Maerl beds comprise branches of unattached coralline algae, which form loose subtidal accumulations on the surface of soft sediments. In Orkney, two species of red algae form maerl beds: *Phymatolithon calcareum* and *Lithothamnion glaciale*. Maerl beds may be made up of varying proportions of live or dead algal branches and are typically found between 0-30m depth, in areas that are protected from wave exposure and subject to moderate tidal streams.

Orkney has a variety of different types of maerl beds, some of which are particularly well developed. The best known deposit of maerl is the bank of dead maerl in Wyre Sound.

Scottish/UK significance

Within the United Kingdom, maerl is found in extensive areas of the Fal estuary and many extensive maerl beds can be found in Scotland. Within the UK, four sites containing maerl beds have been designated candidate SAC (Special Areas of Conservation) under Council Directive 92/43/EC (the Habitats Directive). Of the four sites, Strangford Lough (Ireland) is the most poorly known while the Sound of Arisaig, the Fal and Helford and Loch nam Madadh (Loch Maddy) have all been studied in detail.

The formation of a three dimensional structure by the interlocking maerl matrix provides a unique habitat for a high diversity of organisms, some of which are more or less confined to the maerl habitat. These 'beds' are also an important source of calcium carbonate grains for other coastal habitats, especially beaches and dunes.

Suggestions have also been made in respect to maerl's importance as nursery areas for commercially valuable molluscs. Indeed, divers visiting maerl beds have commented on the large numbers of small individuals of many species that can be seen, with the open structure of the bed providing a secure habitat for juveniles as well as a wide range of flora and fauna used as a food source.

Local distribution
Information on the distribution of maerl in Orkney has been obtained from Marine Nature Conservation Review surveys (JNCC), observations of local divers and the notation of "Crl" on old Admiralty Charts. Using these information sources, maerl is known to be concentrated in six locations: Wide Firth, Gutter Sound, Wyre Sound, East Graemsay, South Eday Channel and Veantrow Bay, North Shapinsay. These are all relatively sheltered sounds or channels, subject to moderated tidal streams, which are typical locations of maerl.

Threats and opportunities
Due to their fragility, poor recruitment and spore dispersal and very slow growth rates, there is concern over the vulnerability of maerl thalli to damage from natural events and human activities.

The most common natural event that may damage maerl beds is storms. The resulting water movement influences the rate of loss of maerl thalli from the beds, whilst the turbidity following such a storm impinges on the ability of the maerl thalli to photosynthesise and thus affects growth rates.

Although information on the effects of human activities on maerl beds is lacking, informed speculations can be made on the possible impacts. There are two types of impact; direct and indirect. The most obvious direct impact is commercial extraction. 'Commercial dredging of maerl deposits is particularly destructive since this removes the productive surface layer and dumps sediment on any plants which escape dredging, inhibiting habitat recovery' (Hall-Spencer, 1994). Maerl is currently extracted for use as a soil conditioner and water treatment. The first licence for the extraction of maerl in Scotland was granted in 1996 to dredge 20,000m^3 over five years from Wyre Sound. Although to date, only 4000m^3 has been extracted in 3 years.

Aquaculture may also have a negative localised impact on maerl, with the positioning of cages over a maerl biotope leading to the accumulation of fish faeces and food waste that may contaminate the maerl bed and lead to anaerobiosis. The detrital rain would also reduce light penetration through the water column and hence may reduce the growth rate. Scallop dredging and suction dredging for other bivalves is one of the biggest threats to live and dead maerl beds. As well as the major impacts on the target species and the structural damage caused to the community, the detrimental effects on maerl beds are expected to include impacts of resuspended sediment smothering the surrounding community and reducing photosynthesis.

Indirect impacts that may seem innocuous to maerl beds include the effects of coastal alterations. The addition of breakwaters and sea defences is commonplace around our coast. However, these structures obviously affect the depositional and erosional patterns of the local coastal environment, possibly destabilising established maerl beds. With the intensification of agricultural practices within the last decade, this has led to the increasing problem of eutrophication in coastal waters. The accompanied excessive growth of ephemeral species of macroalgae could result in damage to maerl biotopes.

Information sources
Hall-Spencer, J.M. (1994). Biological studies on nongeniculate Corallinaceae. PhD thesis, University of London.
Birkett, D.A *et al*. (1998) Maerl – An overview of dynamics and sensitivity characteristics for conservation management of marine SACs. UK Marine SACs Project.

20.3 Saline lagoons — priority habitat

Current UK status and extent
Saline lagoons are lochs having a pH range 7.0-9.8 and a conductivity range of 5,400-35,000 mhos due to their varying salinity. In terms of their physiography, typical saline lagoons are defined as areas of salt or brackish water separated from the adjacent coastal sea by a low lying sand or shingle barrier. Atypical lagoons are distinguished by their mode of formation, being formed by the landward transgression of seawater into freshwater lakes as a result of land subsidence or sea level rise. Locally in Orkney, these lochs and lochans are sometimes called oyces.

Scottish/UK significance
The total area of UK lagoons is 1,300 ha. The most recent figure regarding the size of the Loch of Stenness puts it at 562 ha. Consequently, the Loch of Stenness alone represents approximately 43% of the total UK lagoon area. The rest of Orkney's lagoons are much smaller and typically less than 1 ha.

Local distribution
There are 15 such examples in Orkney, all along the coast, and generally of the typical form, separated from the sea by shingle banks or ayres. Numerically, their distribution is concentrated in Sanday, but they are also found on other islands as far apart as North Ronaldsay and South Ronaldsay. However, in terms of area, the Loch of Stenness represents the bulk of lagoon habitat in Orkney, covering more than 500 ha.

Associated species and example key sites
Lagoons contain soft sediments which support brackish water-crowfoot *Ranunculus baudotii*, fennel-leaved pondweed *Potamogeton pectinatus*, tasselweed *Ruppia maritima* and spiral tasselweed *R.cirrhosa*, horned pondweed *Zannichellia palustris*, stoneworts (charophytes) e.g. the bearded stonewort *Chara canescens*, the Baltic stonewort *C. baltica*, the lesser bearded stonewort *C. curta*, the rugged stonewort *C. rudis*, the birds nest stonewort *Tolypella nidifica* and the clustered stonewort *T. glomera*. Numerous algae species may also be present. Depending on the influence of the sea, marine representatives may be common, e.g. the wracks *Fucus spiralis* and *Ascophyllum nodosum*. Microscopic green, brown and red algae also occur. Freshwater algae may also be present in areas where the salinity is low enough. In the Loch of Stenness, small green ball forming algae *Cladophora aegagropila* (also *Cladophora sauteri*) may be found when the freshwater run-off from the adjacent Loch of Harray is sufficient to lower the salinity. Although common in Loch Harray, this alga is rare on a national scale. Invertebrate fauna includes the snails, *Hydrobia neglecta* and *Theodoxus fluviatalis*. Worms such as the polychaete *Nereis diversicolor* commonly occur in sedimentary areas, as well as the small amphipod crustacean *Corophium volutator*. Lagoons are also important habitat for waterfowl e.g. shelduck *Tadorna tadorna*, marshland birds and seabirds and, in the case of the Loch of Stenness and St. Mary's Loch, they also support populations of brown and sea trout *Salmo trutta*.

Key sites include the Loch of Stenness, which is nominated as a Special Area of Conservation under the Habitats Directive purely as an example of a coastal lagoon, and smaller lochs, such as Little Vasa Loch on Shapinsay.

Threats and opportunities
Some of these sites are very public, e.g. the Peedie Sea in Kirkwall and St. Mary's Loch in Holm. Many are close to farms and may potentially suffer direct nutrient enrichment from land run-off, or indirectly, via feeder burns. More distant threats, especially concerning the smaller lagoons, might include the demolition of the protective ayres by storms, with increasing frequency of high winds and rising water levels associated with climatic change. Even in recent years some of these smaller sites are showing an increase in salinity.

Further reading.
Coastal Directories Series Region 2. JNCC 1997.
The UKBSG Report (1995) contains a habitat statement for saline lagoons.
Moray, J. and Pullar, L., 1910. Bathymetrical survey of the lochs of Orkney. Bathymetrical survey of the freshwater lochs of Scotland, Vol. 2: 222-230.
Nicol, E.A.T., 1938. The brackish water lochs of Orkney. Proc. R. Soc. Edinb., B, Vol. 57(No. 2): 181-191.
Thomson, M., 1997. The ecology and hydrography of the brackish Loch Stenness, Orkney. BSc Dissertation as part of degree of Applied Marine Biology at Heriot-Watt University.
Orkney Field Club Bulletin, 1972 3: 7-8.
UKBSG (1999). Tranche 2: Habitat Action Plans (Volume V – maritime species and habitats) contains a costed UK habitat action plan for saline lagoons.

20.4 Mud in deep water — priority habitat

Current status and extent

This priority habitat is assigned to areas of mud in water depths below 20-30m. There are several distinct biotope types represented by this classification but only the *Nephrops norvegicus*, *Brissopsis lyrifera* (with a variety of brittlestars including the characteristic) *Amphiura chiajei* is thought to apply in Orkney waters.

Local distribution

There is one large area of deep mud offshore from the west coast of the Orkney islands. (Although now subject to continuous deposition (since the construction of the barriers), areas of mud in the north eastern corner of Scapa Flow are relatively shallow, and lie over a gravelly substrate and other muddy inshore areas seem excluded from this priority habitat type.)

Associated species and example key sites

The most well-known species association with this habitat type is that of *Nephrops norwegicus* (Norwegian lobster or often "prawns", and "scampi" once cooked). A number of sea pens and invertebrate species are probably also characteristic of these habitats, as is the fish *Lesueurigobius friesii* (Fries' goby) which cohabits the soft burrows made by *Nephrops*. This fish has never been recorded in Orkney and is considered something of a rarity, but this could be a simple feature of its life style making catches and sightings of it rare occurrences. Other species may include the burrowing urchin *Brissopsis lyrifera* and a variety of brittlestars including *Amphiura chiajei*.

The deep water mud area, known by fishermen as the Noup, is found between 59^{o} 10' and 59^{o} 35'N and between 3^{o} 30' and 3^{o} 50' W. In places the sediment depth exceeds 80m.

Threats and opportunities

The most significant threat to this habitat type is "prawn" or *Nephrops* trawling. Work reviewing such impacts is expected to be published shortly.

Information sources:

Jonathan Side, Pers. Comm.
UKBSG (1999). Tranche 2: Habitat Action Plans (Volume V – maritime species and habitats) contains a costed UK habitat action plan for mud in deep water.

20.5 Serpulid reefs — priority habitat

This priority habitat is reserved for the reefs made entirely of *Serpula vermicularis* found on the west of Scotland. Some of these exceed one metre across. While *Serpula vermicularis* is present in Orkney it is solitary in occurrence and no reefs have ever been observed here.

20.6 Sublittoral sands and gravel — priority habitat

This priority habitat is an aggregate one amalgamating some 17 or so individual sediment biotope types. The classification of these is subject to ongoing discussion and is likely to be modified again. Four of these biotopes are maerl communities already described under a separate priority habitat (see above). While this aggregate priority habitat probably describes over 90% of all UK inshore waters some notable and distinctive local biotopes have not been distinguished.

One distinctive type found in Orkney waters is sand mixed with cobbles and pebbles that is exposed to strong tidal streams and sand scour. This is characterised by the hydroids *Sertularia cupressina* and *Hydrallmania falcata* and bryozoans. Similar substrates in somewhat more moderate tidal streams may be very important for settlement of juvenile lobsters.

Further work is needed once greater distinctiveness has been given nationally to sublittoral sands and gravels and the JNCC and EUNIS marine biotope classification schemes are finalised. Only the areas identifed in Orkney as being important to flatfish nursery grounds and herring spawning grounds have been distinguished and these are presently covered as a locally important habitat for "inlets and enclosed or sheltered bays" (see below).

20.7 Inlets and enclosed and sheltered bays — locally important habitat

Current local status and extent
The 800km coastline surrounding the islands of Orkney provides a particularly insular characteristic, providing a large number of small and enclosed bays. These bays are protected from the harsh and extreme exposure created by the North Sea and the Atlantic Ocean.

Local distribution
There are two estuarine inlets on the east Mainland, Deer Sound and St Peters Pool. On much of the west coast, the shore falls away rapidly, creating deepwater. The firths, sounds and Scapa Flow have much shallower depths, rarely reaching a depth of 36m. The more sheltered firths have some local mud deposits, but as a whole, mud is rare, sand or gravel providing much of the sea bottom.

The sheltered, shallow (and sandy floors in particular), provide a habitat for many marine species and a food reserve for others. Juvenile flatfish use these shallow sandy bays as nursery areas for up to 6 months after metamorphosis before heading back into deeper water. The bays are also important in supporting the populations of sandeel *Ammodytes tobianus* and juvenile herrings are transported around the islands and into the North Sea, from the west.

Associated species and key sites
Plaice, *Pleuronectes platessa*, flounder, *Pleuronectes flesus* and turbot, *Scophthalamus maximus* are quite common residents to be found around the Orkney mainland and as juveniles may arrive in vast numbers in some of the bays. Key sites include Sands of Evie, Scapa Bay and St Peters Pool (Mainland).

Threats and opportunities
Increased pollution and runoff into the bays will decrease the survival rates of the juveniles and have a "knock on effect" on the population numbers affecting their predators as well. Sand extraction and dredging activities, in particular suction dredging, are indiscriminate in their effects and can cause severe damage to the recruitment of the stock. Protection of water quality and keeping destructive operations to a minimum are important protective measures.

Information sources
The local, Orkney Biodiversity Action Forum, flatfish nursery grounds and herring spawning grounds habitat action plan.

21. OFFSHORE, SHELF AND OCEANIC HABITATS — BROAD HABITAT TYPES

General UK description

These broad habitat types describe all water-column and seabed habitats beyond 6 nautical miles off the coast (the limit which is used as a boundary for the inshore zone). The UK BSG identify four broad habitat types which have been amalgamated here, namely:

- Offshore shelf rock
- Offshore shelf sediment
- Continental shelf slope
- Oceanic seas

Within these very broad classifications *Lophelia pertusa* reefs and related species often referred to as cold water corals, occurring at depths of up to 500m, and "sublittoral sands and gravels" have been identified as priority habitats, though the latter is combined with the "sublittoral sands and gravels" for the inshore zone.

Current local status and extent

Biogenic reefs of cold water corals have received much attention in relation to the development of oil and gas west of Shetland. Many of the known deposits on the UK continental shelf and slope are patchy and investigation into the full extent of the distribution of these reefs continues. At the present time the nearest potential reefs (in relation to Orkney) are those to the north and west of Shetland, and specific surveys continue to be undertaken on these though thus far clear indications of extensive reef formations have not been ascertained.

The aim of the (inshore and offshore shelf) "sublittoral sands and gravels" national priority action plan is to protect the extent and quality of a representative range of sublittoral sand and gravel habitats and communities. A wide range of these is represented by inshore and offshore sediments around the Orkney archipelago. While a clearer differentiation of these is obviously desirable in terms of establishing priorities offshore gravels, supporting herring spawning grounds, have already been identified locally as being of particular importance.

SECTION D

SPECIES ACTION PLANS

SPECIES ACTION PLANS

The species for which Species Action Plans will be produced are as follows:

First Group of 10
Great yellow bumblebee
Pipistrelle bat
Otter
Common skate & Thornback ray
Corncrake
Skylark
Reed bunting
Juniper
Purple ramping fumitory
Scottish primrose

Second Group of 10
Dark green fritillary
Trout
Orkney vole
Brown hare
Toad
A Dragonfly
Hen harrier
Twite
Orchid species
Cetaceans

Third Group of 10
Seals
All Sharks
Redshanks
Arctic tern (Terns)
Short-eared owl
Lapwing
Red-throated diver
Linnet
Eared willow
Oyster plant

No timescale is set for the completion of these plans, as yet. However, they will be tackled in groups of 10 as prioritised above.

For further information contact:

Nadine Russell
Community Biodiversity Project
8 Broad Street
Kirkwall
KW15 1NX
Tel: 01856 888760
Email: nadine.russell@orkney.gov.uk

SECTION E

AREA ACTION PLANS

AREA ACTION PLANS

The table below show the Area Action Plans that are being produced and the stage of production they are currently at.

Area Action Plans are to be prepared for all Island areas and Mainland Parishes, and endorsed by their respective Community Councils by the end of 2002.

Area	**Status of Plan**	**Proposed date for final plans to be published by**
1. Sanday	Completed	December 2000
2. Westray	Completed	December 2002
3. Papa Westray	In Draft	December 2002
4. Eday	Completed	December 2002
5. Stronsay	Completed	December 2001
6. Shapinsay	Completed	December 2001
7. Hoy, Walls & Graemsay	In Draft	December 2002
8. S. Ronaldsay & Burray	Completed	December 2002
9. Sandwick	Completed	December 2001
10. Tankerness & Deerness (inc. St Andrews & Copinsay)	In Draft	December 2002
11. Holm & Wideford	In Draft	December 2002
12. N. Ronaldsay	In Draft	December 2002
13. Orphir & Scapa	In Draft	December 2002
14. Evie & Rendall	In Draft	December 2002
15. Rousay, Egilsay & Wyre	In Draft	December 2002
16. Birsay	In Draft	December 2002
17. Stromness		
18. Kirkwall	In Draft	December 2002
19. Flotta	In Draft	December 2002
20. Harray & Stenness	In Draft	December 2002
21. Firth & Sunnybrae	In Draft	December 2002

If you would like more information or a copy of any of these plans please contact:
Nadine Russell
Community Biodiversity Project
8 Broad Street
Kirkwall
KW15 1NX
Tel: 01856 888760
Email: nadine.russell@orkney.gov.uk