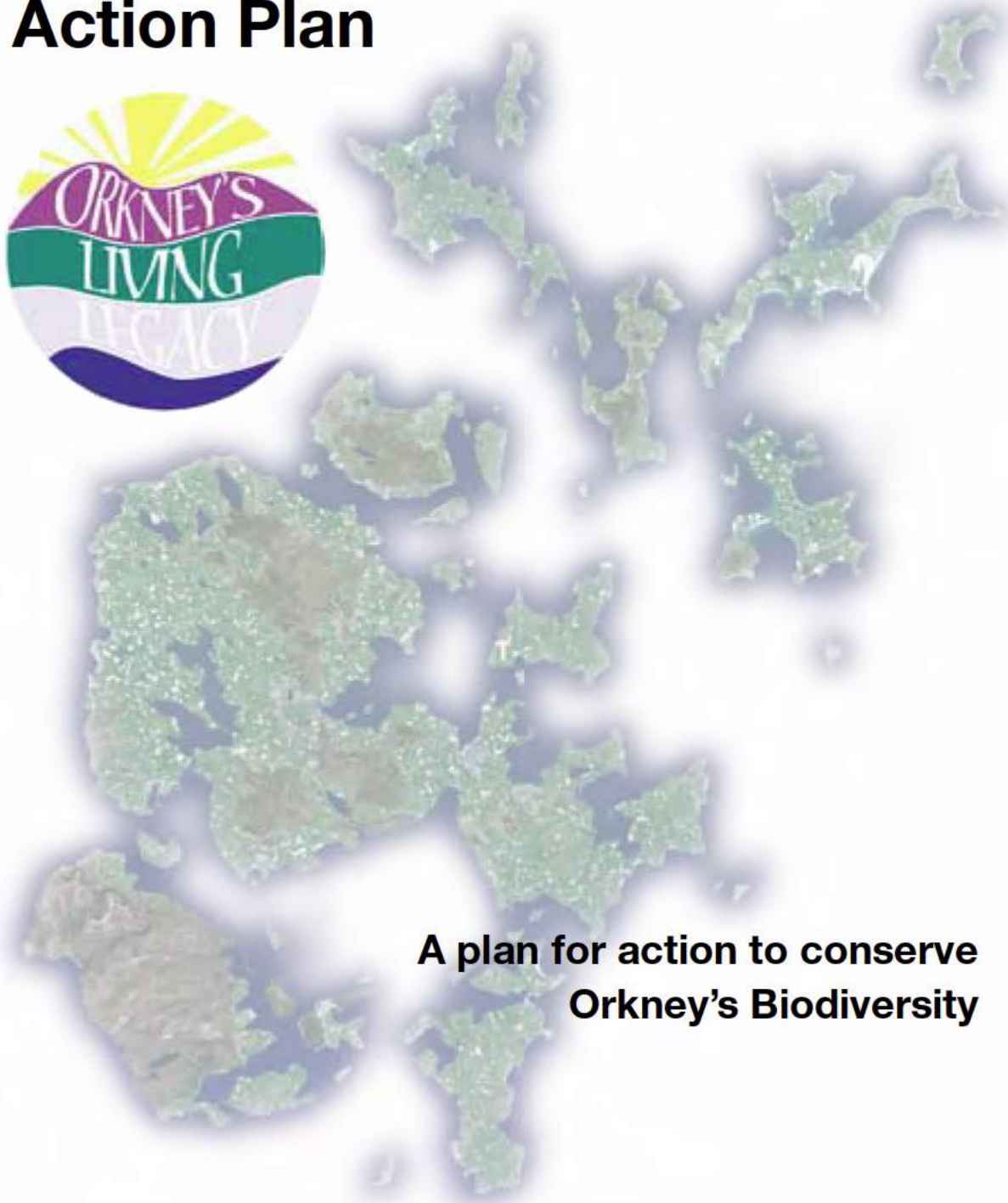


The Orkney Local Biodiversity Action Plan



**A plan for action to conserve
Orkney's Biodiversity**

Version 1.2: A targeted action plan for 2013 - 2016

Prepared by Orkney's Biodiversity Steering Group
for the Orkney Environment Partnership

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Orkney Local Biodiversity Action Plan 2013-2016

Section 1 – Introduction

What is biodiversity?

The term 'biodiversity' means, quite simply, the variety of species and genetic varieties that exist on earth - from the tiny microscopic organisms that are invisible to the naked eye to the mighty whales that swim in our oceans – as well as the habitats and ecosystems within which they live.

Why should we conserve biodiversity?

There are strong ethical reasons to conserve biodiversity and it is recognised that it is wrong to let species decline in number and distribution until they become extinct, and to treat nature as if it has been designed for our convenience and abuse.

However, as well as having its own intrinsic value, biodiversity is our natural capital, delivering ecosystem services that underpin our economy and its deterioration and loss jeopardises the provision of these services. In our day to day lives we all benefit from these ecosystem services, often in ways that we don't immediately recognise.

What is the ecosystem approach?

A key underlying principle for the conservation of biodiversity is the Ecosystem Approach, defined by the Convention on Biological Diversity (1994) as "A strategy for the integrated management of land, air, water and living resources that promotes conservation and sustainable use in an equitable way."¹ Climate change in particular, in addition to other environmental changes, underlines the need for a long-term, ecosystem-based approach.

An ecosystems approach is a set of principles that can be applied to any plan or decision that may positively or negatively affect the environment, whether directly or indirectly.² It is about making sure that we recognise and sustain the benefits provided by the environment, whilst delivering other economic and social goals. The steps needed to implement an ecosystems approach can be summarised in three main principles:

1 <http://biodiv.org/decisions/default.asp?lg=0&m=cop-05&d=06>

2 Applying an ecosystems approach to land use. Scottish Government (2011)

a) Consider natural systems – by using knowledge of interactions in nature and how ecosystems function. For example how changing water temperature affects fish species; how grazing animals or fertilizing crops changes the balance of plant species; or how species interact through competition and predation. This implies a need to consider the broad scale as well as the local; and the long term as well as the immediate. Ecosystem function often shows a capacity to accommodate some change, but a significant impact may result when a threshold is crossed and capacity exceeded.

b) Take account of the services that ecosystems provide – including those that underpin social and economic well being, such as flood and climate regulation, resources for food, fibre or fuel, or for recreation, culture and quality of life. For example:

- The likelihood of floods affecting people's homes depends in part on how the land is used in the surrounding catchment
- Everyone's food resources depend on clean water and productive soils
- Our quality of life is enhanced by pleasant surroundings for work and leisure

All these services are supplied by our ecosystems. There are ways to account for some of these services using economic and other measures to inform policy and consider offsetting or mitigation.

c) Involve people – those who benefit from the ecosystem services and those managing them need to be involved in decisions that affect them. Their knowledge will often be central to success. Public participation should go beyond consultation to become real involvement in decision making.

Why is biodiversity under threat?

Alongside climate change, biodiversity loss is recognised as a critical global environmental threat, and the two are inextricably linked. Not only will habitats and species be affected directly by climate change and sea level rise but, probably as significant, they will also



Dingieshowe - Image courtesy of Drew Kennedy

be affected by policy and behavioural shifts in other sectors such as agriculture, water, transport and energy.³

Other pressures that contribute to a decline in biodiversity include:

- loss of habitat and the resulting degradation of ecosystems;
- pollution, including nutrient enrichment from diffuse forms of pollution;
- over exploitation of natural resources;
- invasive non-native species that threaten our native biodiversity and are costly to eradicate or manage.

Biodiversity is inexorably linked to sustainable development, and a rich biodiversity is generally associated with healthy environments. To ensure the survival of our habitats and species, and to pass down a healthy stock of natural assets for future generations, we must accept that we play a defining role in the sustainability and health of our islands. As a consequence, we must all afford respect and protection to wildlife, along with the natural landscapes within which we live. It is important that we conserve the habitats and species which are rare or under threat, but equally we must appreciate the value of other more commonplace biodiversity and ensure its protection so that future generations can continue to benefit from it.

3 Conserving Biodiversity – The UK Approach (2007)

1.1 Biodiversity action in Orkney – general outline of the Plan

By its nature, biodiversity action planning is a developing process and this Plan represents further progression of the original Orkney Local Biodiversity Action Plan (2002). The first review of the OLBAP which was undertaken in 2007 focused on ten Habitat Action Plans (HAPs) from the original Plan introducing new objectives and targets as well as a set of actions for each. In this, the second review of the OLBAP, a similar approach has been taken and once more ten HAPs have been selected for targeted action. The Audit and Habitat Action Plans from the OLBAP (2002) will continue to be relevant to the protection and enrichment of biodiversity in the Orkney Isles and will provide the context to this more focused Plan for 2013-2016.

The Orkney Local Biodiversity Action Plan 2013-2016 comprises three sections. This, the first section, provides a brief overview of changes which have been made to the Biodiversity Action Planning System since the original OLBAP was produced as well as changes to environmental legislation, planning policy and rural development policy which will contribute to influence biodiversity planning in the years to come. Section 1 covers the following areas:

- Biodiversity action planning – the international context
- The Scottish Biodiversity Strategy
- Recent developments in environmental legislation
- Biodiversity and the Local Authority land use planning system
- Biodiversity and rural development policy
- Other relevant national publications

- Links with the Biodiversity Records Centre

The second section begins with an explanation of the process which led to selection of the ten Habitat Action Plans for inclusion in this review of the OLBAP, then presents the ten HAPs and their revised targets and actions for the period 2013-2016. The baseline information relating to each habitat remains largely as it appeared in the original Plan but has been updated to include details relating to legislative and rural policy changes. The Steering Group would like to stress, however, that although it has chosen to select a limited number of habitats to focus on over the next three years, it would still be looking to others to progress conservation activities to any or all of the remaining Orkney LBAP habitats and species as set out in the original Plan.

The third section provides information which relates biodiversity in Orkney to the Scottish and UK frameworks.

At national level the Scottish Biodiversity List of priority species and habitats has been updated to fully incorporate recent changes to the UK BAP List. The Orkney lists of species and habitats have been amended to take account of these revisions and are included as Appendices I and II of this Plan.

Ten years have elapsed since the Orkney Biodiversity Audit was initially published and it is recognised that its species and habitats lists may need to be updated further to take account of more recently collected recording data. A full review of the Biodiversity Audit will therefore be undertaken during the lifetime of the Orkney LBAP 2013-2016.

1.2 Biodiversity action planning in an international and national context

In October 2010 officials from 192 countries and the European Union – all signatories to the **Convention on Biological Diversity (CBD)** – gathered in Nagoya, Japan to agree how to tackle biodiversity loss. It was the tenth meeting of the Conference of Parties to the Convention on Biological Diversity (COP10), and over 10,000 delegates attended.

The CBD was set up following the Rio Earth Summit in 1992 to ensure the conservation

and sustainable use of biodiversity. It also ensures fair access to, and sharing the benefits from, global genetic resources.

The COP10 led to the adoption of a global Strategic Plan for biodiversity 2011-2020, the **Nagoya Protocol** on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilisation as well as a strategy to mobilise resources for global biodiversity. Delegates agreed 20 new targets for the conservation and sustainable use

of biodiversity for the next ten years. These targets have been named the **Aichi Targets** after the region in Japan where the COP10 meeting was held.

The Aichi Targets are grouped under 5 main goals:

1. Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society.
2. Reduce the direct pressures on biodiversity and promote sustainable use.
3. Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.
4. Enhance the benefits to all from biodiversity and ecosystem services.
5. Enhance implementation through participatory planning, knowledge management and capacity building.

Appendix III of this Plan sets out the 20 Aichi actions which have been identified under these goals.

Informed by the conference in Nagoya, European Commissioners tabled on 3rd May 2011 an updated EU 2020 Biodiversity Strategy. Titled "**Our Life Insurance, our natural capital: an EU biodiversity strategy to 2020**", the strategy includes six priority targets and twenty associated actions which address the main drivers of biodiversity loss.

In summary form, the six EU targets are:

1. Habitat and species assessments are improved between now and 2020.
2. By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15% of degraded ecosystems.
3. Ensure uptake of agricultural funding to improve status of species dependant upon agriculture and to ensure that public owned and private woodland (above a certain size) are managed according to plans to improve the conservation status of habitats and species.
4. Safeguarding and protecting EU fish stocks to achieve the maximum sustainable yield by 2015.

5. By 2020, Invasive Alien Species and their pathways are identified and prioritised, priority species are controlled or eradicated, and pathways are managed to prevent the introduction and establishment of new IAS.
6. By 2020, the EU has stepped up its contribution to averting global biodiversity loss.

Scotland's biodiversity strategy, **Scotland's Biodiversity: It's in Your Hands**, was published in 2004 and sets out how the government will conserve biodiversity for the health, enjoyment and wellbeing of the people of Scotland now and in the future.

The strategy sets out its vision:

"It's 2030: Scotland is recognised as a world leader in biodiversity conservation. Everyone is involved; everyone benefits. The nation is enriched",

.....its aim:

"To conserve biodiversity for the health, enjoyment and wellbeing of the people of Scotland now and in the future",

....and its five key objectives:

1. **Species and habitats:** To halt the loss of biodiversity and continue to reverse previous losses through targeted action for species and habitats;
2. **People:** To increase awareness, understanding and enjoyment of biodiversity, and engage many more people in its conservation and enhancement;
3. **Landscapes and ecosystems:** To restore and enhance biodiversity in all our urban, rural and marine environments through better planning, design and practice;

4. **Integration and co-ordination:** To develop an effective management framework that ensures biodiversity is taken into account in all decision making; and
5. **Knowledge:** To ensure that the best new and existing knowledge on biodiversity is available to all policy makers and practitioners.

Scotland's Biodiversity Strategy is currently being reviewed to make sure it can meet the new challenges and targets for 2020 set out in both the Aichi Targets and the European Biodiversity Strategy. A full public consultation is scheduled for summer 2012.

While the review is ongoing, delivery of the current strategy continues. This is the responsibility of a partnership of the Scottish Government, government agencies, Non Departmental Public Bodies, local government and non-governmental organisations. More information on the delivery structures, biodiversity in Scotland and the delivery partners are available on the Biodiversity Forum website.

To deliver biodiversity in Scotland there are five ecosystem groups covering:

- Freshwater & wetland
- Lowland & farmland
- Marine & coastal
- Upland
- Woodland

Ecosystem group plans for action have been developed for each of the five groups.

These plans are revised and developed on a 3-yearly basis and are implemented by a wide range of organisations across Scotland. In addition, a Biodiversity Implementation Team (BIT), funded by a partnership of public and voluntary bodies has been set up which encourages and supports organisations in meeting their obligations, and oversees delivery, coordination and reporting of the plans. The Scottish Biodiversity Forum working groups also play a role in overseeing and facilitating delivery of the plans, as well as developing the next set of plans.

Further information on the work of the Biodiversity Forum and on biodiversity in Scotland in general may be found at www.biodiversityscotland.gov.uk.

1.3 Recent developments in environmental legislation

The first targeted version of the Orkney LBAP which was published in 2007 highlighted a number of significant changes to environmental legislation which had been introduced since publication of the full Orkney LBAP in 2002, namely the transposition into Scottish law of the provisions of both the Water Framework Directive and the Strategic Environmental Assessment Directive and the introduction of The Nature Conservation (Scotland) Act 2004.

In recent years further changes to the way wildlife is legally protected have been introduced through the Marine (Scotland) Act 2010 and the Wildlife and Natural Environment (Scotland) Act 2011. Another important piece of legislation of relevance to the natural environment is the Climate Change (Scotland) Act 2009.

The Marine (Scotland) Act 2010

The Marine (Scotland) Act 2010 provides a framework which aims to balance competing demands on Scotland's seas. It introduces

a duty to protect and enhance the marine environment and includes measures to help boost economic investment and growth in areas such as marine renewables.

The main measures include:

Marine planning: a new statutory marine planning system to sustainably manage the increasing, and often conflicting, demands on our seas. The planning system will operate at three levels:

- Internationally, by providing links to the UK Marine Act provisions and to wider initiatives such as the EU Marine Strategy Framework Directive;
- Nationally through a Scottish Marine Plan which will set out national marine objectives and priority targets;
- Regionally, through Regional Marine Plans which may be prepared for Scottish Marine Regions, with the option for planning functions to be delegated to a local body.

Although boundaries have yet to be

finalised for all the Scottish Marine Regions, preparation of the Pentland Firth and Orkney Waters (PFOW) Marine Plan began in May 2012. The plan builds on the PFOW Marine Spatial Plan Framework and subsequent Stage 2 studies. It is a non-statutory pilot plan that will inform the future development of a statutory Regional Marine Plan. The pilot is being carried out through a partnership approach involving Orkney Islands Council, Highland Council and Marine Scotland. The draft plan is scheduled to be prepared for consultation by the end of 2013.

Once marine plans are in place, public bodies must take decisions, such as granting licenses or planning permission, in accordance with the plan policies.

Marine conservation: improved marine nature and historic conservation with new powers to protect and manage areas of importance for marine wildlife, habitats and historic monuments; Marine Protected Areas (MPAs) are an important mechanism for protecting Scotland's seas. They are one way of helping us to achieve the Government's vision of 'clean, healthy, safe, productive and biologically diverse oceans and seas'. Scotland has international commitments to establish an ecologically coherent network of MPAs under OSPAR and the World Summit on Sustainable Development. SNH

has undertaken reviews of a large number of marine habitats and species in order to identify those it considers to be of greatest marine nature conservation importance in Scottish territorial waters – these are termed Priority Marine Features. A subset of the PMFs will be used to underpin the selection of Nature Conservation MPAs. As yet no MPAs have been designated in Orkney waters but a number of PMFs are known to occur locally, including benthic habitats such as horse mussel beds, maerl beds, seagrass beds and mobile species such as common and grey seal, sea trout as well as a number of cetacean species.

Seal conservation: the Act introduced much improved protection for seals and a new comprehensive licence system to ensure appropriate management when necessary. On the 1st February 2011 it became an offence to kill, injure or take a seal at any time of year except to alleviate suffering or where a licence has been issued to do so by Marine Scotland. The method of killing or taking seals is detailed in licences issued and regular reporting is required. It will also be an offence to intentionally or recklessly harass seals at significant haul-out sites when these have been designated. The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) also prohibits certain methods of catching or



Grey seal pup - Image courtesy of Derren Fox

killing seals. Marine Scotland is the licensing authority for seals under the Act and licences are issued annually authorising the killing or taking of seals for a number of activities including research, to protect the health and welfare of farmed fish and to prevent serious damage to fisheries or fish farms. Before granting a seal licence Marine Scotland must have regard to any information they have about damage which seals have already done to the fishery or fish farm concerned and the effectiveness of non-lethal alternative methods of preventing seal damage to the fishery or fish farm concerned.

Under Part 6 of the Act it will also be an offence to harass seals intentionally or recklessly at significant haul-out sites. Significant haul-outs are being defined by the Sea Mammal Research Unit based on their aerial seal counts and will be designated soon following a period of consultation. Significant haul-outs will be updated annually based on the most up to date seal counts.

The Act also provides for Scottish Ministers to designate “seal conservation areas”. The areas previously covered by the Conservation of Seal (Scotland) Orders namely Shetland, Orkney, the Moray Firth and the East Coast of Scotland have been transcribed into seal conservation areas and in addition the Outer Hebrides has also been scheduled as a seal

conservation area. Marine Scotland must not grant a seal licence authorising the killing or taking of seals in a seal conservation area unless they are satisfied that there is no satisfactory alternative way of achieving the purpose for which the licence is granted, and that the killing or taking authorised by the licence will not be detrimental to the maintenance of the population of any species of seal at a favourable conservation status in their natural range (within the meaning of Article 1(e) of the Habitats Directive).

Marine licensing: a simpler licensing system, minimising the number of licences required for development in the marine environment to cut bureaucracy and encourage economic investment;

Enforcement: a range of enhanced powers of marine conservation and licensing.

The Wildlife and Natural Environment (Scotland) Act 2011

The Scottish Government introduced the Wildlife and Natural Environment (Scotland) Act 2011 (The WANE Act) to make the law on wildlife and the natural environment more efficient, effective and proportionate. The main purposes of the Act are to:

- Modernise deer management legislation, including recreational deer stalking.



Japanese knotweed, an invasive non-native species - Image courtesy of Eileen Summers

- Modernise and deregulate game law (relating to game birds and ground game), including the abolishment of game licenses.
- Introduce new rules on snaring, including the training of snare operators.
- Ensure badger licensing legislation is consistent with that of other species.
- Control, contain and eradicate invasive non-native species.
- Improve the administration of species licensing.
- Abolish the Areas of Special Protection designation.
- Increase flexibility in how muirburn (controlled burning of heather, grass and other moorland) is carried out.
- Improve Sites of Special Scientific Interest (SSSI) legislation.

Part 2 of the Act amends and expands Section 14 of the Wildlife and Countryside Act 1981 which deals with the “Introduction of new species”, and moves away from listing species, instead introducing a “no release general presumption”. It is now an offence to release any non-native animal from captivity or to cause any non-native plant species to grow in the wild. Non-native includes native species “beyond their native range”. Further detail, along with definitions of “non-native species” and “native range”, is set out in the *Code of Practice on Non-native and Invasive Non-native Species* Scottish Government (2012).

The Code defines the offence of planting or causing to grow in the wild by listing areas that are designated as non-wild and therefore exempted, pointing out that it is the species uses of land that causes it to be designated as non-wild rather than whether the land is privately owned or not.

The 1981 Act enables relevant bodies to recover the costs of operations undertaken to enforce a Species Control Order. The Code confirms that in relation to Invasive Non-native Species “*this power is discretionary and it is expected that this will depend on the particular circumstances. The intention is that costs will be recovered where it is fair and proportionate to do so, in accordance with the “polluter pays” principle. In others words, where it is clear that the person is responsible for the problem, for example if they have actively released the invasive animal or plant*

in question. There may also be other cases where it is fair to recoup costs, for example where the owner or occupier is considered to have caused the species to spread.”

During the lifetime of the LBAP 2013-2016 a list will be prepared of Non-native and Invasive Non-native species that are known to occur in Orkney.

In Part 5 the Act amends Section 1 of the Nature Conservation (Scotland) Act 2004 Act by requiring public bodies to prepare and publish reports on their compliance with the Biodiversity Duty. Reports must be produced on a three-yearly basis with the first report due to be published by March 2014.

Following introduction of the WANE Act, Scottish Ministers have delegated the majority of their species licensing powers to Scottish Natural Heritage. Exceptions include certain areas of licensing in respect to seals and cetaceans (whales, dolphins and porpoises), which are dealt with by Marine Scotland. It also introduces some completely new licensing purposes. These new areas of licensing include out of season heather burning, and licensing impacts on certain species protected under the Wildlife and Countryside Act (1981) under a new purpose ‘for any other social, economic or environmental purpose’.

The Climate Change (Scotland) Act 2009

Another important piece of legislation which will contribute to natural heritage conservation in future years is the Climate Change (Scotland) Act 2009.

Part 4 places climate change duties on public bodies requiring them to act in the way

- a) best calculated to deliver the emissions reduction targets,
- b) best calculated to deliver adaptation programmes made under the Act, and
- c) that they consider most sustainable.



Peatland - Image courtesy of Sydney Gauld

Public bodies are required to report annually on the discharge of their climate change duties within annual Climate Change Declaration Reports. Orkney Islands Council's Climate Change Declaration Reports for 2010 and 2011 may be accessed from the Council website at www.orkney.gov.uk.

Part 5 – Section 53 requires the Scottish Ministers to lay programmes on adaptation to climate change before the Scottish Parliament, and to report on these programmes and the progress made under them.

Part 5 – Section 57 places a duty on the Scottish Ministers to produce a land use

strategy and provides for an enabling power for the Scottish Ministers to vary, but not shorten, the permitted times during which muirburn may be made where they consider it necessary or expedient to do so in relation to climate change. This chapter also allows modification by secondary legislation of the functions of the Forestry Commissioners to enable the Forestry Commission in Scotland to play a greater role in tackling climate change.

Further information on Scotland's Climate Change Framework as well as Scotland's first Land Use Strategy is provided in Section 1.8 below.

1.4 Biodiversity and the local authority land use planning system

The planning system is used to make decisions about the future development and use of land in our towns, cities and countryside. It considers where development should happen, where it should not and how development affects its surroundings. The system balances competing demands to make sure that land is used and developed in the public's long-term interest.

The Planning etc (Scotland) Act 2006 contained the most significant changes to the planning system in 60 years. The Act was drawn up against a commitment to make the planning system more efficient and inclusive. Secondary legislation and supporting guidance brought forward since 2007 has given planning authorities scope to implement a system that reflects local circumstances.

As part of the modernisation process, the Scottish Government has published its consolidated Scottish Planning Policy 2010 which replaces a number of former National Planning Policy Guidelines (NPPGs) and Scottish Planning Policies (SPPs).

In the new SPP the former NPPG 14 *Natural heritage* is replaced by a section entitled *Landscape and natural heritage*, which includes subsections on *International designations*, *National designations*, *Local designations*, *Protected species* and *Trees and Woodland*. In addition within the section on Minerals there is recognition of the need to protect, through development plans and development management decisions, those areas of peatland that retain a high level of natural heritage conservation interest

A key feature of the reforms has been the

promotion of a plan-led system to guide actions and decisions in the long term public interest. This includes the National Planning Framework, as well as Strategic and Local Development Plans.

The Orkney Local Development Plan 2012-2017

The Council has a statutory duty to prepare a Local Development Plan to establish the Council's policies and proposals for the use and development of land in Orkney over a five year period and beyond. The current Development Plan review process has been formerly underway since April 2009 and has been undertaken in 5 stages:

Stage 1 - Development Plan Scheme (reviewed annually from 2009).

Stage 2 - Main Issues Report - (*consultation was from 20th November 2009 to 26th March 2010*)

Stage 3 - The Proposed Plan - (*consultation was from 15th April to 24th June 2012*)

Stage 4 - The Modified Proposed Plan - (*consultation was from 7th May to 18th June 2012*)

Stage 5 - Publication of the Orkney Local Development Plan - (2013)

The Modified Proposed Plan was published on the 7th May 2012, following the decision of a meeting of the Full Council of Orkney Islands Council to remove two local level designations and place the detail in Supplementary Guidance (Local Nature Conservation Sites and Local Landscape Areas). These amendments represented significant change

to the 1st draft of the Plan (the Proposed Plan) so it became necessary to prepare a 2nd draft of the Plan (the Modified Proposed Plan) and hold further public consultation. This has provided an opportunity to take account of relevant consultation comments and other material planning considerations by making amendments to selected policies as well as certain settlement maps and statements. These further amendments have been included in the Modified Proposed Plan.

Supplementary Guidance Natural heritage was redrafted during spring 2012 with details relating to the Local Nature Conservation Sites being included in a supporting Annex. Following consideration of the responses to public consultation on the revised Supplementary Guidance, a meeting of the

Full Council resolved to approve the draft Supplementary Guidance as a material consideration in planning decision making, with subsequent formal adoption pending the completion of a boundary review of the locally designated sites.

When finally approved, the new plan will be known as the Orkney Local Development Plan, and will replace the current policies of the Orkney Structure Plan (2002) and the Local Plan (2004). It is expected that the new Orkney Local Development Plan will be ready for final approval by the Council in 2013. Until then, there will be a transition period during which the provisions of both the old and the draft versions of the emerging new plan will influence decisions on planning applications.

1.5 Community planning

The Orkney Community Plan and Single Outcome Agreement for 2011-2014 has been compiled by the Orkney Community Planning Partnership as its commitment to the people of Orkney. In the Plan, the Partnership sets out what it hopes to achieve over the three year period as its contribution, both to Orkney's local priorities, and to the 15 National Outcomes which are the ambitions of the Scottish Government for the whole of Scotland.

All members of the Orkney Community

Planning Partnership agree to use the Community Plan as the starting point for their own strategic plans, and to make sure there is a clear line of sight from the Plan to their own plans and outcomes.

In the section entitled *Our Environment* the Plan includes as one of its local priorities "*Conserve and, where appropriate, enhance biological diversity in Orkney*". The Orkney Local Biodiversity Action Plan provides a framework as well as the necessary information and guidance to carry forward this priority.

1.6 River Basin Management Planning

Introduction of the EU Water Directive Framework provides a stronger mechanism for the protection and enhancement of eutrophic standing waters than has previously existed and includes new statutory objectives for their ecological status. It requires the production of a national River Basin Management Plan; however, in the context of the national plan, targets and responsibilities trickle down to the local level.

The purpose of the **Orkney and Shetland Area Management Plan** is to maintain and improve the ecological status of the rivers, lochs, estuaries, coastal waters and groundwater areas of Orkney and Shetland. This plan supplements the **River Basin Management Plan for the Scotland River Basin District**, and will help to deliver

Water Framework Directive requirements. It focuses on local actions for Orkney and Shetland and highlights the opportunities for partnership working. Efforts to reduce pollution will continue but achieving these broader goals requires action to reduce the adverse impacts of a wide range of other pressures that can affect ecological quality. These include over-abstraction, engineering modifications that have caused damage to the beds, banks and shores of surface waters, and the introduction and spread of invasive non-native plants and animals. The plan identifies where the waters of the Orkney river basin district are under pressure and the proportionate actions that will be taken to improve them. These actions will support and enhance biodiversity.

1.7 Biodiversity and rural development policy

The Common Agricultural Policy

The 2003 reform of the CAP introduced a new system of direct payments, known as the single payment scheme, under which aid is no longer linked to production (decoupling). The main aim of the single payment is to guarantee farmers more stable incomes. Farmers can decide what to produce in the knowledge that they will receive the same amount of aid, allowing them to adjust production to suit demand.

To receive direct payments, farmers must meet certain standards concerning public, animal and plant health, the environment and animal welfare and keep their land in good agricultural and environmental condition. This is known as cross compliance. Where farmers fail to meet those standards, the direct payments they can claim are reduced or even withdrawn completely for the year concerned.

The instrument known as 'modulation' provides a means to ensure the transfer of CAP funds from direct aid to farmers and market measures ('Pillar 1' of the CAP) to rural development measures ('Pillar 2').

Scotland Rural Development Programme 2007-2013

The Scotland Rural Development Programme is a £1.6 billion programme of economic, environmental and social measures designed to develop rural Scotland until 2013.

Measures are delivered through:

- Crofting Counties Agricultural Grant Scheme
- Food Processing, Marketing and Co-operation Grant Scheme
- Forestry Commission Challenge Funds
- The LEADER initiative
- Less Favoured Area Support Scheme
- Rural Development Contracts
- Skills Development Scheme

The Programme includes measures to address economic and social goals as well as environmental measures. It is outcome-focused and primarily aims to deliver a Greener Scotland and to promote a Wealthier and Fairer rural Scotland. It contributes to the Government's Healthier and Smarter objectives and will help to strengthen rural communities.

It brings together a wide range of formerly separate support schemes including those covering the farming, forestry and primary processing sectors, rural enterprise and business development, diversification and rural tourism. It includes measures to support and encourage rural communities and delivers the LEADER initiative for local innovation in rural areas.

Rural Development Contracts - Rural Priorities offers support to deliver outcomes which benefit the people of Scotland, through an integrated application process.

Each of the 11 Regions for SRDP established a set of 'Regional Priorities', in consultation with local stakeholders, which contribute to the five key SRDP outcomes:

- improving business viability
- enhancing biodiversity and the landscape
- improving water quality
- tackling climate change
- supporting thriving rural communities

Individuals, businesses and formally constituted groups were invited to put forward proposals on how they would contribute to these Regional Priorities. Regional Proposal Assessment Committees selected those



Ploughed furrows - Image courtesy of Sydney Gauld

proposals offering to deliver the greatest benefit.

The Biodiversity Priorities which feature in the Orkney Local Priorities for Rural Development Contracts (RDCs) refer to the habitats and species which are presented in the LBAP 2002-2007 and the LBAP 2008-2011, and which land managers can consider for inclusion in their RDCs. These priorities focus on halting the loss of biodiversity and reversal of previous losses through management, conservation and enhancement. Rural Priorities applications are assessed jointly by SGRPID, SNH and FCS through area offices.

The Common Agricultural Policy is due to

be reformed by 2013. After a wide-ranging public debate the Commission presented on 18 November 2010 a Communication on "The CAP towards 2020", which outlines options for the future CAP and launched the debate with the other institutions and with stakeholders. On 12 October 2011 the Commission presented a set of legal proposals designed to make the CAP a more effective policy for a more competitive and sustainable agriculture and vibrant rural areas. Following a debate in the European Parliament and the Council, the approval of the different regulations and implementing acts is expected by the end of 2013, with a view to having the CAP reform in place as from 1st January 2014.

1.8 Other relevant national publications

To meet the requirements of Section 53 of the Climate Change (Scotland) Act, **Scotland's Climate Change Adaptation Framework** was published in December 2009. The Framework is supported by a series of accompanying Sector Summaries and Action Plans outlining the key issues and planned activity for addressing adaptation within sectors. These will be periodically updated to reflect key developments and the most recent versions are available online from the Scottish Government website at www.scotland.gov.uk/climatechangeadaptation.

The **Biodiversity and Ecosystem Resilience Sector Action Plan** covers:

- biodiversity conservation and management on land and inland water bodies; and
- ecosystem services from land and inland water bodies.

The Plan summarises what is needed to build resilience and maximise opportunities that the changing climate will present for this sector. The second part provides a comprehensive list of current and planned actions, taking a multi-agency approach, to build resilience, grouped by the three pillars of the Adaptation Framework:

1. Understand the consequences of a changing climate
2. Equip decision makers with skills and tools
3. Integrate adaptation into public policy and regulation

Areas which have significant links with Biodiversity and Ecosystem Resilience but are mainly addressed by other Sector Action Plans include:

- Farming and the impact on biodiversity and ecosystems services;
- Forestry and the impact on biodiversity and ecosystems services);
- The impact on biodiversity and ecosystems services of land use and spatial planning decisions; and
- Biodiversity and ecosystems services in the marine environment.

Getting the best from our land, a land use strategy for Scotland was published by the Scottish Government in 2011. Development of the strategy is a key commitment of Section 57 of the Climate Change (Scotland) Act. The Strategy establishes a set of ten principles which are in line with the principles of sustainable development and which also reflect Government policies on the priorities which should inform land use choices across Scotland.

Importantly, the Strategy highlights the need for land use decisions to be informed by an understanding of the functioning of the ecosystems which they affect in order to maintain the benefits of the ecosystem services which they provide. It is supported by an information note entitled "*Applying an ecosystems approach to land use*" which represents the first step towards demonstrating how an ecosystems approach

might be taken into account in relevant decisions made by public bodies, to deliver wider benefits.

The Strategy also promotes the encouragement of outdoor recreation opportunities and public access to land, along with the provision of accessible green space close to where people live, recognising their importance for health and well being.

The **Scottish Soil Framework** sets out the Scottish Government's vision for soil protection in Scotland, and formally acknowledges the important services soils provide to society. Recognising that climate change and loss of organic matter are the most significant threats to Scottish soils it promotes the sustainable management and protection of Scotland's soils and identifies several key outcomes of direct relevance to climate change adaptation.

The principal aim of the Framework is to *"promote the sustainable management and protection of soils consistent with the economic, social and environmental needs of Scotland"*, and its underlying vision is

that *"soils are recognised as a vital part of our economy, environment and heritage, to be safeguarded for existing and future generations in Scotland."*

Acting as an overview for soil protection in Scotland, the Framework brings together key delivery partners, including Scottish Environment Protection Agency, Scottish Natural Heritage, Forestry Commission Scotland and Historic Scotland, as well as land managers, research organisations and other stakeholders working towards a set of 13 defined soil outcomes, of which the following have particular relevance to biodiversity conservation:

- Soil organic matter stock is protected and enhanced where appropriate;
- Soil biodiversity, as well as above ground biodiversity, is protected;
- Soils make a positive contribution to sustainable flood management;
- Water quality is enhanced through improved soil management.

1.9 Links with the Orkney Biodiversity Records Centre

The Orkney Biodiversity Records Centre is located at the Orkney Library & Archive on Kirkwall's Junction Road. Established in 1998, the Centre forms a central location for the collection and dissemination of information relating to the natural heritage of the Orkney Islands. This information primarily takes the form of data associated with the distribution of the County's habitats and species and has been recorded over many years, both by voluntary recorders and by other organisations with an interest in the natural environment of Orkney.

The species records are stored on a database, and the habitat information is stored on a Geographic Information System which can be accessed by planners or consultants to investigate the possible presence of certain species and any potential environmental conflicts in areas identified for development.

The Centre is also widely used by students and naturalists and promotes study of the natural environment by organising courses which are open to professionals and members of the public alike. An extensive library of natural history reference books is available at the Centre, as is a range of sampling equipment which may be loaned out to assist with sampling and recording projects.

In the future it is anticipated that the Records Centre will develop further to increase the range of environmental information it can provide.

For further information on the information and services which are available at the OBRC, please contact Sydney Gauld, Orkney Library & Archive, 44 Junction Road, Kirkwall, Orkney, KW15 1AG. Telephone: 01856 873166.

Selection of the Ten Habitats for Targeted Action 2013-2016

The OLBAP 2002-2007 consisted of 59 habitats for which action plans were written. It had been intended that action plans would also be produced for a select set of 30 species but these were not written during the lifetime of the first OLBAP. The 59 Habitat Action Plans (HAPs) had 459 individual actions, of which over half were accomplished. Approximately 25% were deemed unreasonable, either because the lead partner had no remit to accomplish the action or the actions were judged to be too broad. The remainder became unattainable due to changes to national programmes such as further development of the Common Agricultural Policy and introduction of the Water Framework Directive.

Although a number of the actions from these HAPs are now considered unachievable, the OLBAP 2002-2007 continues to represent the base document, providing guidance on the conservation importance of habitats and species and a range of information relating to each habitat including habitat descriptions, information on their local distribution, factors affecting the habitat and current actions and opportunities. This information remains very relevant and people are still encouraged to refer to the HAPs and to utilize the information which they provide.

The Orkney LBAP 2008-2011 was the first targeted revision to be undertaken of the OLBAP and it provided an opportunity to evaluate the quality of the actions and their suitability to the partners. It also addressed the review of UK priority species and habitats which had been undertaken in 2007, as well as changes to the UK Biodiversity Action Planning process, taking into account the Scottish Biodiversity Strategy and the Scottish Biodiversity Implementation Plans. In line with the latter, the OLBAP continues to be reviewed and developed on a three-year basis with each targeted Plan focusing on a series of habitats that link to form ecosystems.

In 2007 KT (Kepner-Tregoe) analysis and ranking was undertaken of the terrestrial and marine habitats, based on ten criteria that reflect UK, national and local priorities. The ranked habitats were then analysed against a further set of criteria which were based

on potential for positive action towards the habitat as well as resource implications. Following this second stage, ten habitats were selected from three ecosystems.

In 2011 a similar analysis and ranking process was undertaken which identified the following habitats and ecosystems for action in the Orkney LBAP 2013-2016:

Freshwater environment

- 1 Lowland Fens
- 2 Basin bog
- 3 Eutrophic standing water
- 4 Mesotrophic lochs
- 5 Ponds & milldams
- 6 Burns & canalised burns

Coastal environment

- 7 Coastal sand dunes & links
- 8 Aeolianite
- 9 Coastal sand dunes

Marine littoral environment

- 10 Intertidal underboulder communities



Turnstones - Image courtesy of Derren Fox

It was envisaged that each Habitat Action Plan would consist of no more than two targets and six actions and that these actions should benefit species which are dependent upon the habitat, in particular priority species from the UK BAP and Scottish Biodiversity List. Use of an ecosystem approach ensures that implementation of individual actions does not occur in isolation or at the expense of other habitats and species.

To maintain consistency with the Orkney LBAP 2002-2007, the original numbering system of the Habitat Action Plans has been retained.

The lists of species associated with each habitat remain as they appear in the Orkney LBAP 2002, but their conservation status

in relation to the Scottish Biodiversity and UK BAP Lists has been amended as appropriate. However the lists have not been revised to include new species resulting from introduction of the Scottish Biodiversity List, nor to include or exclude species in order to take account of changes to the UK BAP list.

It is anticipated that a similar selection process will be undertaken to identify the 10 habitats for targeted action in 2016 – 2019.

Strategic Environmental Assessment

SEA has been carried out of the OLBAP and the results of the assessment process are presented in the accompanying Environmental Report and its appendices.

1. UK PRIORITY HABITAT DESCRIPTION

Fens are terrestrial wetlands fed by surface water and/or groundwater, as well as direct input from rainfall. They are characterised by high soil water levels for all or part of the year, and are often based on peat. Fens are minerotrophic due to the high level of dissolved nutrients which they receive from the soil, rock and groundwater.

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 and overland, resulting in water ponding in depressions such as valleys, basins and floodplains.
- Soligenous fens, where water movements are predominantly lateral through the soil or discharging from the rock, such as spring fens or flushes.

Some fens, for example valley fens, combine both of these types.

Fens on slopes occur on gently sloping land and include valley-head fens that form the source or headwaters of streams and burns. Water retention is often within low permeability peat or alluvial deposits. Run-off from surrounding slopes is often an important water source, but groundwater discharge may also make an important contribution to the water regime.

Fen in topographic depressions (or basins) occurs in hollows in the landscape, for example those associated with glacial or peri-glacial processes such as kettle holes. Surface run-off from surrounding slopes can be an important source of water, depending on the surrounding topography. Certain sites have no surface water flow outlet.

Fen on the edge of open water, such as a burn or loch, receives water throughout the year.

Spring-fed fen receives water from saturated soil or rock at one spot (spring) or discrete zone (seepage).



Durkadale - Image courtesy of Eileen Summers

Valley bottom fens are normally located on floodplains associated with permanent or ephemeral watercourses. In the lower reaches of a catchment they may include estuaries or coastal plains. Over-bank flow from a river or burn, in the form of 'flash' flood events is normally an important water supply mechanism.

Separate fen habitat can occur along water tracks within a larger fen such as a valley fen or within larger peatland. Here the water supply comes from the soil.

Floodplain wetlands include sites on flat valley bottoms where the watercourse is small and does not provide significant amounts of water through overbank flooding. Groundwater discharge can also be an important water supply mechanism where the wetland is underlain by an aquifer and not separated by impermeable strata.

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).



Northern marsh orchid - Image courtesy of Christine Skene



Short-eared owl - Image courtesy of SNH

- 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.

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

2. CURRENT LOCAL STATUS AND EXTENT

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 been 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, although many of these are equally to be found in a variety of other wetland habitats.

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.



Hen harrier, female - Image courtesy of Derren Fox

3. LOCAL DISTRIBUTION



Dunlin - Image courtesy of Derren Fox

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 fen⁴, rich in plant and bird species, but is based on mineral soils, though there may be areas of *Fen* habitat within it. There are also areas of base-rich fens in some of the upland areas, such as Hoy. However, the objectives and actions in this 3 year Plan are primarily aimed at the fens in the lowland areas, i.e. below 100m, rather than the fens in the uplands.

4 Orkney LBAP 2002 Section 9.4 Base-rich fen



Brown hares - Image courtesy of Derren Fox

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

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.

Species	Common Name	UK BAP List	Scottish Biodiversity List	Local Priority species
<i>Lutra lutra</i>	European otter	✓	✓	✓
<i>Lepus europaeus</i>	Brown hare	✓	✓	✓
<i>Crex crex</i>	Corncrake	✓	✓	✓
<i>Emberiza schoeniclus</i>	Reed bunting	✓	✓	✓
<i>Vanellus vanellus</i>	Lapwing	✓	✓	✓
<i>Numenius arquata</i>	Curlew	✓	✓	✓
<i>Phalaropus lobatus</i>	Red-necked phalarope	✓	✓	✓
<i>Limosa limosa</i>	Black-tailed godwit	✓	✓	✓
<i>Bufo bufo</i>	Common toad	✓	✓	✓
<i>Circus cyaneus</i>	Hen harrier		✓	✓
<i>Anser albifrons</i>	White fronted goose		✓	✓
<i>Calidris alpina</i>	Dunlin		✓	✓
<i>Larus ridibundus</i>	Black-headed gull		✓	✓
<i>Asio flammeus</i>	Short-eared owl		✓	✓
<i>Microtus arvalis orcadensis</i>	Orkney vole		✓	✓
<i>Hierochloa odorata</i>	Holy grass		✓	✓
<i>Sorex minutus</i>	Pygmy shrew			✓
<i>Mergatus serrator</i>	Red-breasted merganser			✓
<i>Aythya fuligula</i>	Tufted duck			✓
<i>Anas platyrhynchos</i>	Mallard			✓
<i>Tringa totanus</i>	Redshank			✓
<i>Rallus aquaticus</i>	Water rail			✓
<i>Acrocephalus schoenobaenus schoenobaenus</i>	Sedge warbler			✓
<i>Enallagma cyathigenum</i>	Common blue damselfly			✓
<i>Libellula quadrimaculata</i>	Four-spot chaser			✓
<i>Tropiphorus terricola</i>	A brown weevil			✓
<i>Lychnis flos-cuculi</i>	Ragged robin			✓
<i>Schoenoplectus tabernaemontani</i>	Glaucous bulrush			✓
<i>Berula erecta</i>	Lesser water parsnip			✓
<i>Carex paniculata</i>	Greater tussock sedge			✓
<i>Apodemus sylvaticus</i>	Wood mouse			✓
<i>Cygnus olor</i>	Mute swan			✓
<i>Anas crecca</i>	Teal			✓
<i>Anas penelope</i>	Widgeon			✓
<i>Anas strepera</i>	Gadwall			✓
<i>Fulica atra</i>	Coot			✓
<i>Gallinago gallinago</i>	Snipe			✓
<i>Ischnura elegans</i>	Blue-tailed damselfly			✓
<i>Hydrothassa hannoveriana</i>	A beetle			✓
<i>Caltha palustris</i>	Marsh marigold			✓
<i>Dactylorhiza purpurella</i>	Northern marsh orchid			✓
<i>Schoenoplectus lacustris</i>	Bulrush			✓
<i>Carex riparia</i>	Greater pond sedge			✓
<i>Rhinanthus minor</i>	Yellow rattle			✓
<i>Samolus valerandi</i>	Brookweed			✓

5. CURRENT FACTORS AFFECTING THE HABITAT

These are the same as for the *Marsh* Locally Important Habitat⁵. An additional factor for the *Fen* habitat is the particular sensitivity to changes in water levels brought about by drainage.

Wetlands were, and perhaps still are, the most threatened of all Orkney's 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 resulted in large increases in livestock numbers, requiring land for grazing and conversion to crops and improved grass. Changes in the Common Agricultural Policy have induced a reversal of this trend with livestock numbers declining by 8.8% for cattle, and 16.6% for sheep, over the last ten years. The following are the most important factors:

- Drainage: 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 drainage was 233 ha (5.3% of the original area)" since the previous survey of 1987. The removal of drainage grants and the shift towards environmental management has seen new drainage works virtually cease.

- Enrichment or eutrophication (increased plant nutrient levels): agriculture involves the rapid cycling of plant nutrients and losses are inevitable. More intensive systems, however efficient, 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.

5 Orkney Local Biodiversity Action Plan 2002 Section 9.1 Marsh



Curlew - Image courtesy of Derren Fox

- 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.
- 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; however this kind of activity is unlikely to be permitted under the Waste Management Licensing (Scotland) Regulations 2011 and would only be allowed if the waste activity could be demonstrated to be of ecological benefit.
- 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

- 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 SAC.
- Loch of Isbister & the Loons and part of Glims Moss & Durkadale are within RSPB reserves.
- SGRPID grants – The Scotland Rural Development Programme provides grants for conservation grazing management of wetlands through Rural Priorities. While the wetland management options of this scheme have seen high levels of uptake it is not known how many or how much of the habitat is protected and managed: probably little, as these sites are generally not subject to current agricultural use, and are therefore disbarred from the scheme.
- SFP and LFA support payments to farmers are conditional on cross compliance and observance of a code of good farming practice, including the protection of natural habitats and avoidance of overgrazing; however, these are not intended to address impacts of existing drainage works.
- The Orkney Islands Council Local Development Plan 2012 (Draft) gives draft Local Nature Conservation Sites a degree of protection from development which requires planning approval, but not from agricultural development.

6.2 Research and Guidance

- Guidance on management and entry into agri-environment schemes is provided by SAC.
- Phase 1 habitat surveys of all draft Local Nature Conservation Sites have been completed.
- RSPB has undertaken National Vegetation Classification (NVC) surveys of the majority of its reserves.

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.

7. ACTION PLAN OBJECTIVE

- Maintain the quality of fen habitat in Orkney and prevent deterioration.

8. ACTION PLAN TARGET

- Assess the scale of impact of breeding greylag geese on selected fens by 2014.
-

9. ACTION PLAN AGENCIES

National agencies: SNH; SGRPID; SEPA; OIC

Local partners: RSPB; SAC.

10. PROPOSED ACTIONS WITH AGENCIES

- Prepare a list of all known fens which are located within draft LNCS and other designated sites – **OIC (LNCS group)**
- Encourage appropriate management of fen through the SRDP and/or subsequent agri-environment programmes – **SGRPID & SAC**

Keynote species: Hen harrier *Circus cyaneus*, Short-eared owl *Asio flammeus*, Orkney vole *Microtus arvalis orcadensis*

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1. LOCAL HABITAT DESCRIPTION

Deep peat sometimes accumulates in basins and can become much deeper than 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 Macaulay 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.



Rackwick valley - Image courtesy of Sydney Gauld

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 bog is one of Europe's rarest and most

threatened habitats, also one of the most damaged.

The total area of basin bog in Orkney 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.



Ingrailed clay - Image courtesy of Sydney Gaud

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. magellanicum*

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 Skail, 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



Mountain hare - Image © Lorne Gill/SNH

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.

Species	Common Name	UK BAP List	Scottish Biodiversity List	Local Priority species
<i>Lepus timidus</i>	Mountain hare	✓	✓	✓
<i>Coenonympha tullia</i>	Large heath	✓	✓	✓
<i>Numenius arquata</i>	Curlew	✓	✓	✓
<i>Gavia stellata</i>	Red-throated diver		✓	✓
<i>Falco columbarius</i>	Merlin		✓	✓
<i>Falco tinnunculus</i>	Kestrel		✓	✓
<i>Pluvialis apricaria</i>	Golden plover		✓	✓
<i>Calidris alpina</i>	Dunlin		✓	✓
<i>Gnaphalium sylvaticum</i>	Heath cudweed		✓	✓
<i>Stercorarius skua</i>	Great skua			✓
<i>Sorex minutes</i>	Pygmy shrew			✓
<i>Anthus pratensis</i>	Meadow pipit			✓
<i>Buteo buteo</i>	Buzzard			✓
<i>Gallinago gallinago</i>	Snipe			✓
<i>Larus fuscus</i>	Lesser black-backed gull			✓
<i>Larus canus</i>	Common gull			✓
<i>Numenius phaeopus</i>	Whimbrel			✓
<i>Carsia sororiata anglica</i>	Manchester treble-bar			✓
<i>Diarsia mendica orkneyensis</i>	Ingrailed clay			✓
<i>Apamea zeta assimilis</i>	Northern arches			✓
<i>Psyche casta</i>	A moth			✓
<i>Dyscia fragaria</i>	Grey scalloped bar			✓
<i>Aeshna juncea</i>	Common hawkler			✓
<i>Chorthippus parallelus</i>	Meadow grasshopper			✓
<i>Sympetrum danae</i>	Black darter			✓
<i>Libellula quadrimaculata</i>	Four-spotted chaser			✓
<i>Pyrrhosoma nymphula</i>	Large red damsel			✓
<i>Hilaira pervicax</i>	A spider			✓
<i>Erigone capra</i>	A spider			✓
<i>Neon reticulatus</i>	A spider			✓
<i>Hypselistes jacksonii</i>	A spider			✓
<i>Araeoncus humilis</i>	A spider			✓
<i>Orthilia secunda</i>	Serrated wintergreen			✓
<i>Leiostryla angelica</i>	A snail			✓
<i>Hammarbya paludosa</i>	Bog orchid			✓
<i>Drosera anglica</i>	Great sundew			✓
<i>Sphagnum magellanicum</i>	A moss			✓

5. CURRENT FACTORS AFFECTING THE HABITAT

Factors affecting basin bog are similar to those outlined for the *Blanket bog* Priority habitat⁶. 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. The Orkney Local Development Plan 2012 (in draft) provides a significant degree of protection against commercial peat cutting.
- Drainage: major drainage systems
 - of valleys and basins including much improved agricultural land as well as basin bogs has inevitably lowered water tables 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.
 - The commercial extraction of peat 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 Orkney LBAP 2002 10.1 Blanket bog



Large red damselfly - Image © Lorne Gill/SNH

6. CURRENT ACTIONS AND OPPORTUNITIES



Meadow grasshopper - Image © Lorne Gill/SNH



Sundew - Image courtesy of Derren Fox

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 SAC; Loch of Isbister & the Loons is a SAC; Glims Moss & Durkadale is a SPA.
- Part of Hoy SSSI is located within the Hoy and West Mainland National Scenic Area (NSA).
- Part of the Glims Moss site and the Hoy site are within RSPB reserves.
- SGRPID grants – SRDP includes management options which provide annual payments for conserving Raised bog. This is a term used by vegetation surveyors for SNH to describe at least some of Orkney's

Basin bogs. Included in the options is the creation of buffer strips to protect sites on or adjacent to inbye land, including improved grassland and arable.

- The 'Muirburn Code' and its recent supplement 'Prescribed Burning on Moorland' produced by SGRPID - 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



Golden plover - Image © Lorne Gill/SNH

sensitive habitats such as basin bog. Section 75 of the Climate Change (Scotland) Act (2009) brought in an enabling power for the Scottish Ministers to vary, but not shorten, the permitted times during which muirburn may be made, where they consider it necessary in relation to climate change factors. More recently the Wildlife and Natural Environment (Scotland) Act (2011) has introduced licensing for out of season heather burning. The Muirburn Code Guidance Card (Scottish Government, 2011) provides a summary of essential information in support of The Muirburn Code.

- SFP and LFA support payments to farmers are conditional on cross compliance and observance of a code of good farming practice, including the protection of natural habitats and avoidance of overgrazing.
- Recent experiments have shown that, provided proper techniques are followed, regeneration will commence

soon after normal hand cutting.

- Groundwater dependent habitats are protected in part by the regulation of abstraction from wells and boreholes under the Water Environment (Controlled Activities) (Scotland) Regulations 2011.

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 SAC and private agents.
- SWT has collected the practical aspects of peat bog 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 OBJECTIVE

- Maintain the quality of basin bog sites in Orkney and prevent deterioration.

8. ACTION PLAN TARGET

Establish the scale of impact of breeding Greylag geese on basin bog sites by 2014

9. ACTION PLAN AGENCIES

National agencies: SNH; SGRPID; OIC

Local partners: RSPB; SAC.

10. PROPOSED ACTION WITH AGENCIES

- Presume against planning permission for any new commercial peat extraction – **OIC**
- Encourage appropriate management of basin bog sites through the SRDP and/or subsequent agri-environment programmes - **SGRPID & SAC**

Keynote species: Large heath butterfly *Coenonympha tullia*, Golden plover *Pluvialis apricaria*; Red-throated diver *Gavia stellata*.

REFERENCES AND OTHER INFORMATION SOURCES

Crawford, R. M. M. (1975). *The Loons, Birsay*. Contract Report for NCC

1. UK PRIORITY HABITAT DESCRIPTION

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.

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, which can colour 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. 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 it is considered to be in the region of 1785 km² of which approximately 15% (360 km²) occur in Scotland.



Loch of Harray - Image courtesy of Sydney Gauld

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; and the 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.



Coot - Image © Lorne Gill/SNH

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 *Ylodes reuteri* and the only Scottish locality for the snail *Theodoxus fluviatilis*.

4.1 Associated species and their biodiversity conservation status

Species	Common Name	UK BAP List	Scottish Biodiversity List	Local Priority species
<i>Lutra lutra</i>	European otter	✓	✓	✓
<i>Bufo bufo</i>	Common toad	✓	✓	✓
<i>Salmo trutta</i>	Trout	✓	✓	✓
<i>Aythya marila</i>	Scaup	✓	✓	✓
<i>Cygnus cygnus</i>	Whooper swan		✓	✓
<i>Larus ridibundus</i>	Black-headed gull		✓	✓
<i>Aythya ferina</i>	Pochard		✓	✓
<i>Theodoxus fluviatilis</i>	A snail		✓	✓
<i>Gavia stellata</i>	Red-throated diver		✓	✓
<i>Chara rudis</i>	Rugged stonewort		✓	✓
<i>Chara curta</i>	Lesser bearded stonewort			✓
<i>Cygnus olor</i>	Mute swan			✓
<i>Anas acuta</i>	Pintail			✓
<i>Anas crecca</i>	Teal			✓
<i>Anas platyrhynchos</i>	Mallard			✓
<i>Fulica atra</i>	Coot			✓
<i>Anas clypeata</i>	Shoveler			✓
<i>Anas penelope</i>	Wigeon			✓
<i>Mergus serrator</i>	Red-breasted merganser			✓
<i>Anas strepera</i>	Gadwall			✓
<i>Aythya fuligula</i>	Tufted duck			✓
<i>Bucephala clangula</i>	Goldeneye			✓
<i>Hydrophilus piceus</i>	Great silver water beetle			✓
<i>Potamonectes griseostriatus</i>	A water beetle			✓
<i>Libellula quadrimaculata</i>	Four-spotted chaser			✓
<i>Coelambus novemlineatus</i>	A water beetle			✓
<i>Ischnura elegans</i>	Blue-tailed damselfly			✓
<i>Ylodes reuteri</i>	A caddis fly			✓
<i>Trienodes reuteri</i>	A caddis fly			✓
<i>Schoenoplectus tabernaemontani</i>	Glaucus bulrush			✓
<i>Schoenoplectus lacustris</i>	Bulrush			✓
<i>Callitriche hermaphroditica</i>	Autumnal water-starwort			✓
<i>Berula erecta</i>	Lesser water-parsnip			✓
<i>Potamogeton filiformis</i>	Slender-leaved pondweed			✓
<i>P. praelongus</i>	Long-stalked pondweed			✓
<i>P. x suecicus</i>	A hybrid pondweed			✓
<i>Cladophora sauteri</i>	A green algae			✓

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. further eutrophication leading to the increased risk of potentially toxic phytoplankton blooms, as well as enhanced plant production and the potential for loss of macrophyte species. Phosphorus is the key nutrient implicated in freshwater eutrophication. 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.

Waste water treatment works final effluent and private septic tanks discharge into eutrophic lochs.



Mallard - Image courtesy of Derren Fox

Harray Loch is affected by eutrophication and was the subject of a study in 1989-1991 following a Canadian pondweed *Elodea Canadensis* / enrichment problem. Monitoring of water quality (by OIC) in feeder burns continued after the study. The discharge of sewage waste from the village of Dounby, which now passes through a tertiary treatment system before entering the loch, is operated under a CAR licence and is sampled and monitored by SEPA. 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;

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. The construction of road and other developments may have similar effects.
- Species introduction. Introduced plants, in particular Canadian pondweed *Elodea canadensis*, may alter the ecological balance of a loch. 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.



Shoveler - Image courtesy of Derren Fox

- 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 waste water treatment works discharge, 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, providing 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 SGRPID, addresses 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

- In addition to Loch of Harray, eutrophic lochs which are located in SSSIs are 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 SAC; and West Westray is an SPA.
- Loch of Isbister & the Loons is also

an RSPB reserve. (Loch of the Stack is not within the Noup Cliffs RSPB reserve.)

- SGRPID grants – From 2008 eutrophic standing waters featured as a Local Priority in the Running and Standing Water and Water Quality packages of the Scotland Rural Development Programme. The SRDP Rural priorities scheme provides annual payments for the management of water margins (essentially fencing off a no-grazing zone around loch edges). The management allows for the development of tall emergent and bank-side vegetation and provides a physical barrier against potentially harmful agricultural operations.
- SGRPID grant conditions: support payments to farmers are conditional on observance of cross compliance and 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.

- 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.
- Codes of practice: SGRPID 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, which is now reinforced by the Diffuse Pollution Regulations.

6.2 Research and Guidance

- SEPA water monitoring: SEPA carries out comprehensive chemical analysis of Harray Loch and Loch of Korbister on a monthly basis.
 - Scottish Water constantly monitors water quality at its pumping stations at Loch of Korbister; Bea Loch, Sanday; and 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 was carried out for SNH in 2001-2002.
 - Nutrient balancing: research had 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 SAC.
 - Amendments have been made to the Controlled Activities Regulations (CAR) by Scottish Government to include new regulations for diffuse pollution. Effective from 1 April 2008, the Water Environment (Diffuse Pollution) (Scotland) Regulations 2008 are General Binding Rules (GBRs) based on widely accepted standards and codes of good practice (e.g. Prevention of Environmental Pollution from Agricultural Activity (PEPFAA), Forest and Water Guidelines, etc).
- The regulations are risk-based and considered a good example of 'better regulation'. Implementation is mainly based on guidance, training and awareness raising initiatives. SEPA is the lead competent authority but inspections are provided via the Scotland's Environmental and Rural Services (SEARS) project.
- The regulations provide a statutory baseline of good practice and as such are expected to contribute significantly to improvements in water quality. A range of guidance materials and training course have been prepared by SEPA on the GBRs for land managers and SEARS and SEPA staff.
- 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.

7. ACTION PLAN OBJECTIVE

- Work towards good ecological status by 2021 in relation to the River Basin Management Plan.

8. ACTION PLAN TARGET

- Use the River Basin Management Plan mechanism to achieve good ecological status for those water-bodies identified in the RBMP but also for small water bodies of ecological significance.

9. ACTION PLAN AGENCIES:

National agencies: SNH; SGRPID; SEPA; OIC

Local partners: RSPB; SAC; Scottish Water; Orkney Trout Fishing Association

10. PROPOSED ACTION WITH AGENCIES:

- Promote the harvesting and storage of rainwater
 - By the agriculture industry. **Lead: SGRPID & SAC**
 - Through Supplementary Guidance Sustainable Construction. **Lead: OIC**
- Promote eutrophic standing waters as a Local Priority through the SRDP and/or subsequent agri-environment programmes. **Lead: SGRPID & SAC**
- Investigate the possibility of a pilot catchment diffuse pollution initiative by 2015 in relation to the RBMP. **Lead: SEPA**
- Continue to monitor and report water quality. **Lead: SEPA**

Keynote Species: Otter, *Lutra lutra*; Common toad, *Bufo bufo*; Shoveler duck, *Anas clypeata*

REFERENCES AND OTHER INFORMATION SOURCES

Birkinshaw. D. (1994) *Macrophyte Survey of the Loch of Harray*. Report for SNH

Hennessy M. M. et al (1995) *Water Quality in Lochs of Harray and Stenness February – April 1995*. Report for OIC

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SEPA - 1998 Environmental Strategy

SEPA's biodiversity position statement How SEPA delivers its biodiversity duties. www.sepa.org.uk/science_and_research/what_we_do/biodiversity.aspx.

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

The Water Framework Directive (WFD). The European Union website:

http://ec.europa.eu/environment/water/water-framework/index_en.html

The Scotland River Basin Management Plan. www.sepa.org.uk/water/river_basin_planning.aspx

The Orkney and Shetland Supplement to the Scotland River Basin Management Plan http://www.sepa.org.uk/water/river_basin_planning/area_advisory_groups/orkney_and_shetland.aspx

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-coordinated.



Loch of Hundland - Image courtesy of Sydney Gauld

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 located outwith these areas.

The largest sites are the Loch of Boardhouse (227 ha), Loch of Swannay (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 of 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 were found to support seven *Potamogeton* species. Muckle Water, Rousay was defined as the most species-rich of the mesotrophic lochs in the 1986 Loch Survey.



Blue-tailed damselfly - Image © Lorne Gill/SNH

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.

4.1 Associated species and their biodiversity conservation status

Species	Common Name	UK BAP List	Scottish Biodiversity List	Local Priority species
<i>Lutra lutra</i>	European otter	√	√	√
<i>Tolypella nidifica</i>	Bird's nest stonewort	√	√	√
<i>Bufo bufo</i>	Common toad	√	√	√
<i>Salmo trutta</i>	Brown trout	√	√	√
<i>Aythya marila</i>	Scaup	√	√	√
<i>Cygnus cygnus</i>	Whooper swan		√	√
<i>Larus ridibundus</i>	Black-headed gull		√	√
<i>Aythya ferina</i>	Pochard		√	√
<i>Gavia stellata</i>	Red-throated diver		√	√
<i>Chara rudis</i>	Rugged stonewort		√	√
<i>Chara curta</i>	Lesser bearded stonewort			√
<i>Cygnus olor</i>	Mute swan			√
<i>Anas acuta</i>	Pintail			√
<i>Anas crecca</i>	Teal			√
<i>Anas platyrhynchos</i>	Mallard			√
<i>Fulica atra</i>	Coot			√
<i>Anas clypeata</i>	Shoveler			√
<i>Anas penelope</i>	Wigeon			√
<i>Mergus serrator</i>	Red-breasted merganser			√
<i>Anas strepera</i>	Gadwall			√
<i>Aythya fuligula</i>	Tufted duck			√
<i>Bucephala clangula</i>	Goldeneye			√
<i>Hydrophilus piceus</i>	Great silver water beetle			√
<i>Potamonectes griseostriatus</i>	A water beetle			√
<i>Libellula quadrimaculata</i>	Four-spotted chaser			√
<i>Coelambus novemlineatus</i>	A water beetle			√
<i>Ischnura elegans</i>	Blue-tailed damselfly			√
<i>Enallagma cyathigeum</i>	Common blue damselfly			√
<i>Schoenoplectus tabernaemontani</i>	Glaucous bulrush			√
<i>Schoenoplectus lacustris</i>	Bulrush			√
<i>Callitriche hermaphroditica</i>	Autumnal water-starwort			√
<i>Potamogeton filiformis</i>	Slender-leaved pondweed			√
<i>Cladophora sauteri</i>	A green algae			√

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 has recently increased. Abstraction is controlled by CAR licence issued by SEPA. Private abstraction 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).



Whooper swans - Image courtesy of Derren Fox

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 responsible.

- 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 Sacquoy Head, Rousay, and North Hill, Papa Westray.
- Of these SSSIs, Loch of Isbister and The Loons is an SAC.

- Loch of Isbister & the Loons and North Hill, Papa Westray are also RSPB reserves.
- Remaining actions (SGRPID 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 carries out comprehensive chemical analysis of Boardhouse, Hundland and Swannay Lochs on a monthly basis.
- Scottish Water constantly monitors water quality and abstraction at its pumping stations at Loch of Boardhouse.

7. ACTION PLAN OBJECTIVE:

- Work towards good ecological status by 2021 in relation to the Scotland River Basin Management Plan supplement for Orkney and Shetland.

8. ACTION PLAN TARGET

- Use the river basin management plan mechanism to achieve and/or maintain good ecological status for those water-bodies identified in the RBMP but also for small water bodies of ecological significance.

9. ACTION PLAN AGENCIES:

National agencies: SNH; SGRPID; SEPA; OIC

Local partners: RSPB; SAC; Scottish Water; Orkney Trout Fishing Association

10. PROPOSED ACTION WITH AGENCIES:

- Promote the harvesting and storage of rainwater
 - By the agriculture industry - **SGRPID & SAC**
 - Through Supplementary Guidance Sustainable Construction – **OIC**

- Promote mesotrophic lochs as a Local Priority through the SRDP and/or subsequent agri-environment programmes **Lead: – SGRPID & SAC**
- Investigate the possibility of a pilot catchment diffuse pollution initiative by 2015 in relation to the RBMP – **SEPA**
- Continue to monitor and report the water quality of mesotrophic lochs – **SEPA**

Keynote Species: Blue-tailed damselfly, *Ischura elegans*; European eel, *Anguilla anguilla*

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Guidance leaflets and other literature are available from RSPB, SNH, SEPA, SGRPID, SAC, FWAG, SGRPID Freshwater Fisheries Laboratory and WWF, either directly or via their web sites.

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 m² 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 Orkney Lochs (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.



Snipe in pool - Image courtesy of Derren Fox

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. They also contribute to connectivity between water bodies. Some ponds are

ancient and of archaeological interest. One milldam is a Scheduled Ancient Monument.

No figures are available for the extent of this habitat. It is thought that ponds are rather scarce. 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

Whilst there is no available information on the overall distribution of ponds and milldams throughout Orkney,

there are known to be at least three milldams with substantial areas of open water.



Marsh marigold - Image courtesy of Sydney Gauld

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 in ponds.

Species	Common Name	UK BAP List	Scottish Biodiversity List	Local Priority species
<i>Lutra lutra</i>	European otter	√	√	√
<i>Salmo trutta</i>	Brown trout	√	√	√
<i>Bufo bufo</i>	Common toad	√	√	√
<i>Anas acuta</i>	Pintail			√
<i>Anas platyrhynchos</i>	Mallard			√
<i>Coelambus novemlineatus</i>	A water beetle			√
<i>Potamonectes griseostriatus</i>	A water beetle			√
<i>Aeshna juncea</i>	Common hawkler			√
<i>Libellula quadrimaculata</i>	Four-spotted chaser			√
<i>Pyrrhosoma nymphula</i>	Large red damselfly			√
<i>Enallagma cyathigerum</i>	Common blue damselfly			√
<i>Ischnura elegans</i>	Blue-tailed damselfly			√
<i>Potamogeton filiformis</i>	Slender pondweed			√

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, and are 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, may 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 shallows 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. *Crassula helmsii*, which is known as swamp stonecrop or New Zealand pigmyweed, is sold as an oxygenating plant for garden ponds but should be avoided as it is highly invasive. Even small fragments of the plant are apparently capable of developing new colonies, including in the wider countryside. The best action is to refrain from purchasing or growing this plant in ponds. If you already have it, take steps to exterminate it. Do not dump excess or unwanted material into streams, ponds or lakes or into any dump or landfill site or into your domestic refuse bin. Burn any excess material or cover it with thick black plastic. Avoid purchasing oxygenating plants from garden centres with communal plant tanks.
- 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.



Four spotted chaser - Image © Laurie Campbell/SNH

6. CURRENT ACTIONS AND OPPORTUNITIES

These relate directly to the management issues outlined above. Good management and good advice is essential.

on observance of cross compliance and a code of good farming practice, including the protection of natural habitats.

6.1 Management

- SGRPID grants – Rural Priorities can provide capital payments for pond creation and restoration. The scheme also provides annual payments for fencing off water margins, and this has been applied to some small ponds, both natural and man-made.
- SGRPID grant conditions: support payments to farmers are conditional

6.2 Research and Guidance.

- Guidance on management and entry into agri-environment schemes is provided by SAC and private agents.
- Guidance on pond creation and management, as well as the disposal of INNS is provided by SEPA and can be accessed from the website at www.sepa.org.uk

7. ACTION PLAN OBJECTIVE

- Maintain the presence and quality of key pond and mill dam sites in Orkney.

8. ACTION PLAN TARGET

- Raise awareness of the location and importance of ponds and milldams.

9. ACTION PLAN AGENCIES

National agencies: SGRPID; SEPA

Local partners: SAC

10. PROPOSED ACTION WITH AGENCIES

- Identify criteria for the assessment of the ecological quality of ponds in Orkney including mill dams and quarries – **Orkney River Basin Area Advisory Group sub group on Small Water Bodies**
- Identify key pond & mill dam sites, including disused quarry sites, along with a list of key species for each site – **Orkney River Basin Area Advisory Group sub group on Small Water Bodies**
- Distribute a list of the key sites to the relevant agencies & authorities – **OIC**
- Promote an explanatory & advisory leaflet on pond management in Orkney – **SEPA**
- Where appropriate, promote suitable buffer margins and good management practice – **SAC**
- Establish a wildlife pond at Happy Valley – **OIC**

Keynote species: European otter *Lutra lutra*, Common toad *Bufo bufo*.

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SEPA - 1998 Environmental Strategy

SEPA's biodiversity position statement: How SEPA delivers its biodiversity duties. www.sepa.org.uk/science_and_research/what_we_do/biodiversity.aspx.

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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; though 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.



Corrigall burn - Image courtesy of Eileen Summers

2. CURRENT LOCAL STATUS AND EXTENT

The Orkney land mass does not give rise to substantial watercourses. Nevertheless the small burns and some of the canalised burns do support a wide range of species, including certain UK priority species. 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 is largely natural.

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.



Golden ringed dragonfly - Image © Laurie Campbell/SNH

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,⁷ 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.



7 Orkney LBAP 2002

Primrose - Image courtesy of Derren Fox

Species	Common Name	UK BAP List	Scottish Biodiversity List	Local Priority species
<i>Lutra lutra lutra</i>	European otter	✓	✓	✓
<i>Emberiza schoeniclus</i>	Reed bunting	✓	✓	✓
<i>Salmo salar</i>	Atlantic salmon	✓	✓	✓
<i>Salmo trutta</i>	Brown / sea trout	✓	✓	✓
<i>Tringa totanus</i>	Redshank			✓
<i>Anas crecca</i>	Teal			✓
<i>Cordulegaster boltonii</i>	Golden-ringed dragonfly			✓
<i>Acrocephalus schoenobaenus</i>	Sedge warbler			✓
<i>Salix phylicifolia</i>	Tea-leaved willow			✓
<i>Callitriche hermaphroditica</i>	Autumnal water-starwort			✓
<i>Salix aurita</i>	Eared willow			✓
<i>Berula erecta</i>	Lesser water-parsnip			✓
<i>Primula vulgaris</i>	Primrose			✓
<i>Caltha palustris</i>	Marsh marigold			✓

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 stream-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 fish hatcheries have been established on a number of major and minor burns, most notably in Hoy and Rousay; however the Rousay hatchery is now closed. There is the pressure for abstraction and potential for 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. Among them are the potential 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.



Redshank - Image courtesy of Derren Fox



Otter - Image © Lorne Gill/SNH

- 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-enforcement 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, e.g. 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 which include 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 SAC; Orphir & Stenness Hills, West Mainland Moorlands, and Keelylang & Swartabeck are parts of The Orkney Mainland Moors SPA.
- Hoy and part of Orphir & Stenness Hills are within the Hoy and West Mainland NSA.
- The RSPB has extensive moorland reserves that include significant burns in Hoy, Rousay and West Mainland. These reserves are parts of the SSSIs in these areas.
- SGRPID grants: Rural Priorities can provide annual payments for management of water margins (essentially, fencing off a no grazing zone along burn sides): a high proportion of farms participating in the scheme 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.

- SGRPID grant conditions: support payments to farmers are conditional on observance of a code of cross compliance and good farming practice, including the protection of natural habitats. Of the highest importance among these is the avoidance of pollution.
- SGRPID waste-management grants: agricultural investment grants for improved waste management.

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 SAC and private agents.
- Advice on management of freshwater habitat is available from SNH.



Celandine in iris - Image courtesy of Derren Fox

- Habitat enhancement grants may be available through the Scottish water environment restoration fund which is administered by 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 PhD 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 OBJECTIVE

- Work towards good ecological status by 2021 in relation to the Scotland River Basin Management Plan Orkney and Shetland Supplement.

8. ACTION PLAN TARGET

- Use the river basin management plan mechanism to achieve good ecological status for those water-bodies identified in the RBMP but also for small water bodies of ecological significance.

9. ACTION PLAN AGENCIES

National agencies: SGRPID; SEPA; SNH; OIC

Local partners: SAC; Orkney College

10. PROPOSED ACTION WITH AGENCIES

- Undertake restoration of an appropriate burn – **SFLPS**
- Prepare an appropriate action plan – **Orkney River Basin Area Advisory Group Small Water Bodies sub Group**
- Continue to monitor the water quality of selected burns - **SEPA**

Keynote species: Brown / sea trout *Salmo trutta*, Reed bunting *Emberiza schoeniclus*, European otter *Lutra lutra*.

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Guidance leaflets and other literature are available from RSPB, SNH, SEPA, SGRPID, SAC, SGRPID Freshwater Fisheries Laboratory and WWF, either directly or via their web sites.

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 presence of a sufficiently large area of beach where the surface dries between tides, allowing the sand to be blown inland. The forces of the wind, waves 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. Climbing dunes form 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 Sand Dune Vegetation Survey of Great Britain - Part 2. Scotland (1993) indicates there may be as much as 48,000 ha of dune and machair in Scotland, of which 33,000 ha 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.

The Links habitat refers to all short turf grasslands on coastal accretions that are not covered by the *Machair* 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 the Sanday machair.



Dunes at Newark, Sanday - Image courtesy of Eileen Summers



Dunes behind bay of Doomy, Eday - Image courtesy of Sydney Gauld

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 its physical features, it could broadly be defined



Angelica - Image courtesy of Christine Skene



Grass of Parnassus- Image courtesy of Christine Skene

within the *Coastal sand dunes* habitat. In Orkney it occurs mainly in Sanday⁸. 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

⁸ Orkney LBAP 2002 17.2 Machair



Bird's foot trefoil - Image courtesy of Christine Skene

Habitat⁹. 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 ridges. Dune material in Orkney originates 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 which links Burray and South Ronaldsay and it is believed that some of this sand results from coastal sand depletion elsewhere rather than from original sources. Offshore glacial till and eroded sandstone add to the sand. In some bays, e.g. Rackwick in Hoy, inland glacial deposits also contribute a fine-grained mineral material to the sand. The varying proportions of lime in the sand of different sites depend 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 and 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.

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; sand has been extracted or, because they are dry in winter, they are used for a variety of damaging agricultural and industrial purposes.

9 Orkney LBAP 2002 17.3 Links

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. at 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 and have become 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, which include 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 is the system of bay dunes developed beside the Churchill Barriers of Scapa Flow, which have formed since the construction of the Barriers during 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*.

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



No. 4 Barrier - Image courtesy of SNH

extensively in Westray, Sanday and Sandwick. Key sites are the Moclett Links, Papa Westray which is the only links or machair site in Orkney for Scottish primrose *Primula scotica*, and Bu and

Norton Links, Burray which, although a degraded dune site, still retains an outstanding diversity of plants and invertebrates.

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 plant 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, *Lotus corniculatus*, white clover *Trifolium repens*, lesser meadow-rue *Thalictrum minus* and, at

one site only, sea bindweed *Calystegia soldanella*. Primrose *Primula vulgaris* occurs abundantly at a 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. These are: oyster plant *Mertensia maritima* (more typical of shingle), limestone bedstraw *Galium sternerii* (varied habitats) and



Eyebright - Image courtesy of Christine Skene



Thrift - Image courtesy of Christine Skene

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. 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 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*.

Species associated with links include those listed in the Machair HAP, although

the list should only include species of fixed dune and dry and damp sandy plain habitats, not the entire range of machair features.



Great yellow bumblebee on red clover
- Image courtesy of John Crossley



Wheatear - Image © Lorne Gill/SNH

4.1 Associated species and their biodiversity conservation status

Species	Common Name	UK BAP List	Scottish Biodiversity List	Local Priority species
<i>Lutra lutra</i>	European otter	✓	✓	✓
<i>Alauda arvensis</i>	Skylark	✓	✓	✓
<i>Carduelis flavirostris</i>	Twite	✓	✓	✓
<i>Bombus distinguendus</i>	Great yellow bumblebee	✓	✓	✓
<i>Bombus muscorum</i>	Heath carder bee	✓	✓	✓
<i>Carex maritima</i>	Curved sedge	✓	✓	✓
<i>Asio flammeus</i>	Short-eared owl		✓	✓
<i>Primula scotica</i>	Scottish primrose		✓	✓
<i>Viola tricolor ssp curtisii</i>	Dune pansy		✓	✓
<i>Microtus arvalis orcadensis</i>	Orkney vole		✓	✓
<i>Sorex minutes</i>	Pygmy shrew			✓
<i>Apodemus sylvaticus</i>	Wood mouse			✓
<i>Anthus pratensis</i>	Meadow pipit			✓
<i>Haematopus ostralegus</i>	Oystercatcher			✓
<i>Somateria mollissima</i>	Eider			✓
<i>Tadorna tadorna</i>	Shelduck			✓
<i>Charadrius hiaticula</i>	Ringed plover			✓
<i>Oenanthe oenanthe</i>	Wheatear			✓
<i>Agrotis vestigialis</i>	Archers dart moth			✓
<i>Argynnis aglaja scotica</i>	Dark green fritillary			✓
<i>Polyommatus icarus</i>	Common blue			✓
<i>Diarsia mendica orkneyensis</i>	Ingrailed clay			✓
<i>Euxoa cursoria</i>	Coast dart			✓
<i>Nematus stichi</i>	A sawfly			✓
<i>Chrysolina crassicornis</i>	A leaf beetle			✓
<i>Ammophila arenaria</i>	Marram			✓
<i>Erodium cicutarium</i>	Common stork's-bill			✓
<i>Calystegia soldanella</i>	Sea bindweed			✓
<i>Mertensia maritima</i>	Oysterplant			✓
<i>Juncus balticus</i>	Baltic rush			✓
<i>Dactylorhiza purpurella</i>	Northern fen orchid			✓
<i>Parnassia palustris</i>	Grass of Parnassus			✓
<i>Gentianella amarella</i> subsp. <i>septentrionalis</i>	Autumn Gentian			✓
<i>Galium sternerii</i>	Limestone bedstraw			✓
<i>Primula vulgaris</i>	Primrose			✓
<i>Drepanocladus lycopodioides</i>	A moss			✓
<i>Brachythecium mildeanum</i>	A moss			✓
<i>Distichium inclinatum</i>	A moss			✓
<i>Riccia cavernosa</i>	A liverwort			✓
<i>Geoglossum arenarium</i>	An earth tongue			✓

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. Similar activities have aggravated coastal erosion problems in Bay of Skail. At Burray Links the habitat has been so extensively damaged that the previous SSSI was de-notified. 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, with hogweed *Heracleum sphondylium* often becoming abundant. Stock feeding sites often become weed-infested.
- Reclamation: considerable areas outwith SSSIs have been ploughed for crops of barely and re-seeding with agricultural grasses. Reversion to 'wild' grass is usually swift, but native plant communities are lost.
- Fertiliser and slurry: some links areas are treated in this way. Slurry may be applied to dry land in winter where farm storage capacity is insufficient. Native plant communities are destroyed or severely modified.
- 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 may also include localised hydrocarbon pollution from old vehicles and nutrient enrichment from silage bales. Attempts to prevent further erosion from blow-outs are usually unsuccessful as 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 Skail, close to Skara Brae, however 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.
- Military use: many links sites were used in World Wars I and II for defences and camps. Foundations, a few derelict buildings and hard standings remain. It seems that the effects have been short term as 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, giving 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 and links (Northwall SSSI, Sanday, has machair vegetation but no dunes). A management statement has been prepared. The European Natura designations of Sanday sites do not include the dune areas, links or dune/links interest.
- All sand extraction is subject to planning controls. In its draft Local Development Plan Orkney Islands Council has developed 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.
- SGRPID grants – From 2008 Coastal sand dunes features as a Local Priority in the Species-rich Coastal Grasslands package of the Scotland

Rural Development programme. The Rural Priorities scheme provides grants for management of “species-rich grassland”, which would include dunes if they were grazed as part of a links or machair area. Under the terms of the scheme, the feeding of livestock is not permitted.

- SFP and LFA support payments to farmers are conditional on observance of a code of cross compliance and good farming practice, including the protection of natural habitats and avoidance of overgrazing.

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 SAC and private agents.
- Orkney Islands Council has developed a policy on mineral extraction, including sand.

7. ACTION PLAN OBJECTIVE:

- Maintain all coastal sand dune and links sites, excluding permitted sand extraction sites, in good ecological condition.

8. ACTION PLAN TARGET:

- There is a greater awareness of the importance and vulnerability of sand dune and links systems.

9. ACTION PLAN AGENCIES:

National agencies: OIC; SEPA; SGRPID; SNH; JNCC

Local partners: SAC; ICIT

10. PROPOSED ACTIONS WITH AGENCIES:

- Respond to reports of inappropriate sand extraction – **OIC**
- Raise awareness of the importance of sand dune/links systems – **Outdoor Orkney**
- Promote sand dune and links restoration through SRDP – **SGRPID & SAC**
- Respond to and investigate reports of damage to dune/links systems – **SGRPID**
- Respond to and investigate reports of illegal waste disposal – **OIC & SEPA**

Keynote Species: Great Yellow Bumble Bee *Bombus distinguendus*; Marram Grass *Ammophila arenaria*; Common Blue Butterfly *Polyommatus icarus*

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1. LOCAL HABITAT DESCRIPTION

Aeolianite is blown sand which has become 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 aeolianite is rare and confined to a dozen localities scattered around the northern and western coasts of Scotland.



Aeolianite - Image courtesy of Sydney Gauld

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.



Stiff sand grass - Image courtesy of Eric Meek

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Aeolianite outcrops support typical machair or links vegetation (see Orkney LBAP 2002 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*, moonwort *Botrychium lunaria*, orchids and, notably, the usually southern stiff sand grass, *Catapodium marimum*.



Common moonwort - Image courtesy of Eric Meek

4.1 Associated species and their biodiversity conservation status

Species	Common Name	UK BAP List	Scottish Biodiversity List	Local Priority species
<i>Catapodium marinum</i>	Stiff sand grass			√
<i>Euphrasia spp</i>	Eyebright			√

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.



Bird's foot trefoil on aeolianite - Image courtesy of Sydney Gauld

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

6.1 Management

- The key site at Aikerness has been assessed for management (RSPB)

6.2 Research and Guidance

- Aeolianite features as a “Local Priority” in the Geodiversity package of the Scotland Rural Development Programme.

7. ACTION PLAN OBJECTIVE

- Key Aeolianite sites are identified and maintained under optimum management

8. ACTION PLAN TARGET

- Optimum management agreed for all key sites by 2013.

9. ACTION PLAN AGENCIES

National agencies: SNH; SGRPID; OIC; RSPB

Local partners: SAC; ICIT



Flower assemblage on aeolianite
- Image courtesy of Eileen Summers

10. PROPOSED ACTIONS WITH AGENCIES:

- Investigate the condition of potential aeolianite sites in Westray. **Lead: RSPB**
- Monitor the management plan at the Aikerness site. **Lead: RSPB**
- Survey the extent of the Warebeth site. **Lead: RSPB**
- Identify appropriate management in order to maintain the site at Warebeth in favourable condition. **Lead: OIC**
- Monitor the effectiveness of management. **Lead: RSPB**

Keynote Species: Stiff sand grass, *Catapodium marinum*

REFERENCES AND OTHER INFORMATION SOURCES

As for *Coastal sand dunes*

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 cusped forelands where a series of parallel ridges pile up against the coastline.

Most of the length of shingle coastline

in 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 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 this priority habitat in Orkney. In some exposed situations, substantial shingle banks have been thrown up by concurrences of great



Coastal vegetated shingle between holms and Copinsay - Image courtesy of Sydney Gauld



Long Ayre, Tankerness - Image courtesy of SNH

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 Orkney LBAP 2002 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 due to extraction. Roads have been constructed on a number of ayres.

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 Mirkady, 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 *Potentilla anserina* and cleavers *Galium aparine*.



Ringed plover - Image courtesy of Derren Fox



Arctic tern - Image courtesy of Derren Fox

Organic enrichment of the shingle habitat occurs where seals haul out, or large numbers 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 paradisaea* 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.



Oystercatchers - Image courtesy of Derren Fox

4.1 Associated species and their biodiversity conservation status

Species	Common Name	UK BAP List	Scottish Biodiversity List	Local Priority species
<i>Sterna hirundo</i>	Common tern		√	√
<i>Sterna paradisaea</i>	Arctic tern		√	√
<i>Charadrius hiaticula</i>	Ringed plover			√
<i>Haematopus ostralegus</i>	Oystercatcher			√
<i>Oenanthe oenanthe</i>	Wheatear			√
<i>Rhamphomyia morio</i>	A fly			√
<i>Aphrosylus raptor</i>	A dolichopodid fly			√
<i>Mertensia maritima</i>	Oysterplant			√
<i>Scutellaria galericulata</i>	Skullcap			√

5. CURRENT FACTORS AFFECTING THE HABITAT

Shingle structures are subject to natural mobility, in particular during storm events. There are human impacts too:

- Extraction operations: small-scale operations to remove shingle for local farm road and construction use are 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 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, providing a conservation direction to the local HAP. Reference should be made to the national HAP.

6.1 Management

There are few designated sites for the habitat (none for ayre barriers).

- 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 SAC. Site management statements have been drawn up.
- Commercial shingle extraction (but not small-scale farm use) is subject

to planning controls. In its draft Local Development Plan Orkney Islands Council has developed a policy on mineral extraction, including shingle.

- SGRPID grants - Vegetated shingle features as a Local Priority in the Species-Rich Coastal Grasslands package of the Scotland Rural Development Programme. The Rural Priorities scheme provides grants for conservation management of varied habitats which could, rarely, include shingle banks.
- Oil spill contingency plans are in place.

6.2 Research and Guidance

- Guidance on management and entry into agri-environment schemes is provided by SAC and private agents.

7. ACTION PLAN OBJECTIVE:

- Identify key Coastal Vegetated Shingle sites in Orkney.

8. ACTION PLAN TARGET:

- A record of key sites has been established by the end of 2012.

9. ACTION PLAN AGENCIES:

National agencies: SNH; SGRPID; SEPA; JNCC

Local partners: OIC; SAC; ICIT



Sow thistle - Image courtesy of Sydney Gauld

10. PROPOSED ACTIONS WITH AGENCIES:

- Carry out a desk study to identify sites and whether they are designated as draft LNCS through the Local Development Plan - **OIC (LNCS group)**
- Identify a set of local criteria for Orkney sites – **OIC (LNCS group)**
- Determine the risks to each site – **OIC (LNCS group)**
- Ensure prevention of inappropriate extraction on the sites - **OIC**

Keynote Species: Skullcap: *Scutellaria lateriflora*

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1. UK PRIORITY HABITAT DESCRIPTION

This habitat is found from the mid-shore down to the extreme lower shore, and encompasses areas of boulders (greater than 256 mm diameter) that support a diverse underboulder community. The underboulder habitat, along with fissures, crevices and any interstitial spaces between adjacent boulders, form a series of microhabitats that add greatly to the biodiversity of a shore. The presence of boulders on a shore may also lead to local modification to wave energy, current strength and levels of trapped organic matter in the area surrounding the boulders themselves; altering the physical environment in this way results in an enhancement to the immediate biodiversity beyond the boulders themselves. By their very nature boulders are associated with high energy environments. Sediments can build up over periods of low energy but will eventually be subject to energetic disturbance, which continues to sort

sediment sizes and redistribute fine grained material. This maintains the integrity of the boulder environment. Species are usually resistant to the movement of fine grained sediment.

This habitat can occur on a variety of substrata (including bedrock, mixed rock and sediment or mud), but there needs to be a sufficient gap on the underside of the boulder to support an under-boulder community. The richest underboulder communities are often found where there is running seawater, for instance, from pools or lagoons emptying after the tide has fallen, or alternatively on shorelines which border moderate to strong tidal streams. A particularly striking example of a lagoon retained by a low-lying cobble bank is The Choin in Marwick Bay. Increased wave action will also keep surfaces wet for longer periods. Diversity of species in a local scale will also be increased where freshwater streams runoff the land and over these beaches.



Boulder shore - Image courtesy of Sydney Gauld

2. CURRENT LOCAL STATUS AND EXTENT

Whilst boulders are widespread around the UK coast, only some of these support a diverse underboulder community. Boulders with a limited underboulder community are not included in this habitat, as may occur for example where boulders are embedded in sediment,

in low salinity conditions, and where boulders experience high levels of mobility and scour.

The land and underwater topography of Orkney is favourable to the widespread development of this habitat.

3. LOCAL DISTRIBUTION

Although the habitat is widespread in Orkney, some shores support a much richer diversity of species than others. High energy sites include The Choin, Billia Croo, Birsay Bay, Yesnaby as well as the north end of Rackwick Bay in Hoy. Lower energy sites are found at Tingwall,

Woodwick and the Bay of Sandoyne. Particularly species-rich examples of underboulder communities can be found on the low intertidal of the shores on the east and west of the Bay of Houton, as well as the rocky stretch which extends between Aikerness and Grit Ness in Evie.

4. ASSOCIATED SPECIES AND LINKS WITH SPECIES ACTION PLANS

Underboulder habitat provides an environment of shade, moisture and shelter. The undersides of boulders can therefore sustain a diverse collection of animals needing these conditions to survive on an otherwise hostile shore. Underboulder communities are generally

dominated by an encrusting fauna of sea mats, sponges, sea squirts, barnacles, coat-of-mail shells and calcareous tube worms.

The breadcrumb sponge *Halichondria panicea* and star ascidian *Botryllus*



Breadcrumb sponge - Image courtesy of Jenni Kakkonen



Lomentaria articulata - Image courtesy of Jenni Kakkonen



Ulva lactuca - Image courtesy of Jenni Kakkonen

scholsseri are both recognised as important structural species. Crustaceans such as the hairy porcelain crab *Porcellana platycheles*, the long-clawed porcelain crab *Pisidia longicornis*, other small crabs and squat lobsters shelter on the undersides of boulders together with bristleworms, scale worms and brittle stars *Ophiothrix* spp. The tubeworm *Pomatoceros triqueter* is also commonly found.

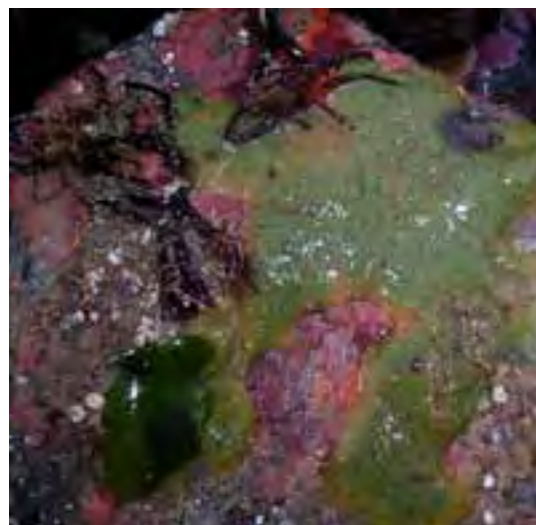
Herbivores include the common limpet *Patella vulgata*, top shells *Gibbula* spp. and the painted top shell *Calliostoma ziziphinum*, the winkle *Littorina littorea*, the beadlet anemone *Actinia equina* and the green sea urchin *Psammechinus*

miliaris. Encrusting sponges are predated upon by sea slugs such as the sea-lemon *Archidoris pseudoargus*, as are colonial sea squirts by the cowrie *Trivia monacha*. Dogwhelks *Nucella lapillus* predate upon barnacles.

Algal species commonly associated with this habitat include serrated wrack *Fucus serratus* and the green seaweeds *Ulva lactuca* and *Ulva intestinalis*. Colonies of the hydroid *Dynamena pumila* can be found on the *F. serratus* fronds. The shaded sides of the boulders are, depending on environmental conditions, often colonised by a variety of foliose red seaweeds, including Irish moss *Chondrus crispus*, false Irish moss *Mastocarpus*



Tubeworm - Image courtesy of Jenni Kakkonen



Star ascidian - Image courtesy of Jenni Kakkonen



Brown crab - Image courtesy of Jenni Kakkonen

stellata, dulce *Palmaria palmata*, pepper dulce *Osmundea pinnatifida* and *Lomentaria articulata*. Coralline algae such as *Corallina officinalis* and coralline crusts are also found on the undersides of the boulders where the encrustations adhere rocks, producing a more stable substrate.

Underboulder habitat plays an important role in the life cycle of marine animals, for example the under surfaces are an important refuge for the eggs of fish, dog whelks and sea slugs. The sheltered gaps

between and under the boulders provide security for mobile species, and also the juveniles of many more species. They are important as a refuge for juvenile lobster *Homarus gammarus* and crabs *Cancer pagurus* and *Carcinus maenas* as well as a feeding ground for adult populations of these species.

Like other examples of hard substrata, the species composition of the upward face of boulders varies with a number of factors – e.g. geology, wave exposure, tidal strength and position on the shore.



Porcelain crab - Image courtesy of Jenni Kakkonen



Beadlet anemone - Image courtesy of Jenni Kakkonen

4.1 Associated species and their biodiversity conservation status

Species	Common Name	UK BAP List	Scottish Biodiversity List	Local Priority species
<i>Nucella lapillus</i>	Dogwhelk			√



Dog whelks - Image courtesy of Jenni Kakkonen



Dog whelk eggs - Image courtesy of Jenni Kakkonen

5. CURRENT FACTORS AFFECTING THE HABITAT

The level of threat this habitat experiences is influenced by ease of access and proximity to dense populations.

Consequently, in certain parts of the UK such as Scotland, it is not considered to be under threat.



The choin, Marwick - Image courtesy of Eileen Summers

- Boulders may be turned when collecting winkles *Littorina littorea* for human consumption. Where boulders are not replaced in their original position, the underboulder community is exposed to desiccation, predation and wave action, whilst the surface cover of seaweed becomes smothered by the displaced boulder.
- Similarly, one of the recreational activities to be had on a shore is to turn boulders to see what lives beneath. However, chronically elevated levels of recreational disturbance are generally only associated with popular tourist destinations with easy shore access.
- De-oxygenation of underboulders and consequent death of underboulder fauna may be caused by anthropogenic organic input e.g. sewage and agricultural inputs, and also as a consequence of eutrophication. Note that de-oxygenation may also occur naturally from rotting seaweed drift.
- The potential for oil spills.
- Chemical contaminants from antifouling systems (AFS) widely used on commercial marine vessels. Banned organotin products have been replaced by copper based paints that can also bio-accumulate in certain species and increase the toxicity of other pollutants.
- Undersea electricity or telecommunications cables may make landfall on shores with this habitat, with cable installation operations have potential to cause disturbance to underboulder communities.

6. CURRENT ACTIONS AND OPPORTUNITIES

6.1 Management

There are no designated sites for this habitat in Orkney.

- Oil spill contingency plans are in place.

6.2 Research and Guidance

Three years of baseline shoreline wave energy monitoring has been carried out by ICIT at Billia Croo and Marwick Bay in relation to biotope classifications of rocky shore intertidal species. Biological assessments of the boulder beach community at The Choin, Marwick Bay and algal coverage with growth monitoring at Billia Croo are underway, having started in summer 2009. This continuous sampling programme will run until at least 2015.

OSPAR identified a number of sites around Orkney which, historically, have had significant impact from TBT; therefore they cannot be assumed to be in a state

of good ecological status at this point in time, although it is recognised that, with the substitution of AFS, they may be in a state of change (OSPAR, 2011). SEPA routinely monitors TBT levels at specific locations around Orkney.



Mixed algae- Image courtesy of Bob Beharie

7. ACTION PLAN OBJECTIVE

- Maintain all intertidal communities in good ecological condition.

8. ACTION PLAN TARGET

- There is a greater awareness of the importance and vulnerability of intertidal boulder communities.

9. ACTION PLAN AGENCIES

National agencies: SNH, SEPA; Marine Scotland; OIC

Local partners: ICIT

10. PROPOSED ACTIONS WITH AGENCIES

- Compile a list of species-rich intertidal under boulder community sites – **OIC Marine Services**
- Raise awareness with the appropriate agencies to ensure that development does not adversely affect intertidal underboulder communities – **OIC**
- Raise awareness of the importance of intertidal under boulder communities – **Outdoor Orkney group**

Keynote species: Breadcrumb sponge: *Halichondria panicea*, Star ascidian: *Botryllus scholsseri*

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The Orkney Local Biodiversity Action Plan 2013-2016

Appendix I: Species considered to be of conservation concern in Orkney

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
VERTEBRATES				
Mammals				
<i>Apodemus sylvaticus</i>	Wood mouse	Terrestrial mammal	No	No
<i>Balaenoptera acutorostrata</i> (baleen whales group)	Minke whale	Sea mammal	Yes	Yes
<i>Balaenoptera borealis</i>	Sei whale	Sea mammal	Yes	Yes
<i>Balaenoptera musculus</i>	Blue whale	Sea mammal	Yes	Yes
<i>Balaenoptera physalus</i>	Fin whale	Sea mammal	Yes	Yes
<i>Delphinus delphis</i> (small dolphins group)	Common dolphin	Sea mammal	Yes	Yes
<i>Erinaceus europus</i>	West European hedgehog	Terrestrial mammal	Yes	Yes
<i>Globicephala melas</i> (toothed whales group)	Long-finned pilot whale	Sea mammal	Yes	Yes
<i>Grampus griseus</i> (small dolphins group)	Risso's dolphin	Sea mammal	Yes	Yes
<i>Halichoerus grypus</i>	Grey seal	Sea mammal	No	No
<i>Hyperoodon ampullatus</i>	Northern bottlenose whale	Sea mammal	Yes	Yes
<i>Lagenorhynchus acutus</i> (small dolphins group)	Atlantic white-sided dolphin	Sea mammal	Yes	Yes
<i>Lagenorhynchus albirostris</i> (small dolphins group)	White-beaked dolphin	Sea mammal	Yes	Yes

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
Lepus europaeus	Brown hare	Terrestrial mammal	Yes	Yes
Lepus timidus	Mountain hare	Terrestrial mammal	Yes	Yes
Lutra lutra lutra	European otter	Terrestrial mammal	Yes	Yes
Megaptera novaeangliae	Humpback whale	Sea mammal	Yes	Yes
Mesoplodon bidens	Sowerby's beaked whale	Sea mammal	Yes	Yes
Microtus arvalis orcadensis	Orkney vole	Terrestrial mammal	Yes	No
Neomys fodiens	Water shrew	Terrestrial mammal	No	No
Orcinus orca (toothed whales group)	Killer whale	Sea mammal	Yes	Yes
Phoca vitulina	Common seal	Sea mammal	Yes	Yes
Phocoena phocoena	Harbour porpoise	Sea mammal	Yes	Yes
Physeter catodon (toothed whales group)	Sperm whale	Sea mammal	Yes	Yes
Pipistrellus nathusii	Nathusius' pipistrelle bat	Terrestrial mammal	Yes	No
Pipistrellus pipistrellus	Pipistrelle bat	Terrestrial mammal	Yes	No
Plecotus auritus	Brown long-eared bat	Terrestrial mammal	Yes	Yes
Rattus rattus	Black rat, ship rat	Terrestrial mammal	Yes	No
Sorex minutus	Pygmy shrew	Terrestrial mammal	No	No
Stenella coeruleoalba	Striped dolphin	Sea mammal	Yes	Yes

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
Tursiops truncatus	Bottle-nosed dolphin	Sea mammal	Yes	Yes
Ziphius cavirostris	Cuvier's beaked whale	Sea mammal	Yes	Yes
Amphibians				
Bufo bufo	Common toad	Amphibian	Yes	Yes
Fishes				
Anguilla anguilla	European eel	Bony fish	Yes	Yes
Ammodytes marinus	Lesser sandeel	Bony fish	Yes	Yes
Ammodytes tobianus	Lance sandeel	Bony fish	Yes	No
Brosme brosme	Torsk	Bony fish	No	No
Cetorhinus maximus	Basking shark	Shark/skate/ray	Yes	Yes
Clupea harengus (commercial marine fish group)	Herring	Bony fish	Yes	Yes
Gadus morhua	Cod	Bony fish	Yes	Yes
Hippoglossus hippoglossus	Atlantic halibut	Bony fish	Yes	Yes
Lamna nasus	Porbeagle shark	Shark/skate/ray	Yes	Yes
Lophius piscatorius	Angler fish, Sea monkfish	Bony fish	Yes	Yes
Merlangius merlangus	Whiting	Bony fish	Yes	Yes
Merluccius merluccius	European hake	Bony fish	Yes	Yes

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
<i>Molva molva</i>	Ling	Bony fish	Yes	yes
<i>Pleuronectes platessa</i>	Plaice	Bony fish	Yes	Yes
<i>Pomatoschistus minutus</i>	Sand goby	Bony fish	No	No
<i>Prionace glauca</i>	Blue shark	Shark/skate/ray	Yes	Yes
<i>Dipturus cf. intermedia</i>	Flapper skate	Shark/skate/ray	Yes	Yes
<i>Raja clavata</i>	Thornback ray	Shark/skate/ray	Yes	No
<i>Leucoraja naevus</i>	Cuckoo ray	Shark/skate/ray	No	No
<i>Salmo salar</i>	Atlantic salmon	Bony fish	Yes	Yes
<i>Salmo trutta</i>	Brown / sea trout	Bony fish	Yes	Yes
<i>Scomber scombrus</i>	Atlantic mackerel	Bony fish	Yes	Yes
<i>Sebastes viviparus</i>	Norway haddock	Bony fish	Yes	No
<i>Squalus acanthias</i>	Spiny dogfish, spurdog	Shark/skate/ray	Yes	Yes
<i>Squatina squatina</i>	Monkfish, angel shark	Shark/skate/ray	Yes	Yes
<i>Trisopterus esmarkii</i>	Norway pout	Bony fish	Yes	No
Reptiles				
<i>Caretta caretta</i>	Loggerhead turtle	Turtle	Yes	Yes
<i>Dermochelys coriacea</i> (marine turtles group)	Leatherback turtle	Turtle	Yes	Yes

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
Birds				
Accipiter nisus	Sparrowhawk	Bird	No	No
Acrocephalus pallustris	Marsh warbler	Bird	Yes	Yes
Acrocephalus schoenobaenus	Sedge warbler	Bird	No	No
Alauda arvensis	Skylark	Bird	Yes	Yes
Alca torda	Razorbill	Bird	No	No
Anas acuta	Pintail	Bird	No	No
Anas clypeata	Shoveler	Bird	No	No
Anas crecca	Teal	Bird	No	No
Anas penelope	Wigeon	Bird	No	No
Anas platyrhynchos	Mallard	Bird	No	No
Anas querquedula	Garganey	Bird	Yes	No
Anas strepera	Gadwall	Bird	No	No
Anser albifrons subspecies flavirostris	Greenland white-fronted goose	Bird	Yes	No
Anser anser	Greylag goose	Bird	No	No
Anser fabalis	Bean goose	Bird	Yes	No
Anthus petrosus	Rock pipit	Bird	No	No

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
<i>Anthus pratensis</i>	Meadow pipit	Bird	No	No
<i>Aquila chrysaetos</i>	Golden eagle	Bird	Yes	No
<i>Arenaria interpres</i>	Turnstone	Bird	No	No
<i>Asio flammeus</i>	Short-eared owl	Bird	Yes	No
<i>Asio otus</i>	Long-eared owl	Bird	No	No
<i>Aythya ferina</i>	Pochard	Bird	Yes	No
<i>Aythya fuligula</i>	Tufted duck	Bird	No	No
<i>Aythya marila</i>	Greater scaup	Bird	Yes	Yes
<i>Branta leucopsis</i>	Barnacle goose	Bird	Yes	No
<i>Bucephala clangula</i>	Goldeneye	Bird	No	No
<i>Buteo buteo</i>	Buzzard	Bird	No	No
<i>Calidris alba</i>	Sanderling	Bird	No	No
<i>Calidris alpina</i>	Dunlin	Bird	Yes	No
<i>Calidris maritima</i>	Purple sandpiper	Bird	Yes	No
<i>Carduelis cannabina</i>	Linnet	Bird	Yes	Yes
<i>Carduelis chloris</i>	Greenfinch	Bird	No	No
<i>Carduelis flavirostris</i>	Twite	Bird	Yes	Yes

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
<i>Carduelis spinus</i>	Siskin	Bird	Yes	No
<i>Cephus grylle</i>	Black guillemot	Bird	No	No
<i>Charadrius hiaticula</i>	Ringed plover	Bird	No	No
<i>Circus aeruginosus</i>	Marsh harrier	Bird	Yes	No
<i>Circus cyaneus</i>	Hen harrier	Bird	Yes	No
<i>Clangula hyemalis</i>	Long-tailed duck	Bird	No	No
<i>Coturnix coturnix</i>	Quail	Bird	No	No
<i>Corvus corax</i>	Raven	Bird	No	No
<i>Corvus cornix</i>	Hooded crow	Bird	Yes	No
<i>Corvus monedula</i>	Jackdaw	Bird	No	No
<i>Crex crex</i>	Corncrake	Bird	Yes	Yes
<i>Cygnus cygnus</i>	Whooper swan	Bird	Yes	No
<i>Cygnus olor</i>	Mute swan	Bird	No	No
<i>Delichon urbica</i>	House martin	Bird	No	No
<i>Emberiza schoeniclus</i>	Reed bunting	Bird	Yes	Yes
<i>Erithacus rubecula</i>	Robin	Bird	Yes	No
<i>Falco columbarius</i>	Merlin	Bird	Yes	No

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
Falco peregrinus	Peregrine	Bird	Yes	No
Falco tinnunculus	Kestrel	Bird	Yes	No
Fratercula arctica	Puffin	Bird	No	No
Fringilla montifringilla	Brambling	Bird	Yes	No
Fulmarus glacialis	Fulmar	Bird	No	No
Gallinago gallinago	Snipe	Bird	No	No
Gavia arctica	Black-throated diver	Bird	Yes	Yes
Gavia immer	Great northern diver	Bird	Yes	No
Gavia stellata	Red-throated diver	Bird	Yes	No
Haematopus ostralegus	Oystercatcher	Bird	No	No
Haliaeetus albicilla	White-tailed eagle	Bird	Yes	No
Hirundo rustica	Swallow	Bird	No	No
Hydrobates pelagicus	Storm petrel	Bird	Yes	No
Lagopus lagopus	Willow ptarmigan	Bird	No	No
Lagopus lagopus scoticus	Red Grouse	Bird	Yes	Yes
Larus argentatus	Herring gull	Bird	Yes	Yes
Larus canus	Common gull	Bird	No	No

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
Larus fuscus	Lesser black-backed gull	Bird	No	No
Larus marinus	Great black-backed gull	Bird	No	No
Larus ridibundus	Black-headed gull	Bird	Yes	No
Limosa lapponica	Bar-tailed godwit	Bird	Yes	No
Limosa limosa	Black-tailed godwit	Bird	Yes	Yes
Melanitta fusca	Velvet scoter	Bird	No	No
Mergus serrator	Red-breasted merganser	Bird	No	No
Miliaria calandra	Corn bunting	Bird	Yes	No
Morus bassanus	Gannet	Bird	No	No
Motacilla alba	Pied wagtail	Bird	No	No
Numenius arquata	Curlew	Bird	Yes	Yes
Numenius phaeopus	Whimbrel	Bird	No	No
Oceanodroma leucorhoa	Leach's petrel	Bird	Yes	No
Oenanthe oenanthe	Wheatear	Bird	No	No
Phalacrocorax aristotelis	Shag	Bird	No	No
Phalacrocorax carbo	Cormorant	Bird	No	No
Phalaropus lobatus	Red-necked phalarope	Bird	Yes	Yes

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
<i>Phylloscopus trochilus</i>	Willow warbler	Bird	No	No
<i>Plectrophenax nivalis</i>	Snow bunting	Bird	Yes	No
<i>Pluvialis apricaria</i>	Golden plover	Bird	Yes	No
<i>Podiceps auritus</i>	Slavonian grebe	Bird	Yes	No
<i>Podiceps grisegena</i>	Red-necked grebe	Bird	Yes	No
<i>Porzana porzana</i>	Spotted crane	Bird	Yes	No
<i>Prunella modularis</i>	Dunnock	Bird	No	No
<i>Puffinus puffinus</i>	Manx shearwater	Bird	Yes	No
<i>Rallus aquaticus</i>	Water rail	Bird	No	No
<i>Regulus regulus</i>	Goldcrest	Bird	No	No
<i>Riparia riparia</i>	Sand martin	Bird	No	No
<i>Rissa tridactyla</i>	Kittiwake	Bird	No	No
<i>Saxicola torquata</i>	Stonechat	Bird	No	No
<i>Scolopax rusticola</i>	Woodcock	Bird	Yes	No
<i>Somateria mollissima</i>	Eider	Bird	No	No
<i>Stercorarius parasiticus</i>	Arctic skua	Bird	Yes	Yes
<i>Stercorarius skua</i>	Great skua	Bird	No	No

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
<i>Sterna albifrons</i>	Little tern	Bird	Yes	No
<i>Sterna hirundo</i>	Common tern	Bird	Yes	No
<i>Sterna paradisaea</i>	Arctic tern	Bird	Yes	No
<i>Sterna sandvicensis</i>	Sandwich tern	Bird	Yes	No
<i>Sturnus vulgaris</i>	Common starling	Bird	Yes	Yes
<i>Tadorna tadorna</i>	Shelduck	Bird	No	No
<i>Tachybaptus ruficollis</i>	Little grebe	Bird	No	No
<i>Tringa totanus</i>	Redshank	Bird	No	No
<i>Turdus iliacus</i>	Redwing	Bird	Yes	No
<i>Turdus philomelos</i>	Song thrush	Bird	Yes	Yes
<i>Uria aalge</i>	Guillemot	Bird	No	No
<i>Vanellus vanellus</i>	Lapwing	Bird	Yes	Yes
INVERTEBRATES				
Ants				
<i>Myrmica ruginodis</i>	A red ant	Ant	No	No
Bees				
<i>Bombus distinguendus</i>	Great yellow bumblebee	Bee	Yes	Yes

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
<i>Bombus muscorum</i>	Heath carder	Bee	Yes	Yes
<i>Andrena tarsala</i>	Tormentil mining bee	Bee	Yes	Yes
Wasps				
<i>Dolichovespula sylvestris</i>	Tree wasp	Wasp	No	No
<i>Dolichovespula norvegicus</i>	Norwegian wasp	Wasp	No	No
<i>Paravespula vulgaris</i>	Common wasp	Wasp	No	No
<i>Nematus stichi</i>	A sawfly	Sawfly	No	No
Beetles				
<i>Agabus paludosus</i>	A water beetle	Beetle	No	No
<i>Apion ryei</i>	A weevil	Beetle	No	No
<i>Brychius elevatus</i>	Crawling water beetle	Beetle	No	No
<i>Cercyon depressus</i>	A water beetle	Beetle	Yes	No
<i>Cercyon melanocephalus</i>	A water beetle	Beetle	Yes	No
<i>Cercyon quisquilius</i>	A water beetle	Beetle	Yes	No
<i>Chaetarthria seminulum</i>	A scavenger water beetle	Beetle	No	No
<i>Choleva glauca</i>	Fungus beetle	Beetle	No	No
<i>Chrysolina crassicornis</i>	A leaf beetle	Beetle	No	No

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<i>Coelambus novemlineatus</i>	A water beetle	Beetle	No	No
<i>Cryptopleurum minutum</i>	A water beetle	Beetle	Yes	No
<i>Elodes minuta</i>	A water beetle	Beetle	Yes	No
<i>Enochrus quadripunctatus</i>	A water beetle	Beetle	Yes	No
<i>Helophorus griseus</i>	A water beetle	Beetle	Yes	No
<i>Hybius aenescens</i>	A water beetle	Beetle	No	No
<i>Hydraena britteni</i>	A small water beetle	Beetle	No	No
<i>H. gracilis</i>	A water beetle	Beetle	No	No
<i>Hydrophilus piceus</i>	Great silver water beetle	Beetle	No	No
<i>Hydroporus longicornis</i>	A water beetle	Beetle	No	No
<i>Hydroporus melanarius</i>	A water beetle	Beetle	No	No
<i>Hydroporus obsoletus</i>	A water beetle	Beetle	No	No
<i>Hydroporus umbrosus</i>	A water beetle	Beetle	No	No
<i>Notiophilis rufipes</i>	A ground beetle	Beetle	No	No
<i>Pelophila borealis</i>	A ground beetle	Beetle	No	No
<i>Potamonectes griseostriatus</i>	A water beetle	Beetle	No	No
<i>Rhagonycha elongata</i>	A soldier beetle	Beetle	No	No

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Stictonectes lepidus	A water beetle	Beetle	No	No
Trechus fulvus	A ground beetle	Beetle	No	No
Tropiphorus terricola	Brown weevil	Beetle	No	No
Butterflies				
Argynnis aglaja scotica	Dark green fritillary	Butterfly	No	No
Coenonympha tulia	Large heath	Butterfly	Yes	Yes
Polyommatus icarus	Common blue	Butterfly	No	No
Caddis flies				
Ylodes reuteri	A caddis fly	Caddis fly		No
Damselflies and Dragonflies				
Aeshna juncea	Common hawk	Dragonfly	No	No
Cordulegaster boltonii	Golden-ringed dragonfly	Dragonfly	No	No
Enallagma cyathigerum	Common blue damselfly	Damselfly	No	No
Ischnura elegans	Blue-tailed Damselfly	Damselfly	No	No
Libellula quadrimaculata	Four-spotted chaser	Dragonfly	No	No
Pyrrhosoma nymphula	Large red damselfly	Damselfly	No	No

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Sympetrum danae	Black darter	Dragonfly	No	No
Mayflies				
Baetis muticus	A mayfly	Mayfly	No	No
Siphonurus lacustris	A mayfly	Mayfly	No	No
Flies				
Aphrosylus raptor	A dolichopodid fly	Fly	No	No
Delia caledonica	A fly	Fly	No	No
Neoascia geniculata	A hoverfly	Fly	No	No
Neoascia obliqua	A hoverfly	Fly	No	No
Orthonevra geniculata	A hoverfly	Fly	No	No
Platycheirus podagratus	A hoverfly	Fly	No	No
Rhamphomyia morio	A fly	Fly	No	No
Tipula limbata	A crane fly	Fly	Yes	No
Stoneflies				
Dinocras cephalotes	A stonefly	Fly	No	No
Grasshoppers				

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<i>Chorthippus parallelus</i>	A meadow grasshopper	Grasshopper	No	No
<i>Omcestus viridulus</i>	Common green grasshopper	Grasshopper	No	No
<i>Tetrix undulata</i>	A grasshopper	Grasshopper	No	No
Moths				
<i>Agrotis vestigialis</i>	Archer's dart	Moth	No	No
<i>Amphipoea oculea</i>	Ear moth	Moth	Yes	Yes
<i>Amphipyra tragopoginis</i>	Mouse moth	Moth	Yes	Yes
<i>Apamea zeta assimilis</i>	Northern arches	Moth	No	No
<i>Apamea remissa</i>	Dusky brocade	Moth	Yes	Yes
<i>Aporophyla lutulenta</i>	Northern deep-brown dart	Moth	No	Yes
<i>Arctia caja</i>	Garden tiger	Moth	Yes	Yes
<i>Brachylomia viminalis</i>	Minot shoulder-knot	Moth	Yes	Yes
<i>Carsia sororiata anglica</i>	Manchester treble-bar	Moth	No	No
<i>Celaenia haworthii</i>	Haworth's minor	Moth	Yes	Yes
<i>Chesias legatella</i>	The streak	Moth	Yes	Yes
<i>Ecliptopera silaceata</i>	Small phoenix	Moth	Yes	Yes

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<i>Entephria caesiata</i>	Grey mountain carpet	Moth	Yes	Yes
<i>Entephria flavicinctata</i>	Yellow-ringed carpet	Moth	No	No
<i>Eudonia alpina</i>		Moth	No	No
<i>Eupithecia venosata ochraceae</i>	Netted pug	Moth	No	No
<i>Euxoa cursoria</i>	Coast dart	Moth	No	No
<i>Dasypolia templi</i>	Brindled ochre	Moth	Yes	Yes
<i>Diarsia mendica orkneyensis</i>	Ingrailed clay	Moth	No	No
<i>Diarsia rubi</i>	Small square-spot	Moth	Yes	Yes
<i>Dyscia fagaria</i>	Grey scalloped bar	Moth	No	No
<i>Graphiphora augur</i>	Double dart	Moth	Yes	Yes
<i>Hepialus humili</i>	Ghost moth	Moth	Yes	Yes
<i>Hydraecia micacea</i>	Rosy rustic	Moth	Yes	Yes
<i>Mesoligia literosa</i>	Rosy minor	Moth	Yes	Yes
<i>Orthonama vittata</i>	Oblique carpet	Moth	Yes	Yes
<i>Orthosia gracilis</i>	Powdered quaker	Moth	Yes	Yes
<i>Parasemia plantaginis insularum</i>	Wood tiger	Moth	No	No
<i>Perizoma flavofasciata</i>	Sandy Carpet	Moth	No	No

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Psyche casta		Moth	No	No
Saturnia pavonia	Emperor	Moth	No	No
Scotopteryx xhenopodiata	Shaded broad-bar	Moth	Yes	Yes
Spilosoma lubricipeda	White ermine	Moth	Yes	Yes
Stilbia anomala	The anomalous	Moth	Yes	Yes
Thera cognata	Chestnut-coloured carpet	Moth	No	No
Thera juniperata orcadensis	Juniper carpet	Moth	No	No
Udea uliginosalis	A moth	Moth	No	No
Xanthia icteritia	The sallow	Moth	Yes	Yes
Xestia agathina	Heath rustic	Moth	Yes	Yes
Xestia alpicola alpina	Northern dart	Moth	Yes	Yes
Xestia castanea	Neglected rustic	Moth	Yes	Yes
Xylena exsoleta	Sword-grass	Moth	Yes	Yes
Millepedes				
Nanogona polydesmoides	A millepede	Millipede	No	No
Spiders				

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
<i>Agyneta cauta</i>	Money spider	Spider	No	No
<i>Agyneta conigera</i>	Money spider	Spider	No	No
<i>Araeoncus crassiceps</i>	Money spider	Spider	No	No
<i>Araeoncus humilis</i>		Spider	No	No
<i>Baryphyma trifrons</i>	Money spider	Spider	No	No
<i>Bathyphantes approximatus</i>	Money spider	Spider	No	No
<i>Centromerus arcanus</i>	Money spider	Spider	No	No
<i>Clubiona comta</i>		Spider	No	No
<i>Drepanotylus uncatus</i>	Money spider	Spider	No	No
<i>Erigone arctica</i>	Money spider	Spider	No	No
<i>Erigone capra</i>		Spider	No	No
<i>Erigone longipalpis</i>	Money spider	Spider	No	No
<i>Halorates reprobus</i>	Money spider	Spider	No	No
<i>Hilaira excisa</i>	Money spider	Spider	No	No
<i>Hilaira frigida</i>	Money spider	Spider	No	No
<i>Hypselistes jacksoni</i>		Spider	No	No

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
<i>Hilaira pervicax</i>		Spider	No	No
<i>Hyposinga pygmaea</i>		Spider	No	No
<i>Jacksonella falconeri</i>		Spider	No	No
<i>Latithorax faustus</i>	Money spider	Spider	No	No
<i>Lepthyphantes minutus</i>		Spider	No	No
<i>Lepthyphantes whymeri</i>	Money spider	Spider	No	No
<i>Leptorhopterus robustum</i>	Money spider	Spider	No	No
<i>Lophomma punctatum</i>	Money spider	Spider	No	No
<i>Mecynargus (Rhaebothorax) morulus</i>	Money spider	Spider	No	No
<i>Meioneta beata</i>	Money spider	Spider	No	No
<i>Meioneta nigripes</i>		Spider	No	No
<i>Minyriolus pusillus</i>	Money spider	Spider	No	No
<i>Neon reticulatus</i>	Jumping spider	Spider	No	No
<i>Nesticus cellulanus</i>	Comb-footed cellar spider	Spider	No	No
<i>Ozyptila atomaria</i>	Crab spider	Spider	No	No
<i>Ozyptila trux</i>	Crab spider	Spider	No	No

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
<i>Pelecopsis nemoralis</i>	Money spider	Spider	No	No
<i>Pirata piraticus</i>	A wolf spider	Spider	No	No
<i>Poeciloneta variegata</i>	Money spider	Spider	No	No
<i>Robertus arundineti</i>	Comb-footed spider	Spider	No	No
<i>Scotinotylus evansi</i>	Money spider	Spider	No	No
<i>Silometopus ambiguus</i>	Money spider	Spider	No	No
<i>Trichopterna thorelli</i>	Money spider	Spider	No	No
<i>Typhochrestus digitatus</i>	Money spider	Spider	No	No
<i>Walckeneria clavicornis</i>	Money spider	Spider	No	No
<i>Walckeneria clavicornis</i>	Money spider	Spider	No	No
<i>Walckeneria dysderoides</i>	A spider	Spider	No	No
<i>Walckeneria vigilax</i>	Money spider	Spider	No	No
Pseudoscorpions				
<i>Neobisium carcinioides</i>		Crustacean	No	No
Worms & Leeches				
<i>Chaetopterus variopedatus</i>	A tube-dwelling polychaete	Worm	No	No

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<i>Hirudo medicinalis</i>	Medicinal leech	Leech	Yes	No
<i>Ophelia bicornis</i>	An estuarine polychaete	Worm	No	No
Molluscs				
<i>Amauropsis islandicus</i>	A gastropod	Mollusc	Yes	No
<i>Atrina fragilis</i>	Fan mussel	Mollusc	Yes	Yes
<i>Cerastoderma glaucum</i>	Lagoonal cockle	Mollusc	No	No
<i>Devonia perrieri</i>	A marine mollusc	Mollusc	Yes	No
<i>Hydrobia acuta</i> subsp. <i>neglecta</i>	A brackish water snail	Mollusc	Yes	No
<i>Hancockia uncinata</i>	A sea slug	Mollusc	Yes	No
<i>Leiostyla anglica</i>	A terrestrial snail	Mollusc	No	No
<i>Lymnaea peregra</i>	A snail (near-involute form)	Mollusc	No	No
<i>Manzonina crassa</i>	A small marine gastropod	Mollusc	Yes	No
<i>Margaritifera margaritifera</i>	A freshwater pearl mussel	Mollusc	Yes	Yes
<i>Modiolus modiolus</i>	Horse mussel	Mollusc	No	No
<i>Mya arenaria</i>	Sand gaper	Mollusc	No	No
<i>Nucella lapillus</i>	Dog whelk	Mollusc	No	No
<i>Okenia leachii</i>	A sea slug	Mollusc	Yes	No

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Ostrea edulis	Native oyster	Mollusc	Yes	Yes
Theodoxus fluviatilis	River nerite	Mollusc	Yes	No
Simnia patula	A marine snail	Mollusc	Yes	No
Vertigo lilljeborgi	A terrestrial snail	Mollusc	No	No
Crustaceans				
Nephrops norvegicus	Norway lobster	Crustacean	No	No
Palinurus elephas	Crayfish / spiny lobster	Crustacean	Yes	Yes
Cnidarians (sea anemones)				
Scolanthus callimorphus	Worm anemone	Cnidarian	No	No
Haliclystus auricula	Stalked jellyfish	Cnidarian	Yes	Yes
Ventromma halecioides	A hydroid	Cnidarian	Yes	No
Echinoderms (sea urchins)				
Strongylocentrotus droebachiensis	Northern sea-urchin	Echinoderm	No	No
PLANTS				
Algae				

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
<i>Cladophora sauteri</i>	A green alga	Alga	No	No
<i>Fucus distichus</i>	A brown algae	Alga	Yes	Yes
<i>Lithothamnion coralloides</i>	Coral maerl	Alga	Yes	Yes
<i>Lithothamnion glaciale</i>	A maerl algae	Alga	No	No
<i>Phymatolithon calcareum</i>	Common maerl	Alga	Yes	Yes
Fungus				
<i>Clavaria zollingeri</i>	A fairy club	Fungus (non-lichenised)	No	No
<i>Coprinus comatus</i>	Shaggy ink cap	Fungus (non-lichenised)	No	No
<i>Hygrocybe calyptriformis</i>	Pink meadow cap	Fungus (non-lichenised)	No	No
<i>Langermannia gigantea</i>	Giant puffball	Fungus (non-lichenised)	No	No
<i>Microglossum olivaceum</i>	Earth-tongue	Fungus (non-lichenised)	Yes	Yes
<i>Wawelia microspora</i>		Fungus (non-lichenised)	No	No
Lichens				
<i>Alectoria sarmentosa vexillifera</i>	A lichen	Lichen	No	No
<i>Calicium corynellum</i>	A lichen	Lichen	Yes	No
<i>Caloplaca cerinella</i>	A lichen	Lichen	No	No

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
<i>Caloplaca ferruginea</i>	A lichen	Lichen	Yes	No
<i>Caloplaca ochracea</i>	A lichen	Lichen	Yes	No
<i>Catapyrenium cinereum</i>	A lichen	Lichen	No	No
<i>Cladonia fragilissima</i>	A lichen	Lichen	No	No
<i>Lobaria pulmonaria</i>	Lungwort	Lichen	Yes	No
<i>Lecidea confluens</i>	A lichen	Lichen	No	No
<i>Melaspilea interjecta</i>	A lichen	Lichen	Yes	No
<i>Nephroma laevigatum</i>	Kidney lichen	Lichen	Yes	No
<i>Peltigera scabrosa</i>	A dog lichen	Lichen	Yes	No
<i>Psorotichia schaeereri</i>	A lichen	Lichen	No	No
<i>Ramalina fraxinea</i>	Cartilage lichen	Lichen	Yes	No
<i>Schaereria fuscocinerea</i>	A lichen	Lichen	No	No
<i>Stringula taylorii</i>	A lichen	Lichen	Yes	No
<i>Toninia lobulata</i>	A lichen	Lichen	No	No
Liverworts				
<i>Barbilophozia atlantica</i>	A liverwort	Bryophyte	No	No

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<i>Calypogeia azurea</i>	A liverwort	Bryophyte	No	No
<i>Eremonotus myriocarpus</i>	A liverwort	Bryophyte	No	No
<i>Gymnomitrium crenulatum</i>	A liverwort	Bryophyte	No	No
<i>Herbertus stramineus</i>	A liverwort	Bryophyte	No	No
<i>Jungermannia polaris</i>	Arctic flapwort	Bryophyte	Yes	No
<i>Jungermannia subelliptica</i>	A liverwort	Bryophyte	No	No
<i>Leiocolea fitzgeraldiae</i>	A liverwort	Bryophyte	No	No
<i>Lepidozia pearsonii</i>	A liverwort	Bryophyte	No	No
<i>Odontoschisma elongatum</i>	A liverwort	Bryophyte	No	No
<i>Plagiochila carringtonii</i>	A liverwort	Bryophyte	No	No
<i>Plagiochila spinulosa</i>	A liverwort	Bryophyte	No	No
<i>Porella obtusata</i>	A liverwort	Bryophyte	No	No
<i>Riccia cavernosa</i>	A liverwort	Bryophyte	No	No
Mosses				
<i>Amblyodon dealbatus</i>	A moss	Bryophyte	No	No
<i>Brachythecium mildeanum</i>	A moss	Bryophyte	No	No

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<i>Bryum weigeli</i>	A moss	Bryophyte	No	No
<i>Bryum calophyllum</i>	Blunt bryum / Matted bryum	Bryophyte	Yes	Yes
<i>Campylopus schimperi</i>	A moss	Bryophyte	No	No
<i>Campylopus subulatus</i>	A moss	Bryophyte	No	No
<i>Dicranella crispa</i>	A moss	Bryophyte	No	No
<i>Distichium inclinatum</i>	A moss	Bryophyte	No	No
<i>Ditrichum flexicaule</i>	Bendy dictrichum	Bryophyte	Yes	No
<i>Drepanocladus lycopodioides</i>	A moss	Bryophyte	No	No
<i>Leucobryum glaucum</i>	A moss	Bryophyte	No	No
<i>Microbryum rectum</i>	Upright pottia	Bryophyte	Yes	No
<i>Orthothecium rufescens</i>	A moss	Bryophyte	No	No
<i>Philonotis seriata</i>	A moss	Bryophyte	No	No
<i>Sphagnum austinii</i>	A moss	Bryophyte	No	No
<i>Sanionia orthothecioides</i>	St Kilda hook-moss	Bryophyte	Yes	No
<i>Sphagnum magellanicum</i>	A moss	Bryophyte	No	No
<i>Tortula protobryoides</i>	Tall pottia	Bryophyte	Yes	No
Stoneworts				

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
<i>Chara aspera</i>	Rough stonewort	Bryophyte	No	No
<i>Chara baltica</i>	Baltic stonewort	Bryophyte	Yes	Yes
<i>Chara canescens</i>	Bearded stonewort	Bryophyte	Yes	Yes
<i>Chara curta</i>	Lesser bearded stonewort	Bryophyte	No	No
<i>Chara muscosa</i>	Mossy stonewort	Bryophyte	No	No
<i>Chara rudis</i>	Rugged stonewort	Bryophyte	Yes	No
<i>Tolypella glomerata</i>	Clustered stonewort	Bryophyte	No	No
<i>Tolypella nidifica</i>	Bird's nest stonewort	Bryophyte	Yes	Yes
Vascular Plants				
<i>Ajuga pyramidalis</i>	Pyramidal bugle	Vascular plant	Yes	Yes
<i>Ammophila arenaria</i>	Marram	Vascular plant	No	No
<i>Annagallis arvensis</i>	Scarlet pimpernel	Vascular plant	Yes	No
<i>Angelica archangelica</i>	Angelica	Vascular plant	No	No
<i>Arctostaphylos alpinus</i>	Alpine bearberry/ Black blaeberry	Vascular plant	No	No
<i>Arctostaphylos uva-ursi</i>	Bearberry	Vascular plant	No	No
<i>Aster tripolium</i>	Sea aster	Vascular plant	No	No

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<i>Avena fatua</i>	Wild oat	Vascular plant	No	No
<i>Avena strigosa</i>	Bristle oak, black oak	Vascular plant	No	No
<i>Betula pubescens</i>	Downy birch	Vascular plant	No	No
<i>Bolboschoenus maritimus</i>	Sea club-rush	Vascular plant	No	No
<i>Briza media</i>	Quaking-grass	Vascular plant	No	No
<i>Callitriche hermaphroditica</i>	Autumnal water-starwort	Vascular plant	No	No
<i>Caltha palustris</i>	Marsh marigold/ king cup	Vascular plant	No	No
<i>Calystegia soldanella</i>	Sea bindweed	Vascular plant	No	No
<i>Carex capillaris</i>	Hair sedge	Vascular plant	No	No
<i>Carex diandra</i>	Lesser tussock sedge	Vascular plant	No	No
<i>Carex flacca</i>	Glaucous sedge	Vascular plant	No	No
<i>Carex maritima</i>	Curved sedge	Vascular plant	Yes	Yes
<i>Carex riparia</i>	Great pond-sedge	Vascular plant	No	No
<i>Carex riparia x rostrata</i>	Hybrid sedge	Vascular plant	No	No
<i>Carum carvi</i>	Caraway	Vascular plant	Yes	Yes
<i>Catabrosa aquatica</i>	Whorl-grass	Vascular plant	No	No

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
Catapodium marinum	Stiff sand grass	Vascular plant	No	No
Centaurea cyanus	Cornflower	Vascular plant	Yes	Yes
Chamaemelum nobile	Chamomile	Vascular plant	Yes	Yes
Chrysanthemum segetum	Corn marigold	Vascular plant	No	No
Coeloglossum viride	Frog orchid	Vascular plant	Yes	Yes
Cornus suecica	Dwarf cornel	Vascular plant	No	No
Corylus avellana	Hazel	Vascular plant	No	No
Dactylorhiza purpurella	Northern fen orchid	Vascular plant	No	No
Dactylorhiza sp	Spotted orchids	Vascular plant	No	No
Diphasiastrum alpinum	Alpine clubmoss	Vascular plant	No	No
Draba incana	Hoary whitlowgrass	Vascular plant	Yes	No
Drosera longifolia	Great sundew	Vascular plant	No	No
Dryas octopetala	Mountain avens	Vascular plant	No	No
Dryopteris aemula	Hay-scented buckler-fern	Vascular plant	No	No
Dryopteris oreades	Mountain male-fern	Vascular plant	No	No
Equisetum pratense	Shady horsetail	Vascular plant	No	No

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
Eriophorum latifolium	Broad-leaved cottongrass	Vascular plant	No	No
Erodium cicutarium	Common stork's bill	Vascular plant	No	No
Eupatorium cannabinum	Hemp agrimony	Vascular plant	No	No
Euphorbia helioscopia	Sun spurge	Vascular plant	Yes	No
Euphrasia atroviolacia	An eyebright	Vascular plant	No	No
Euphrasia farhaidensis	An eyebright	Vascular plant	No	No
Euphrasia foulaensis	An eyebright	Vascular plant	No	No
Euphrasia heslop-harrisonii	An eyebright	Vascular plant	Yes	Yes
Euphrasia marshallii	An eyebright	Vascular plant	Yes	Yes
Euphrasia ostenfeldii	An eyebright	Vascular plant	Yes	Yes
Euphrasia rotundifolia	An eyebright	Vascular plant	Yes	Yes
Euphrasia (as yet unnamed)	An eyebright	Vascular plant	No	No
Fallopia convulvulus	Black bindweed	Vascular plant	Yes	No
Festuca arenaria	Rush-leaved fescus	Vascular plant	No	No
Fragaria vesca	Wild strawberry	Vascular plant	No	No
Fritillaria meleagris	Snakes-head fritillary	Vascular plant	No	No

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
<i>Fumaria bastardii</i>	Tall ramping fumitory	Vascular plant	No	No
<i>Fumaria capreolata</i>	White ramping fumitory	Vascular plant	Yes	No
<i>Fumaria densiflora</i>	Dense flowered fumitory	Vascular plant	No	No
<i>Fumaria purpurea</i>	Purple ramping fumitory	Vascular plant	Yes	Yes
<i>Galium sternerii</i>	Limestone bedstraw	Vascular plant	No	No
<i>Gentianella campestris</i>	Field gentian	Vascular plant	Yes	Yes
<i>Gnaphalium sylvaticum</i>	Heath cudweed	Vascular plant	Yes	No
<i>Goodyera repens</i>	Creeping lady's-tresses	Vascular plant	No	No
<i>Hammarbya paludosa</i>	Bog orchid	Vascular plant	No	No
<i>Hieracium orcadense</i>	Hawkweed	Vascular plant	No	No
<i>Hierochloë odorata</i>	Holy-grass	Vascular plant	Yes	No
<i>Hymenophyllum wilsonii</i>	Wilson's filmy-fern	Vascular plant	No	No
<i>Hyoscyamus niger</i>	Henbane	Vascular plant	Yes	No
<i>Isoetes lacustris</i>	Quillwort	Vascular plant	No	No
<i>Jasione montana</i>	Sheeps' bit	Vascular plant	No	No
<i>Juncus balticus</i>	Baltic rush	Vascular plant	No	No

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
Juniperis communis	Juniper	Vascular plant	Yes	Yes
Loiseleuria procumbens	Trailing azalea	Vascular plant	No	No
Lupinus nootkatensis	Nootka lupin	Vascular plant	No	No
Lychnis flos-cuculi	Ragged robin	Vascular plant	No	No
Lycopodium annotinum	Interrupted clubmoss	Vascular plant	No	No
Medicago sativa ssp. Falcata	Sickle medick	Vascular plant	No	No
Melampyrum pratense	Common cow-wheat	Vascular plant	No	No
Mertensia maritima	Oyster plant	Vascular plant	No	No
Myrica gale	Bog myrtle	Vascular plant	No	No
Ophioglossum azoricum	Small adder's-tongue	Vascular plant	No	No
Orchis mascula	Early purple orchid	Vascular plant	No	No
Orthilia secunda	Serrated wintergreen	Vascular plant	No	No
Oxyria digyna	Mountain sorrel	Vascular plant	No	No
Parnassia palustris	Grass-of-parnassus	Vascular plant	No	No
Phegopteris connectilis	Beech fern	Vascular plant	No	No
Pimpinella saxifrage	Burnet-saxifrage	Vascular plant	No	No

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
<i>Plantago media</i>	Hoary plantain	Vascular plant	Yes	No
<i>Platanthera bifolia</i>	Lesser butterfly orchid	Vascular plant	Yes	Yes
<i>Poa alpina</i>	Alpine meadow-grass	Vascular plant	No	No
<i>Polygonum boreale</i>	Northern knotgrass	Vascular plant	No	No
<i>Polystichum lonchitis</i>	Holly fern	Vascular plant	Yes	Yes
<i>Populus tremula</i>	Aspen	Vascular plant	No	No
<i>Potamogeton filiformis</i>	Slender pondweed	Vascular plant	No	No
<i>Potamogeton friesii</i>	Flat-stalked pondweed	Vascular plant	No	No
<i>Potamogeton lucens</i>	Shining pondweed	Vascular plant	No	No
<i>Potamogeton praelongus</i>	Long-stalked pondweed	Vascular plant	No	No
<i>Potamogeton pusillus</i>	Lesser pondweed	Vascular plant	No	No
<i>Potamogeton x zizii</i>	A hybrid pondweed	Vascular plant	No	No
<i>Primula scotica</i>	Scottish primrose	Vascular plant	Yes	No
<i>Primula veris</i>	Cowslip	Vascular plant	No	No
<i>Pseudorchis albida</i>	Small white orchid	Vascular plant	Yes	Yes
<i>Pyrola rotundifolia</i> ssp. <i>rotundifolia</i>	Round-leaved wintergreen	Vascular plant	No	No

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
Ranunculus hederaceus	Ivy-leaved water-crowfoot	Vascular plant	No	No
Rorippa islandica	Northern yellow-cress	Vascular plant	No	No
Rosa tomentosa	Harsh downy-rose	Vascular plant	Yes	No
Rubus chamaemorus	Cloudberry	Vascular plant	No	No
Rubus septentrionalis	Bramble	Vascular plant	No	No
Ruppia cirrhosa	Spiral tasselweed	Vascular plant	Yes	No
Sagina subulata	Awl-leaved pearlwort	Vascular plant	No	No
Salicornia europaea agg.	Common glasswort	Vascular plant	No	No
Salix aurita	Eared willow	Vascular plant	No	No
Salix cinerea	Grey willow	Vascular plant	No	No
Salix myrsinites	Myrtle-leaved willow	Vascular plant	Yes	Yes
Salix phylicifolia	Tea-leaved willow/ rice	Vascular plant	No	No
Salix phylicifolia x repens = x schraderiana	Hybrid willow	Vascular plant	No	No
Samolus valerandi	Brookweed	Vascular plant	No	No
Saussurea alpina	Alpine saw-wort	Vascular plant	No	No
Saxifraga aizoides	Yellow saxifrage	Vascular plant	No	No

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
<i>Saxifraga oppositifolia</i>	Purple saxifrage	Vascular plant	No	No
<i>Saxifraga stellaris</i>	Starry saxifrage	Vascular plant	No	No
<i>Scandix pecten-veneris</i>	Shepherd's needle	Vascular plant	No	Yes
<i>Schoenoplectus lacustris</i>	Bullrush	Vascular plant	No	No
<i>Schoenoplectus tabernaemontani</i>	Glaucos bullrush	Vascular plant	No	No
<i>Schoenus nigricans</i>	Black bog-rush	Vascular plant	No	No
<i>Scutellaria galericulata</i>	Skull-cap	Vascular plant	No	No
<i>Senecio sylvaticus</i>	Wood groundsel	Vascular plant	No	No
<i>Sherardia arvensis</i>	Field madder	Vascular plant	Yes	No
<i>Silene acaulis</i>	Moss campion	Vascular plant	No	No
<i>Sinapsis alba</i>	White mustard	Vascular plant	Yes	No
<i>Sinapsis arvensis</i>	Charlock	Vascular plant	Yes	No
<i>Sorbus aucuparia</i>	Rowan	Vascular plant	No	No
<i>Stachys arvensis</i>	Field woundwort	Vascular plant	Yes	No
<i>Stellaria holostea</i>	Greater stitchwort	Vascular plant	No	No
<i>Taraxacum europhyllum</i>	Dandelion	Vascular plant	No	No

SCIENTIFIC NAME	COMMON NAME	TAXON	SCOTTISH BIODIVERSITY LIST	UK BAP LIST
<i>Taraxacum fulvicarpum</i>	Dandelion	Vascular plant	No	No
<i>Taraxacum fulvicarpum</i>	Dandelion	Vascular plant	No	No
<i>Taraxacum landmarkii</i>	Dandelion	Vascular plant	No	No
<i>Taraxacum orcadense</i>	Dandelion	Vascular plant	No	No
<i>Taraxacum rubellum</i>	Dandelion	Vascular plant	No	No
<i>Taraxacum subnaevosum</i>	Dandelion	Vascular plant	No	No
<i>Taraxacum tanylepis</i>	Dandelion	Vascular plant	No	No
<i>Thalictrum alpinum</i>	Alpine meadow-rue	Vascular plant	No	No
<i>Trientalis europaea</i>	Chickweed wintergreen	Vascular plant	No	No
<i>Vaccinium uliginosum</i>	Bog blaeberry	Vascular plant	No	No
<i>Viola tricolor</i>	Wild pansy	Vascular plant	Yes	No
<i>Zostera angustifolia</i>	Narrow-leaved eelgrass	Vascular plant	No	No
<i>Zostera marina</i>	eelgrass/ common grass-wrack	Vascular plant	No	No

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Appendix II: BAP categories of terrestrial, freshwater and marine habitat found in Orkney - Revised 2012

Table 1: Terrestrial and Freshwater Habitats

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 oakwood	Not present	Upland birchwoods * Upland willow scrub Wet woodlands *Broad-leaved plantations and policy woodlands
		Upland birchwoods	Present	
		Lowland mixed deciduous woodland	Not present	
		Upland mixed ashwoods	Not present	
		Wet woodlands	Present	
		Wood pasture and parkland	Not present	
		Traditional orchards	Not present	
2	CONIFEROUS WOODLAND	Native pine woodlands	Not present	Conifer plantation
3	BOUNDARY AND LINEAR FEATURES	Hedgerows	Present	*Miscellaneous field boundaries *Road verges Hedgerows Stone and earth boundary features
4	ARABLE AND HORTICULTURE	Arable field margins	Present	Arable field margins *Arable crops
		Open mosaic habitats on previously developed land	Not present	
5	IMPROVED GRASSLAND	Coastal and floodplain grazing marsh	Not present	Improved grassland *Extensive Hay/Silage crops
6	NEUTRAL GRASSLAND	Lowland meadows	Present	Lowland meadows *Wet meadow Semi-natural grassland
		Upland hay meadows	Not present	
7	CALCAREOUS GRASSLAND	Upland calcareous grassland	Present	Upland calcareous grassland Lowland calcareous grassland
		Lowland calcareous grassland	Present	
		Limestone pavements	Not present	
		Calaminarian grasslands	Not present	

No.	BROAD HABITAT TYPE	UK Priority Habitats	UK Priority Habitat Occurrence in Orkney	Local Habitat UK Priority= Bold Locally important=*
8	ACID GRASSLAND	Lowland dry acid grassland	Present	Lowland dry acid grassland
		<i>Juncus squarrosus-Festuca ovina</i> grassland	Present	Acid grassland Juncus squarrosus-Festuca ovina grassland
		<i>Nardus stricta-Gallium saxatile</i> grassland	Present	Nardus stricta-Gallium saxatile grassland
9	BRACKEN	Bracken	Not present	
10	DWARF SHRUB HEATH	Upland heathland	Present	Upland heathland
		Lowland heathland	Present	Lowland heathland
				*Treeless woodland and dales *Maritime heath *Empetrum heath *Lichen heath *Species rich heath
11	FEN, MARSH AND SWAMP	Lowland fens	Present	Lowland fens
		Upland Flushes, Fens and Swamps	Present	Upland Flushes, Fens and Swamps
		Reedbeds	Present	Reedbeds
		Purple moorgrass and rush pastures	Present	Purple moorgrass and rush pastures
		Coastal and floodplain grazing marsh	Not present	*Marsh
12	BOG	Lowland raised bog	Present	*Basin bog
		Blanket bog	Present	Blanket bog
13	STANDING OPEN WATER AND CANALS	Eutrophic standing waters	Present	Eutrophic standing waters
		Mesotrophic lakes	Present	Mesotrophic lakes
		Oligotrophic and Dystrophic Lakes	Present	Oligotrophic and Dystrophic Lakes
		Ponds	Present	Ponds
		Aquifer fed naturally fluctuating water bodies	Not present	
14	RIVERS AND STREAMS	Rivers	Not present	*Burns and Canalised burns
15	MONTANE HABITATS	Mountain Heaths and Willow Scrub	Present	Mountain Heaths and Willow Scrub
16	INLAND ROCK	Limestone pavement	Not present	
		Inland rock outcrop and scree habitats	Present	Inland rock and scree outcrops

No.	BROAD HABITAT TYPE	UK Priority Habitats	UK Priority Habitat Occurrence in Orkney	Local Habitat UK Priority= Bold Locally important=*
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
19	SUPRALITTORAL SEDIMENT	Coastal sand dunes	Present	Coastal sand dunes
		Machair	Present	Machair *Links *Aeolianite
		Coastal vegetated shingle	Present	Coastal vegetated shingle *Coastal strandline Storm beach

MARINE HABITATS

Table 2 lists the UK and Scottish Priority Habitats which occur in Orkney and, where relevant, expands these Priority Habitats to identify the specific habitat types which relate to the LBAP. It includes many additions to the list of marine habitats featured in the 2002 LBAP, reflecting both recent work which has been carried out into marine recording in Orkney and also the introduction of the Scottish Biodiversity List (SBL) in 2005 and the UK BAP review which was carried out in 2007. Although UK priority habitats present in Scotland all qualify under the criteria used for habitat selection, they are not explicitly named in the SBL. Instead the SBL has a much longer list of habitats using more narrowly defined units – mostly at the level of NVC community for terrestrial/freshwater habitats, and MNCR biotope for marine. Work is ongoing to correlate the UK and Scottish lists and, once finalised, a list of Orkney marine biotopes will be produced for inclusion in the LBAP.

Table 2: Marine Habitats

No.	BROAD HABITAT TYPE	UK/Scottish Priority Habitat within Broad Habitat Type	Occurrence in Orkney	LBAP Specific Habitat Type UK Priority= Bold
20	LITTORAL ROCK	Littoral chalk	Not Present	
		<i>Sabellaria alveolata</i> reefs	Not Present	
21	LITTORAL SEDIMENT	Intertidal mudflats (Mudflats)	Present	Littoral mud
		Sandy shores	Present	Littoral sand
		Coastal saltmarsh	Present	Coastal saltmarsh
		Seagrass beds	Present	
		Intertidal boulder communities	Present	Intertidal boulder communities

No.	BROAD HABITAT TYPE	UK/Scottish Priority Habitat within Broad Habitat Type	Occurrence in Orkney	LBAP Specific Habitat Type UK Priority= Bold
21	LITTORAL SEDIMENT	Blue mussel beds (<i>Mytilus edulis</i>)	Present	Blue mussel beds (<i>Mytilus edulis</i>)
22	INSHORE SUBLITTORAL ROCK	Littoral caves and overhangs	Present	Littoral caves and overhangs
		Sublittoral wave surge gullies and caves	Present	Wave surge gullies and caves Circalittoral caves and overhangs
		Tide-swept channels Wave exposed and/or tide swept infralittoral and circalittoral rock and tidal rapids	Present	Tide-swept channels Tide-swept fucoids High-energy infralittoral rock Tide-swept infralittoral rock Tide-swept kelp Very tide-swept faunal turf Tide-swept faunal turf Tide- and wave-swept faunal turf
23	INSHORE SUBLITTORAL SEDIMENT	Sheltered muddy gravels	Present	Circalittoral sandy mud
		Seagrass meadows	Present	Seagrass beds (<i>Zostera marina</i> and <i>Zostera angustifolia</i>) <i>Ruppia</i> meadows

No.	BROAD HABITAT TYPE	UK/Scottish Priority Habitat within Broad Habitat Type	Occurrence in Orkney	LBAP Specific Habitat Type UK Priority= Bold
23	INSHORE SUBLITTORAL SEDIMENT	Saline lagoons and environs	Present	Saline lagoons Variable salinity fucoids Low salinity sublittoral mud Low salinity sublittoral mixed sediment Low salinity infra-littoral rock
		Inlets, enclosed and sheltered bays and sublittoral sand, fine sand and mud	Present	Circalittoral coarse sediment Sublittoral sands and fine sand Infralittoral mixed sediment Sparse <i>Modiolus modiolus</i> Circalittoral mixed sediment Brittlestar beds
		Infralittoral mixed sediment	Present	Sublittoral sands and gravel Offshore gravely mud
		Sublittoral sands and gravel	Present	Mud habitats in deep water (Mud in deep water) Sublittoral sands and gravel
		Maerl beds	Present	Maerl beds
		Horse mussel beds (Biogenic reefs)	Present	Horse mussel beds (<i>Modiolus modiolus</i> beds)
24	OFFSHORE	Cold-water coral reefs (Biogenic reefs)	Present	Cold-water coral reefs (<i>Lophelia pertusa</i> reefs)
		Mud habitats in deep water (Mud in deep water)	Present	Mud habitats in deep water (Offshore circalittoral mud)

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Appendix III: The Aichi Targets

Listed below are the 20 targets agreed by the 193 signatories to the Convention for Biological Diversity (CBD) at the COP10 in Nagoya in October 2010. These targets form the framework for biodiversity conservation for the next 10 years, until 2020.

The 20 targets are grouped under 5 main goals. The following extract from the CBD website lists the targets in brief outline.

Strategic Goal A:

Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society

Target 1

By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

Target 2

By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.

Target 3

By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.

Target 4

By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

Strategic Goal B:

Reduce the direct pressures on biodiversity and promote sustainable use.

Target 5

By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

Target 6

By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

Target 7

By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

Target 8

By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

Target 9

By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

Target 10

By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

Strategic Goal C:

Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.

Target 11

By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.

Target 12

By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

Target 13

By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

Strategic Goal D:

Enhance the benefits to all from biodiversity and ecosystem services.

Target 14

By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

Target 15

By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

Target 16

By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.

Strategic Goal E:

Enhance implementation through participatory planning, knowledge management and capacity building.

Target 17

By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

Target 18

By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.

Target 19

By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

Target 20

By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.