

URBAN AND BUILT ENVIRONMENT



P & A MACDONALD

THE RIVER TAY AT PERTH

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“However urbanised our lifestyle may become, we still depend on nature to provide the food we eat. It helps to house and clothe us, and it processes our waste.”

PROF. CHRIS BAINES

Tayside Biodiversity Partnership



BIODIVERSITY
THE VARIETY OF LIFE



DUNDEE LAW

DEFINITION

Built up areas and greenspace are intrinsically important for biodiversity, providing a contact between people and the places they are familiar with or explore from home. All urban areas within Tayside will be included within this Habitat Action Plan – from small villages to larger towns and cities.

Managed greenspace includes parks, gardens and amenity greenspace, civic space, children's play areas, sports facilities, natural and semi-natural greenspaces, allotments, graveyards and cemeteries. Transport corridors and residential areas are also included, as are private gardens which provide invaluable urban space for wildlife.

Many of these will be subject to separate Habitat Action Plans, including:

- Businesses with Land;
- Golf Courses;
- Hospitals, Sheltered Housing and Nursing Homes;
- School, College and University Grounds;
- Urban and Community Woodland;
- Burial Grounds (Kirkyards and Cemeteries);
- Urban Waters.

CURRENT STATUS AND EXTENT OF HABITAT

Tayside is home to over 385,000 people and more than three quarters of them live in an urban environment. They come into contact with various types of managed greenspace which include:

- approximately 1,950 hectares of parks and open space;
- 440 ha. of school grounds;
- over 400 playgrounds;
- 223 cemeteries.

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Derelict and vacant land also provides shelter for wildlife and in Tayside it is estimated there is some 700 ha. that come into this category.

All of these areas provide havens for a rich variety of biodiversity and excellent educational opportunities.

NATURE CONSERVATION IMPORTANCE

Urban areas offer a mosaic of habitats suitable for an unexpectedly large variety of wildlife. Many buildings offer important roost sites for swifts, house martins and bats. Some urban industrial buildings offer sites for kestrels, barn owls and peregrine falcons. Buildings, old walls and bridges can all support bats, bees and beetles, as well as lichens and mortar-loving plants such as wall rue.

Railway and roadside verges provide habitats for a range of species associated with grassland and woodland. Railways and roads, as well as rivers and burns can facilitate the spread of both native and non-native species. Some invasive species such as Giant hogweed and Japanese knotweed cause problems to the native flora.

Private gardens are an important resource for biodiversity, creating a web of wildlife corridors which enable many species to colonise other areas.

Greenspaces within towns and villages often support species commonly found in the wider countryside such as uncommon grassland flowers and a number orchid species.

KEY SPECIES

(those marked * are non-native invasive species) **P** = UK Priority species **C** = UK species of conservation concern

Mammals	Pipistrelle bat	<i>Pipistrellus pipistrellus</i>	P
	Brown long-eared bat	<i>Plecotus auritus</i>	C
	Hedgehog	<i>Erinaceus europaeus</i>	C
Birds	Song thrush	<i>Turdus philomelos</i>	P
	House sparrow	<i>Passer domesticus</i>	
	House martin	<i>Delichon urbica</i>	C
	Swift	<i>Apus apus</i>	
	Moorhen	<i>Gallinula chloropus</i>	
	Heron	<i>Ardea cinerea</i>	
	Tawny owl	<i>Strix aluco</i>	C
Kestrel	<i>Falco tinnunculus</i>	C	
Amphibians and Reptiles	Common toad	<i>Bufo bufo</i>	C
	Common frog	<i>Rana temporaria</i>	C
Fish	Brown trout	<i>Salmo trutta</i>	
Invertebrates	Ringlet butterfly	<i>Aphantopus hyperantus</i>	
	Meadow brown butterfly	<i>Maniola jurtina</i>	
	Red admiral butterfly	<i>Vanessa atalanta</i>	
	Peacock butterfly	<i>Inachis io</i>	
	Painted lady butterfly	<i>Vanessa cardui</i>	
	Orange tip butterfly	<i>Anthocharis cardamines</i>	
	grasshoppers, damselflies and dragonflies		
New Zealand flatworm	<i>Artioposthia triangulata</i>	*	

Built and Developed Environment

UBE1

Plants	Ox-eye daisy	<i>Leucanthemum vulgare</i>	
	Northern marsh orchid	<i>Dactylorhiza purpurella</i>	
	Wall rue	<i>Asplenium ruta-muraria</i>	
	Common knapweed	<i>Centaurea nigra</i>	
	Rosebay willowherb	<i>Chamerion angustifolium</i>	*
	Giant hogweed	<i>Heracleum mantegazzianum</i>	*
	Japanese knotweed	<i>Fallopia japonica</i>	*
	lichens fungi		

NATIONAL BIODIVERSITY CONTEXT

There is a UK Broad Habitat Statement for urban areas, which has the following objective:

Maintain the existing diversity and extent of wildlife in all urban areas, expanding the range and distribution of rare and common species and enabling this resource to be utilised as an educational tool.

Measures to be considered nationally include:

- Survey and evaluate the full range of urban habitats (including buildings) in terms of their importance in maintaining wildlife interest;
- Protect sites important for wildlife from inappropriate development;
- Encourage the integration of green networks (including a full range of wildlife habitats) in planning and developments within the urban environment;
- Implement strategies to enable the use of vacant and derelict land, either temporarily or permanently, as wildlife habitats;
- Incorporate the conservation and enhancement of wildlife into the design and management of urban Greenspace;
- Encourage community and individual action to survey, plan for and manage urban wildlife habitats;
- Promote wild space in urban areas as an educational resource to inform communities about local wildlife in the context of the wider environment;
- Expand the range and distribution of wildlife found in urban areas through sympathetic management;
- Ensure 50% of all urban wildlife areas are under sympathetic management, at the same time as increasing the extent of the wild areas and diversity of species within these areas - by 2005.

ECOLOGY AND MANAGEMENT

Urban and built up areas contain a surprisingly large number of native species. Pipistrelle bats *Pipistrellus pipistrellus* tend to use man-made structures such as modern houses and bridges for roosts, whereas Brown long-eared bats *Plecotus auritus* favour older houses and buildings. House martins *Delichon urbica* and Swifts *Apus apus* rely heavily on man-made structures too – thus adding to the diversity of this, the most familiar and least natural of all our habitats.

Roadside verges and urban railways vary tremendously in the type of habitats they provide for many species. Although these habitats are largely grassland orientated, they are often associated with hedges, trees, bare soil and walls. For the most part these are the widespread and common species, but they can also include rare natives, together with a large

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proportion of naturalised plants. As a linear habitat, urban road and path verges facilitate the distribution of newly-colonising species, as do railways, motorways, and trunk roads. Additional information will be included in a future Roads and Paths Habitat Action Plan.

Derelict or disturbed land tends to favour 'pioneer species'. These include annuals such as Shepherd's Purse *Capsella bursa-pastoris* and the Bittercresses *Cardamine spp.*, through the various grasses and Willowherbs *Epilobium spp.* to the primary woodland species of Birch *Betula pendula* and Rowan *Sorbus aucuparia*. These rapidly establish themselves and equally rapidly spread and set seed. Often the short lifespan of these wildlife areas does not allow species to settle or for a wider mix of animals and plants to get established. The transitional nature of these sites means that management needs to reflect their future development potential, but their relative importance can be judged by their inclusion as community descriptions in the National Vegetation Classification. Although such sites increase the options for urban wildlife and can be beneficial in the short-term, they are no substitutes for properly managed greenspace.

Nationally, there has been a significant decrease in the number of farm and natural-edged garden ponds with the subsequent decline or loss of species such as Common frog *Rana temporaria* and Pillwort *Pilularia globulifera*. The Tayside region does, however, have a number of old mill ponds that have great potential as superb wildlife sites. Dundee's Trottick Ponds Local Nature Reserve is one such example. Further information will be available in the forthcoming Ponds, Pools and Lochans Habitat Action Plan.

Historically, urban rivers and burns have been canalised with their banks invariably encased in concrete. This has impeded the spread of such native species as Water vole *Arvicola terrestris* and is a danger to birdlife who cannot access the water safely, nor utilise the banks as breeding sites. Where it is inappropriate to return the watercourse to its natural banking a variety of soft-engineering options can now be deployed which often have a visual benefit as well as being effective in flood prevention projects. Returning to natural banking or implementing the soft-engineering options can be extremely advantageous to wildlife with a very wide diversity of species directly benefiting. It should be noted, however, that excessive removal of debris can also have a very damaging effect on local urban waters and must be monitored carefully. The subject of urban watercourses will be more fully covered in the Urban Waters Habitat Action Plan.

The numbers of species in urban areas is greatly enhanced by non-native trees, shrubs and plants used in parks and gardens, together with the presence of many inadvertently introduced pests and weeds. Britain's 14.5 million private gardens, however, represent the biggest potential natural areas in the country, but a high usage of chemicals and an over-tidy attitude can have an equally adverse affect. There are many initiatives to encourage the planting of butterfly, bat and bird-friendly shrubs and plants and to generally make room for wildlife by providing a variety of nestboxes or suitable hibernation sites for hedgehogs and toads.

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RSPB

Song Thrush

It has been proposed that the poor survival of many song thrushes beyond their first year may be caused by the ingestion of molluscicides.

In high density housing areas, the smaller garden sizes can be offset by enhancing the surrounding public greenspace. In some cases elsewhere in Scotland tower block communities have taken over the responsibility of managing their surroundings by planting wildflower meadows, community orchards and areas of butterfly-friendly shrubs which they then manage accordingly. It has been proven that other members of the community rarely damage such areas as so many people of all ages are involved in the decision-making and practical work.

The same goes for enhancing school grounds.

Numerous projects are currently underway in which pupils, staff and parents are involved in creating school gardens, woodlands and orchards with linkages between community and curriculum.

CURRENT FACTORS CAUSING LOSS OR DECLINE

DEVELOPMENT – new building (for housing, industrial or retail), including in-fill development within extensive garden ground, green belt and open space, can result in the fragmentation, disruption and occasional total destruction of wildlife habitats. Mature trees and established hedgerows, species-rich grasslands, rivers, burns and wetlands tend to be the most affected. Planning can take into consideration the wider implications of new developments ensuring that wildlife corridors are retained or introduced in new plans for industrial sites, retail parks and residential areas. Greenspace policies can be reconsidered to include community woodlands, wildflower areas, community orchards that preserve local heritage varieties of fruit, and stands of native trees.

New approach – better planning with positive measures to conserve the biodiversity within the newly developed site, protection of remaining wildlife sites, increase in the quality and quantity of greenspaces, identification of priority habitats, habitat creation, linking Tayside Biodiversity Action Plan projects to key sites – and setting up good practice demonstration sites. Priority should be afforded to development of brownfield sites. This will be delivered through appropriate provision and understanding of biodiversity in Structure Plans, which set the framework for Local Plans. In addition, where there is a development requiring an Environmental Impact Assessment appropriate consideration will be given to the nature, scale and quality of biodiversity to be affected.

PUBLIC AND PRIVATE BUILDINGS – many species from Swifts and bats to masonry bees and wall-loving plants can be put at risk – birds are often prevented from nesting on buildings; bat colonies can be destroyed by inappropriate use of roof treatment chemicals or trapped when routine maintenance work takes place on buildings or on bridges.

New approach – guidance should be given to safeguard swifts, swallows and house martins, together with awareness-raising to protect all bat species. When renovation of buildings (including listed buildings) is undertaken, encouragement should be given for any re-pointing carried out to be done in lime mortar, where appropriate, so as not to exclude masonry bees. Where possible, retention of lime-loving plants such as ferns, liverworts and mosses should also be considered.

Case Study

Dundee's Green Space

Dundee City Council is unique in that it was the first local authority in the UK to adopt an "Urban Nature Conservation Subject Local Plan" (UNCSLP). This has raised the profile of nature conservation both within the Council and the city itself. The land use aspects of the UNCSLP will be rolled into the Review of the Dundee Local Plan to achieve better integration between development and local biodiversity.

The City Council has also produced an Open Space Strategy, which puts forward a broad vision for parks, play areas, open spaces and wildlife sites based on promoting a high quality of life and a sustainable urban environment. The Strategy proposes a system of accessible open spaces to meet a wide range of social, environmental and economics needs. An Urban Woodland Strategy will also give a long-term focus for enhancing existing woodland and planting new woods.

Case Study

A Swift Response to help Wildlife

Historic Scotland's innovative restoration of Stanley Mills, Perthshire, incorporated nest spaces under the eaves of the roof for its already-resident colony of swifts. The liaison between Historic Scotland, its project architect and the organisation Concern for Swifts (Scotland) led to a 'Swifts in Historic Buildings' Advice Note being written and made available.



HISTORIC SCOTLAND

Case Study

Brechin Nature Trail

The Brechin Nature Trail is a linear trail bordered by housing estates and a primary school and running adjacent to a railway line which is used by the Caledonian Steam Railway Association most Sundays.

The railway line and trail are bordered by a mixture of mature broadleaf trees that are encroaching on to the path and, in certain areas, on to the railway line. A partnership between the Caledonian Steam Railway Association and Angus Council's Ranger Service and Arboricultural Officer will enable the trail to be extended.

An environmental audit of the area will be carried out and a management plan drawn up.

Improvements will range from selective thinning and pruning of existing trees to planting native trees and hedgerows to increase the site's biodiversity. Fencing will also be included to improve health and safety and to discourage informal access along the trail.

To ensure local ownership and pride in the project the adjacent primary school and local community groups will be encouraged to help plant trees and in constructing and siting bird and bat boxes.



ANGUS COUNCIL

TRANSPORT CORRIDORS - bypasses and road straightening/widening all cause direct physical damage to wildlife habitats with the additional increase of animal roadkills from high-speed traffic.

New approach – sympathetic management of existing road corridors, sensitive planning of routes, better habitat creation and enhancement along road corridors, better fencing, introduction of animal underpasses or overpasses and wildlife scaring devices.

POLLUTION from vehicle exhausts, herbicides, industrial leakage, oil and salt from the road surface to watercourses has a direct impact on wildlife, including native trees, amphibians, invertebrates and birds.

New approach – Highlight good practice through awareness-raising/education projects, assessment of Local Authorities' policies for salt-spreading during the winter and overall use of herbicides; encouragement for improved technology of industrial processes and better pollution warning systems.

SEMI-NATURAL PLACES now support wildlife marginalised from intensively used farmland or development. Wastelands support rare solitary bees and invertebrates which rely on undisturbed soil and sandy outcrops. A variety of wildflower colonies will also occur which can include both invasive species and endangered plants such as orchids. Neglect of these sites will cause scrub invasion that can then mature into woodland. Whilst not always inappropriate, in some cases important populations of species needing more open ground, such as warblers and skylarks, can be lost.

New approach – Local Authorities and local communities need to highlight what semi-natural habitats they have, their proposed future use and their current management. Local Authorities need to assess resources available to ensure that urban wildlife sites are managed for biodiversity.

Case Study

Craigie Burn, Perth

The Craigie Burn is a small tributary of the River Tay. The flood prevention works which started in 1999 provided the opportunity to visually enhance the burn to the benefit of both local residents and wildlife. Community involvement was an essential part of the project; a Volunteers Day attracted 20 people to directly play a part in habitat enhancement.

A partnership approach enabled soft engineering solutions to flood alleviation and at the same time created an attractive wildlife habitat. The original wide rectangular channel was altered into a narrower, more natural channel which will allow water to flow faster and cleaner during normal flows; this will also attract various invertebrates, including Mayflies.

New banking was constructed in an undulating manner to give a more natural shape. The bank was stabilised with mesh netting and a mixture of topsoil and sub-soil incorporating a wildflower and grass mix. Seeds included Common Mallow, Great Willowherb and Lesser Burdock; all of these wild flowers will attract bees and butterflies.

The shelf was stabilised with coconut fibre placed in the water and secured with wooden stakes. Wetland plants such as Yellow flag, Meadowsweet and Sedges were planted. This type of habitat will attract a rich diversity of species and may well encourage the return of the long-absent Water Vole to a Perth burn.



PERTH & KINROSS COUNCIL

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LITTER – direct effects on small mammals (including hedgehogs and moles) becoming trapped in discarded cartons and bottles, or birds being hanged or choked by plastic beer can carriers, or disabled owing to plastic fibres wrapping around their legs.

New approach – link with awareness raising campaigns, locally and nationally, by highlighting the impact of litter on biodiversity.

INVASION OF NON-NATIVE SPECIES – the New Zealand Flatworm *Artioposthia triangulata* can cause the eradication of native earthworms and therefore has a direct impact on soil fertility and mammals such as moles. A significant percentage of the wild flowers growing in semi-natural places include invasive species such as Himalayan Balsam *Impatiens glandulifera*, Monkey flower *Mimulus guttatus*, Giant Hogweed *Heracleum mantegazzianum* and Japanese Knotweed *Fallopia japonica*. All these impact on the native biodiversity and have a serious detrimental effect.

New approach – a consensus is required on how to control the various invasive species and who can take on such work.

Japanese Knotweed

This plant, regarded as the most invasive plant in Britain, was introduced to this country in 1825 as a garden and fodder plant. It was first recorded growing wild in Wales in 1886 and has since become widely established throughout the UK.

It forms dense thickets of growth which suppress other plant species, resulting in loss of wildlife habitat. It is often spread by the movement of soil containing rhizome fragments so is particularly prevalent in urban areas. In Tayside it is also widely found on many rural riverbanks. Because the plant dies back in winter, dense thickets along watercourses can also increase the risk of bank erosion.

It is an offence under the Wildlife & Countryside Act 1981 (as amended) to plant or cause Japanese Knotweed to grow in the wild. Eradication is impractical, but its removal from sensitive sites is recommended. However, non-chemical control is very labour intensive and needs to be managed carefully and any herbicide usage near water must be requested first from SEPA.



SEPA

PESTICIDES – over-use of chemicals to control insects and weeds seriously impacts the diversity of wildlife throughout the urban area. Over-tidying of gardens and public places, coupled with the increased use of all kinds of chemicals is causing huge decreases in invertebrate and bird numbers. Inappropriate woodworm treatment in attics can destroy bat colonies.

New approach – individual householders can reduce the amount of chemicals used. Information can be made available at point source, e.g. garden centres. Landowners, including local authorities, golf courses and retail/business units should also assess their need for pesticides. Awareness can be raised to show that a more natural approach to urban landscape is not a lack of management, but a change in management.

USE OF PEAT – mechanical peat extraction has caused serious deterioration in bog habitats throughout Britain. The extensive use of the resulting product for horticultural purposes is causing commercial companies to look beyond our shores for cheaper peat.

New approach – the Tayside Raised Bogs Habitat Action Plan proposes that all Tayside Biodiversity Partners adopt and implement a peat-free policy by 2005. As there is now a wide choice of alternatives to peat, individual householders, businesses, hospitals and schools can significantly reduce their use of peat (or choose to become peat-free) in both indoor and outdoor plantings.

WILDLIFE CRIME – although there are instances of birds, badgers and feral cats being purposely killed, many people still collect eggs, uproot wildflowers and kill insects. Species such as house martins and bats are often perceived as 'pests' and illegally excluded from private houses and public buildings.

New approach – efficient policing and the proposed change in legislation are required to deter deliberate killings (raising awareness of Wildlife Liaison Police Officers), but general education is necessary to prevent ignorance.

Case Study

Making Friends with Your Environment

The Dundee Educational Development Service has run the 'Making Friends With Your Environment' exhibition every year since 1990. Between 1990 and 2001 more than 9,000 pupils from 96 schools have taken part.

The exhibition raises awareness of the environment for upper primary pupils and teaching staff in Dundee and some Angus schools. The pupils take part in all kinds of activities from planting seeds and looking at live mini-beasts from a local burn, to finding out what happens to waste flushed down the toilet or trying their hand at a traditional craft such as felt-making.

A wide Partnership is involved and includes the Dundee City Council and Angus Council Ranger Services, Scottish Natural Heritage, the Scottish Environment Protection Agency, RSPB, Scottish Water, Tayside Police Wildlife Liaison, the Scottish SPCA, Scottish Wildlife Trust, the Scottish Crop Research Institute, and the Broughty Ferry Environmental Project.

MAIN THREATS TO KEY SPECIES

Bat Species (Pipistrelle, Brown Long-Eared)	Destruction of existing wildlife corridors (especially hedges and treelines) which impede feeding. Inappropriate maintenance or renovation of buildings and bridges. Inappropriate use of woodworm treatment in roofs.	
	UK Importance of Tayside population:	high
Common Frog	Loss of habitat through infilling or inappropriate management of ponds. Introduction of fish to ponds and pools, sometimes for angling purposes. Increased mortality as a result of increased road traffic.	
	UK Importance of Tayside population:	unknown
Swift	Loss of nest sites owing to modern building practices Loss of nest sites owing to exclusion from traditional sites	
	UK Importance of Tayside population:	unknown

OPPORTUNITIES AND CURRENT ACTION

A lot of activity is already under way particularly by small community groups keen to take a lead in improving their own local area. For instance:

- The Broughty Ferry Environmental Project is running its own Swift, Swallow and House Martin Survey, as well as making and putting up bird boxes and arranging local library displays.
- The Murroes Community Council is considering planting a community orchard which will involve the local school and residents alike. They also want to assist with a variety of wildlife surveys.
- Oakbank Primary School in Perth developed an unwanted area of ground into an Infant Garden through the enthusiasm of teachers, parents and pupils. The garden, which has conservation, sensory, wildlife and recycling areas, is of great benefit as a teaching resource.

Many Council Services make decisions that directly affect biodiversity. There are also increasing opportunities within the local authorities to link biodiversity initiatives with LA21 projects, community planning and community learning plans. To highlight the success stories within each Tayside local authority and to give examples of what can be achieved within each department, a 'Guide to Incorporating Biodiversity into Local Services' has been prepared and circulated.

Case Study

A Green Roof fit for a King

Arbroath in Angus holds a very special place in Scottish history. Its abbey was founded in 1178 and in 1320 Scotland's nobles affirmed their allegiance to Robert the Bruce as their King by signing the 'Declaration of Arbroath'. Today the abbey is a major tourist attraction run by Historic Scotland.

The need for a new visitor centre to abut such an important site led to the commissioning of a company of Edinburgh-based architects. The design brief was for the building to be as sustainable as possible and its visual impact negligible so as not to detract from the abbey. The unusual sedum roof is not only a green choice, but when flowering it will enhance the biodiversity of the immediate area by attracting hoverflies and a variety of butterflies.



HISTORIC SCOTLAND

OBJECTIVES AND TARGETS

	Objectives	Targets
1	Encourage the integration of open space networks, including green access corridors, in planning urban renewal or development projects within the urban environment	
2	Incorporate the conservation and enhancement of wildlife into the design, management and maintenance of urban greenspace	Set up or encourage initiatives to enhance the biodiversity of local school and university grounds, allotments, community orchards and woodlands, public parks and graveyards.
3	Instigate an awareness-raising programme and control programme for invasive species	By 2006
4	Promote the Tayside Local Patch Project (Wildlife on your Doorstep) to engage the public in urban biodiversity surveying and recording	Incorporate project findings in the Perth Museum Biodiversity Exhibition in 2004.
5	Promote gardening for wildlife initiatives, including the "Garden for Life" scheme	50% of all urban wildlife areas to be under sympathetic management by 2005

Stakeholders

- Architects, developers and builders;
- Universities, colleges and schools;
- Sheltered housing, nursing homes and hospitals;
- Landscape architects, designers and contractors;
- Enterprise companies;
- Garden Centres;
- Non-Governmental Organisations (NGO's);
- Retail, businesses and industry;
- Tourist Boards, visitors and local users;
- Home owners;
- Regulatory and statutory bodies;
- Local Authorities;
- Contractors;
- Community groups and charitable organisations.

ACTION FOR BIODIVERSITY

		Action - Built and Developed Environment Action Plan	Deliverers		To take place by								Meets Objective No.
			Lead Partners	Partners	02	03	04	05	06	07	11	16	
LBAP Ref.	A	Policy and legislation											
UBE1	1	Encourage planning authorities in Tayside to take full account in the planning process to the local needs of listed species and habitats in the LBAP.	DCC AC PKC		#	#	#	#	#	#	#	#	
UBE1	2	Ensure planning policies support the re-use of previously developed sites, in accordance with Development Plans, to minimise loss of habitats elsewhere.	DCC AC PKC		#	#	#	#	#	#	#	#	
UBE1	3	Protect designated wildlife sites from inappropriate development.	DCC AC PKC		#	#	#	#	#	#	#	#	
UBE1	4	Ensure development plans promote development that minimises adverse effects on the natural heritage and incorporates positive environmental features.	DCC AC PKC		#	#	#	#	#	#	#	#	
UBE1	5	Encourage the integration of open space networks, including green access corridors, in planning urban renewal or development projects within the urban environment.	DCC AC PKC	SNH	#	#	#	#	#	#	#	#	
	B	Site safeguard and management											
UBE1	1	Implement strategies to enable the use of vacant and derelict land, either temporarily or permanently, as wildlife habitats.	DCC AC PKC	Business community; local environment groups	#	#	#	#	#	#	#	#	
UBE1	2	Incorporate the conservation and enhancement of wildlife into the design, management and maintenance of urban greenspace; i. Produce Park Management Plans for all major parks. ii. Encourage the setting up of a Tayside Green Graveyard Initiative. iii. Continue to encourage biodiversity enhancement within school grounds and play grounds. iv. Raise awareness of biodiversity issues in allotment management. v. Encourage species management where appropriate in existing community woodlands and encourage the planting of new community orchards and woodlands.	DCC AC PKC	SNH FC SWT TBP	#	#	#	#	#	#	#	#	
UBE1	3	Publish management guidelines to incorporate biodiversity conservation into the management of greenspace on an incremental basis.	TBP	DCC AC PKC	#	#	#						
UBE1	4	Expand the range and distribution of wildlife found in urban areas through sympathetic management and maintenance (inc. railway and riparian corridors).	DCC AC PKC	Business community Railtrack SEPA	#	#	#	#	#	#	#	#	
UBE1	5	Encourage working towards the UKBAP target of 50% of all urban wildlife areas to be under sympathetic management by 2005.	DCC AC PKC	TBP				#					
UBE1	6	Instigate an awareness-raising programme and control programme for invasive species.	AC PKC	DCC SNH SEPA Scottish Crop Institute	#	#	#						

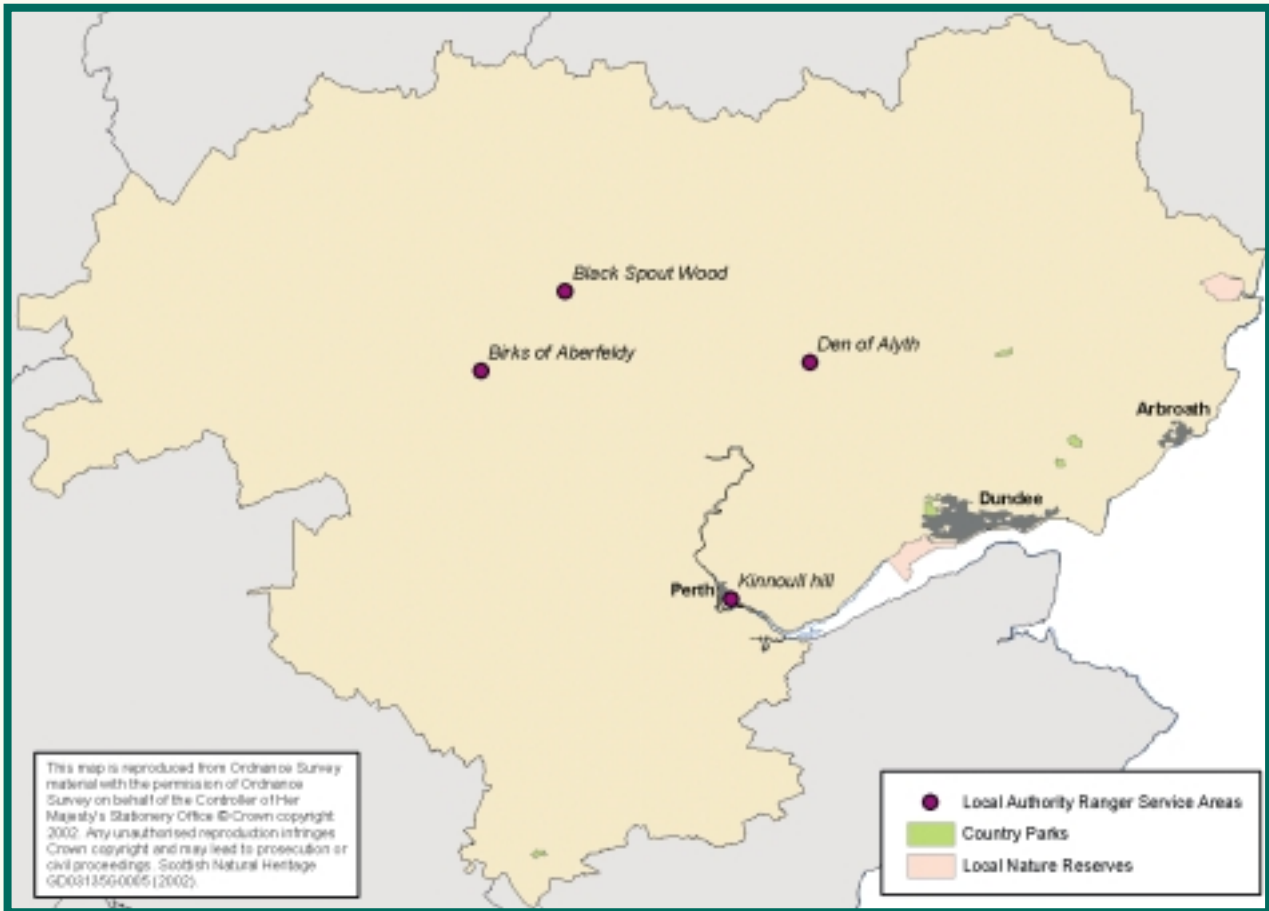
Built and Developed Environment

UBE1

	C	Species management and protection				
	D	Advisory				
UBE1	1	Promote and develop demonstration sites on business and retail parks, industrial estates, hospital and college grounds, etc, to show best practice for a wide variety of habitats and species.	TBP	DCC AC PKC Business Community SEPA	# # # # #	
UBE1	2	Set up and maintain an annual local Awards Scheme to recognise commercial and industrial contributions to enhancing urban biodiversity.	TBP	SEPA DCC AC PKC	# # # # # # # #	
UBE1	3	Support biodiversity awareness-raising projects and initiatives in local garden centres, gardens open to the public and their visitors.	TBP SWT	SNH AC DCC PKC Garden Centres NTS Business community	# # # # # # # # #	
	E	Research and monitoring				
UBE1	1	Instigate a Tayside Local Patch Project (Wildlife on your Doorstep) survey to engage the public in urban biodiversity recording.	TBP	DCC AC PKC	# # #	
	F	Promotion and awareness-raising				
UBE1	1	Promote urban greenspace as an educational resource.	DCC AC PKC	SNH SWT TBP	# # # # # # # #	
UBE1	2	Set up and maintain a "Tayside Business of Biodiversity" awareness programme to engage commerce and industry in biodiversity issues.	TBP SET	DCC AC PKC	# # # #	
UBE1	3	Engage the tourism industry to participate in biodiversity projects and awareness raising for all their visitors, service providers, operatives and staff.	TBP Perth Tourist Board	Angus & Dundee Tourist Board; Angus Rural Partnership; Perthshire Rural Partnership; NTS SWT FC FE BTCV	# # # # # # # # #	
UBE1	4	Increase practical involvement of local people through environmental projects and initiatives within communities	TBP	SNH SWT RSPB NTS BFEP BTCV DCC AC PKC	# # # # # # # # #	
UBE1	5	i. Set up and run Urban Swift and Swallow Survey. ii. Encourage local community and environmental groups to initiate local nestbox making and siting projects.	TBP	DCC AC PKC BFEP NTS	# # # #	
UBE1	6	Dissemination of newsletters to schools and communities.	TBP	PKC AC	# # # # # # # # #	
UBE1	7	Monitor and review this plan - ensure this plan is being delivered annually and in detail after 5 years.	TBP		# # # # # # # # #	

Built and Developed Environment

This illustrative map shows some of the country parks, public access areas and Local Nature Reserves in Tayside. Many other sites of interest are privately owned and owners' permission should be sought for any access.





INVERGOWRIE BAY

DEFINITION

The term “businesses with land” is used to describe a wide variety of commercial interests. These range from large national/international employers to small family run businesses. The common denominator is that all these businesses have land attached to them ranging in area from a simple boundary fence line to large areas of landscaped or bare ground.

This land will include a variety of landscape types, for example:

- Woodland;
- Heath/Scrub;
- Designed Landscape;
- Grassland;
- Wetland.

Businesses with attached land provide a challenge to integrate industry with the environment in areas traditionally regarded as not being people or wildlife friendly. Individual businesses can greatly benefit from improving their surroundings and at the same time provide wildlife havens amidst an increasingly fragmented urban environment. The larger industrial areas will also benefit from enhanced surroundings, but they also have the opportunity to provide important wildlife corridors to link these fragmented habitats.

CURRENT STATUS AND EXTENT OF HABITAT

Currently there are approximately 105 industrial estates in Tayside: 49 in Perth and Kinross, 46 in the City of Dundee and 10 in Angus. These industrial areas are of varying size - the smallest, Balmossie Mill in Dundee, covers an area of 0.12 hectares, whilst the largest, Baldovie, also in Dundee, covers an area of 66.4 ha.

In addition to those businesses located within defined industrial areas, there are a large number of business parks and standalone business premises throughout the region with surrounding land which fits the criteria of this Action Plan.

NATURE CONSERVATION IMPORTANCE

Woodland and Copses

Many trees on business land are non-native by virtue of being within a designed landscape. The Acer species and flowering cherry are among those most commonly encountered. Although not supporting the invertebrate biodiversity of native species these trees are still valuable habitats. They provide shelter and nest sites for birds, feeding and flyways for bats, shelter for buildings and landscape features for people to enjoy.

Hedges and Hedgerow Trees

Any new hedges planted in a commercial landscape tend to include quick-growing non-native species, but a mixed hedge using native species such as Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Dog Rose *Rosa canina*, Holly *Ilex aquifolium*, and Hazel *Corylus avellana* will add to the visual diversity and provide much needed shelter and food for birds and invertebrates. The bushy growth of hedges containing native species can provide an effective filter against air pollution if sited alongside busy roads and they make effective shelters and screens for buildings and industrial sites. In maturity they can also act as a barrier and in the case of using Hawthorn and Blackthorn, an aid to property security.

Where there are already hedges in the commercial landscape these should be retained wherever possible. A mature hedge will only need trimming once every two years and may already act as important flyways for bats and some bird species who use them as song-posts, feeding and nesting sites.

In either new hedge planting or in the retention of a mature hedge, native tree species should be allowed to grow up as standards within the hedge to provide a treeline in the landscape. This greatly enhances the visual benefits of the hedge and again provides nesting sites and flyways for a number of species.

Heath/Scrub land

Many industrial areas have adjacent or nearby areas of little-used or abandoned (brown field) land. Over time this often reverts to a wild state with initial colonising species frequently represented by Gorse *Ulex europaeus*, Broom *Sarothamnus scoparius*, and Elder *Sambucus nigra*. This scrub/heath land is a valuable habitat for songbirds providing food and nesting sites. Such open ground can also be high in invertebrate interest with some beetles relying on undisturbed rocky or sandy soil. Small mammals will also benefit from this habitat - as in turn will their predators.

In many cases it should be possible to retain elements of this important habitat even when commercial use resumes.

Designed Landscape

This is the most frequently encountered habitat found around business units, particularly within planned industrial estates. It invariably consists of short mown grass, non-native trees and shrubs set in a chipped mulch with gravel or tarmac paths. This type of landscape is of very little benefit for most wildlife.

With imagination and a change in management designed landscape can, however, be both formal and wildlife-rich. Native trees and shrubs should be selected to give a mixture of berries and fruits, pollen-rich flowers and shelter for a diverse variety of species. Areas of lawn or grassland should be managed to encourage wildflowers and native grass species. These do not have to be unsightly if areas close to pathways and building entrances are close-mown with scalloped edges. Ponds can be incorporated which offer not only visual benefits with attractive pond-edge planting, but also a rich habitat for amphibians and invertebrates. Ideally they should be utilised as part of a water runoff management or Sustainable Urban Drainage Scheme.

Grassland

Grassland areas surrounding businesses are typically short mown amenity mixtures which lack diversity. Ideally grassland areas should be managed to maximise biodiversity with creation of wildflower meadows where appropriate achieved via a general reduction in mowing frequency. As more species colonise the grassland invertebrates, birds, small mammals and their predators will benefit. In addition to this, the quality of life of employees, clients and suppliers can be enhanced from the greater variety of flowers and insect life once the meadows are established. This will, in many cases, stimulate greater awareness of biodiversity which can lead to enthusiasm for individual projects.

Tayside Biodiversity Partnership



Businesses with Land

UBE2

Wetland

Existing streams flowing through or alongside industrial sites are all too frequently used as convenient dumping grounds or are forced to flow through culverts. When new commercial or industrial sites are being planned, the culverting of burns should be avoided where ever possible and existing culverts opened up and enhanced where feasible.

Creation of ponds should be encouraged, whether free standing or linked into the existing or planned drainage system. A series of rain water holding ponds around an industrial estate would not only provide an excellent habitat for a wide variety of species, but would offer a valuable contribution to the wider problem of water runoff from built up areas.

Management of waterways will be important to ensure that they are not polluted with either rubbish or industrial waste. This will require a management framework to be delivered and implemented by local authorities, SEPA and businesses.

KEY SPECIES

P = UK Priority species **C** = UK species of conservation concern

Mammals	Pipistrelle bat spp.	<i>Pipistrellus pipistrellus</i> and <i>Pipistrellus pygmeus</i>	P
	Brown long-eared bat	<i>Plecotus auritus</i>	C
	Daubenton's bat	<i>Myotis daubentoni</i>	C
	Hedgehog	<i>Erinaceus europaeus</i>	C
	Stoat	<i>Mustela erminea</i>	C
	Weasel	<i>Mustela nivalis</i>	C
Birds	House martin	<i>Delichon urbica</i>	C
	Sand martin	<i>Riparia riparia</i>	C
	Swallow	<i>Hirundo rustica</i>	C
	Swift	<i>Apus apus</i>	
	Kestrel	<i>Falco tinnunculus</i>	C
	Tawny owl	<i>Strix aluco</i>	C
	Barn owl	<i>Tyto alba</i>	C
	Yellowhammer	<i>Emberiza citrinella</i>	C
	Goldfinch	<i>Carduelis carduelis</i>	C
Amphibians and Reptiles	Common frog	<i>Rana temporaria</i>	C
	Common toad	<i>Bufo bufo</i>	C
	Slow worm	<i>Anguis fragilis</i>	C
Invertebrates	Peacock butterfly	<i>Inachis io</i>	
	Red admiral butterfly	<i>Vanessa atalanta</i>	
	Garden tiger moth	<i>Arctia caja</i>	
	Common blue damselfly	<i>Enallagma cyathigerum</i>	
	bumble bees		
	beetles		

Plants	Willow Oak Ash Hazel Hawthorn Blackthorn Nettle White clover Valerian Red campion	<i>Salix spp</i> <i>Quercus robur</i> <i>Fraxinus excelsior</i> <i>Corylus avellana</i> <i>Crataegus monogyna</i> <i>Prunus spinosa</i> <i>Urtica dioica</i> <i>Trifolium repens</i> <i>Valeriana officinalis</i> <i>Silene dioica</i>	
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ECOLOGY AND MANAGEMENT

Case Studies

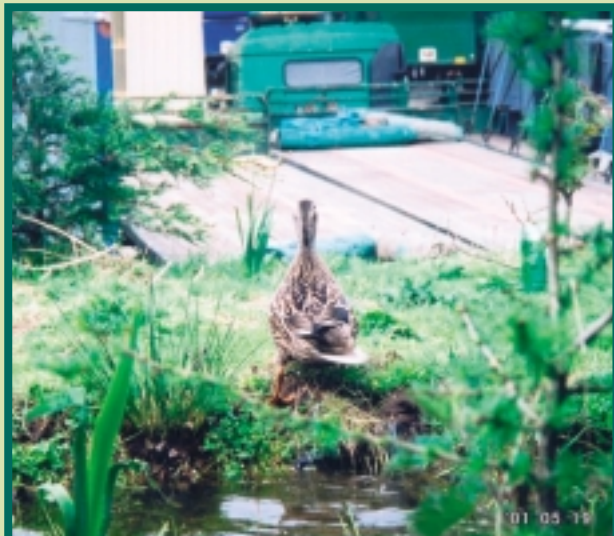
Orchardbank Industrial Estate Wildlife Corridor

A sand bank stretching from the edge of Forfar Loch Country Park into the heart of the Orchardbank Industrial Estate has been transformed into a wildlife corridor in collaboration between local residents, local business owners and Angus Council Ranger Service. Local businesses have allowed their land boundaries to be used and with volunteer input the area has become rich in wildlife.

As the area was initially very exposed, a variety of trees and shrubs were planted to provide cover and shelter. Local residents contributed food scraps and garden waste to make compost piles along the length of the corridor. Over time this has turned almost pure sand into a much richer soil and a variety of plants such as Elder, Nettle, Clover and Hop trefoil have colonised from the nearby Country Park.

The greater water-holding properties of the soil have increased the diversity of invertebrates and the area has become a popular Hedgehog feeding site. The creation of a pond has further increased invertebrate life and both Mallard and Common Frog have bred as a result. The increase in insect diversity has attracted bats to the area which use the corridor as a flyway.

Songbirds have benefited from the increased availability of nesting sites and food source and many species have bred within the corridor including Blackbird, Wren and Sedge warbler.



CRAIG BORLAND

The Mallard *Anas platyrhynchos* requires nearby water and sufficient ground cover to breed. Here a small pond about 1 metre wide located on the Orchardbank wildlife corridor is perfect for their needs.

Car park Improvements at A. Sturrock and Son (Kirkbuddo) Ltd., Whigstreet, Angus

The site is a showcase for what can be achieved with an absolute minimal amount of land available - the existing car park boundary consists of gravel and chips no wider than 1 metre.

An initial survey showed virtually no usage of this site by wildlife. The narrow area by the boundary fence was planted with a variety of wildlife friendly plants - both native and non-native e.g. Elder and Buddleia. Within a few weeks insect life was noticeably more abundant, including the appearance of a Great green grasshopper.

A survey has shown Soprano Pipistrelle *Pipistrellus pygmaeus* in the area so it is hoped in future they will utilise the site for feeding as the planting scheme is already attracting a variety of moths and other night active insects.

The business owners have become increasingly interested in the project and further wildlife friendly features are to be included on their site, including the addition of bat and bird boxes on the actual building.



CRAIG BORLAND

The Peacock butterfly *Inachis io* has become more frequent in Tayside in recent years, but it is still an unusual sight. Nettles are the primary food plant for their caterpillars; other food plants benefit not only adult Peacocks, but numerous other butterfly and insect species as well.

Lidl Ltd., Forfar

Permission has recently been given from Lidl senior management to carry out major improvement work around the car park of this popular supermarket.

In association with the Store Manager, local volunteers and Angus Council Ranger Service the car park boundary will be enhanced with a variety of wildlife friendly plants, shrubs and trees. This will encourage butterflies such as Red admirals and Peacocks, birds such as Goldfinch and Greenfinch and a number of bat species to use this site.

It is particularly hoped to attract the Peacock butterflies which although becoming more common, are still a fairly unusual sight in Tayside. All these species will be monitored and recorded by the supermarket's employees and its customers, together with local volunteers and the Angus Council Ranger Service. Bird feeding stations and boxes for both birds and bats will also be erected to encourage wildlife to breed within the car park area.

CURRENT FACTORS CAUSING LOSS OR DECLINE

Construction of new industrial sites on greenfield areas

Many greenfield sites have been transferred from agricultural use. With current intensive farming practices greenfield areas may no longer be as species rich as they first appear. Sensitive planning consideration could enable the enhancement of both the immediate and surrounding areas to improve the habitat for wildlife.

Destruction of existing habitats owing to industrial development

Existing habitats may be destroyed when new industrial sites are built. To alleviate this potential impact extensive survey work should be carried out prior to any new development and, where possible, valuable wildlife areas should be incorporated into the design and construction of the industrial site.

Fragmentation of habitats

Intensive industrial development may result in habitat fragmentation with resultant interference to existing badger or otter routes or flyways for bats. In many cases, however, it is possible to retain or create wildlife corridors linking isolated habitats together. As has been shown at Orchardbank, Forfar, the width of such corridors need only be a few metres (for example, following a fence, wall or tree line) for them to be of use to wildlife.

Pollution from industrial sites contaminating air, land and water

Pollution should be kept to an absolute minimum. Regular monitoring of industrial areas should be carried out to identify any sources, or potential sources, of pollution and minimise any impact on the wider environment. The Scottish Environmental Protection Agency (SEPA), Scottish Water and local authority Environmental Health departments all have responsibilities for monitoring and limiting pollution. In partnership with such agencies, local planning authorities should consider carefully the potential impact on adjacent and nearby residential and countryside areas of any planned development or expansion of industry.

Dumping of rubbish

Providing litter bins for the resident workforce could alleviate indiscriminate littering. However, serious fly tipping creates eyesores and dangers in both countryside and urban areas. Such rubbish dumping should be discouraged by raising awareness about the illegality of fly tipping, together with the provision of alternative legitimate disposal sites. Members of the public and employers alike should be encouraged to report any witnessed incidents direct to the Scottish Environment Protection Agency.

MAIN THREATS TO KEY SPECIES

Bat species (Pipistrelle, Brown Long-eared, Daubenton's bat)	Loss of roost sites. Loss of feeding sites.	
	UK Importance of Tayside population:	high
Stoat and Weasel	Loss of habitat. Loss of habitat for prey species.	
	UK Importance of Tayside population:	unknown
Hedgehog	Use of slug pellets in landscaped areas. Loss of hibernation sites. Loss of feeding areas in designed landscape.	
	UK Importance of Tayside population:	unknown
House Martin, Sand Martin, Swallow	Loss of nesting sites. Loss of feeding sites.	
	UK Importance of Tayside population:	unknown
Kestrel	Loss of hunting ground/reduction in prey species.	
	UK Importance of Tayside population:	moderate
Tawny Owl	Felling of roost/nesting trees. Destruction of habitat that supports small mammals.	
	UK Importance of Tayside population:	small

Song Bird species	Loss of nesting sites. Loss of feeding habitat. Loss of roosting areas. Planting of non-native species as part of designed landscape.	
	UK Importance of Tayside population:	small
Butterflies and Moth species	No available food plants for larvae/adults due to grass cutting regimes.	
	UK Importance of Tayside population:	moderate
Invertebrate species	Loss of food plants/cover. Use of insecticides. Planting of non-native species as part of designed landscape.	
	UK Importance of Tayside population:	unknown
Native tree species (including Ash, Oak, Alder, Elder, Hazel, Aspen, Willow, Hawthorn, Scots Pine, Bird Cherry, Gean (Wild Cherry), Holly, Wych Elm, Rowan, Juniper, Birch and Yew)	Felling of mature trees and destruction of existing hedgerows for development purposes. Replacement of native species with ornamental species. Planting of non-native species as part of designed landscape.	
	UK Importance of Tayside population:	moderate

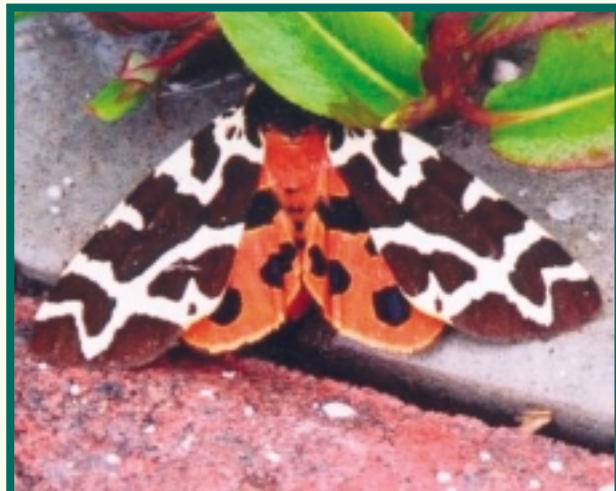
OPPORTUNITIES AND CURRENT ACTION

Current Action

Orchardbank Industrial Estate Wildlife Corridor - work is continuing within the wildlife corridor with the aim of extending the corridor throughout the industrial estate. Approaches will be made to other businesses within the estate to assess their views on habitat improvements and to show the advantages of using the wildlife corridor as a best practice site.

A. Sturrock and Son, Whigstreet, By Forfar - monitoring of species using the car park will continue. Bat surveying, coupled with the location of bat boxes in the area, will assist in estimating the local bat population. A 'display book' will be prepared to show what work has been carried out on the car park, together with species information. This will be situated within the company's reception area so that staff, clients and other companies can see what has been achieved.

Lidl, Queenswell Road, Forfar - car park improvements will be planned and implemented. A display area within the store will show customers, staff and other visitors what improvements are being made to the area and to highlight the importance of biodiversity.



CRAIG BORLAND

Garden Tiger at Whigstreet

The striking Garden tiger moth *Arctia caja* is a widespread species throughout the British Isles. Its appearance in the previously wildlife-poor car park of Sturrock's at Whigstreet a few weeks after improvements had been carried out was a source of inspiration and comment amongst the workforce and a spur to include further wildlife features around the site.

Opportunities

- i) Demonstration, by using case study sites as best practice, to existing businesses with land to show the benefits of biodiversity
- ii) Involvement of local planning authorities and community councils to show the benefits of biodiversity by highlighting existing case study sites as sites of best practice.
- iii) Ensuring through co-operation with local authorities that any new industrial estates and business planning applications include provision for wildlife friendly surroundings.
- iv) Set up local biodiversity monitoring within industrial estates, perhaps by way of an annual competition, to see who attracts the most species onto their patch. This has the potential to link in with the award scheme postulated in (viii).
- v) Encourage environmental education opportunities for schools who can compare before and after scenarios with regard to enhancing biodiversity. For instance, Forfar Academy pupils have already contributed to the creation, maintenance and monitoring of the Orchardbank Wildlife corridor
- vi) Encourage environmental or community groups to work in association with local industrial estates and businesses with land to enhance their surroundings.
- vii) Encourage businesses to incorporate appropriate biodiversity information into their company literature and web sites.
- viii) Develop a 'Tayside Business of Biodiversity Award' to show appreciation to the commercial community for environmental enhancement works. This will generate positive publicity for companies within Tayside and provide additional Partnership opportunities.
- ix) Within industrial estates and single businesses with land there are a wide variety of improvements which can be carried out, namely:

- **Involvement by staff (and their families) in enhancing their immediate work area**

Wherever possible staff should be encouraged to take an interest in their work environment. This could initially come in the form of talks, presentations and in-house newsletter articles and possibly lead to active participation in local environmental improvements.

- **Planting a wide variety of berry-bearing and native trees and hedgerows**

By encouraging the planting of native trees and shrubs, businesses with land will immediately play a more active part in attracting a variety of wildlife to their area.

- **A change in grassland management to save on maintenance costs and improve biodiversity**

By restricting cutting of certain areas of land to once or twice a year, the habitat in the immediate vicinity can be dramatically improved to give a show of wild flowers that in turn will attract butterflies, moths, bats and birds. Interpretation, by way of attractive information boards, leaflets, newsletters or a photographic record kept in the company's reception area can alert staff, suppliers and clients to the improvements being made. In some cases, companies use the savings made in the reduced mowing costs to invest in bird and bat boxes for the building.

- **Creation of wildflower areas on grassland and road verges**

As well as modulating the grass cutting regime outlined above, specific areas can be set aside for creation of wildflower meadows or road verge areas. This could be accomplished in a variety of forms and scales depending on individual sites from large wildflower areas to a patch of nettles located where intruders are likely.

- **Creation of ponds and wetland areas**

A pond or wetland area should be encouraged where land area permits. In some circumstances existing damp areas and burns can be enhanced. Care should be taken with the siting of ponds as water is invariably a magnet for local children. Potential dangers can be partially alleviated by attractive fencing around the site or the provision of life belts.

● **Provision of bat boxes and nest boxes**

Where there are existing mature trees a variety of bird and bat boxes could be sited. If no trees are present, industrial or company buildings should be considered for box location. In the case of new developments the inclusion of appropriate barn owl ledges, swift bricks and bat bricks should be considered before construction takes place.

● **Siting of bird tables/ feeding stations**

Bird tables/feeding stations should be set up where possible, particularly where they can be viewed by the workforce, for example outside canteen windows, or in an area specifically set aside as an outdoor staff rest area. Providing the birdtables with food is a potential cost and although it could be met by the business itself in many instances the staff will be willing to set up a “nut and seed roster”.

● **Provision of recycling sites**

The recycling of aluminium cans should be encouraged to minimise litter around industrial areas. Drinks cans are still one of the commonest litter items found in urban and country areas and they can have a detrimental affect on wildlife. Collection points should be encouraged within industrial estates or individual businesses.

● **Repair of existing dry stone walls**

Industrial sites situated on the edge of settlements are likely to border farmland and incorporate ex-farmland into their environment. Any existing dry stone dykes should be preserved where feasible, but if demolition is the only option, the stone could be used elsewhere to create a new dyke or a cairn feature.

● **Siting of benches and litterbins for workforce/public use**

All too often industrial areas have no benches or litter bins for the workforce to use. By encouraging such items the workforce will be able to take their breaks outside and enjoy the environmental improvements around them.

OBJECTIVES AND TARGETS

Objectives	Targets
1.	<p>Raise awareness to business owners of the benefits of biodiversity</p> <ul style="list-style-type: none"> ● Work with local planning authorities to set minimum guidelines for design landscaping around new industrial units. ● Database of costs involved with existing/ ongoing projects over costs and savings involved in habitat enhancement. ● Devise training programmes / seminars in partnership specifically for business leaders.
2.	<p>Raise public awareness among workforce/ public of the benefits of biodiversity.</p> <ul style="list-style-type: none"> ● Provide a database of existing/ ongoing projects to highlight benefits to other businesses with land. ● Provide a database of native tree, plant and shrub species available for consultation to all planning environmental improvements. ● Produce a database of voluntary organisations who may be interested in carrying out work on sites. ● Produce a database of local suppliers of plants and materials.

3.	Protect existing wildlife areas associated with businesses and create new areas.	In partnership with local planning authorities, SEPA and Scottish Natural Heritage raise awareness of the legal responsibilities attached to businesses with regard to existing wildlife sites.
4.	Showcase businesses that have improved their environment to include wildlife areas as examples of best practise.	<ul style="list-style-type: none"> ● Develop sites of best practice to highlight to businesses a variety of environmental improvements. ● Hold open days at best practise sites to demonstrate good practice.
5.	Promote adoption of Sustainable Urban Drainage Systems principles such as swales, infiltration basins, detention/ retention ponds, wetlands, reedbeds, etc. in new developments	Work with the Scottish Environment Protection Agency (SEPA), Scottish Water and local planning authorities to develop policies regarding drainage/culverts.
6.	Promote a better understanding of recording and survey systems so that habitat and species information is readily accessible to a wide audience.	<ul style="list-style-type: none"> ● Identify existing recording systems and adjust specifically for business use. ● Trial recording systems on specific businesses with land and assess results. ● Provide feedback on the recorded information in a practical accessible manner.

Stakeholders

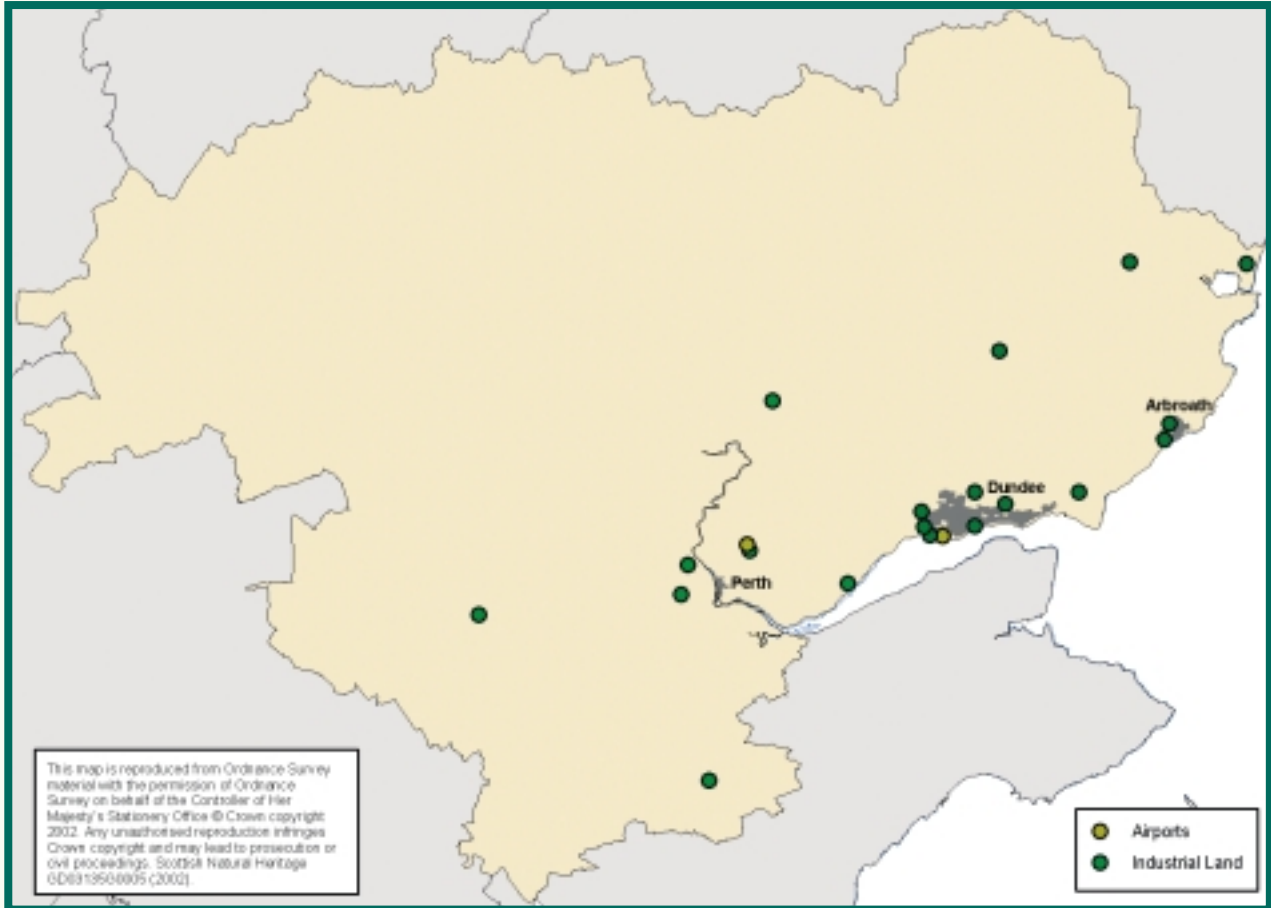
- Employers;
- Employees and their families;
- Suppliers and clients;
- Local/National Press;
- Regulatory Bodies;
- Voluntary Sector Organisations;
- Members of the public;
- Local communities living near industrial sites;
- Enterprise companies;
- Universities and Colleges;
- Local Authorities;
- Tourist Boards.

ACTION FOR BIODIVERSITY

		Action - Businesses with Land	Deliverers		To take place by	Meets Objective No.
			Lead Partners	Partners	02 03 04 05 06 07 11 16	
LBAP Ref.	A	Policy and legislation				
UBE2	1	Produce a Planning Advice Note for use by Planning Authorities to encourage incorporation of biodiversity measures in new business developments.	AC DCC PKC SNH	TBP	#	
UBE2	2	Issue Biodiversity Planning Advice note to businesses applying for planning permission to encourage the incorporation of biodiversity measures into developments.	AC DCC PKC SNH		# # # # # #	
		B Site safeguard and management				
UBE2	1	i. Visit all existing sites on an annual basis and carry out survey. ii. Discuss project with site managers.	AC DCC PKC Ranger Services	Voluntary Groups	# # # # # # # #	
UBE2	2	i. Annually, target 6 new businesses in Tayside and carry out surveys. ii. Discuss potential projects with site managers.	AC DCC PKC Ranger Services	Voluntary groups	# # # # # # #	
UBE2	3	By 2009 target 12 new businesses in Tayside per annum.	AC PKC DCC Ranger Services	Voluntary groups	# # #	
		C Species management and protection				
UBE2						
		D Advisory				
UBE2	1	i. Produce and regularly update a database of local and countrywide industrial case studies and make available to planners and local businesses. ii. Produce and regularly update database of local personnel who can advise and liaise with volunteer groups.	TBP	AC PKC DCC Voluntary groups	# # # # # # # #	
		E Research and monitoring				
UBE2	1	Use "Local Patch Survey" type recording so employers/employees can have direct input. i. 2002 - Pilot Local Patch Project with Lidl (Forfar) staff. ii. 2003 - Extend Local Patch technique to 6 other sites. iii. 2004 - Extend Local Patch technique to 12 other sites. iv. By 2009 - Extend Local Patch technique to 20+ other sites per annum.	AC PKC DCC Ranger Services	Voluntary Groups	# # # # # # # #	
		F Promotion and awareness-raising				
UBE2	1	Raise awareness of current and new projects through the local press and the Tayside Biodiversity Action Plan.	AC PKC DCC	TBP Voluntary groups	# # # # # # # #	
UBE2	2	Raise industry awareness through industry press and encourage businesses to highlight their environmental credentials.	TBP SET	AC PKC DCC Voluntary groups	# # # # # # # #	
UBE2	3	Plan Monitoring – monitor the delivery of the Action Plan yearly and review it in detail every 5 years, starting in 2003.	TBP		# # # # # # # #	

Businesses with Land

This illustrative map shows some of the areas of industrial land in Tayside. It cannot, however, illustrate locations of all 'businesses with Land'. Please note that many such sites are privately owned and owners' permission should be sought for any access.





LORNE GILL/SNH

GLENEAGLES GOLF COURSE

DEFINITION

Golf courses in Tayside cover a wide range of landscape types that include:

- Parkland
- Heathland
- Woodland
- Links (Sand Dunes)
- Designed Landscape

These areas offer unique opportunities for habitat and species development, not only in terms of their own natural features, but also to the wildlife corridors that they can provide. Golf courses are unique in that they can provide a safe haven for flora and fauna in recreational areas not commonly considered to be conservation habitats.

Golf courses cover a variety of landscape designations. In many of these areas golf courses act as invaluable 'green lungs' protecting land from industrial or housing development and contributing greatly to the quality of life to local residents and visitors alike.

CURRENT STATUS AND EXTENT OF HABITAT

Nationally there are 460 golf courses. In Tayside there are 45 golf courses; these fall within a number of habitat types each with the potential to contain a very wide array of species.

Past management practices have rendered many golf courses void of any conservation value. More and more golf courses are, however, being managed sustainably with new techniques conserving water and lowering the need for pesticides. Many golfers welcome the increasing variety of wildlife on their course.

KEY SPECIES

P = UK Priority species **C** = UK species of conservation concern

Mammals	Roe deer	<i>Capreolus capreolus</i>	C
	Badger	<i>Meles meles</i>	C
	Fox	<i>Vulpes vulpes</i>	
	Otter	<i>Lutra lutra</i>	P
	Red squirrel	<i>Sciurus vulgaris</i>	P
	Pipistrelle bat	<i>Pipistrellus pipistrellus</i>	P
	Brown long-eared bat	<i>Plecotus auritus</i>	C
Birds	Buzzard	<i>Buteo buteo</i>	C
	Barn owl	<i>Tyto alba</i>	C
	Short-eared owl	<i>Asio flammeus</i>	C
	Tawny owl	<i>Strix aluco</i>	C
	Kestrel	<i>Falco tinnunculus</i>	C
	Osprey	<i>Pandion haliaetus</i>	C
	Sparrowhawk	<i>Accipiter nisus</i>	C
	Capercaillie	<i>Tetrao urogallus</i>	P
	Black grouse	<i>Tetrao tetrix</i>	P
	Oystercatcher	<i>Haematopus ostralegus</i>	C
	Curlew	<i>Numenius arquata</i>	C
	Heron	<i>Ardea cinerea</i>	
	Fieldfare	<i>Turdus pilaris</i>	C
	Redwing	<i>Turdus iliacus</i>	C
	Yellowhammer	<i>Emberiza citrinella</i>	C
Amphibians	Common frog	<i>Rana temporaria</i>	C
	Common toad	<i>Bufo bufo</i>	C
	Newt spp.		C
Invertebrates	Small tortoiseshell butterfly	<i>Aglais urticae</i>	
	Ringlet butterfly	<i>Aphantopus hyperantus</i>	
	Meadow brown butterfly	<i>Maniola jurtina</i>	
	Bumble bee spp.		
Plants	Oak spp.		
	Scots pine	<i>Pinus sylvestris</i>	
	Juniper	<i>Juniperus communis</i>	P
	Cowslip	<i>Primula veris</i>	
	Ragged robin	<i>Lychnis flos-cuculi</i>	
Northern marsh orchid	<i>Dactylorhiza purpurella</i>		

NATURE CONSERVATION IMPORTANCE

Golf course management involves much more than just managing turfgrass. Winter maintenance, particularly on Scottish golf courses makes up the bulk of the management programmes that encompass some, if not all of the following:

Golf Courses

UBE3

Woodland Management

Trees provide definition for fairway edges or low maintenance areas in and around golf courses. In addition they provide valuable wildlife habitats and corridors.

In wet areas Willow *Salix caprea* and Alder *Alnus glutinosa* are found, whereas in better-drained soils Scots Pine *Pinus sylvestris* and Silver Birch *Betula pendula* are often present. Trees not susceptible to ball damage are also better for obvious reasons; these include Oak, Ash, Pine and Lime.

A mix of ages and species creates a greater variation in the genetic stock, lessening the risk of the spread of disease and loss of trees through wind damage. Such a variety of tree types and maturity provides a range of canopy heights and provision of habitat areas. Where safe, dead timber can be allowed to stand, with both large timber and branches stacked to create microhabitats and smaller branches and leaves swept into brush piles.

RSPB



Osprey (*Pandion Haliaeetus*)

Ospreys are found in forests and stands of Scot's Pine, usually beside a loch. Although invariably associated with the wilds of Scotland, their favoured habitats are commonly found on many of our golf courses and they are becoming more widely seen.

On their return from Africa, these striking birds lay their eggs in late April. Although their population is increasing overall and the return of the species can be looked upon as a success story, they are continually under threat from egg collectors, poisoned bait and habitat loss.

Ospreys look for fish, their sole food source, by hovering over water, or by utilising a nearby perch.

Grassland Management

Areas of grassland roughs provide valuable habitat corridors; they should be linked both internally and outwith the golf course environs. Grassland offers excellent water retention opportunities as well as having the ability to prevent soil erosion. Control and eradication of invasive species such as bracken is essential. However, once bracken is under control a limited amount is beneficial for a variety of invertebrates. Areas of rough grassland can be managed to provide excellent wildlife habitats, together with buffer strips for water features, ditches and other sensitive areas.

Rough grassland only requires annual maintenance such as one cut and rake in September. This lowers maintenance costs, especially if the area can also be kept free of chemical applications or drift spray and the depositing of grass cuttings.

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Northern Marsh Orchid (*Dactylohiza Purpurella*)

Found in marsh grassland areas, these orchids are a characteristic deep purple colour with beautiful diamond-shaped petals and dark markings.

Where wildflower populations are identified and finer native grasses such as Red Fescue *Festuca rubra* and Creeping Bent *Agrostis stolonifera* are identified special care should be taken to conserve these sensitive species. If they are already in situ it is generally a sign of good management practice.

Grasslands can also be made more visually interesting and diverse with the addition of native wildflower seed mixes or native wildflower plugs. Such planting will encourage a wide range of butterflies and moths, which in turn will attract many species of birds and bats. Careful planting and maintenance of gorse and broom will not only add visual stimulus, but can be very valuable bird and invertebrate habitats in themselves if they adjoin rough grassland.

Ponds and Wetlands

Ponds and wetlands can be particularly aesthetically pleasing areas on golf courses. However, the long-term management outlay of such features is sometimes forgotten at great cost to the wildlife and the golfer. Management of existing ponds and wetlands, together with the creation of new ponds and wetlands encourages a wide diversity of wildlife, creates an ecologically sound system and provides course drainage and, in some cases, primary water treatment.

Wetlands offer a tremendous range of plants such as Common Reedmace *Typha latifolia* and Hare's Tail Cotton Sedge *Eriophorum vaginatum*. However, these areas need to be protected from chemical applications and drift spray so that aquatic plants and wildlife remain unharmed.

Under Local Environment Risk Assessments for Pesticides (LERAP) six metre buffer zones have been set for some pesticides. However, this can be reduced to one metre when using LERAP-tested and approved spray jets. In addition, under the Groundwater Regulations golf courses cannot flush sprayer washings down the drain or onto waste ground. The homogenous cover of a plant type is usually an indicator of chemical application or spray drift. In nutrient-rich waters for example, Common Duckweed *Lemna minor* and Canadian Waterweed *Elodea canadensis* are highly invasive species. Where over-nutrication (eutrophication) occurs algal bloom can be present.

Heathland

Heaths are characterised by nutrient poor acid soils principally consisting of the heath (Ericaceae) family. Heather or Ling *Calluna vulgaris* is usually the most prominent species, although the Vaccinium species, for instance Blaeberry and Cowberry, become more important on the upland heaths.

On lowland heaths Ling *Calluna vulgaris*, Bell heather *Erica cinerea* and Cross-leaved heath *Erica tetralix* combine with gorse and grasses to provide a mixed habitat, which like the upland heaths, is sensitive to a number of factors.

This vulnerable habitat can be home to a number of game birds that rely on a variation in the age of the heather cover for nesting and feeding. These game birds include Red grouse, Capercaillie and Black grouse, as well as Pheasant, alongside a considerable array of invertebrates such as moths, grasshoppers, crickets and dragonflies.

Changes in golf course management can rapidly benefit the heathland in terms of its health and diversity with benefits arising beyond its high biodiversity value. The heath's slow growth pattern enables general maintenance costs to be kept low in comparison to woodland and grasslands.

Many different management options can help regenerate heather, including restricted burning, scarification, seeding and turfing. Such options for golf courses are dependent on a number of localised factors - climate, land use, viable seed bank and budgets - to name but a few.

Dunes

Sand dunes are extremely fragile habitats sensitive to changes brought about by erosion, pollution and development. Dunes are formed through natural processes with formation triggered by obstacles to the wind (including tidal litter and vegetation) which slows the wind and allows the deposition of sand. Vegetation is probably the most important in terms of dune stability, but it is also the most susceptible to damage from movement and trampling.

Links courses derive their name from the Scottish word 'links' meaning 'undulating sandy ground near the coast'. These courses have a clear role to play in possible preventative measures for coastal erosion. As part of this process the conservation of native plants and careful utilisation of chemical sprays will need to be considered.

Dunes are home to more than a thousand species of flowering plants and ferns, as well as hundreds of species of lichens, fungi and algae. These support a diverse range of invertebrates such as butterflies (including the Small pearl-bordered fritillary), bumblebees, grasshoppers, spiders and beetles. Birds of prey (Short-eared owls and Merlins) hunt the dunes and slacks, whilst Fieldfares and Redwings winter among sea buckthorn where they feed on the berries. The dune system on the Angus Coast, which includes a number of golf courses, features many of these species.

ECOLOGY AND MANAGEMENT

Case Studies

North Inch Golf Club, Perth

The recent redevelopment and extension of the North Inch Course led to an opportunity to develop "natural areas", which will also enhance the players' enjoyment. Owing to its restricted area it was determined that the woodland and water features on the course would need to play many roles.

With this in mind the Scottish Golf Course Wildlife Group carried out an assessment of the current landscape, the course, its future developments and improvements. It was decided to split the course in terms of landscape type. Parts of the course are set in parkland and these have had supplementary planting of Oak and Lime trees. Other areas have 'gone native' with plantings of local tree and hedge species. This defines the course fringes. The south bank of the Tay has been planted with species reflecting those on the north bank.

In the wetter areas Willow and Alder trees have been used to create a semi-natural wetland habitat. It has been designed to demonstrate the mutual benefits to both golfer and wildlife. The course has also had areas of rough 'grown in' to create better definition and - importantly, to provide a challenge to golfers, as well as introduce further habitats.

The planting schemes were co-ordinated by Perth and Kinross Council Tree and Woodland Officers.

Gleneagles Golf Courses

Since 1983 Gleneagles Golf Courses have been developing environmental practices that enhance the resort's five star reputation. To date this has culminated in the 'Committed to Green' Pan-European Golf Environment Award.

Baseline information was gathered on the geology and history of the landscape. The conservation works first and foremost revolved around the management of the eighteen Sites of Scientific Interest (SSIs) and one Site of Special Scientific Interest (SSSI), but they also made many of the wetland areas a feature of the new Monarch's (now Centenary) Course which was developed in 1992.

The international journal "Golf World" stated in June 2000 'when nature and golf collide harmoniously, as they do in the marsh in the front of the 5th green, the hole becomes naturally more exciting to play'.

In 1992 the first Gleneagles Golf Courses' Integrated Ecological Management Plan 1992 – 1997 was produced which set out the objectives for the coming five years. In 1998 the plan was reviewed and replaced with the Gleneagles Golf Courses 'Environmental Management Plan 1998 – 2002'.



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CURRENT FACTORS CAUSING LOSS OR DECLINE

Changes in plant diversity

Within the last twenty-five years there have been significant declines in plant species diversity in moorland grass, infertile grassland, tall grass/herb and lowland wooded habitats. Conversely there was an increase in species diversity in heath/bog vegetation.

Decreases in the average number of species have occurred in fields, woods, moorland, hedges and riparian edges, especially in lowland landscapes. The changes in the different types of plants suggest that the decline reflects an overall shift towards more intensively managed and nutrient-rich vegetation. The increase in diversity in heath/bog vegetation was associated with an increase in grasses at the expense of typical heath and bog plants.

Native species at risk

Whilst many native species are relatively common over a quarter of fish, amphibians and reptiles assessed in 1997 are considered “threatened”. Between 10 and 20 per cent of invertebrates, vascular plants and lower plants (lichens and mosses) are “threatened”, with a similar proportion designated “nationally scarce”.

Comparable figures are not available for mammals and birds because their threat status is considered in the international rather than the national context. A large proportion of invertebrates, plants, and other organisms (for example parasitic animals, springtails, fungi, and micro-algae) has not been assessed and so is not included.

MAIN THREATS TO KEY SPECIES

Otter	Poor spraying practices and lack of buffer zones, plus pollution of watercourses. Impoverished bankside habitat features needed for breeding and resting. Incidental mortality, primarily by road deaths.	
	UK importance of Tayside population:	moderate
Capercaillie	Loss of heath/ pinewood habitat due to inappropriate management, including use of fertilisers and pesticides, over-watering, excessive foot and cart traffic, burning and lack of invasive species control.	
	UK importance of Tayside population:	high
Black Grouse	Inappropriate management of heathland, including use of fertilisers and pesticides, over-watering, excessive foot and cart traffic, burning and lack of invasive species control. Habitat fragmentation leads to isolated populations. Collisions with deer fences. Loss of under-storey food plants in mature conifer plantations.	
	UK Importance of Tayside population:	high
Short-eared owls	Inappropriate habitat management, including poor spraying practices. Excessive trampling. Loss of sand dune habitat.	
	UK Importance of Tayside population:	moderate

Golf Courses

UBE3

Fieldfares, Redwings and other migrants	Loss of sand dune complexes owing to lack of shrub species such as buckthorn and inappropriate habitat management (poor spraying practices). Excessive trampling.	
	UK Importance of Tayside population:	small
Amphibians, including Frog, Toad and Newts	Poor spraying practices. Lack of buffer zones. Loss or poor management of ponds and pools.	
	UK Importance of Tayside population:	moderate
Native Tree Species (including Ash, Oak, Alder, Elder, Hazel, Aspen, Willow, Hawthorn, Scots Pine, Bird Cherry, Gean (Wild Cherry), Holly, Wych Elm, Rowan, Juniper, Birch and Yew)	Poor selection and inappropriate plantings of trees on golf courses leading to loss of other habitats of equal importance. Poor tree management through inappropriate use of strimmers and staking leading to a high loss of existing and newly planted trees. Removal of hedges and treelines leading to loss of 'wildlife corridors'. Removal, or inappropriate management, of mature trees or copses leading to habitat loss. Loss of diversity of habitat through removal of standing dead wood or log piles.	
	UK Importance of Tayside population:	moderate
Cowslip	Poor rough grassland management, including use of fertilisers and pesticides leading to a loss of native grasses and wildflower populations. Lack of invasive species control.	
	UK Importance of Tayside population:	moderate
Ragged Robin	Poor rough grassland management, including use of fertilisers and pesticides leading to a loss of native grasses and wildflower populations. Loss of wetland habitat. Lack of invasive species control.	
	UK Importance of Tayside population:	moderate

OPPORTUNITIES AND CURRENT ACTION

Scottish Golf Environment Group

The Scottish Golf Course Wildlife Group, established in 1992, is a partnership of golfing and environmental organisations from the public, private and voluntary sectors. It employs two full time golf course advisers who aim to:

- Raise awareness of the existing and potential environmental value of golf courses;
- Promote best practice management and development of golf courses for the benefit of golf and the environment;
- Establish mechanisms for proactive adoption of best environmental practices.

They do this through:

- Increasing the application of best environmental practices in golf course management;
- Improving knowledge and understanding of environmental issues and how they affect golf course management and development;
- Promoting golfing and environmental issues to relevant organisations and involving them in the delivery of the Group's aims and objectives;
- Enhancing the environmental contribution of new golf course developments by offering guidance on best practice.

OBJECTIVES & TARGETS

	Objectives	Targets
1	Raise awareness in Golf Clubs of the benefits of biodiversity.	<p>Work with the Scottish Environment Protection Agency (SEPA) and Scottish Natural Heritage (SNH) locally to raise awareness of the benefits of good environmental practices.</p> <p>Provide a list of relevant native tree species for Tayside golf courses, with suppliers and prices.</p> <p>Produce a database of support organisations and suppliers whose goods and services would be of benefit to golf courses.</p> <p>Devise training programmes/seminars in partnership specifically for greenkeepers in order to raise awareness of biodiversity on golf courses.</p>
2	Raise public awareness of the benefits of biodiversity on golf courses.	<p>In conjunction with Scottish Enterprise Tayside, Tourist Boards, Scottish Golf Course Wildlife Group, retail outlets and accommodation providers show the general public the links between golf courses and biodiversity.</p>
3	Promote the Scottish Golf Environment Group Environmental Excellence Awards and the associated benefits.	<p>Scottish Golf Environment Group have set a target of 20 courses to be actively involved in the Local Biodiversity Action Plan process by April 2005.</p> <p>The Scottish Golf Environment Group have set a target of 40 courses to be fully recognised in the Environmental Excellence Awards by April 2005.</p>
4	Protect and enhance biodiversity on golf courses. Tayside.	<p>Audit the biodiversity golf course resource in</p> <p>Set up a standard recording mechanism for flora and fauna on Tayside golf courses.</p> <p>Implement practical pilot project to protect and enhance biodiversity on golf courses.</p>

Golf Courses

UBE3

Stakeholders

- Golf Club Boards;
- Golf Club Members;
- Golf Course Managers;
- Greenkeepers;
- Regulatory Bodies;
- Voluntary Sector Organisations;
- Members of the public;
- Suppliers;
- Universities and Colleges;
- Local Authorities;
- Golf retail outlets;
- Tourist Boards;
- Accommodation providers;
- Enterprise companies.

ACTION FOR BIODIVERSITY

		Action - Golf Courses Action Plan	Deliverers		To take place by								Meets Objective No.
			Lead Partners	Partners	02	03	04	05	06	07	11	16	
LBAP Ref.	A	Policy and legislation											
UBE3	I	In partnership with SEPA and SNH raise awareness of golf courses' legal responsibilities. i. 2004 - select areas of concern and improvement. ii. 2005 - Devise awareness raising media. iii. 2006 - circulate publication. iv. By 2007 - Monitor breaches of compliance against 2002 level.	SEPA	SNH AC DCC PKC			#	#	#	#	#	#	
	B	Site safeguard and management											
UBE3	I	Devise in consultation with golf clubs practical projects that would be of benefit to both the golf clubs and biodiversity; encourage Best Practice demonstration sites and Open Day visits.	SGCWG	SNH SEPA TBP Selected golf clubs			#	#	#	#	#	#	
	C	Species management and protection											
UBE3													
	D	Advisory											
UBE3	I	Produce a database of support organisations and products which will protect and enhance biodiversity on golf courses - by 2004 (include provision of database training from 2005 if required).	SGCWG	SNH AC DCC PKC Selected organisations & golf clubs			#	#					

E		Research and monitoring				
UBE3	1	Identify existing recording systems, trial recording systems, audit specific golf courses and adjust specifically for golf course use. By 2007 assess results from three selected golf clubs and roll out system to all Tayside Clubs by 2011.	SWT	SGCWG SNH Selected golf clubs TBP	# #	
F		Promotion and awareness-raising				
UBE3	1	Devise regular training programmes/seminars in partnership, if required, specifically for greenkeepers.	SGCWG	Selected golf clubs, Universities and Colleges TBP	# # #	
UBE3	2	In conjunction with partners develop and promote innovative marketing ideas to raise the profile of biodiversity on golf courses.	SET TBP	ATBs SGCWG Retail Outlets	# # # # # # #	
UBE3	3	Plan Monitoring – monitor the delivery of the Action Plan yearly and review it in detail every 5 years, starting in 2003.	TBP		# # # # # # #	

Golf Courses

This illustrative map shows a few key examples of the habitat. Please note that many sites of interest are privately owned and owners' permission should be sought for any access.

