Biodiversity Action Plan

Prepared by:
Leanna Dixon, Richard German, Mark Goddard,
Jennifer Wickens, Victoria Wickens,
& Claire Quinn

Faculty of Biological Sciences
&
Sustainability Research Institute, School of Earth and Environment

March 2011
Contents

Rationale ................................................................................................................................................. 3

Biodiversity Action Planning .................................................................................................................... 7
  Leeds City Council Biodiversity Action Plan ......................................................................................... 7
  Biodiversity on University campuses .................................................................................................... 8

University of Leeds Campus Biodiversity Action Plan ........................................................................... 10
  Species Action Plan: Birds ..................................................................................................................... 11
  Species Action Plan: Amphibians ........................................................................................................... 21
  Species Action Plan: Invertebrates ......................................................................................................... 24
  Habitat Action Plan: Hedgerows ........................................................................................................... 11
  Habitat Action Plan: Grassland ............................................................................................................. 31
  Habitat Action Plan: Woodland and Trees ............................................................................................. 33
  Habitat Action Plan: Wetland ................................................................................................................. 37
  Habitat Action Plan: Ornamental Planting ............................................................................................. 38

Benefitting from biodiversity ..................................................................................................................... 42
  Health and well-being ........................................................................................................................... 42
  Educational opportunities ....................................................................................................................... 42
  Volunteering groups ............................................................................................................................... 43
  Case Study: Edible Campus ..................................................................................................................... 43

Bibliography .............................................................................................................................................. 44
Rationale

The University of Leeds campus is an urban campus covering an area of approximately 90 acres to the north-west of Leeds City Centre (Figure 1). In the next 5 years there are significant development plans in the process or approved that will lead to the construction of new buildings, redevelopment of others, and changes in land use on campus. There is a need to develop baseline information for biodiversity on campus that can then be used to guide future planning and development. There is also a growing imperative that all public bodies, including universities and other centres of higher education, plan for and consider biodiversity on their grounds. The UK Biodiversity Standing Committee, which advises the UK government on biodiversity issues, has stated:

“Our vision is that in our countryside, towns and seas, living things and their habitats are part of healthy, functioning ecosystems; we value our natural environment, a concern for biodiversity is embedded in policies and decisions, and more people enjoy, understand and act to improve the natural world about them.”

In their report ‘Conserving Biodiversity – a UK approach’ published by DEFRA (Department for Environment and Rural Affairs) in 2007 they set out six priorities for biodiversity. Of those six, the policy of “Engaging people, and encouraging behaviour change” is of relevance to the university. This policy promotes programmes that create wildlife friendly spaces at home, in the local community and through work and encourages enjoyment and value in local wildlife friendly spaces.

In addition Section 40 of the Natural Environment and Rural Communities Act in England and Wales (2006) includes legislation which puts a biodiversity duty on public bodies. Both DEFRA and Natural England have indicated that,

“Universities are likely to be subject to the biodiversity duty and should take steps to ensure that, in exercising their functions, they have regard to the purpose of conserving biodiversity.”

In light of this government and university policy, an ecological survey was commissioned in October 2010 with the aim of documenting the current habitat provision and outlining areas where improvements could be made to enhance biodiversity on the Leeds University Campus. The ecological survey provided the necessary baseline information for the creation of this campus Biodiversity Action Plan (BAP). The campus BAP demonstrates a commitment on the part of the
university to prioritise biodiversity. It provides the basis for a coordinated approach and provides teaching opportunities and the chance to engage students with the management of their campus. The BAP will improve information gathering, recording and monitoring, and ultimately, if recommendations are implemented, enhance the biodiversity value of the university campus and its immediate surroundings.

The BAP seeks to fulfil the following objectives:

1. To raise awareness of biodiversity on campus and the need to maintain and enhance it
2. To maintain and enhance biodiversity on campus through the implementation of the species and habitat action plans
3. To engage staff and students in biodiversity projects and initiatives that will enhance their University experience
4. To provide a new teaching resource through the incorporation of biodiversity survey and monitoring into the curriculum
Figure 1. Satellite photograph of the University Campus in its city centre edge setting. The campus boundary is outlined in pink. Image courtesy of Google Earth (©Google 2010.)
Figure 2. Phase 1 habitat classification of the green spaces on campus. The definitions of these classes are found in the separate Biodiversity Report. The base map is an OS Mastermap digital map, downloaded from the EDINA Digimap collections.
Biodiversity Action Planning

For the purpose of this report we define the term biodiversity as everything that contributes to variety in the living world. This includes variety in habitats (e.g. grassland and woodland) as well as diversity in species. Biodiversity is important because of the essential contribution that it makes to the functioning of our planet and because of all the benefits that it provides, from foods and medicine to climate regulation. Contact with biodiversity and the natural world has also been linked to improvements in health and emotional well-being. As a result Natural England (the statutory body responsible for the natural environment) has programmes such as ‘Green Spaces’ and a range health programmes designed to encourage people to use and enjoy the natural environment more.

Concerns about the loss of biodiversity as a result of human activities have been growing since the 1960s. The first United Nations Earth Summit was held in Rio de Janeiro in 1992 where governments came together to find ways of halting the damage being done. At this summit the UK signed up to the Convention on Biological Diversity which committed the UK to develop plans and programmes for the conservation and sustainable use of biodiversity. In 1994 the first UK Biodiversity Action Plan (BAP) was published. The UK BAP sets out targets for the UK as a whole, and identifies important habitats and species in need of protection. The UK BAP has since been followed by local BAPs that provide a mechanism for local action to protect and enhance local biodiversity.

Leeds City Council Biodiversity Action Plan

Leeds City Council’s vision for biodiversity in Leeds is to maintain:

“A range of habitats, characteristic of the landscapes of Leeds, supporting both typical and rare species, contributing to regional and national biodiversity and providing an attractive and sustainable natural environment for leisure, education and work.” (Introduction to the Biodiversity Action Plan for Leeds, pp. 2)

The Leeds Local Biodiversity Action Plan (LBAP) identifies four natural areas in West Yorkshire: Coal Measures, Southern Magnesian Limestone, Southern Pennines and Pennine Dale Fringe. The University campus is located in the Coal Measures natural area. The LBAP comprises four habitat action plans and six species action plans. Two action plans are of some relevance to the university
campus: the hedgerow and field margin action plan, and the action plan for the Pipistrelle Bat; these were consulted in the preparation of the campus BAP.

**Biodiversity on University campuses**

Although many universities are now looking to improve their environmental performance in the areas of waste, energy and transport, biodiversity still seems to be low down on agenda. This needs to change if universities and other higher education institutions are to set an example and educate the next generation about the importance of biodiversity in sustainability. In its ‘Sustainable Development in Higher Education’ strategy the Higher Education Funding Council for England (HEFCE) committed to promote sustainable estates management, including biodiversity. At the same time the Learning and Skills Council’s (LSC) strategy ‘From Here to Sustainability’ also identifies biodiversity as a key part of their principles and actions. It recommends that Further Education institutions should:

“Implement a locally appropriate biodiversity programme that best manages the site for conservation.” (Environmental Association for Universities and Colleges, 2006).

The Environmental Association for Universities and Colleges (EAUC) (2006) identifies nine benefits for universities that have an active biodiversity agenda:

- Improved reputation and green image
- Potential to develop partnerships between staff and students
- Opportunities for education and curriculum greening
- Campus contribution to healthy living and wellbeing
- Enhanced volunteering opportunities for students
- Greater support from local authorities for planning and new development
- Cost savings in maintenance
- Legislative compliance
- Wider benefits in terms of flood reduction and carbon reduction.

Out of the ten universities and higher education colleges in the Yorkshire and Humber region five have some sort of biodiversity plan for their campus and their activities are summarised briefly below.
The University of Hull has a Campus Biodiversity Action Plan which sets out a number of activities to improve biodiversity on their campus. This includes management of hedgerows to reduce disturbance to nesting birds, reducing herbicide and pesticide use, leaving long margins in suitable areas of amenity grassland (for example on the edges of playing fields) and using plants that provide nectar, fruit or seeds for birds and other wildlife (University of Hull, 2006).

Leeds Metropolitan University has a Woodland Biodiversity Action Plan, focused on their Headingley campus, but are also looking to improve provision for wildlife on their city campus by providing food sources and planting a wildflower meadow at the Rose Bowl car park (Leeds Metropolitan University, 2009).

The University of Bradford is creating wildlife areas on their campus and implementing a Biodiversity Action Plan that will create a green corridor through the city centre campus, create a peace garden, install green walls and develop new ponds (University of Bradford, 2009).

The University of Huddersfield has a ‘Go Green’ initiative for their campus which tries to incorporate a ‘healthy respect for wildlife and the natural environment’ in their estate management. They are working to preserve, improve and create wildlife habitats and have a policy of only planting local native species (University of Huddersfield, 2009).

Leeds Trinity University College has identified environmental projects including increasing biodiversity as a priority in their Campus Master Plan while the University of Sheffield have a policy to produce a Biodiversity Action Plan for their campus (Leeds Trinity University College, 2008; University of Sheffield, 2009).
University of Leeds Campus Biodiversity Action Plan

The University of Leeds campus BAP is comprised of a number of species action plans (SAPs) that cover key species groups and a habitat action plan (HAP) that covers key habitats for which biodiversity action is recommended on campus. Species and habitats selected for biodiversity action are those which are included in the UK BAP or those for which greater provision on campus could considerably enhance their local conservation. Each action plan will provide background information on the biology and current status of the species and habitats before summarising proposed objectives and actions.

Biodiverse meadow outside the Faculty of Biology (© J. Rosindell)
Species Action Plan: Birds

The Birds SAP seeks to enhance the habitat provision for a wide range of birds that occur on the University of Leeds Campus. Particular attention is paid to the following six species, five of which are UK BAP priority species, and the other (swift) is a declining species for which the campus is especially suited to provide nesting habitat:

1. Starling
2. House sparrow
3. Bullfinch
4. Swift
5. Song thrush
6. Dunnock

Biology, current status and declines

Starlings (*Sturnus vulgaris*) are familiar birds in urban and rural habitats throughout the UK. They are gregarious and are particularly noticeable in winter where huge flocks gather and create impressive aerial displays. They eat wide variety of foods including fruits but are often seen searching for insect larvae by probing grass. Nest sites include buildings and trees, and egg laying takes place between early April and mid June, with 1-2 clutches of 4-7 eggs laid. Long term monitoring by the British Trust for Ornithology (BTO) has shown that starling numbers have fallen by 66% in Britain since the mid-1970s. In response to this decline, the starling is red listed as a bird of high conservation concern (Eaton *et al.* 2009) and is also a UK BAP priority species. Loss of permanent pasture and mixed farming, and increased use of farm chemicals are probable causes of starling declines, but there is also a shortage of nesting sites in many parts of the UK.

House sparrows (*Passer domesticus*) are the most familiar of urban birds, and have successfully colonised cities throughout the world. They are gregarious all year as a loose colony and eat a wide range of foods including seeds, berries, insects and scraps. Natural nest sites include buildings and tree crevices, but they will also nest in bird boxes. Two or three clutches of eggs are laid in spring, each comprising 4-5 eggs. Despite the success with which they have adapted to man-made habitats, they are now struggling to survive in the UK. The population crashed during the 1990s and has declined by 62% in the last 25 years. The house sparrow is a priority species in the UK BAP and is red
listed as a species of high conservation concern (Eaton et al. 2009). There are thought to be many factors contributing to the decline in house sparrow numbers, with lack of food and nest sites probable causes in towns and cities.

**Bullfinches** (*Pyrrhula pyrrhula*) are shy birds, usually seen as a family pair and not in flocks. Although the bullfinch’s preferred habitat is scrub and deciduous woodland, they are increasingly seen in gardens and other suburban habitats. They feed on seeds and berries, with insects also an important food source for young. Nests are placed in thick cover, and 2-3 clutches are laid from April to September, with 4-5 eggs each. Since the 1970s bullfinch numbers have fallen steeply, probably due to tree and hedge removal, agriculture intensification and, loss of nesting sites and winter food sources. The bullfinch is on the amber list of species of conservation concern (Eaton et al. 2009) and is a UK BAP priority species.

**Swifts** (*Apus apus*) are iconic summer visitors to the UK, lauded for their speed, manoeuvrability and screaming call. They feed on insects and airborne spiders caught on the wing. Nests are placed under eaves in a building cavity or in a specially designed nest box, and swifts favour tall buildings to allow a drop from the nest site to reach a sufficient speed to get airborne. Eggs are laid in May, comprising one brood of 2-3 eggs. The loss of suitable nest sites is a particular threat for swifts, either through redevelopment of old properties or the renewal of their roofs. The population has declined 41% since 1994 and swifts are therefore amber listed as a species of conservation concern (Eaton et al. 2009).

**Song Thrushes** (*Turdus philomelos*) are popular song birds with a bold and precise song comprised of repetitive phrases. They are usually solitary birds, becoming territorial in winter. Despite being well-known for their unique technique of feeding on snails by using a stone as an anvil, worms are actually a more important component of the song thrush diet than snails. Breeding occurs between March and August, with 2-3 clutches of 3-5 eggs laid. The nest is sited low down in a tree or shrub, or may also be positioned on a ledge or on the ground. Song thrush populations have declined around 50% since the mid-1970s. The decline has been most drastic in agricultural landscapes as a result of farming intensification. The pace of this decline has resulted in the song thrush being placed on the red list as a species of conservation concern. It is also included in the UK BAP list of priority species.
Dunnocks (*Prunella modularis*) are rather unobtrusive and somewhat plain looking birds that favour scrubby undergrowth, woodland and gardens. Their diet is mainly comprised of insects, spiders and occasionally small seeds taken from the ground. Dunnocks have a complex social system that includes monogamous, polyandrous and polygamous relationships. Nests are usually well hidden in thick cover up to 3m above the ground, and 2-3 broods of 4-5 eggs are laid between March and August. The dunnock is a UK BAP priority species due to a steady decline in the population in recent decades.

Objectives and actions

**Objective:** To preserve existing species populations and undertake measures to raise numbers within the campus and surrounding landscape.

**Actions**

1. Baseline survey and subsequent monitoring of bird species on campus, in particular the six target species

   **Strategy:** Annual bird survey with staff/student volunteers; approach student and staff groups on campus to be involved in bird survey

   **Responsible partners:** Sustainability team and Biodiversity Champion to co-ordinate with student and staff groups

   **Target date:** April/May 2011

   **Strategy:** Inclusion of campus surveys into UG methods modules in Biology/SEE

   **Responsible partners:** Biodiversity Champion to co-ordinate

   **Target date:** January 2012

2. Raise awareness of birds on campus and the need for their conservation

   **Strategy:** Advertisement on Sustainability website/Reporter magazine/student magazines

   **Responsible partners:** Sustainability team

   **Target date:** Summer 2012

3. Increase the provision of bird feeding opportunities and nest sites (artificial and natural)
**Strategy:** Encourage voluntary provision by buildings/departments through advertisement online/Reporter Magazine

**Responsible partners:** Sustainability team and grounds team (to approve locations and materials used)

**Target date:** January 2012

---

4. Relaxation of management in appropriate areas of campus green space to allow development of taller swards and scrub

**Strategy:** (1) To create and position signs outside Earth and Environment Building to raise awareness of need for taller swards and ‘wild’ plant species on campus; (2) Identify locations on campus where taller swards and scrub vegetation could be encouraged by relaxed management; (3) Reduce cutting in identified areas

**Responsible partners:** (1) Biodiversity Champion and SEE staff; (2) Grounds team; (3) Grounds team

**Target date:** September 2012
5. Increase the planting of native tree and shrub species to include seed and fruit bearing species

**Strategy:** Continue native tree planting schemes, identify and include seed and fruit bearing species for inclusion

**Responsible partners:** Grounds team (with input from Leeds planning dept & Biodiversity Champion)

**Target date:** On-going

6. Promote organic management and reduced chemical pesticide and fertiliser use

**Strategy:** Continued use of shredding and composting facilities at Bardon Grange; continued low use of herbicides and non-use of pesticides and fertilisers

**Responsible partners:** Grounds team

**Target date:** On-going

7. Promote biodiverse green infrastructure (e.g. green and brown roofs)

**Strategy:** Include provision of green infrastructure in development proposals

**Responsible partners:** Estates

**Target date:** On-going

**Species actions**

<table>
<thead>
<tr>
<th>Species</th>
<th>Actions</th>
</tr>
</thead>
</table>
| Starling      | • Ensure that areas of short grassland are retained on campus as feeding grounds  
|               | • Initiate a nest box scheme                                             
|               | • Retain mature trees on campus, especially those containing cavities for nesting  
|               | • Install artificial bird feeding stations                               |
| House sparrow | • Enhance the provision of weed seeds by allowing tall swards to develop in appropriate area of campus  
|               | • Initiate a nest box scheme                                             
|               | • Retain mature trees on campus, especially those containing cavities for nesting  
<p>|               | • Install artificial bird feeding stations                               |
| Bullfinch     | • Increase the provision of native scrub and thick hedgerows on campus to include seed and fruit-bearing species |</p>
<table>
<thead>
<tr>
<th>Species</th>
<th>Suggested Measures</th>
</tr>
</thead>
</table>
| Swift        | • Incorporate roof space access, ‘swift bricks’ or externally positioned nest boxes into new builds  
               • Avoid building repair work near nest sites during the May – August breeding season |
| Song thrush  | • Ensure that areas of short grassland are retained on campus as feeding grounds  
               • Increase the provision of native scrub and thick hedgerows on campus to include fruit-bearing species  
               • Encourage sympathetic hedgerow and shrub management by limiting trimming and cutting after fruiting  
               • Avoid the application of pesticides on campus, in particular molluscicides such as slug pellets |
| Dunnock      | • Enhance the provision of weed seeds and insects by allowing tall swards to develop in appropriate area of campus  
               • Increase the provision of dense scrub, hedgerow and shrub on campus to provide suitable nest sites  
               • Install artificial bird feeding stations |
Species Action Plan: Mammals

The Mammals SAP seeks to enhance the habitat provision for a wide range of mammals that occur on the University of Leeds Campus. Particular attention is paid to two UK BAP priority species for which the campus can provide suitable habitat:

1. Pipistrelle bats
2. European hedgehog

Biology, current status and declines

Pipistrelle bats are the commonest and most widespread of all British bat species. In the mid 1990s it was discovered that there are actually two species - the Common Pipistrelle (*Pipistrellus pipistrellus*) and the Soprano Pipistrelle (*Pipistrellus pygmaeus*). Research suggests that the Soprano Pipistrelle prefers lakes and rivers while the Common Pipistrelle prefers improved grassland and built up areas, but both species have been recorded in Leeds. Like all UK bats, pipistrelles are nocturnal and feed on insects and moths caught aerially with the help of echolocation. A single pipistrelle can consume up to 3000 insects in a single night. Populations of pipistrelles have declined in the last few decades in response to modern agricultural practices which have reduced the abundance of prey. Their reliance on buildings for roosting also makes pipistrelles vulnerable to renovations and new building techniques which reduce access to building cavities. Pipistrelle Bats are legally protected under the Conservation Regulations 1994 and the Wildlife and Countryside Act 1981. They are also priority species in both the UK and Leeds BAPs.

European hedgehogs (*Erinaceus europaeus*) are unmistakable spiny mammals with over 6000 spikes covering their body. When threatened they roll up into a ball so that the spikes offer protection. They are widespread in the UK, largely nocturnal and are found in hedgerows, grassland and gardens where they feed on a wide range of invertebrate prey including slugs, snails, earthworms and beetles. The young are born between May and September, in litters of four or five. Hedgehogs build nests called hibernacula in which to avoid the coldest times of winter by hibernating, usually between November and early April. Favourite sites for these are under timber buildings, in piles of brushwood or leaves, or in compost heaps. Hedgehog numbers are steadily falling and a range of factors are implicated in this decline, including secondary poisoning from slug pellets, increased road
traffic and a reduction in feeding and hibernating sites caused by loss of hedgerows and removal of leaf litter. Hedgehogs are a UK BAP priority species.

Objectives and actions

**Objective**: To preserve existing mammal populations and undertake measures to raise numbers within the campus and surrounding landscape (Pipistrelle bats and hedgehogs)

**Actions**

1. Baseline survey and subsequent monitoring of mammal species on campus, in particular the two target species

**Strategy**: (1) Instigate surveys on campus with local bat group and student/staff volunteers; (2) Annual hedgehog and small mammal surveys with student/staff volunteers

**Responsible partners**: Sustainability team and Biodiversity Champion (with colleagues in Biology)

**Target date**: April/May 2012

2. Raise awareness of mammals on campus and the need for their conservation

**Strategy**: Advertisement on Sustainability website/Reporter magazine/student magazines

**Responsible partners**: Sustainability team

**Target date**: Summer 2012

3. Relaxation of management in appropriate areas of campus green space to allow development of taller swards and scrub

**Strategy**: (1) To create and position signs outside Earth and Environment Building to raise awareness of need for taller swards and ‘wild’ plant species on campus; (2) Identify locations on campus where taller swards and scrub vegetation could be encouraged by relaxed management; (3) Reduce cutting in identified areas

**Responsible partners**: (1) Biodiversity Champion and SEE staff; (2) Grounds team; (3) Grounds team

**Target date**: September 2012
4. Increase the planting of native tree and shrub species to include seed and fruit bearing species

**Strategy:** Continue native tree planting schemes, identify and include seed and fruit bearing species for inclusion

**Responsible partners:** Grounds team (with input from Leeds planning dept & Biodiversity Champion)

**Target date:** On-going

5. Create log piles on campus

**Strategy:** Identify locations and then create log piles in sunny and shady sites

**Responsible partners:** Grounds team

**Target date:** September 2012

*Log and brash pile providing potential hibernation site for hedgehogs  (© J & V Wickens)*
6. Promote organic management and reduced chemical pesticide and fertiliser use

**Strategy:** Continued use of shredding and composting facilities at Bardon Grange; continued low use of herbicides and non-use of pesticides and fertilisers

**Responsible partners:** Grounds team

**Target date:** On-going

**Species actions**

<table>
<thead>
<tr>
<th>Species</th>
<th>Actions</th>
</tr>
</thead>
</table>
| Pipistrelle bats | • Install bat boxes in suitable locations on mature trees and buildings  
|              | • Promote the installation of directional lighting on campus to reduce disruption to natural feeding behaviour  
|              | • Enhance the provision of rough grassland and hedgerow on campus to provide habitat for insect prey  
|              | • Retain and protect mature trees on campus, in particular those containing cavities that could act as roosting sites  
|              | • Ensure that building work adheres to current guidelines for the protection of bats.              |
| Hedgehog    | • Where appropriate ensure that deadwood piles and leaf litter are retained and protected on campus as potential hibernation sites  
|             | • Promote the creation of compost heaps that provide hibernacula and attract invertebrate prey  
|             | • Install hedgehog boxes in undisturbed sites hidden by ground covering plants, low shrubs or tree branches  
|             | • Increase the provision of dense scrub, hedgerow and shrubs on campus to provide suitable foraging habitat  
|             | • Avoid the application of pesticides on campus, in particular molluscicides such as slug pellets  |
Species Action Plan: Amphibians

The Amphibians SAP seeks to enhance the habitat provision for amphibians that occur, or could occur, on the University of Leeds Campus. Particular attention is paid to the following three West Yorkshire BAP species, one of which (the common toad), is also a UK BAP priority species:

1. Common frog
2. Common toad
3. Smooth newt

Biology, current status and declines

Common frogs (*Rana temporaria*) are the only frogs native to Britain. Like all amphibians, they require waterbodies for breeding and wetlands and grasslands for foraging and hibernation. Frogs enter their breeding ponds in spring and spend the remaining seasons foraging for food before hibernating during the winter. Frogs hunt mainly at night and feed on insects, slugs and snails. Frogs appear to be declining in Britain, and loss or fragmentation of habitat, due to factors such as encroachment of housing and other developments, infilling of breeding ponds and pollution of suitable waterbodies, is likely to be the main contributor to any local decline in the species. Frogs are included in the West Yorkshire BAP.

Common toads (*Bufo bufo*) have similar habitat requirements to common frogs but are more ‘site faithful’ and tend to return to the same ponds each year to breed. Toads can be distinguished from frogs by their drier and rougher skin and their tendency to crawl rather than jump. Glands in the toad’s skin contain powerful toxins which deter many predators, and allows them the luxury of this more sedentary lifestyle. Unlike frogs, who lay spawn in clumps, toads lay strings of eggs. Common toads are most active at night when they hunt snails, slugs, ants, spiders and other invertebrates. Common toads were added to the UK BAP priority species list in 2007 in response to national declines caused by loss of wetland habitats.

Smooth newts (*Lissotriton vulgaris*) are the most widespread of the three newt species that occur in Britain. They rely on ponds for breeding during spring and summer, but are terrestrial outside the breeding season where they are most frequently encountered underneath logs and debris. On land, newts feed on insects, worms and slugs and in water they feed on insect larvae, water snails and
frog tadpoles. Unlike frogs and toads, spawn is laid as individual eggs each of which is carefully wrapped in a leaf of pond weed by the female newt. Garden ponds have become extremely important for this species especially as ponds in the wider countryside have become fewer and more polluted. Smooth newts are included in the West Yorkshire BAP.

Objectives and actions

**Objective:** To undertake measures to encourage amphibians on campus and/or on other university holdings (residences).

**Actions**

1. Raise awareness of amphibians and the need for their conservation

**Strategy:** Advertisement on Sustainability website/Reporter magazine/student magazines

**Responsible partners:** Sustainability team

**Target date:** Summer 2012

2. Baseline survey to identify suitable sites for the three target species

**Strategy:** Survey with staff/student volunteers; approach student groups on residences to be involved

**Responsible partners:** Sustainability team and Biodiversity Champion to co-ordinate with student and staff groups

**Target date:** April/May 2013

3. Create new wetland habitat designed to be favourable for amphibians

**Strategy:** Seek opportunities for the creation of new wetland habitat on campus or other University sites, in particular as part of new developments; explore potential for integrating the surface water management plan with biodiversity objectives

**Responsible Partners:** Estate Services

**Target date:** 2-3 years
4. Promote organic management and reduced chemical pesticide and fertiliser use

**Strategy:** Continued use of shredding and composting facilities at Bardon Grange; continued low use of herbicides and non-use of pesticides and fertilisers

**Responsible partners:** Grounds team

**Target date:** On-going
Species Action Plan: Invertebrates

The invertebrates SAP aims to enhance the habitat provision for a wide range of invertebrate species on the University of Leeds Campus. Invertebrates are often underrepresented within the biodiversity planning process and as a result there are no UK BAP invertebrate species likely to occur on campus.

Invertebrates are the most numerous and diverse species on Earth, making up at least 65% of all species on the planet. They include insects, spiders, snails, woodlice, worms, millipedes and centipedes, false scorpions, mites and earthworms. They perform a range of vital functions within ecosystems such as pollination and decomposition, and are also essential prey for many bird, mammal and amphibian species. Invertebrates can be encouraged by the provision of an array of microhabitats on including ponds, compost heaps, rockeries, flower borders and shrubberies.

Many invertebrates feed and shelter on plant stems and leaves and it is important to maximise the complexity of vegetation structure by ensuring a range of vegetation cover at different heights, from ground cover through to tall tree canopies. They will also benefit from a variety of plant growth forms such as grasses, herbs, shrubs and trees. Planting native species is likely to encourage a greater range of herbivorous invertebrates, although plants closely-related to British native plants are also often equally suitable. For pollinating insects such as bees, hoverflies and butterflies, it is ideal to maximise the provision of flowers throughout the season, and many exotic species are important sources of pollen and nectar early and late in the season.

Hoverfly feeding on corn marigold (© J. Rosindell)
Although little is known about the population status of many invertebrates, surveys of the more charismatic groups such as butterflies and bees suggest that they are experiencing declines. The plight of the honey bee *Apis mellifera* has been particularly well documented in recent years, but many of the lesser known wild bees, including bumblebees and solitary bees, have also declined. Overall, it is estimated that at least 15% of the total UK invertebrate fauna is under threat which equates to 4,500 species in decline.

**Objective and actions**

**Objective:** To preserve existing invertebrate populations and undertake measures to raise numbers within the campus and surrounding landscape.

**Actions**

1. Give preference to native plants in planting schemes to maximise their value to plant-feeding invertebrates
2. Maximise the complexity of vegetation structure by planting a mixture of plant forms such as grasses, herbs, shrubs and trees
3. Plant ‘butterfly bars’ that contain an abundance of flowers with different structures, including open, flat flowers for generalist species, and tubular flowers for more specialist pollinators such as long-tongued bumblebees. Avoid double-flowered cultivars that provide little or no nectar or pollen resources
4. Ensure the provision of a good variety of flowers throughout the year, in particular in early spring and late summer/autumn

**Strategy:** Workshop/training day with Landlife or similar organisation for Grounds team; Adapt planting plan to incorporate the above actions

**Responsible partners:** Grounds team (with input from Biodiversity Champion and others)

**Target date:** September 2012
5. Relaxation of management in appropriate areas of campus green space to allow development of taller swards and scrub

**Strategy:** (1) To create and position signs outside Earth and Environment Building to raise awareness of need for taller swards and ‘wild’ plant species on campus; (2) Identify locations on campus where taller swards and scrub vegetation could be encouraged by relaxed management; (3) Reduce cutting in identified areas

**Responsible partners:** (1) Biodiversity Champion and SEE staff; (2) Grounds team; (3) Grounds team

**Target date:** September 2012

6. Retention of leaf piles and dead plant material that provide shelter and over-wintering sites and feeding sites for specialists of decaying wood such as beetles and hoverfly larvae

**Strategy:** Identify suitable locations and create leaf and log piles

**Responsible partners:** Grounds team

**Target date:** September 2012
7. Create ‘hot-spots’ that allow invertebrates to bask in full sun, including exposed bare ground, wood, rocks or sun traps in flower borders

**Strategy:** Identify all current ‘hot-spots’ on campus and possible locations for new ‘hot-spots’

**Responsible partners:** Student/staff volunteers co-ordinated by Biodiversity Champion and Sustainability team (with approval of Grounds team)

**Target date:** 2012

8. Install invertebrate nest sites at suitable locations on campus, e.g. ‘bee hotels’

**Strategy:** Identify suitable locations and install invertebrate nest sites

**Responsible partners:** Staff/student volunteers (with approval of Grounds team)

**Target date:** Site identification in 2011 and installation in 2012.
9. Promote organic management and reduced chemical pesticide and fertiliser use

**Strategy:** Continued use of shredding and composting facilities at Bardon Grange; continued low use of herbicides and non-use of pesticides and fertilisers

**Responsible partners:** Grounds team

**Target date:** On-going

10. Create new wetland habitat on campus, including ponds and bogs, to provide habitat for aquatic invertebrates such as dragonflies, damselflies, water beetles and pond snails.

**Strategy:** Seek opportunities for the creation of new wetland habitat on campus or other University sites, in particular as part of new developments; explore potential for integrating the surface water management plan with biodiversity objectives

**Responsible Partners:** Estate Services

**Target date:** 2-3 years
Habitat Action Plan

The campus HAP seeks to enhance the management of existing habitats on campus for biodiversity and to encourage the creation of new habitats to maximise their wildlife provision. Six broad habitats have been included in the action plan:

1. Hedgerows
2. Grassland
3. Woodland and trees
4. Wetland
5. Ornamental planting
6. Green roofs

The current distribution and condition of each habitat will be summarised below in addition to biodiversity objectives and actions.
Hedgerows

There are very few traditional linear hedgerows on campus, and those that exist are mostly made up of privet (*Ligustrum vulgare*), with hawthorn and beech taking a minor role. However, there are extensive stands of mainly exotic shrubs (chiefly *Cotoneaster* spp., cherry laurel (*Prunus laurocerasus*), *Mahonia* spp., *Hebe* spp., and *Berberis* spp.) which also provide cover, flowers and fruits. As a whole, shrubby vegetation covers roughly 13% of the green space on campus. Ivy is an important species on campus currently as it forms blankets on walls and fences which can provide flowers and fruit over winter when other resources are scarce.

Less managed hedgerows are more attractive to bird, mammal, amphibian and invertebrate species than frequently cut hedges. Relaxed management will encourage a dense hedge to develop and allow the production of flowers, fruits and seeds. Species rich hedgerows are of greatest importance for biodiversity and are recognised as priority habitats in the UK BAP (Defra, 2007). Hedgerows also act as wildlife corridors, allowing species movement from one habitat to another.

**Actions**

1. Increase the area of linear hedgerows on campus, including the replacement of fences with hedgerows where appropriate. This will improve the connectivity of hedgerows so that they act as ‘green corridors’ for the safe movement of wildlife across the campus
2. Ensure that new hedgerows plantings are of predominantly native species that produce flowers and berries that provide resources for wildlife (e.g. Hawthorn, Blackthorn)
3. Reduce the cutting of existing hedgerows to encourage the development of a dense habitat offering opportunities for shelter and nesting
4. Introduce hedge-laying a management tool to maximise the long-term biodiversity value of hedgerows on campus
5. Encourage the growth of tall herb and grass vegetation along the base of hedgerows, and continue to sympathetically manage (i.e. tolerate unless it causes damage) ivy on walls and fences

**Strategy:** Expanding the amount and composition of hedgerows on campus is a longer term strategy. Currently there are no resources available for the Grounds team to cut and manage hedgerows. The
strategy is therefore to investigate and evaluate the potential for managing hedgerows on campus through voluntary action by staff/students i.e. hedge-laying training and activities by BTCV.

**Responsible Partners:** Sustainability team

**Target date:** 2-3 years

---

Cherry laurel hedge near the Garstang Building that could be replaced by a native species-rich hedge (© Indy)

---

**Grassland**

Grassland on campus is dominated by amenity grassland, with occasional small patches of rough grassland, mainly on road verges. St. George’s Field is the largest area of semi-improved grassland on campus and provides an important link to other habitats to the north of the campus such as Woodhouse Ridge LNR. St Georges Field formerly known as Leeds General Cemetery, or Woodhouse Cemetery, was established in 1835 and was later landscaped in 1968.

Amenity grassland is widespread throughout the campus where it is managed for recreational use such as sitting areas. It currently covers 60% of the available green space. Its intensive management regime involves frequent cutting and occasional herbicide use. Amenity grassland on
campus tends to be species poor and dominated by perennial rye grass (*Lolium perenne*) and common forbs such as white clover (*Trifolium pratense*) and buttercups (*Ranunculus* spp.).

*Wildflowers flourish in the former wildlife garden outside the Faculty of Biology* (© J. Rosindell)

Increasing the species and structural diversity of amenity grassland on campus will have a wide range of biodiversity benefits. Even a slight reduction in the frequency of mowing will allow grassland species to flower and seed, thus providing nectar and seed for invertebrates and birds. This could be achieved without comprising the recreational function of the green space. Less intensively used grassland (e.g. road verges) could be restored to species-rich meadow, with mowing of edges and path rides used to give a cared-for appearance.

**Actions**

1. Relaxation of management in appropriate areas of campus green space to allow development of taller swards and scrub

**Strategy:** (1) To create and position signs outside Earth and Environment Building to raise awareness of need for taller swards and ‘wild’ plant species on campus; (2) Identify locations on campus where
taller swards and scrub vegetation could be encouraged by relaxed management; (3) Reduce cutting in identified areas

**Responsible partners:** (1) Biodiversity Champion and SEE staff; (2) Grounds team; (3) Grounds team

**Target date:** September 2012

2. Promote organic management and reduced chemical pesticide and fertiliser use

**Strategy:** Continued use of shredding and composting facilities at Bardon Grange; continued low use of herbicides and non-use of pesticides and fertilisers

**Responsible partners:** Grounds team

**Target date:** On-going

_Amenity grassland in Chancellor’s Court (© J & V Wickens)_

_Woodland and trees_
The trees on campus play an important role in attracting wildlife by providing sources of food, opportunities for nesting and roosting, and routes for movement across the landscape. They play a major role in reducing the effects of atmospheric pollution, can provide shade or act as a wind break, and are visually pleasing.

Tree canopy currently covers at least 10% of the total area of campus, and about 41% of the available green space. There are several key areas where mature trees are well represented, and/or where a number of trees canopies meet to give a woodland “feel”, for instance the car park at the end of the E.C. Stoner building, the lines of street trees in the network of terraces South of Mount Preston Street and the wooded area above the Gryphon sports centre and along Woodsley Road. These areas are likely to attract birds and insects from Hyde Park and Woodhouse Ridge, but they are probably too small and isolated to support specialist woodland birds or insects. Of these areas, only Woodsley Road and the street trees in lesser-used terrace gardens have a woodland-like understorey, which limits the opportunity for the retention of standing or lying dead-wood. Apart from these areas, there are a large number of more scattered street trees around campus buildings, and many parkland trees in St.George’s fields. Conspicuously, larger areas (> 0.25 ha) of continuous canopy with a well developed woodland ground flora and dead-wood are absent.

**Actions**
1. Improve the diversity of stand structure and age class of tree species on campus

**Strategy:** Where opportunities arise for new tree plantings seek to diversify stand structure and age class

**Responsible Partners:** Grounds team (with input from Biodiversity Champion)

**Target date:** On-going

2. Identify areas for new tree planting on campus or other University sites

**Strategy:** Identify potential areas for new tree planting to maximise connectivity with existing habitat

**Responsible Partners:** Grounds team (with input from Biodiversity Champion)

**Target date:** 2-3 years

3. Where possible retain standing dead-wood to provide habitat for fungi and invertebrates

**Strategy:** Identify locations where the retention on standing dead-wood would pose a minimal risk to human safety; Encourage the protection of standing dead-wood in identified locations

**Responsible Partners:** Grounds team (with input from Biodiversity Champion)

**Target date:** On-going
4. Retain and protect mature trees on campus, in particular those that contain cavities that are potential nest sites for birds and roost sites for bats

**Strategy:** Identify mature trees that have the highest potential for birds and bats on campus; Retain and protect identified trees

**Responsible Partners:** Grounds team (with input from Biodiversity Champion)

**Target date:** On-going

5. Encourage the development of woodland ground flora (e.g. bluebells)

**Strategy:** Identify areas of deep shade with low footfall, and where other vegetation struggles; Active bulb or seed planting.

**Responsible Partners:** Grounds team

**Target date:** 2-3 years
Wetland

Wetland is currently the most under-represented habitat on campus. The only existing area of open water is the concrete pool outside the Roger Stevens building which has no associated vegetation. The creation of new ponds and other wetlands is the single action which would see the greatest increase in biodiversity. Where opportunities arise for the creation of new wetlands they should ideally be clustered together and linked by rough grassland or ditches to encourage movement of invertebrates and amphibians. Wetland creation for biodiversity could be integrated with a surface water management plan.

Actions

1. Identify suitable locations for the creation of new ponds and ditches (most likely on other University sites – residences)
2. Cluster new wetlands together to maximise their connectivity and value to amphibians
3. Integrate biodiversity requirements into a surface water management plan
**Strategy:** Seek opportunities for the creation of new wetland habitat on campus in particular as part of new developments; explore potential for integrating the surface water management plan with biodiversity objectives

**Responsible Partners:** Estate Services

**Target date:** 2-3 years

---

**Ornamental planting**

Ornamental planting is widespread on campus and comprises landscaping around existing buildings and new developments, and seasonal bedding in planters and borders. At current, the aesthetic value of ornamental planting is given priority over biodiversity considerations. These plantings need not consist solely of native species; non-native species such as *Cotoneaster* and *Buddleia* can be very good plants for wildlife. Of greater significance than nativeness in these settings is the provision of structural diversity. Planting should seek to maximise the range of canopy heights (from lawn through to tall grass or sedge, shrubs and trees). By creating a visually impressive mosaic of habitat types, ornamental plantings can balance both aesthetic and biodiversity requirements.
Typical ornamental plantings on campus with limited biodiversity value (© J & V Wickens)

Actions

1. Develop structural diversity in planting, with all canopy layers represented wherever possible
2. Use a diversity of species, deciduous, evergreen and herbaceous
3. Include plants with a diversity of food sources for invertebrates and birds (i.e. blossoms for nectar, berries, seed-heads)
4. Prioritise the planting of species with single or tubular flowers that provide pollen and nectar resources throughout the season
5. Avoid bare soil/mulch by using prostrate groundcover plants wherever possible
6. Use climbing plants on walls
7. Introduce edible fruiting species, such as apples, currants etc., for human enjoyment

Strategy: Workshop/training day with Landlife or similar organisation for Grounds team; Adapt planting plan to incorporate the above actions
**Responsible partners:** Grounds team (with input from Biodiversity Champion and others)

**Target date:** September 2012

---

Green roofs

Recent new developments on campus have realised the potential of green roofs for providing a range of environmental benefits. In addition to their value for wildlife, they extend roof life, help to cool buildings in summer and keep them warm in winter and reduce water run-off. They also offer considerable visual appeal in a landscape dominated by dull grey buildings and rooftops. Green roofs can be designed to support a range of vegetation types, from substrate mosses and sedums, through to wildflowers and grasses and even shrubs and trees. Maximal biodiversity function will be achieved by ensuring that the roof has a low fertility substrate (such as crushed brick or stone) that will encourage their colonisation by less common plants and invertebrates that thrive in well-drained, warm and dry habitats.
Actions

1. Encourage the incorporation of green roofs into all new developments and where possible include a variety of vegetation types to include wildflower roofs

2. Where possible, consider retro-fitting existing flat or shallow-pitched roofs with vegetation

3. Prioritise the planting of native species and plants that provide pollen and nectar sources throughout the season

4. Incorporate a range of microhabitats on green roofs, including patches of bare sand or gravel, and stone and log piles on green roofs to offer nesting, shelter and hibernation sites for invertebrates

Strategy: Expanding the amount and composition of green roofs on campus is a longer term strategy. The strategy is therefore to investigate and evaluate the potential for both new and retro-fitting of green roofs on campus.

Responsible Partners: Estate Services

Target date: 2-3 years
 Benefitting from biodiversity

Managing biodiversity on campus will bring a wide range of benefits beyond those for wildlife *per se*. In addition to enhancing the diversity of habitats and species, an attractive natural environment can contribute to human physical and mental well-being. Engaging staff and students in biodiversity projects on campus can encourage a sense of ownership and belonging, and provide opportunities for partnerships with the local community. From a financial perspective, managing land for biodiversity rather than intensive horticulture can result in considerable cost savings.

*Health and well-being*

There is a wealth of scientific research that links the quality of the environment to human health and well-being (e.g. Tzoulas *et al.* 2007). Physically, human health can be improved by the presence of trees that provide urban ecosystem services such as a reduction in air pollution. Moreover, physical exercise can be encouraged through participation in practical conservation tasks such as tree planting. Mentally, exposure to natural environments can promote emotional well-being by reducing stress and increasing attention. Recent research in Sheffield has demonstrated the significance of biodiversity in this process; the psychological benefits of exposure to green space increased with greater biodiversity, as measured by species richness of plants, birds and butterflies (Fuller *et al.* 2007).

*Educational opportunities*

The BAP is an ideal opportunity for the campus to become both an interactive learning environment for students and a superb teaching resource. The need for continued ecological survey and monitoring of target species could be met by incorporating BAP objectives into the curriculum. Engaging students with the BAP process would help them develop fieldwork skills in surveying and assessment techniques, and also provide experience of nature conservation planning. Biodiversity initiatives can also play an important role in emphasising broader environmental and sustainability issues, and will enhance environmental awareness and personal responsibility amongst graduates. The BAP will also offer opportunities for informal learning for both staff and students via habitat interpretation panels and conspicuous features such as bird feeders.
Volunteering groups

There are a number of existing student groups on campus that would benefit from involvement in the BAP and also provide the necessary expertise to ensure its successful implementation. Conservation Volunteers aim to conserve the natural environment in and around Leeds by conducting conservation work alongside local initiatives. They are perfectly placed to assist with practical management work on campus and would benefit from an opportunity to promote their activities to a larger pool of potential volunteers. A further two groups, Green Action and the Sustainability Action Group, support environmental initiatives on campus and would be able to assist with promoting awareness of biodiversity and work alongside the University to achieve the BAP objectives.

The opportunities for voluntary work experience provided by student groups and societies can be invaluable and often contribute to securing paid employment following graduation. Biodiversity projects are an excellent way to get this experience because they offer an array of relevant skills including team work and co-operation, practical project work and administration.

Case Study: Edible Campus

There is a growing interest from students in edible plants and in growing their own food. This connects to a broader interest in environmental living among our students, who are increasingly challenging the university on these issues. For several years, for instance, some students have been gathering wild food from around campus, and others have established vegetable growing activities for themselves and to engage local school children. Given the university’s interests in education for sustainable development, this is something that the BAP should both encourage and facilitate.

Incorporating edible plants on campus would provide benefits to both people and biodiversity. This could include fruit trees, herb bushes, and small vegetable plots that are managed organically to minimise harm to wildlife. There are various existing organisations that could harness such student participation in the Edible Campus initiative (Green Action; Sustainability Action Group; Student allotments). Furthermore, students have expressed an interest in drawing an edible map of the campus and in being involved in the practical maintenance of plants and vegetable plots.
Bibliography


Mammal Society mammal fact sheets. Online at:
http://www.mammal.org.uk/index.php?option=com_content&view=article&id=211&Itemid=244
[Accessed December 2010].


University of Bradford (2009) *Greening the campus.*


http://www2.hull.ac.uk/Administration/environment/universityaction/hullcampusbiodiversity.aspx [Accessed August 2009].

University of Sheffield (2009) *University of Sheffield Environmental Policy 2009.*