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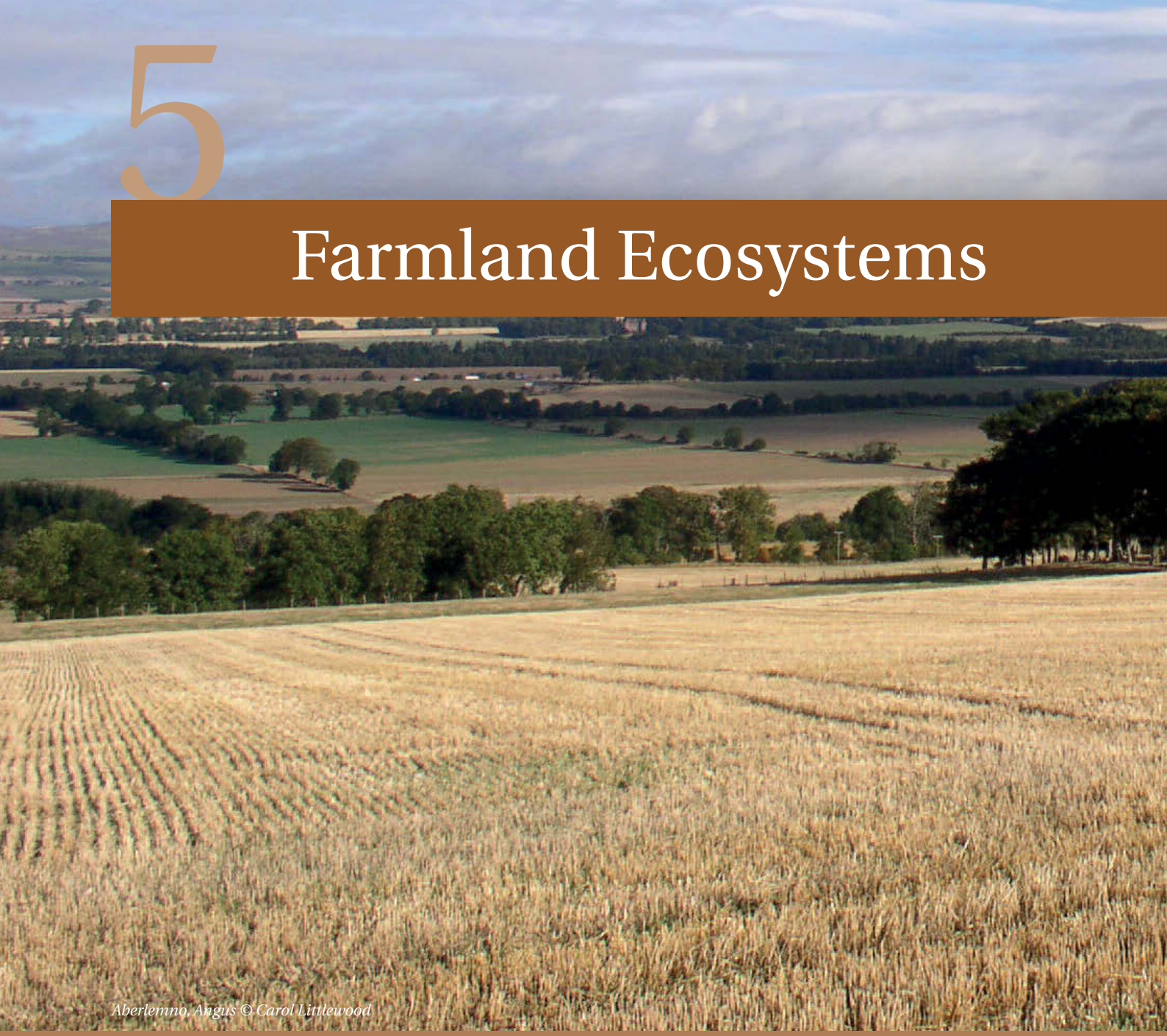
Farmland Ecosystems

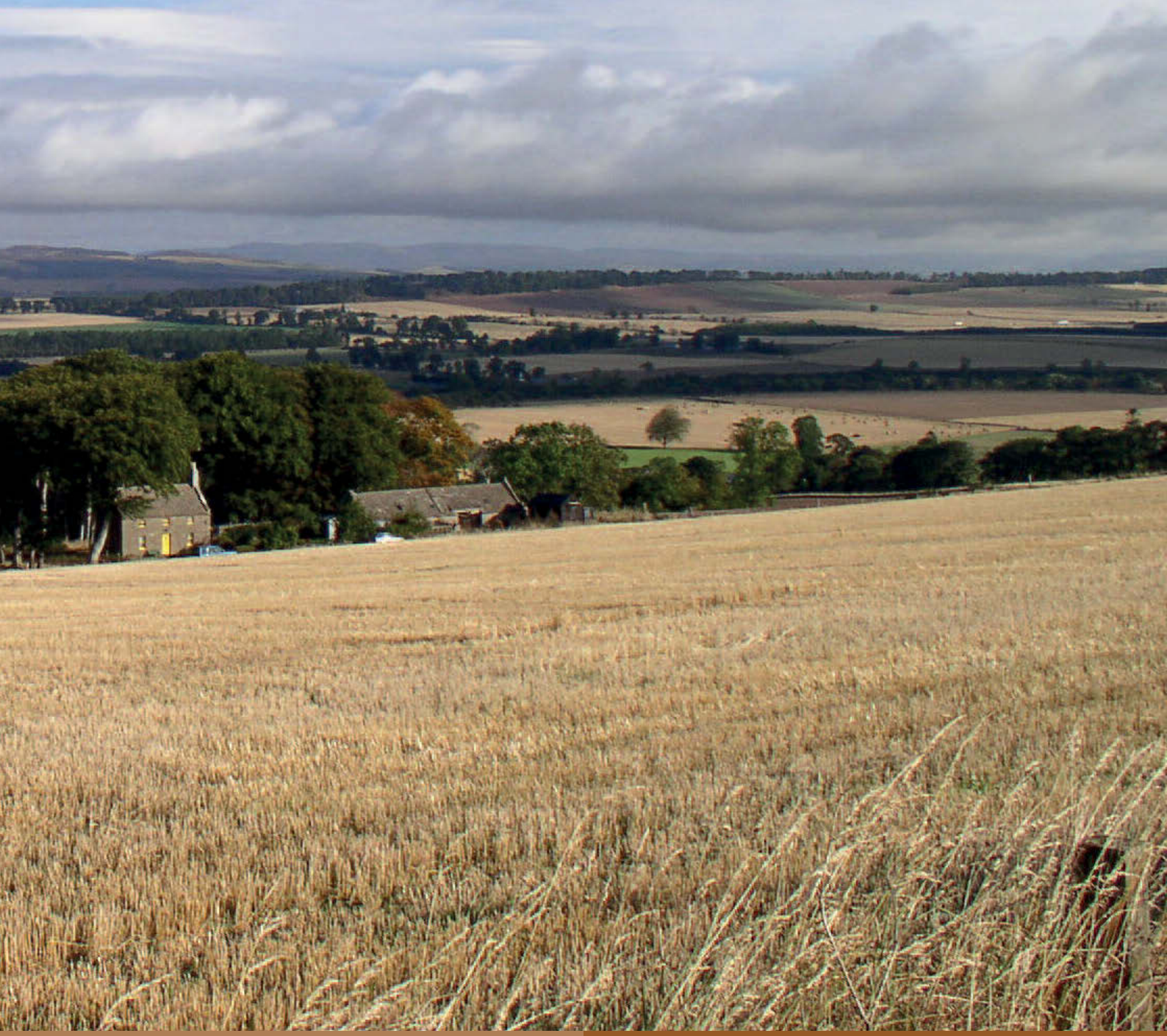


Aberlemno, Angus © Carol Littlewood

Background

The area covers probably the greatest variety of farm enterprises seen in Scotland: from extensive upland sheep grazing units on semi-natural grasslands, to highly intensive fruit, vegetable and crop growing on some of the best quality land in Scotland. Accounting for just over 200,000 hectares, Tayside's arable land provides the patchwork of fields, hedges, dykes, veteran trees and farm buildings generally associated with land under cultivation. Although malting barley, winter wheat, oats, potatoes and oilseed rape are the mainstay of the area's agriculture, many farms still have some land down to rotational grassland, used either for grazing sheep and cattle, or producing hay or silage for winter feeding. This rotational grassland covers 86,000 hectares of land; add to this 11,000 hectares of potatoes, 3,500 hectares of market-quality vegetables and over 1,500 ha of soft fruit (mainly raspberries and strawberries) and Tayside's land is certainly extensively farmed. There are also units producing herbs and a recently established tea plantation, as well as the associated commercial production of honey.

Although the traditional patchwork of different crop types still prevails, much more intensive management has seen a decline in many habitat types and species as farm and field sizes have increased with the greater mechanisation of farming systems. Managed and cultivated farmland in Tayside still acts as a vital haven for some of the UK's rarer species – Corn bunting, Brown hare, Skylark, Tree sparrow and Grey partridge, as well as locally important species such as Lapwing, Common frog and Barn owl. Changes from hay to silage as the main means of conserving grass, the liming and fertilising of "unimproved" grasslands and greater use of sprays and fertilisers on cropped land have all contributed to a reduced diversity of both plant and animal species over recent decades, particularly invertebrates.



Through cross-compliance and greening measures farmers maintain areas of habitat to benefit biodiversity and reduce pollution risk. This can be, for example, by maintaining buffer strips, leaving fields fallow or growing crops to benefit farmland birds. Via competitive schemes they can also apply to manage more complex habitats such as wetlands and species-rich grasslands, to exclude livestock from watercourses and manage hedgerows to name but a few of the options which can attract funding for creation and management. With an ecosystem approach now being mooted there are excellent opportunities arising for partnerships to consider larger-scale projects. Managing land for biodiversity at a catchment or green network scale - and for rare butterflies, farmland birds or wet grassland species at a smaller scale - can involve not just farmers and landowners (and the statutory bodies), but also local communities and non-governmental organisations.

Objectives

1 **Endeavour to reduce the direct pressures on farmland biodiversity by implementing projects to enhance ecosystem health.**

2 **Safeguard farmland ecosystems, species and genetic diversity by enhancing connectivity and where possible preventing its decline.**

3 **Encourage mainstream biodiversity conservation action by raising awareness and the enjoyment of farmland ecosystems by local communities.**

Priority Habitats

- Lowland Meadows
- Upland Hay Meadows
- Calcareous and Base-rich Grassland (including limestone pavement)
- Wet Grassland
- Farm Buildings
- Hedgerows and Treelines
- Stone Dykes

Hedgelaying training, Brechin, Angus © CAG Lloyd

Key Sites Designated

Calcareous & Base-Rich Grassland

Ben Lawers NNR

Beinn a'Ghlo SSSI

Ben Vrackie SSSI

Corrie Fee NNR (Glen Doll and Glen Fee)

Tulach Hill and Glenfender Meadow SSSIs

Tigh An Eilein, Glenshee

Forest Hill SSSI

Edintian Bog, Glen Fincastle

Loch Kinardochy & Tomphubil Limekiln, Tummel Bridge

Creag Mhor, Loch Tummel

Kiltyrie Meadows, Loch Tayside

Gleann Taitneach

Grandtully Meadow, Strathtay

Auchleeks

Gleann Beag, Glenshee

Upland Hay Meadows

Brerachan Meadow

Straloch

Keltneyburn SSSI

Weem Meadow SSSI

Limestone Pavement/Granular Limestone

Allean Forest Limestone, Loch Tummel

Meall Ban

Trinafour

Lassintulloch

Wet Grassland

Loch Freuchie Meadows (SSSI)

River Braan, by Amulree

Meikleour Area SSSI

Loch Tay Marshes SSSI

Tay and Isla Valley

Loch Leven meadows

Egno Moss

Strathallan

Strathmore

Glen Clova

Montrose Basin

Key Species

- Bat species
- Farmland birds, including Barn owl, Tree sparrow, Grey partridge, Linnet, Lapwing, Corn bunting and Skylark
- Reptiles, including Common lizard and Slow worm
- Hirundine species (Swallow, House martin, Sand martin) and Swifts
- Calcareous Grassland species, inc. *Osmia inermis* (Mason bee), Northern brown argus, Rock rose

Bat © SNH

Rock rose © Bryan Smith

Highland Perthshire Calcareous Grassland Project

This project, which ran until 2010, increased awareness of the conservation value of calcareous and other species-rich grasslands and encouraged their restoration and enhancement. Demonstration sites were established at Glenfincastle, Tomnaguie, Strathgarry and Chesthill. A Best Management Practice booklet was published in 2011 to show the lessons learnt from each site.

Sward enrichment was achieved at Glenfincastle by seeding into improved and semi-improved grassland via a turbo tiller which created bare patches of ground for seeding. Seeds laboriously collected on site were sown in the autumn by hand using a mix of wildflower seed and sand. Natural regeneration was also undertaken from existing seed sources at three sites: Strathgarry, Tomnaguie and Glenfincastle. Removing lime, inorganic fertiliser, pesticides and farmyard manure allowed improved or semi-improved grasslands to become more flower-rich. A section of calcareous grassland was fenced to allow targeted grazing. The quickest results for enrichment of the sward were seen at Foss Meadow where a combination of Yellow rattle and the introduction of cutting and baling at the end of the summer resulted in the rapid spread of wildflowers throughout the sward.

Ecosystem Services & Ecosystem Scale Projects

Ecosystem Services

- Pollination of crops by insects
- Food provision, biomass fuel and fibre (sheep's wool)
- Protection from floods
- Climate regulation
- Carbon storage
- Photosynthesis and oxygen production
- Water quality regulation
- Recreation and leisure
- Soil formation and conservation
- Health and wellbeing
- Tourism

Ecosystem Scale Projects

- Buildings and Biodiversity Project (Carse of Gowrie pilot)
- Wet Grassland Waders
- Farmland Bird Lifeline
- Wildlife corridor projects
- Sustainable grazing projects
- Controlling invasive species – Mink, INNS, etc
- Farmland butterfly projects
- Farmland Bird (inc. Barn Owl) Projects
- Grassland projects

Yellowhammer © Angus Council

Pressures

Agricultural Intensification

Fertiliser and herbicide applications, ploughing and re-seeding all destroy calcareous grasslands or wet grassland habitat. Supplementary feeding results in poaching and enrichment of grasslands, encouraging the growth of ruderals. Drainage of land affects flooding regimes, nutrient loading and lowering of water levels.

Major biodiversity loss can occur when sustainable farming practices are not followed, i.e. the loss of topsoil from harvested potato fields, lack of pollination opportunities for pollinator-dependent crops, and the lack of management of field corners and margins for biodiversity.

Overgrazing

Heavy grazing by sheep, cattle and horses adversely affect species-richness and structural diversity, with loss of tall herbs in particular. Deer and rabbits can be a problem in some areas.

Loss of Traditional Rural Buildings

Demolition or conversion to housing of old buildings invariably destroys bat roosting and bird nesting sites, or excludes them during restoration works. Timber treatments are also toxic to bats; some rodenticides used in and around farm buildings are detrimental to owls and other birds of prey, particularly Red kites.

Fragmentation of Habitat

Field enlargement results in the loss of boundary features, especially hedges, treelines and drystane dykes. Remaining hedges are often cut on an annual basis, resulting in the hedge's decline in quality and removing berries that could feed wild birds over winter. Spray drift and fertilisers in hedge bottoms can destroy bumblebee nests and encourage undesirable weed species. Ploughing too close to a hedge weakens the plants and hedgerow trees. Cost and time requirements means dyke restoration is no longer viable without grant aid.

Climate Change

Our weather patterns are changing. Long dry spells can no longer be relied upon to ripen crops or to make hay. Unseasonably low temperatures can create issues with our soft fruit farming or delay ploughing. A change in farmland ecosystems is inevitable: pressures on many of our species will increase and many will have nowhere else to go to.

Loss of Boundary Trees

There is a continuing loss of boundary trees to natural age, wind blow and disease. With little replacement being undertaken, biodiversity loss is exacerbated. Boundary trees (including road side trees and standard treelines in hedges) contribute to habitat connectivity.

Inappropriate Tree Planting

Open landscapes suitable for breeding waders can be damaged with tree planting, not just removing habitat, but also creating a 'predator shadow' where birds will not breed close to woodland owing to an actual or perceived threat of predation.

Barn Owls in Tayside

During 2004, SNH funding enabled the Scottish Agricultural College and Perthshire FWAG to raise awareness of Barn owls to farmers in the River Tay corridor. Additional funding from the SITA Tayside Biodiversity Action Fund and the Biodiversity Action Grant Scheme (BAGS) widened the project to include the River Isla corridor with farms surveyed and Barn owl habitat requirements discussed with farmers.

Tayside was also involved in the Barn Owls of Lowland Scotland Project (BOOLS) funded through BAGS. The Angus Barn Owl Project is still ongoing, having attracted funding from SNH, the Cairngorms Biodiversity Fund and Angus Environmental Trust - one particular nestbox in Angus has been highly successful, producing 14 chicks in 3 years.

Harsh winters have had a devastating effect on Barn owl numbers as snow cover hides small mammals and Barn owls can very quickly starve to death. The British Trust for Ornithology reported over 100 dead ringed Barn owls in the winter of 2010-2011, double the usual number for Britain.

Despite this there is optimism as birds are still present and breeding so milder winters should see numbers starting to bounce back.

Many Barn owls use old steadings for roosting and nesting, but there is an increasing pressure to convert these to housing or replace them with modern farm sheds. This is why nestbox provision is so important to helping maintain populations. The Partnership continues to collate Barn owl sightings for Tayside and maintains a distribution map to help advise planners where Barn owls are likely to be present. Please add your sightings via www.taysidebiodiversity.co.uk.

Barn owl © K Munday

Buildings & Biodiversity Project

Following an action featured in the 1st Edition Tayside Biodiversity Action Plan, fifty site management plans are being prepared throughout the Tay Landscape Partnership area to benefit Barn owls, bats, Tree sparrows, hirundines and Swifts. The project is also raising awareness of good practice where timber treatment and pesticides are concerned. Together with the Tay to Braes Project the overall aim is to improve connectivity between habitats to address fragmentation and permeability of the landscape to wildlife. Installation of nest boxes, hedge restoration and tree planting is all underway, as is grassland management to maximise biodiversity.

The Carse of Gowrie is laced with a network of pows (man-made drainage ditches, some dating back to the 18th century). These, plus grasslands and linear woodlands, provide vital habitat links between the Braes of the Carse and the River Tay, an area of large arable fields associated with mechanised farming. The mixed agriculture around the River Earn affords excellent habitat for Barn owls so rough grassland creation and installation of nestboxes is especially important here. Improvements to the area's habitats will benefit many species.

Farmland Ecosystems Actions Schedule

Key for timescale Short: 1-3 yrs **Medium**: 4-6 yrs **Long**: 7-10 yrs
Actions will be input into the UK Biodiversity Action System (UKBARS)where Lead Partners will be outlined

Maintaining & Improving Habitats

Action	Action breakdown	Who needs to take the action	Timescale
1 Restore species-rich grassland to improve and enhance invertebrate and bird populations.	Support improved management of existing sites through Agri-Environment Climate Scheme grant aid. Encourage the wide dissemination of Best Practice information for managing land for farmland birds and beneficial invertebrates. Encourage the use of agri-environment schemes to plant new hedges where appropriate. Encourage the use of agri-environment schemes to restore drystane dykes. Encourage flowering species by appropriate management of marginal land and rural road verges, together with the planting of nectar-loving annuals along field margins. Support actions within the Scottish Pollinator Strategy to protect pollinators and to safeguard the ecological services they provide, especially for food production and the health of Tayside's environment. Support Plantlife's Save our Magnificent Meadows project and its National Meadow Day celebrations. Encourage community participation, where appropriate, to increase knowledge and skills to reverse the ongoing losses of wildflower meadows and grasslands.	Cairngorms National Park Authority Scottish Natural Heritage Scotland's Rural College National Farmers Union Scotland Royal Society for the Protection of Birds Scottish Wildlife Trust National Trust for Scotland Plantlife Scotland Landowners and managers Angus Council Perth & Kinross Council Tayside Biodiversity Partnership Tay Landscape Partnership Scottish Association of Farm Conservation Advisers Communities	Long
2 Promote appropriate grazing regimes to safeguard calcareous base-rich grassland.	Raise awareness of the importance of this habitat to landowners and planners, especially within Forest and Woodland Plans, to encourage appropriate and proactive management. Promote Best Practice demonstration sites to raise awareness of positive management of this habitat, e.g. the Keltneyburn Special Area of Concern (SAC).	Forestry Commission Scotland Scottish Natural Heritage Scotland's Rural College Scottish Association of Independent Farm Conservation Advisors Scottish Wildlife Trust Landowners and managers Woodland owners and businesses Perth & Kinross Council Angus Council	Long
3 Ensure legal obligations regarding EU Protected and Scottish Biodiversity List Species are met.	Develop a series of seminars for planners, developers, landowners and agricultural businesses on the legal responsibilities regarding EU Protected Species and wildlife in general. Encourage wildlife-friendly features in the conversion of redundant farm buildings (including Barn Owl ledges, integral Swift and bat boxes).	Tayside Biodiversity Partnership Scottish Natural Heritage Angus Council Perth & Kinross Council Tay Landscape Partnership Royal Society for the Protection of Birds Scottish Badgers Bat Conservation Trust Scottish Association of Independent Farm Conservation Advisors	Medium

Maintaining & Improving Habitats

Action	Action breakdown	Who needs to take the action	Timescale
4 Showcase best practice land and farm building management techniques.	Encourage the retention or creation of foraging habitat close to farm buildings (rough grass, hedges, trees, ponds, puddles, etc) to assist bats, Barn owls and other birds. Encourage landowners to provide alternative roosting sites/nesting sites when building work is being undertaken. Work with farm construction companies (e.g. Knapp, Algo) to incorporate integral nest and roosting sites in new buildings (self-contained so as to comply with Farm Assurance Schemes). Increase farmers' awareness of threats posed to birds such as Barn owls by rodenticides in/around farm buildings. Work with landowners and timber treatment companies to raise awareness of targeted chemical usage in farm buildings to safeguard bats, birds and beneficial invertebrates. Encourage farmers to use waste grain/tailings to feed birds during the winter months. Encourage lower levels of sheep grazing where appropriate. Promote Wildlife Estates Scotland accreditation to demonstrate a high standard of excellence in land management that encourages biodiversity. Promote LEAF (Linking Environment & Farming) Open Days on local farms and visits to their demonstration farms. Encourage the development of a leaflet to promote high quality farm trails that demonstrate the inclusion of biodiversity management within farmland habitat (including the Loch Leven Heritage Trail, Scotland's Berry Trails).	Scottish Natural Heritage Scottish Government Rural Payments & Inspections Directorate Cairngorms National Park Authority North East Green Network Angus Council Perth & Kinross Council Royal Society for the Protection of Birds British Trust for Ornithology Bat Conservation Trust Scotland's Rural College Scottish Association of Independent Farm Conservation Advisors Deer Management Groups Linking Environment & Farming (LEAF) Tayside Biodiversity Partnership Tay Landscape Partnership Scottish Land & Estates National Farmers Union Scotland Wildlife Estates Scotland (inc. Atholl Estate and Stracathro Estate) VisitScotland Landowners and Land Managers	Long
5 Safeguard wet grassland habitat.	Maintain appropriate management and restoration of wet grassland habitat, especially through the agri-environment schemes. Identify farms where there is well-managed wet grassland habitat and conduct regular training days for farmers, advisers, etc. Ensure all planning documents within the region take account of wet grassland as a habitat of national and international importance. Support Wet Grassland for Waders projects across Tayside. Undertake Wetland Inventory of Tayside.	Angus Council Perth & Kinross Council Royal Society for the Protection of Birds Cairngorms National Park Authority Scottish Association of Independent Farm Conservation Advisors Scotland's Rural College Landowners and managers	

Maintaining & Improving Habitats

Action	Action breakdown	Who needs to take the action	Timescale
6 Reduce the direct pressures on farmland biodiversity by enhancing ecosystem health.	Tackle invasive non-native species at problem sites. Raise awareness of diffuse pollution and the damage caused to farmland species, by investigating the introduction of best practice demonstration projects. Encourage measures which reverse habitat fragmentation. Curb plastic litter from entering watercourses, especially silage bags and berry baskets by introducing a recycling scheme and raising awareness of the issue with landowners. Encourage Ecological Focus Areas (EFA) to manage fallow land for the benefit of pollinators and ground-nesting birds, and to protect water courses from spray drift and erosion. Support the inclusion of buffer strips, wild bird cover, beetle banks, and wildflower or in-field grassland strips.	Scotland's Rural College Cairngorms National Park Authority Scottish Association of Independent Farm Conservation Advisors Angus Council Perth & Kinross Council Scottish Natural Heritage Tayside Biodiversity Partnership River South Esk Catchment Partnership	Long
7 Promote restoration projects and species management programmes.	Work in partnership with different organisations to establish demonstration sites to illustrate best management practice for calcareous grassland. Remove invasive plants such as Japanese Knotweed, Himalayan Balsam and Giant Hogweed. Explore options for fencing to protect sensitive habitats from disturbance. Continue to run rural skills training days to encourage appropriate management of hedgerows (including hedge-laying), less frequent cutting, the retention of hedgerow trees and the restoration of gappy hedges. Encourage the development and setting up of a Tayside Farmland Butterfly Initiative to advise farmers and landowners on targeted management for farmland moths and butterflies.	Cairngorms National Park Authority Scotland's Rural College Scottish Association of Independent Farm Conservation Advisors Angus Council Perth & Kinross Council Scottish Natural Heritage Scottish Environment Protection Agency Tayside Biodiversity Partnership Butterfly Conservation (Scotland) River South Esk Catchment Partnership	Medium
8 Encourage collaborative regional working for green networks.	Identify and promote “cross-boundary” opportunities to safeguard degraded calcareous grasslands where they buffer or link small or discontinuous sites. Encourage or co-ordinate landscape-scale projects and surveys and advise on funding. Set up Green Habitat Network to create stepping stones for key species. Promote the expansion of Buglife’s B-Lines project to contribute towards insect pollination for lowland crops. Encourage the setting up of a Boundary Trees Project to champion natural green networks and their associated species (especially songbirds, bats and invertebrates).	North East Green Network Tayside Biodiversity Partnership Scottish Natural Heritage Angus Council Perth & Kinross Council Cairngorms National Park Authority Scottish Government Rural Payments & Inspections Directorate Landowners and land managers Buglife Scotland River South Esk Catchment Partnership	

Surveying & Monitoring

Action	Action breakdown	Who needs to take the action	Timescale
9 Investigate the effects of climate change on the movement of farmland species through regular surveying and monitoring.	Promote the CNPA as a key area for monitoring climate change impacts on farmland habitats and species. Raise awareness of farmland species and conservation amongst the wider community. Generate records of farmland wildlife by facilitating biological surveys at sites around Tayside. Expand the Green Shoots programme across Tayside. Promote the Partridge Count Scheme as part of Grey Partridge Conservation projects. Support the gathering of data to discover the scale and trend of loss of farmland species and habitats since the mid-1940s. Expand the Linnet Link Project across Tayside to enhance cycle tracks and public footpaths for wildlife (especially farmland birds such as Linnets, Yellowhammers and Barn owls) by promoting shrub planting and linked habitats along pathways. The habitat enhancement will improve the surroundings for those using the route.	British Association of Shooting & Conservation Scottish Natural Heritage Angus Council Perth & Kinross Council Scottish Wildlife Trust Butterfly Conservation Scotland North East Scotland Biological Records Centre Tayside Biodiversity Partnership Tayside Recorders' Forum Cairngorms National Park Authority Game & Wildlife Conservation Trust James Hutton Institute Scottish Association of Independent Farm Conservation Advisors Botanical Society of Britain and Ireland	Long
10 Investigate farmland bird spatial and temporal distribution patterns in Tayside.	Undertake farmland bird wader and Corn bunting-focussed surveys. Support and expand the Tayside Barn Owl Projects. Support and expand the Save Tayside's Tree Sparrows and Tree Sparrows on the Edge projects. Promote the Farmland Bird Lifeline (FBL) Angus Corn Bunting Recovery Project in growing wild bird seed mixtures for Corn buntings and other farm wildlife. Consider the potential for expanding the existing FBL Fife Biodiversity Areas for Buntings & Bees Project into Tayside to benefit both pollinators and farmland birds.	Royal Society for the Protection of Birds Scottish Natural Heritage Tayside Biodiversity Partnership British Trust for Ornithology Scottish Association of Independent Farm Conservation Advisors Local community Landowners and managers	
11 Survey and monitor threatened farmland butterfly and moth populations.	Support the setting up of a pilot project or case study in Tayside to collect annual survey data in specific farmland areas. Collect annual survey data in farmland areas. Analyse collected, verified data annually and develop adaptive management strategy to develop surveying and monitoring protocol. Investigate the connectivity of farmland butterfly and moth populations.	Butterfly Conservation Scotland Tayside Biodiversity Partnership Angus Council Landowners and land managers Local community	Long

Education & Awareness Raising

Action	Action breakdown	Who needs to take the action	Timescale
12 Increase awareness of farmland species in Tayside and facilitate community participation in data recording.	Determine current status and distribution, and monitor populations of Barn owl, Tree sparrow and other farmland birds in Tayside. Determine current status and distribution, and monitor populations of farmland birds. Determine current status and distribution, and monitor populations of farmland butterflies and moths. Promote Citizen Science websites where community sightings can be submitted to a central database. Focus on awareness-raising through local and national press, specialist publications and events. Develop web and social media presence focussing on media used by local communities and the farming community. Provide survey training for recorders. Produce and reprint postcards and posters to publicise ongoing projects. Expand the project to include the North East Biodiversity Partnership areas and the CNPA. Annually prepare and circulate updates on survey work, publicity and volunteers.	Cairngorms National Park Authority Scottish Association of Independent Farm Conservation Advisors Tayside Biodiversity Partnership Tayside Recorders' Forum Scottish Natural Heritage Scottish Association of Independent Farm Conservation Advisors Local community Butterfly Conservation (Scotland) British Trust for Ornithology Scottish Land & Estates National Farmers Union Scotland North East Biodiversity Partnership	Long
13 Encourage school age participation in projects relating to farmland issues.	Work with the Royal Highland Education Trust in Angus and Perthshire to promote farm visits that demonstrate good wildlife management. Promote the use of the Living Field Centre (James Hutton Institute, Invergowrie), including its many projects, online facilities and the Living Field CD.	Tayside Biodiversity Partnership RHET Perth & Kinross Countryside Initiative RHET Angus Countryside Initiative The James Hutton Institute	

Invasive Non-Native Species

Action	Action breakdown	Who needs to take the action	Timescale
14 Reduce the direct pressures on farmland biodiversity and ecosystem health from invasive non-native species.	Produce a map highlighting key areas threatened by invasive non-native species. Limit the spread of the invasive non-native species such as Himalayan balsam and Giant hogweed. Raise awareness of invasive non-native species and demonstrate the impact that can be achieved by labour-intensive control. Showcase good practice control effort.	Angus Council Perth & Kinross Council Scottish Wildlife Trust Tayside Biodiversity Partnership Scottish Natural Heritage River South Esk Catchment Partnership Scottish Mink Initiative Esk Rivers and Fisheries Trust Scottish Environment Protection Agency National Trust for Scotland	Long