

Report of the *Forth Naturalist and Historian* Man and the Landscape  
Conference Saturday November 16th 2013

### The Changing Biodiversity of Central Scotland

To celebrate The Year of Natural Scotland, as well as the United Nations' Decade of Biodiversity, The Society held a major meeting to review changes in biodiversity over the last 50 years or so. The conference also served to highlight the achievements of the Society in its successful *What's Changed? Project: Measuring Biodiversity Change in the Forth Valley through Citizen Science*. The conference attracted more than 150 people.

The meeting was opened by Stirling University's Deputy Principal, Prof **Steve Burt**, who spoke about the aspirations that the University has for its campus. Airthrey has been listed by Historic Scotland for its 18th century garden landscape. The diversity of habitats on campus is remarkable, and a local biodiversity plan is being formulated to enhance these. This is now aided by one of the FNH *What's Changed?* projects, when the Stirling University Nature Society conducted a 'bioblitz' of the campus in 2011 and 2012.

The Chair of the morning session was **Carol Evans** (Director for Scotland, Woodland Trust), who summarised the commitment of the Trust to protecting the ancient woodlands of the Forth region and fostering new native woodlands, with 90 sites covering some 9000 ha in Scotland. The Forth region is particularly well represented. Glen Finglas is by far the Trust's largest property at 5000 ha, an upland wood pasture managed for cattle and deer, and forming with the Forestry Commission property at Loch Katrine and the that at Inversnaid, held by the RSPB, an enormous area to develop landscape-scale policies. Glen Devon, at a little over 1,235 ha is the Trust's second largest property, acquired early in the 21st century with funding from the Scottish Forest Alliance, where the Trust has planted over 800 ha of native woodland. In a very different context, Livingston in West Lothian is an urban woodland project, tremendously important for urban wildlife and part of the habitat networks which are a fundamental aspect of the Central Scotland Green Network (CSGN).

Carol introduced **Ed Mackey** (Scottish Natural Heritage): who spoke about Central Scotland and its changing environment. He began with success stories, with the re-colonisation of otter to central Scotland and land management for the Great Crested Newt. Central Scotland is at the edge of the newt's range, and so under-represented from traditional surveys in the National Biological Network (NBN), but environmental DNA tracing (eDNA) has proved effective in establishing presence, and is faster, requires less skill and has a low error rate. Great Crested Newt has now been established as native much further north than the Forth. He reviewed the ambitions of the CSGN, connecting

spaces in towns and cities with the countryside and coast, with every settlement in central Scotland within good-quality landscape by 2050. He introduced the NBN Gateway (<https://data.nbn.org.uk>), the inter-active website for Scotland's biodiversity, and the Scotland's environment site: (<http://www.environment.scotland.gov.uk>), also fully inter-active and a great store of maps, tools and data.

**Peter Maitland** (Fish Conservation Centre: SavingFish@sky.com) considered the changing fish fauna of central Scotland. He took us back to the last Ice Age in Scotland, when there were no fish. They arrived 12,000 years ago. The Arctic Charr arrived then, the most northerly freshwater fish anywhere in the world. There are now three populations, one of which is in Loch Lubnaig. There are 42 freshwater species of fish, 40 in central Scotland, 26 native and 16 alien species. Perhaps most iconic is the Atlantic Salmon which, Maitland argued, has a stable population in the River Forth. The Brown Trout population is very robust but Sparling numbers are declining, though, from over-fishing. Eel populations have collapsed globally since the mid-1960s. While Vendace have become extinct, there is now a re-stocking programme in Loch Skeen, high in the Southern Uplands. The re-introduction of Powan into Loch Lomond was described by Peter in Volume 36 of the FNH Journal. It has been stocked in Loch Sloy and the Carron Reservoir. Loch Lomond and the Forth are homes to the only Scottish populations of freshwater feeding Lampreys.

Grayling, an alien species, is known as the 'queen of the river'. In the late 19th century it was found only in the Clyde, Tweed and Nith, but by 1970 it was common in all three, and in the Tay, and is now common throughout southern Scotland. The Ruffe is also alien. In Loch Lomond it is trapped and monitored at Ross Priory. There has been a huge and unwanted increase in the population since 1990. We need to stop new alien introductions, Maitland concluded, through improved legislation. Native species need protection, and management plans that are holistic in ambition.

Buglife contributed enormously to the success of the FNH *What's Changed?* Project. **Scott Shanks** discussed changes to central Scotland's butterflies, moths and other invertebrates. There are more than 40,000 species of invertebrates in the UK, 26,000 in Scotland. In fact, some 85 % of Scotland's biodiversity is invertebrate. Their activities include pollination, soil management, nutrient cycling, waste management, natural controls of pests, and providing food for us and other animals.

Invertebrate surveys can be problematic with 26,000 species, and few expert recorders. But butterfly and moth data are invaluable in monitoring changes in biodiversity. Butterflies, for instance, react rapidly to environmental changes and so are good indicators of habitat quality. They are also relatively straight forward to identify. Survey techniques have now been formalised, with timed counts and walked transects. The Butterfly Monitoring scheme, established in

1976, merged with the UK Butterfly Monitoring Scheme network in 2006, and now some 1076 sites are monitored, 55 in Scotland. Regular monitoring allows the identification of new arrivals, species decline and competition for resources. We can differentiate between 'generalist' and 'specialist' feeders. Since 1979, generalist feeders are increasing at the expense of specialists.

Habitat management is helping some species, such as the Pearl-bordered Fritillary. But habitat loss is important at a local scale, as Stirling University Nature Society demonstrated in the Forth region. Climate change is helping several species, as seen in increases in Red Admiral and Painted Lady while spring species flying earlier in the year. The population trend for 24 of the 33 species of butterfly is that 13 are increasing, six significantly, and 11 are decreasing, only one significantly so. Southern species are expanding their range northward since 1990. The Orange Tip was found in the Lothians and the Solway Firth in the 1970s, expanding from there by the 1980s, and to almost all 10 km squares of Scotland south of the Forth-Clyde line in the 1990s. The Comma, the subject of one of the FNH *What's Changed* projects, colonised a few squares south of the Forth-Clyde line in the 1990s, spreading up the east coast to Angus in the early 21st century and Perthshire by 2010. The abundance of moths has declined in southern Britain since 1965, but is holding steady in Scotland. Among the aquatic invertebrates, Dragonfly and damselfly populations are increasing. Six new species of hoverfly were recorded in a FNH-sponsored *What's Changed* survey of two 10 km squares. Aliens remain a problem. The New Zealand flatworm has spread from the Edinburgh Botanic Gardens from their accidental introduction in 1965. The New Zealand flatworm affects populations of moles because it eats worms.

**Jonny Hughes** (Director of Conservation, SWT) introduced the afternoon speakers, but asked the audience to focus on the restoration of biodiversity, through greater connectivity of habitats, to diversified land uses, and to urban environments that are pro-nature. **John Haddow** is a free-lance consultant (Auritus Wildlife Consultancy@ auritus@btinternet.com) and an expert on mammals in central Scotland. We have 36 mammals in Scotland. He focused on changing geographical patterns in two. The Water Vole (*Arvicola amphibius*) has been the subject of a major release programme in the last few years at the Forestry Commission Loch Ard Forest, which included the creation of new ponds and habitat restoration. Expansion of the population also required the systematic trapping of American Mink, another alien. The expansion of the range of Pine Marten (*Martes martes*) is even more successful. Confined to the central and north west Highlands until the 1990s, it has expanded to eastern and central Scotland, from environmental DNA markers and droppings (scats). There is even a local hotspot around the Airthrey Estate.

**Roy Sexton** (SWT and FNH) then evaluated changes in the floral biodiversity of central Scotland over the last c. 40 years. His baseline was a 1971 paper by John Proctor: *Vegetation and Flora of Central Scotland*, in Timms' edited volume on *The Stirling Region*. Central Scotland has a very rich flora of 1500

species of flowering plants. The arctic-alpine and montane flora of the NTS-owned estate on Ben Lawers is internationally important, with 16 Red Data Book species and 56 nationally scarce species. Threats to this flora are from sheep grazing: too little or too much, with the balance very delicate. Sheep and deer exclosures from 1987 have been a spectacular success here.

Climate change may be leading to the loss of snow-patch species. Closer to Stirling, Sticky catchfly is our most outstanding plant, with the biggest population in the UK on the cliffs and screes of the Ochils, the subject of one FNH-sponsored *What's Changed* re-survey in 2013.

The Forth valley raised mosses are a very special habitat and home to a number of Red Data Book species. Originally there were 95,000 hectares of raised bog in the UK of which only 6,000 hectares remain. In 1972 Flanders Moss was being drained for horticultural peat extraction and forestry. SWT purchased part of the site and stopped the development. Later SNH bought out the extraction rights for £1.3 m and it is now a National Nature Reserve. Wester Moss at Fallin has now become a Butterfly Conservation Nature Reserve while Shirgarton and Killorn Mosses have had birch woodlands removed by SNH to restore the habitat. The biodiversity of wetland habitats is high. Scottish Dock (*Rumex aquaticus*), for instance, has an almost circum-polar distribution but in the British Isles it is only found at Balmaha on Loch Lomond side and on the flood plain of the Endrick. Some woodland herbs like Bluebell and Wild Garlic have flourished. Threats to the woodland ground flora come from *Rhododendron ponticum*, Spanish Bluebell, deer and a lack of management. Some 70 % of central Scotland is cultivated or grazed grassland. Some arable weeds like Corn Marigold, Poppy, Scentless Mayweed, Hemp-nettle etc have long lived seed banks in the soil, and set-aside has given them the chance to germinate once more. Grassland 'improvement' has resulted in a massive loss of wild flower-rich grasslands through construction, overgrazing or abandonment, afforestation and leisure activities. Fortunately a few unimproved grasslands like Quoigs Meadow remain, many partially protected by designating them as SSSIs.

**Ben Darvill** (British Trust for Ornithology) evaluated data obtained from the publication of the *Bird Atlas 2007-11*. Our landscape and land uses are changing, in farming, forestry, energy generation, disturbance, recreation and muirburn frequency. Our climate is also changing. Bird atlases provide periodic insights into the status of all of bird species in an area. The first UK breeding bird atlas was for 1968-72. The 1988-91 *The Bird Atlas* allowed us to see changes in bird distributions for the first time. Declines in farmland birds became the focus of much research. The 2008-11 *The Bird Atlas* recorded populations in 2 km x 2 km squares, sampled twice in summer and twice in winter. It has over 16 million records of 520 species (and subspecies), with over 3,870 10 km squares surveyed, involving 40,000 observers.

Woodland, farmland, wetland and upland birds show positive change in our region while wading birds show negative change. Migrants are faring

badly south of the Anglo-Scots border but show positive trends in Scotland. Within species, Siskin is increasing as conifer plantations mature, Jays and Ravens also because fewer people are shooting them nowadays, and the Nuthatch is moving north through climate change, and Greylag Geese populations are soaring because their habitat was under-utilised. On the other hand, Corn Bunting abundance is falling, pinned to the east coast and the Uists. Causes of change are often complex and multiple. For instance, Willow Warblers are at the southern edge of their breeding range. They have lower survival rates and lower breeding success than in England, through climate and land use change. In Scotland, reductions in grazing pressures, especially from sheep (due to changes to agricultural subsidies under the CAP) but also from deer in some areas, and increases in scrub and young woodland due to enlightened management, help to maintain and expand bird populations. It was argued that we need to model predictions of how land use changes will effect Scottish birds but we have few sites where they are needed – in the uplands. We also need more recorders. The BTO web-site ([www.birdtrack.net](http://www.birdtrack.net)) encourages contributions, as does the Breeding Bird Survey. ([www.bto.org/volunteer-surveys/bbs](http://www.bto.org/volunteer-surveys/bbs))

**Duncan Orr Ewing** (RSPB) followed with an analysis of the changing fortunes of Central Scotland's raptors. He introduced the Central Scotland Raptor Study Group, which co-ordinates monitoring across the region and contributes to the Scottish Raptor Monitoring Scheme. Trends are shown in this table.

Species	No of breeding pairs	Trend
Golden eagles	10	Stable
Red Kite	27	Increasing slowly
Osprey	20	Increasing
Goshawk	3	Increasing slowly
Sparrowhawk	Not known	Not known
Buzzard	c200 pairs monitored	Stable
Kestrel	Not known	Declining fast
Peregrine	26 monitored (some sites not checked)	Declining slowly
Merlin	c10	Stable
Hen harrier	c5-10	Stable/declining
Short-eared owl	c5-10	Stable/declining
Long-eared owl	4	Unknown
Tawny owl	31 pairs monitored	Stable? Hard winter
Barn owl	32 pairs monitored	Stable? Hard winter
Raven	72 pairs monitored	Increasing

It was left to the Chair of FNH, **Michael Usher**, to summarise the day. There exist Biodiversity Action Plans at all spatial scales, from very local to global.

Scottish Natural Heritage has, for its part, defined its strategy for the conservation and enhancement of biodiversity to 2020. Action plans cost money, however, while public sector expenditure on biodiversity in the UK rose from c. £280 million in 2000-1 to peak at nearly £600 million in 2008-9, around 0.4 % of GDP. The 'crash' has forced a decline in spending from 2010-11. Is biodiversity now seen to be too expensive? Or can we afford not to protect and enhance it?

Richard Tipping