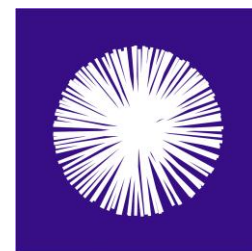


Response to a consultation on the Pollinator Strategy for Scotland

by the Wildlife Subgroup at Scottish Environment LINK.

Date: 14 March 2016



Scottish
Environment

LINK

Scottish Environment LINK is the forum for Scotland's voluntary environment organisations – over 35 member bodies representing a spectrum of environmental and associated cultural heritage interests with the common goal of contributing to a more environmentally sustainable society. LINK provides a forum and network for its members; and assists communication between members, government and civic society. Further information on LINK is available at www.scotlink.org

Members of LINK's Wildlife Subgroup are all engaged in the everyday work of conserving Scotland's biodiversity and its landscapes on the ground and through policy work. Since before the publication of the Scottish Biodiversity Strategy in 2004, members of the Wildlife Subgroup have contributed very significant time and resources to the Scottish biodiversity policy process, representing LINK on every relevant delivery group for that strategy since 2004. LINK is currently represented on the Scottish Biodiversity Committee.

Our response to the current consultation has been put together following detailed discussions of the review document. Our response outlines some general points on the review aims and some of the concepts included within it. We have then made more detailed comments on each of the chapters, making suggestions on the chapter outcome and the key steps needed to reach it, in response to the consultation questions. We trust these suggestions will be useful and we would welcome further dialogue with the Scottish Government on any points raised here.

Introduction

Scottish Environment LINK strongly supports the production of "A Pollinator Strategy for Scotland" and welcomes the opportunity to comment on the strategy at this stage. Scotland's pollinators face a diverse range of threats that will require a coordinated landscape scale strategy to address.

Are the aims and vision of the strategy appropriate?

The aim and the vision for the strategy are commendable, however the ambition in the vision is perhaps lacking. We would suggest that we should be '*restoring populations and habitats in areas where pollinators need greatest support...*' by 2020 rather than 2025. We welcome the ambition in the final point for a 'strong network of good quality pollinator habitat' however we think this sentiment could be strengthened further. The key actions required for pollinator habitats is to i) maintain the current diversity of habitats; ii) restore degraded habitats; and iii) extend pollinator habitats in to adjacent areas. This will result in bigger, better and more connected areas of pollinator habitat across Scotland. We would therefore suggest amending the vision to:

- By 2020 the value of our pollinators will be widely recognised and action to support them will be firmly embedded in policy and practices; we will be restoring populations and habitats in areas where pollinators need greatest support, ensuring a strong network of sites and enriching the environment to support improvements in ecosystem health and services.

- 2020 and beyond: areas of pollinator habitat will be bigger, better managed and more connected so that a strong network of good quality pollinator habitat will cover Scotland, supported by policies and legislation that will help to sustain them.

Have we identified the main areas of concern for pollinators in Scotland?

The strategy highlights the key areas of concern for pollinators in Scotland however the significance of these concerns has been underplayed in some cases. Generally the overview given is excellent and balanced yet there are areas where further information will strengthen the sections.

Evidence base

The use of plain English is essential and welcomed. We suggest the form of words must be always checked to ensure the language is supported by the available evidence. While this is a public-facing policy document, we feel it is important that sentences should be supported, here and there, with a numbered footnote pointing to the citation of key literature. This is important to demonstrate the traceable evidence, crucial for credibility.

There is a definite need to improve the evidence base to include the most recent knowledge (much of the cited literature is old, and this at least gives a poor impression). For example, there is a need to update the economic benefits of pollination. The market price of additional crop production stemming from animal pollination services to agriculture was most recently estimated to be US\$ 232-577 billion (US\$ 2015) (Lautenbach, S., Seppelt, R., Liebscher, J., and Dormann, C.F. (2012). Spatial and temporal trends of global pollination benefit. *PLoS ONE* 7, e35954-e35954.). Such figures of course go up and down depending on market fluctuations, production volumes and the method of calculation. Another scene setting point that could be made would be that global agriculture has become more pollinator-dependent over the last 50 years, with production of pollinator-dependent crops increased by >300% in absolute terms (Aizen, M.A., and Harder, L.D. (2009). The global stock of domesticated honey bees is growing slower than agricultural demand for pollination. *Current Biology* 19, 915-918. doi: 10.1016/j.cub.2009.03.071.). Although the majority of this increase has occurred in the global south, nonetheless we live a global market when it comes to food supply and security.

At first mention of animal-pollinated crops (in the global context) be clear to list them as: ‘many fruit, vegetable, nut and seed crops’. This will avoid any confusions with staples such as cereals that provide the calorific bulk.

Page 2 “The domesticated honey bee is believed to be responsible for most agricultural pollination worldwide”. This statement is too categorical and is not supported by the most recent evidence: Rader et al (2015). Non-bee insects are important contributors to global crop pollination. *PNAS*. doi: 10.1073/pnas.1517092112. AND (2013). Garibaldi et al (2013) Wild pollinators enhance fruit set of crops regardless of honey bee abundance. *Science* 339, 1608-1611. doi: 10.1126/science.1230200. Suggest rephrasing as they make a significant contribution. Also an important point would be that reliance on a single species for crop pollination represents a risk, which would be spread across multiple species by ensuring wild insect diversity and abundance is maintained/enhanced. The strategy should recognise that the suite of pollinator species offer complementarity and resilience to assure ecosystem service delivery.

Page 2 Currently structured around the managed honeybee mainly. Strongly recommend that this paragraph is restructured to reflect the contribution of wild bee species first, then managed species, which includes certain bumblebees and solitary bees. Perhaps avoid the use of ‘domesticated’ honeybee, as not strictly true, they are a managed, albeit sometimes selectively bred, wild species. The use of ‘managed’ instead will cover the different managed species used in UK/Scotland.

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Flies – on their importance as flower visitors including crops see Rader et al (2015). Non-bee insects are important contributors to global crop pollination. PNAS. doi:10.1073/pnas.1517092112 AND Orford, K.A., Vaughan, I.P., and Memmott, J. (2015). The forgotten flies: the importance of non-syrphid Diptera as pollinators.

Page 3 Threats to pollinators and pollination. On this point recommend as supporting literature Vanbergen, A.J., and the Insect Pollinators Initiative (2013). Threats to an ecosystem service: pressures on pollinators. *Frontiers in Ecology and the Environment* 11, 251-259. doi: doi:10.1890/120126. AND Vanbergen A.J., Heard, M.S., Breeze, T., Potts, S.G., and Hanley, N. (2014). "Status and value of pollinators and pollination services - A report for the Department for Environment, Food and Rural Affairs ". Defra Contract number: PH0514). The latter fed into the Defra NPS, but often took a UK wide perspective, especially on declines and drivers.

Page 3 "With the exception of a few individual species, we have very limited data on population trends for some of the UK's most important pollinators, e.g. bumble bees, solitary bees and hoverflies." See Vanbergen et al (2014). "Status and value of pollinators and pollination services - A report for Defra". There are only population trend data for butterflies and moths, whose importance as crop pollinators is low, there are no comparable data (hence the repeated calls for monitoring schemes) on population trends for bees or flies, which are much more important pollinators.

Other recent UK evidence for declines in species richness (inferred from biased species occurrence data) are: Carvalheiro, et al. (2013). Species richness declines and biotic homogenisation have slowed down for NW-European pollinators and plants. *Ecology Letters* 16, 870-878. doi: 10.1111/ele.12121. AND Ollerton et al (2014). Extinctions of aculeate pollinators in Britain and the role of large-scale agricultural changes. *Science* 346, 1360-1362. doi: 10.1126/science.1257259.

Page 3 "It is not clear whether these apparent changes in pollinator diversity are related to population sizes although there is evidence that species richness of bees and hoverflies is also in decline." The sense of this reads a little strangely and may confuse? The evidence is i) there are reported declines in many butterflies and moth population sizes, ii) there are documented contractions in the geographic occurrence (ranges) of several bumble bee species (which you describe), and iii) from such occurrence data we have been able to detect changes in species richness of different pollinator taxa. The direction, degree and scale of these changes in species richness varies with taxon and time period. Finally, there has been a general homogenisation of pollinator communities, the same species everywhere. This in essence is the evidence for pollinator decline and is all captured in the Defra report cited above and the Carvalheiro paper.

Suggested minor rephrase: After "observed changes" insert 'abundance (for butterflies and moths only), ranges or diversity'. And change to: no single factor seems to be responsible for all the changes, but many factors may have combined to create a greater overall impact. This can be backed by the citation of Vanbergen, A.J., and the Insect Pollinators Initiative *Frontiers in Ecology and the Environment* 11, 251-259.

Note the citation of urban expansion as a driver (and also on P8 reference to brownfield sites). This is a complicated story, initial urbanisation might be damaging but it depends on what it replaces, and also the quality of the resulting urban habitat (which can vary greatly as cities are heterogeneous places). See IPI Urban project for a way in to the knowledge.

<http://www.bristol.ac.uk/biology/research/ecological/community/pollinators/>

Climate change section. It will always be hard to attribute climate effects at a national or regional level due to data limitations. However at larger scales these effects have been demonstrated, for example the recent paper in *Science* which integrated data across the northern hemisphere showed a contraction in ranges of bumblebee species (Kerr et al 2015 Climate change impacts on bumblebees converge across continents. *Science* 349, 177-180. doi: 10.1126/science.aaa7031.)

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Pesticides: “The majority of pesticide used in Scotland comprises herbicides and fungicides because our cooler climate generally leads to reduced insect pressure. Insecticides account for around 2.5% of total pesticide use by weight in Scotland.” This statement may be regarded as implying there is no problem with pesticide use because herbicides dominate. However, it is arguable that herbicides are often overlooked, they of course erode the nutritional basis of pollinator health and populations by reducing wildflower populations.

The paragraph on neonicotinoids is generally balanced, but needs to be updated to include the findings of Rundlof et al (2015). Seed coating with a neonicotinoid insecticide negatively affects wild bees. *Nature*. doi: 10.1038/nature14420, which showed at actual field exposure negative effects on wild bee density and production of bumble bee reproductives. No effect on honeybee colony strength (a single parameter) was found by Rundlof et al. This study was a true field experiment, the best designed to date. There have been other field experiments on honeybees alone which found little /no effect of neonicotinoids (e.g. Pilling et al (2013). *Plos ONE* 8. doi: 10.1371/journal.pone.0077193.g001). For a most recent summary of available semi-field (where the insect is lab dosed then released) or true field studies, see Godfray et al (2015). A restatement of recent advances in the natural science evidence base concerning neonicotinoid insecticides and insect pollinators. *Proceedings of the Royal Society of London B: Biological Sciences* 282. doi: 10.1098/rspb.2015.1821.

Page 4 “Whilst there is some evidence that these diseases may already be present in our wild pollinator populations, there are currently no statistics from Scotland clarifying the level of pathogen spill-over from these commercial colonies or the routes of transmission”. This statement needs to be updated to include the recent UK-wide work, which does show an association and hence at least potential for pollinator community epidemiology (Furst et al (2014). Disease associations between honeybees and bumblebees as a threat to wild pollinators. *Nature* 506, 364-366. doi: 10.1038/nature12977; AND McMahon et al (2015). A sting in the spit: widespread cross-infection of multiple RNA viruses across wild and managed bees. *Journal of Animal Ecology*, doi: 10.1111/1365-2656.12345.)

There is a need to add details where certain issues appear underplayed (eg risk from disease/climate change on page 8). For example, the issues around trade in pollinators and their products and the links between that and bee husbandry and bee diseases are not adequately discussed in this draft. The importation of pollinators from outside Scotland because of the risk of importing novel pathogens and pests, either exotic ones or different genotypes with enhanced virulence, represents a risk of spill over into Scotland's own conspecifics and potentially into many other pollinator species.

Page 5 Given Scottish Government, NERC, Wellcome Trust and Defra also contributed to the IPI perhaps a good idea to get the details correct.

The aim to achieve landscape-scale action on maintaining and restoring the pollinator habitats that provide floral and nest resources is necessary and welcome (e.g. see page 7). There is a real concern, however, that the mechanism by which this strategy document proposes to achieve this (ECAF under SRDP/CAP) will not be fit for purpose, because it focuses on priority species, only two of which are bees. There is a need to get management interventions that support pollinators and pollination supportive into Pillar 1 and find ways to incentivise farmers to take up the best options for pollinators and target them in the places where they will have greatest effect. One approach that needs consideration is bundling agri-environment options together (eg pest control, pollination, water run-off, soil fertility) to achieve multifunctional AES options. This might represent a more persuasive option.

Better knowledge transfer (eg via agronomists) and improved farmer training opportunities will help ensure targeting of interventions and assure they succeed in delivering their aim (eg providing floral resources).

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Page 7-8 theme 1& 2 Demonstration of impact of more nature-friendly farming on yield is crucial to persuade farmers of the benefits, while this evidence of links between management interventions to support ES-providing organisms and yields is at an early stage there is a recent paper (Pywell, et al. (2015). Wildlife-friendly farming increases crop yield: evidence for ecological intensification. Proc Biol Sci 282. doi: 10.1098/rspb.2015.1740.). Funding by Scottish Government for farmers and scientists to co-develop such evidence would be important in leveraging change in farmer behaviour.

Page 7-8 theme 1& 2 There is recent evidence from the IPI and published in Nature (Baude et al 2016. Historical nectar assessment reveals the fall and rise of floral resources in Britain. Nature 530, 85-88). This provides a wealth of information, for instance it identifies key floral (nectar) resources: Four species of plant (marsh thistle, white clover, bell heather and common ling) provide >50% of the UK nectar resource. The importance of these plants within the agricultural landscape mosaic should be made clear in the document. White clover (*Trifolium repens*) has great potential to provide nectar in improved grasslands if cutting regimes are modified to allow (longer) flowering, because of the amount of improved grassland such steps could make a massive difference to certain bees. This analysis also identifies linear features (hedges, watersides, roadsides) as being disproportionately important in providing nectar resources in many landscape types, trees such as willows can also be important parts of such features and provide pollen as well.

P7 “a substantial area of land under public sector management, including hospital and college grounds, NNRs and the National Forest Estate, which presents opportunities to increase habitat networks”. This is a real opportunity. There should be options to save money and benefit biodiversity including pollination through a relaxation of the intensity of land management in such public lands. What is not mentioned here is the possibility of using the rail corridors and under pylon areas to generate linear habitats enabling and increase in the area and connectivity of habitats supporting wildlife populations. This could have ramifications for Theme 4 Addressing Climate Change Impacts.

A suitable, standardised and systematic (unbiased) sampling scheme to monitor pollinator diversity and abundance would be essential to understand the effectiveness of the strategic aims of this strategy. It will be almost impossible to measure the response of pollinator biodiversity to policy interventions without one. Therefore, it is welcome that this strategy reflects this knowledge need in Theme 5, what would be more welcome would be for the Scottish Government to press for a UK or even EU scheme. Note the actual title of the DEFRA-led (but part funded by SG) project is National Pollinator and Pollination Monitoring Framework (NPPMF).

Policy Framework

Section 5 of the Strategy provides details of the policy framework in which the Pollinator Strategy sits. It is however incomplete and does not recognise the conflicts that exist between the Pollinator strategy and other policies.

It is unusual that this strategy makes no reference to ‘A strategy for invertebrate conservation in Scotland’. This document was published in 2009 and drew support from Scottish Government, SNH, SEPA and NGOs alike. The Pollinator Strategy is an important implementation step for the invertebrate strategy.

The inclusion of the National Planning Framework 3 priority for greening vacant and derelict land (ie brownfields) is misleading as this greening often results in tidying up and creating an amenity use for the land, or planting woodland on the site. Brownfield sites are incredibly important for pollinators in urban areas and they require management to ensure that their benefit for pollinators and other biodiversity is maximised. The priorities identified in the NPF3 may be detrimental to pollinators.

Brownfields of high environmental value should be identified in development plans and managed appropriately. Brownfields typically have an optimal value to biodiversity for around 15 years. It is important that ‘stepping stone’ sites are identified to provide a refuge for brownfield species in times of economic growth. Spatial planning should take in to

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account these sites and schedule development to ensure an adequate supply of brownfield land for pollinators. Losses of pollinator foraging and nesting habitat should be adequately compensated for to ensure there is no loss to the functional network of pollinator resources in the area. Green roofs and other green infrastructure has an important role in maintaining this network.

Considering that the key to implementation of this strategy will be through local delivery it is surprising that there is no mention of the importance of Local Biodiversity Action Plans and their role in actions for pollinators. Similarly, we would have expected the Biodiversity Duty on public bodies to be reiterated in this strategy to emphasise the role that public bodies have in helping pollinators.

The strategy should recognise SSSI targets as they make important contributions to pollinator conservation, but designations should be revised to include pollinator populations. Only 10% of SSSIs mention invertebrates as being features deserving consideration in management of the SSSI. Therefore key sites should be afforded appropriate protection through SSSI notification, with no prejudice between greenfield and brownfield sites.

Other notable omissions are the Climate Change Adaptation Framework, the National Peatland Plan, the GB Invasive Non-Native Species Strategy and elements of the Water Framework Directive which aim to protect and improve riparian habitats.

Accountability

It is vital to the success of this strategy that clear objectives and targets are identified as well as the organisations and individuals that are accountable for their success. The emboldened text at the end of each paragraph in Section 4 seems to imply a signal of intent to act, yet there is little to back this up later in the document? This contributes to a sense that the document is an awareness raising tool, but not a strategy with specific targets or actions.

It is therefore not without some concern that LINK notes the absence of an implementation plan within the strategy and the delay in publishing this plan till August 2017. Scottish Environment LINK sees the implementation plan as an integral part of the strategy as a whole and without its inclusion the strategy currently lacks direction and accountability. At the moment the implication seems to be that everyone will contribute - in time, money and expertise. A bit like Defra's NPS it is relying on the goodwill of everyone with an interest. It would be good for the Scottish Government to be clear how they will support the Strategy - both administratively and financially, and how they will support others to achieve funding if they can't provide funding directly. A clearer specific set of objectives for each of the five themes with steps as to how these will be achieved would be important because at the moment it seems a bit vague as to how the five themes will be achieved.

Scottish Environment LINK urges the Scottish Government to bring forward the publication of the implementation plan in line with the publication of the Scottish Pollinator Strategy as a combined document.

LINK recognises that many of the identified "achievements" in Annex 2 of the strategy will make up the actions of the implementation plan and would support this initiative. However, LINK would stress that when creating the targets identified within the implementation plan Scottish Government employ SMART targeting with clear objectives, timelines and accountability. For example LINK would encourage Scottish Government to set a habitat objective within the Pollinator Strategy of a 25% increase in wildflower habitats over the lifetime of the strategy. This could be completed through Local Pollinator Plans (see below) and a change in management of public land such as road verges, parklands etc. Scottish Government has already committed to woodland restoration targets of 25% by 2050ⁱ, and LINK would recognise the same approach for wildflower restoration as a major step towards pollinator resilience and recovery.

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It is also important that the efficacy of this strategy is monitored/assessed and the outcomes reviewed on a regular basis. The strategy should give details of the monitoring and review process (for example the timetable for review and whether it would be done internally or in partnership with other organisations).

Local pollinator plans

To achieve the level of landscape scale work required to address the declines in Scotland's pollinators Scottish Environment LINK would encourage the formation of Local Pollinator Plans as an objective for this strategy.

These Local Pollinator Plans would be developed at a local council level and work towards delivering the SMART targets identified in the future implementation plan.

At a local council level achievements have already been made in the creation of wildflower habitats with sympathetic management of road verges, and wildflower meadow creation occurring in many areas. LINK members such as Buglife have also made great strides in working alongside local councils to benefit pollinators in the form of the "B-lines" and "Fife's Buzzing" projectsⁱⁱ. These projects should be seen as examples of best practice.

The Strategy should also highlight that there may be real opportunities to save money if management adaptations to help pollinators (and other biodiversity) were adopted. Aside from potential benefits to farmers growing high value insect-pollinated crops like soft fruits/OSR/beans, changes to the management of public lands (parks, transport infrastructure, national grid, school and edges of playing fields) to reduce intensive grass management (e.g. cutting frequency) and encourage plant biodiversity would benefit pollinators and improve the wellbeing people derive from contact with nature.

Pollination and the importance of a landscape scale approach

Despite the protection of highly valued nature sites under EU and UK law biodiversity is still decreasing in Britain at an alarming rate. This is highlighted in the 'State of Nature Report' with 60% of species studied having declined over recent decades and one in ten species a risk of extinction.

One of the reasons that the network of designated sites has failed to halt the decline in biodiversity is that the protected sites are scattered and disconnected with large areas of land in between that are in most cases not managed with wildlife interest in mind. Conservation work and environmental management must begin to think on a 'landscape scale' if many environmental challenges are to be met with long term sustainable solutions. Many highly productive areas are farmed intensely, with very little regard for wildlife, which has resulted in some regions being depauperate of native plants. As a consequence - there is a poor source of nectar diversity, a reduction in pollinators, and the essential 'ecosystem resource' of pollination is severely diminished.

If farming can be managed to be more inclusive of environment issues such as biodiversity then solutions can be formulated to address the loss that intensive farming has incurred in the natural process of pollination. The main way to address that issue is through the CAP so that subsidy payments are based on the provision of pollination as an ecosystem resource source within the farming landscape. As a member state it is strongly suggested that the Government puts the case forward for better integration of farming and environmental management through the CAP scheme and a review of Pillar 1 payments.

A massive landscape change has occurred with the need to maintain fallow land diminished or become obsolete. This has seen the loss of areas of land that would have been sown with clover, for example, that is an obvious attractive pollination source. Whilst this change in land management practice has allowed for increased production, there has been little political thought put into the planning process to replace the lack of nectar source in the environment. Hence

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we are seeing the loss of pollinators in Britain and a potential threat in the long run to agricultural production that has been experienced in places such as California. A 'Sticking plaster' approach, through agri-environment schemes, may help in some cases, but this is not sufficient to address a landscape scale National issue. It is only by combining farming productivity with environmental resource management, that the issue of pollination as a natural capital resource will be fully addressed and a long term sustainable solution is secured.

The role of agri-environment schemes

“Agri-environment schemes are a good vehicle for encouraging landscape-scale management and the Environmental Audit Committee recommended that pollinator protection must become a CAP priority. The Scottish Rural Development Programme provides such a vehicle in Scotland and we will continue to design and set in place appropriate options to support management that favours pollinators. This will include ECAF incentives to encourage ‘green’ management across individual landholdings. Grassland comprises around 30% of Scotland’s land area and efforts directed at these habitats are particularly important.”

We agree that the SRDP is potentially the best vehicle for delivering action for wild plants and pollinators at a large enough scale to make a positive impact. Currently it is unable to do this, but a national strategy may look to influence how the next Programme in 2021 could deliver in a strategic way.

The current SRDP has options for land managers to choose that would help pollinators, but these will be part of a larger application submitted by individual landholdings, some of which will be successful. This will benefit pollinators in and around those landholdings that implement the measures, but will not tackle the larger issue identified in the theme of fragmentation.

ECAF is a measure that may help with collaborative action over a number of land holdings. It is not certain if it actually will do as collaborative projects are dependent on the aims of the individual land managers and again are not likely to address the fragmentation issue identified above, except in a few scattered cases. In addition there is the limited amount of funding available in the ECAF pot that will be depleted quickly on whichever projects come forward, not necessarily for wild plants and pollinators.

Looking at habitat loss and fragmentation strategically, there would be huge advantages if measures to address pollinator habitat issues were incorporated into Pillar 1 measures of greening, rather than the more ad hoc take-up of Pillar 2 AECS options.

Activities that could reduce pollinator habitat loss and increase connectivity that were delivered through Basic Payments and Standards of Good Agricultural and Environmental Condition (GAEC) would have a much wider impact on a landscape scale than individual actions through agri-environment schemes.

This will necessarily take a number of years to develop through discussions with the range of interests involved, so starting soon should give enough time to develop the ideas and prescriptions before the next SRDP commences in 2021. These may involve hedgerow and field edge management. Ecological Focus Areas may be considered as a targeting mechanism for strategic delivery.

Additionally, having some measure of wild plants and their pollinators as a National Priority in AECS scoring criteria would help land managers gain points and deliver more widely through Pillar 2 options.

Functional seed mixes

There are also issues regarding wildflower seed mixes, where existing natural seed bed assemblages, if any are still existing in the soil, are best adapted to local environmental conditions.

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We advocate a sequential approach to establishing wildflowers for pollinators: Habitat management of existing vegetation initially- maintain existing pockets of wild flowers, using them as ‘hubs’; restore surrounding areas using local seed sources; link flower-rich habitats so that plants and pollinators can spread by natural colonisation, assisted by movement of livestock, wildlife and other natural processes. When natural regeneration or colonisation is unlikely then use seed mixes of native plant species as local as possible, but certainly not of origin outwith the UK.

The species mix will be important, as many native wild plant species are not adapted to the conditions found in most agricultural fields. “If a field has lost much of its species diversity, the soil flora will have been altered such that fewer microrhizal (*sic*) fungi are present and more bacteria are present in their place. Most plants (apart from weedy species) cannot establish and survive without forming a relationship with a microrhizal fungus. There may also be significant changes in the soil nematode communities which can influence which plant species can establish.” (North Pennines AONB, 2010. A step-by-step guide to upland hay meadow restoration in the North Pennines.)

A functional seed mix therefore needs to be used, not necessarily a ‘traditional’ hay meadow mix. Certain species can tolerate the impoverished soil conditions and encourage the build-up of mycorrhizal fungus. These species, such as yellow rattle and red clover, also provide nectar for pollinators.

Pesticides and Integrated Pest Management

The section of the draft strategy on pesticides section starts with premise that pesticides are essential and also considers only about one class of pesticides (neonicotinoids). There is no reference to the cocktail of chemicals that pollinators are now exposed to in the agricultural landscape and or the risks posed from this exposure.

The Code of Practice for using Plant Protection Products in Scotland is now inadequate and does not reflect the EU Directive on the sustainable use of pesticides. For instance there are almost no details on how to identify, then monitor key pests, how to decide on action thresholds, how to reduce pesticides using other IPM tools or what the alternatives in the IPM toolbox could be.

Implementing pollinator focused initiatives could achieve real change for pollinators, with clear and coordinated action, and better developed Integrated Pest Management (IPM). Reducing pesticide use, IPM should be a key aim of the strategy. Currently there is great disparity in the interpretation of IPM amongst stakeholders, as well as their understanding of its capacity to deliver reductions in pesticide use and wider benefits through habitat creation to encourage natural pest control and to benefit pollinator populations. The Pollinator Strategy gives the Government another opportunity to step up efforts on widespread implementation of IPM in Scotland. We recommend that a clear definition of IPM is developed that builds on the principles set out in the Sustainable Use Directive. We urge the Government to end commission-based selling of pesticides in Scotland as this is a counter-productive practice which undermines any efforts to reduce pesticide use. Furthermore, crop and sector-specific IPM protocols should be developed and extension and outreach services provided to assist farmers in implementing IPM. Mandatory training in IPM for all sectors should be incorporated into existing assurance schemes.

Imported bumblebees

Over 40,000 bumblebee colonies are imported into the UK each year to assist with the pollination of crops such as tomatoes and soft fruit. There is growing evidence that imported bees can spread disease to indigenous bees, causing catastrophic crashes of their populations - this has already happened to wild American bumblebees and several times in domesticated Honeybees. Commercial bumblebee importers claim that their stock is disease-free, but a recent published study by the University of Sussex has shown this to be incorrect. Increasing international trade in diseased bees is a disaster waiting to happen. The use of foreign bees is usually driven by commercial expediency and it would be a wise precaution to replace this importation trade with trade in home bred indigenous bees. At present we do not know how many of these imported bumblebee colonies are used in the Scottish countryside. We urge the Scottish

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Government to work with UK counterparts to identify final destination in addition to point of origin when colonies are imported to the UK. We believe that the strategy should include a clear statement on favouring the use of naturally occurring pollinators, and a commitment to stop the importation of bumblebees and other pollinators for crop pollination.

Illustrative case studies

Case study 1: The benefits to pollinators of sympathetic road verge management

RSPB Scotland has a long history of providing sympathetic management for the rare, great yellow bumblebee (*Bombus distinguendus*). On Orkney activities have included species rich grassland creation and planting of specially created bird and bee crops. In 2007 an RSPB commissioned surveyⁱⁱⁱ was carried out across a suite of RSPB reserves throughout the Orkney archipelago with the aim of identifying good foraging areas for the great yellow bumblebee and measuring abundance across the reserve network.

One of the major findings of the survey was how reliant great yellow bumblebees (and other pollinators) were on roadside verges, particularly on mainland Orkney. In 2007 it was recorded that roadside verges were cut once, at the end of August providing an almost entire seasons worth of nectar plants.

Agricultural intensification has occurred on Orkney as it has across the UK with many species rich grasslands converted to high production silage fields which are unsuitable for pollinators. In this landscape of fragmented habitat bumblebees were seen to favour the abundant roadside verges that through their management contained a high abundance of pollinator friendly plants such as tufted vetch and common knapweed.

If this style of management could be employed across even a small proportion of Scotland's road network then major gains in habitat connectivity and nectar provision could be made. As an example; if 25% of Scotland's motorways and trunk road verges (which make up 6% of Scotland's entire road network^{iv}) were managed sympathetically for pollinators i.e. maintained as grasslands and cut once on an annual basis at the end of the summer, over 1000 miles of beneficial habitat could be created.

Case Study 2: The importance of brownfields and green infrastructure for pollinators

The importance of brownfield (or post-industrial/previously developed) sites for supporting pollinator populations should not be overlooked. If properly managed, brownfield sites with high value for biodiversity can not only deliver suitable habitat for many rare and endangered species, but can also transform themselves into wild city spaces full of wildflowers that will attract pollinators and other animals. Such sites are an important part of the habitat network, providing corridors "stepping stones" for species to disperse around and through urban areas. Wherever possible brownfield sites with the highest potential for biodiversity should be protected from redevelopment. Buglife has worked with Scottish Natural Heritage to identify brownfield sites in Scotland that are potentially of high environmental value. In addition, we have developed guidance for planners and other land managers on identifying these sites and ensuring that they are retained for their environmental value in development plans^v. Further information on the importance of brownfields is available on Buglife's Brownfield Hub (<https://www.buglife.org.uk/brownfield-hub>).

Green roofs should also be considered as potential pollinator habitat in urban areas. Even the simplest sedum based roof can provide a foraging area for a wide range of insect pollinators. More extensive green roofs can incorporate wildflower habitats and features to provide shelter and nesting areas for insects. Buglife has developed guidance on how to create green roofs for invertebrates^{vi} and is working with the Inner Forth Landscape Initiative to install green roofs on industrial and public sector buildings in Grangemouth – see <https://www.buglife.org.uk/campaigns-and-our-work/habitat-projects/glorious-green-roofs> for further details.

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Case Study 3: Managing urban greenspace for pollinators

The Edinburgh Living Landscape is a long-term vision to bring a transformational change to the city's environment. The project will reinforce and expand existing green networks and reconnect the people of Edinburgh to their natural environment. The Edinburgh Living Landscape will work to benefit local people and wildlife with an aim to make the city one of the most sustainable in Europe by 2050.

The ELL is partnership project between: The Scottish Wildlife Trust, City of Edinburgh Council, Edinburgh and Lothian Greenspace Trust, The Royal Botanic Gardens Edinburgh, GreenSurge and the University of Edinburgh.

The ELL has five strategic objectives:

- Ecosystem health of Edinburgh is improving year on year
- Improved ecosystem health in Edinburgh is having measurable socio-economic benefits for the city, particularly in areas of deprivation
- More people are engaged in caring for their local greenspaces
- More people are making use of Edinburgh's connected network of green and blue spaces to move around the city by walking and cycling
- New developments are planned and delivered in such a way as to create low carbon, walkable neighbourhoods, and workplaces containing high quality green infrastructure.

Projects which support the pollinator strategy include the following:

- Increase by c. 10 % area of wildflower meadows on council owned land
- Increase no. of urban trees and urban woodland; selecting trees appropriate for the location
- Increase the number of green exteriors of buildings (e.g. green roofs and walls)
- 15% of city parks naturalised
- At least 10,000 people signed up to wildlife gardening pledge
- Work with volume house builder to showcase exemplar high quality and wildlife rich landscapes in new development(s)
- Provide accessible, multifunctional, high quality greenspace for all

The programme of work so far by the Council has produced 64 floral sites and 80 relaxed grass cutting sites across Edinburgh.

Case Study 4: Pollinators and the planning system

The Cairngorms National Park is an area of exceptional biodiversity, supporting some 25% of the UK's threatened species. These include important pollinators that are known from very few locations within the Park. The future of some of these species is not being secured by the planning process or designations.

The Small Scabious Mining Bee (*Andrena marginata*) is a solitary bee that may play a particularly important role in the pollination of Devil's Bit Scabious (*Succisa pratensis*). This late flowering scabious is an important source of nectar and pollen for a variety of insects late in the season. It is the only bee on the short list of the Cairngorms Nature Action Plan.

Within the Cairngorms National Park the Small Scabious Mining Bee is only known from a few sites, almost all of which are threatened with development. At Granish (north of Aviemore), a general area long known as exceptionally valuable for invertebrates, this bee was recorded by local volunteers from the Badenoch and Strathspey Conservation Group (BSCG) within an application site for a caravan park. Despite being informed of the recent record of the Small Scabious Mining Bee on the site, the Cairngorms National Park Authority (CNPA) approved the application with no mitigation

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measures for the bee. While an invertebrate survey was undertaken in one season for the developer on this site, it failed to record the Small Scabious Mining Bee.

Permission for a Tesco supermarket on a brownfield site in Aviemore was granted by the CNPA without any terrestrial invertebrate survey being required. The Tormentil Mining Bee (*Andrena tarsata*) was subsequently recorded by volunteers on this site. Had planners recognised the value of such a brownfield site to pollinators, the applicant could have undertaken an invertebrate survey and appropriate mitigation measures incorporated in to the development.

Do you feel you can contribute to the success of the strategy and if so how?

Members of the Wildlife Subgroup of Scottish Environment LINK represent a broad spectrum of organisations and bring with them considerable knowledge and expertise. We believe that there are many ways that our members can contribute to the success of the strategy from practical conservation activities, to education, outreach and research.

We look forward to continuing to help shape the scope and content of the strategy and the implementation plan over the coming months.

Other comments

Given that Scotland is the last of the countries within the UK to create a Pollinator Strategy it would be good if they demonstrated some joined-up thinking with respect to the Wales, All-Ireland and England Strategies. They should also be mentioned, not so that the strategies can be compared as such, but so that anyone reading the Scottish Strategy is at least aware of the strategies in place elsewhere. On this note it would be good to see some mention of consulting with administrations further ahead with plans (e.g. Wales) and learn from their experiences. The different strategies should be supporting one another and finding a way to work together.

This response is supported by the following organisations:

Badenoch and Strathspey Conservation Group
British Ecological Society – Scottish Policy Group
Buglife – The Invertebrate Conservation Trust
Bumblebee Conservation Trust
Butterfly Conservation Scotland
Cairngorms Campaign

Froglife Trust Scotland
Plantlife Scotland
RSPB Scotland
Scottish Wildlife Trust

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i The Scottish Forest Strategy. (2006)

ii <https://www.buglife.org.uk/campaigns-and-our-work/habitat-projects/fifes-buzzing>

iii Bridge, D. (2007) Orkney Great Yellow Bumblebee Monitoring; Unpublished

iv <http://www.transport.gov.scot/road/maintenance/key-facts-about-trunk-road-network-scotland>

v <http://www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=2062>

vi https://www.buglife.org.uk/sites/default/files/Creating%20Green%20Roofs%20for%20Invertebrates_Best%20practice%20guidance.pdf

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