Pollinators Expert Advisory Group 4 July 2013
Summary of discussion and key actions

Attendees
External experts:
Charles Godfrey (chair)
Rosemary Hails
Simon Potts
Stephen Martin
Adam Vanbergen

Defra officials:
[redacted]

Purpose of the meeting
The main purpose of the meeting was to continue developing the design of the proposed landscape-scale trials on the effect of neonicotinoids on pollinators followed by a short discussion of the draft evidence assessment.

Trial design

EFSA guidance
[redacted] gave an overview of the approach required by EFSA. There are several tiers to the approach. Initially acute toxicity of candidate compounds, in laboratory studies, looks at contact and oral dosing of honey bee larvae and adults along with lab-based cumulative studies. Results of these are then input into a mechanistic risk assessment (RA) model. If the results indicate that a pre-set trigger point will be passed the compound may be restricted in use, e.g. not to be used during flowering or it may be assessed in a field trial. The field trial involves placing honey bee colonies around a treated field in order to calculate exposure to which 90% of colonies would be subjected. This 90th centile dose is then re-run through the RA model. If trigger points are again passed the option exists for full-scale field trials to determine actual effects. As well as measuring mortality secondary assessments would include other endpoints, e.g. behavioural parameters such as handling time on flowers and proportion of foragers returning to the hive.

Power analysis
This is essential for determining the overall scale and degree of replication needed in the proposed landscape-scale trial. RH presented an initial analysis based on multiple scenarios where parameters such as number of sites, the magnitude of the desired detectable effect and the number of years over which the trial is run were varied. Outputs suggested that continuing over more years would give greater benefits in terms of increased power than increasing replicates within years.

The inherent variability between colonies within an apiary and between apiaries (i.e. within- and between-group variability) will be further explored. As the EFSA guidelines require a pesticide not to exceed a 7% reduction in colony size, compared to controls, over a two-brood (roughly two week) cycle the innate variability over this time period is needed. RH and SP will continue to work on the

power analysis; RH, SP and SM will work on data sources; Defra will explore what data is held by Fera's bee unit and whether this includes repeated colony size assessments over a season.

Scale

The working hypothesis is that a six mile separation is necessary between treatments and controls to ensure cross-contamination is minimised. The foraging distance of bees may be reduced if the landscape is homogeneous in terms of plant species and flowering synchronicity, e.g. a managed landscape of predominantly oilseed rape.

There was discussion on the benefits of using "real world" regimes in the control group compared to a trial using controls with no insecticide at all and a neonicotinoids-only treatment group. The proposal is that paired sites are replaced by triplet sites: one site neonicotinoid treated, one treated with alternative pesticide regimes, and one with no pesticide input (including measures such as replacing old wax in hives that may harbour pesticide residues to minimise exposure). This would need considerable management of the farmer behaviour in each treatment group which could be managed through an extension service such as ADAS. This approach would remove the possibility to carry out "blind" trials.

Species

As well as honey bees and bumble bees, which can be assessed through hive weighing and trap-nesting, pan traps and transects would be used to assess abundance and diversity of hover flies and other Diptera, solitary bees and any other minor pollinators that might be trapped. Additionally the abundance of insecticide target species will be measured: aphids (and their associated plant viruses) and flea beetles.

The effect of pollinator services in each treatment will also be measured through crop yield, raceme bagging and, for wild plants, the use of phytometers.

Other parameters

The input and effects from drips, dust, guttation and drinking water should all be assessed throughout the experiments.

Costs

The group felt that even with the uncertainties around underlying variability, and hence the overall size of the experiments, a rough estimate of the trial would be **£1.0 million to £1.5 million per year** and that the experiment should run for **at least three years and ideally five years**. These costs would **not** include compensation to farmers through losses due to low or no insecticide inputs.

<u>Evidence assessment</u>

The group felt that this needed more work before they would be comfortable with it being published. Over the next three weeks the group will consider the document closely concentrating on: ensuring precise language (e.g. being specific about where evidence relates to bumble bees or honey bees rather than "bees"); re-checking some of the evidence (e.g. does % pollinated crops mean % species or % area); clarifying the difference between changes in abundance and changes in distribution; and whether cited evidence applies to UK or globally. Experts will comment sequentially with CG providing initial changes w/c 8 July and final version to be back with Charles by end 26 July for Ian Boyd's return.

Once the group have commented the statement will be sent in confidence to two academic reviewers as a final check before submission to Defra for publication.

It was agreed that only peer-reviewed evidence would be eligible for the statement.

CG also challenged the group to look again at the confidence ratings for the evidence to ensure they were not overstating the situation in any area.

Terms of reference for the group

The group agreed that they were happy for their names to be published on the Government websire along with the ToR for the group. Defra will circulate the ToR for sign off by the group by correspondence in the next week.

Summary of actions:

1. Refine the power analysis RH/SP
2. Gather data on underlying variability in bee colony size - RH/SP/SM
3. Explore data on colony size available from Fera/BeeBase – Defra
4. Comment on Evidence Assessment – all experts
5. Circulate ToR for sign off by group – Defra/all
6. Provide details for inclusion on website and to formalise membership of group – Defra to circulate requirements/all experts to provide

Pollinators Expert Advisory Group 5 August 2013
Summary of discussion and key actions

Attendees
External experts:
Charles Godfrey (chair)
Rosemary Hails
Simon Potts
Stephen Martin
Adam Vanbergen
Nick Hanley
Lin Field

Defra officials:
Ian Boyd
[redacted]

1. Terms of reference for the group
The group agreed the ToR (paper 1 with agenda) with a minor amendment to bullet-point three to replace "insecticides" with "pesticides" to reflect the proposal in the trial design to have a managed control that would necessarily involve herbicides, fungicides, etc., as well alternative insecticides to neonicotinoids.
Action: Defra to amend and circulate final version

2. Trial design
The group agreed that further progress of the trial as summarised in paper 3 (with agenda) beyond the remaining work on the power analysis was not practical without discussion with industry.

The Defra would draft a narrative summary of the main principles of the trial for submission to Ian Boyd. This would be in a format suitable for publication on the pollinators' area of the UK Gov website (https://www.gov.uk/government/publications/bees-and-other-pollinators-their-health-and-value).

RH and SM would determine what data are still needed to complete the power analysis and pass to [redacted] for Defra to put a formal request to Fera to extract the data from the National Bee Unit's database. By mid-September a finalised a summary of the power analysis would be available for inclusion in the note to Ian Boyd along with a more comprehensive appendix detailing the methodology, results and conclusions.

Actions: RH, SM to provide data request; GK to put formal request to Fera NBU; GK to draft note to IB (sign off by CG)

3. Evidence base
Rather than tackling the elements of the evidence requirements separately the group reviewed the whole approach to the evidence base and how the elements interrelate, i.e. the evidence assessment, the desk-study review and the workshop(s). CG rephrased the question to be answered

by the various evidence activities as "What is the evidence that needs to go into the Pollinator National Strategy?"

Key points from the resulting discussions:

Evidence reviews

Pollinator status

Data on pollinator populations and population trends are insufficient to make practical future projections beyond more than a few years.

The group accepted the schematic summary of pollinator groups, outcomes and drives, proposed in [redacted]'s paper tabled at the meeting (supplementary paper 1 attached), as a very useful summary of the scope to be addressed by the national pollinator strategy.

The group were clear, however, in stating that the hoped-for elucidation of the relationship between pollinator numbers and pollination service, as illustrated in [redacted]'s paper, could not be achieved from existing evidence.

Given the lack of data on pollinator abundance and relationship to pollination service the group agreed an alternative approach of using data on pollination deficiency as the key metric for the general status of pollinator abundance/diversity/health.

Data on pollination deficit would include crop yield, fruit set, crop quality and effects of reduced pollination on wild plant species, particularly those recognised being scarce under conservation schemes (e.g. Red Data List). Using this approach projection to 2025 *may* be possible at least for some groups of pollinator.

The economic value of pollination services would be explored in the desk study review led by AV with assistance from NH and researchers at Reading University. In particular Reading University would be tasked with providing a list of the crops of economic importance in England that are at least partly dependent on insect pollinators.

Where evidence of pollination efficiency does not exist in the literature the review would make clear statements on the absence of evidence.

Actions: [redacted] to re-draft specification for review. AV (with assistance from group members and Defra) to draft Evid2 research proposal form for submission to Defra

Evidence assessment

This will now be put on hold pending outputs from the review. Aim is to update and publish at same time as national pollinator strategy is put out for consultation.

Evidence restatement for neonicotinoids

CG reported that the Oxford Martin School were about to undertake a review of evidence on neonicotinoids following the approach taken for bovine TB (http://www.futureoffood.ox.ac.uk/news/bTBevidence). [redacted] and [redacted] asked if this would include data other than published peer-reviewed evidence. [redacted] thought it might be possible for the review to have access data on regulatory studies not normally in the public domain. It was agreed that this should be dealt with outside this expert group.

Action: CG to write to [redacted] detailing the proposed work with the aim of meeting to discuss further.

Workshops

Pollinator evidence and policy

The group was very strongly against holding two workshops – one for experts/academics and one for stakeholders. Preference was for a single workshop which would include all interested parties in defining what needed to be done to safeguard pollination services to crops and wild plants, whilst maintaining acceptable biodiversity and meeting aesthetic and cultural goals.

Action: [redacted] to take proposal for single workshop to other interested parties in Defra for sign off. All to assist with design of workshops as required

Monitoring

CG tabled a proposal to hold a workshop in the autumn involving Biological Records Centre, National Biodiversity Network and Natural History Museum to scope how pollinator populations might be better monitored in the future. The group were strongly in favour of this although timing might be an issue given other commitments through to November. If the proposal to move to a single workshop for evidence/policy is accepted by Defra it may be possible to hold a pollinator monitoring workshop in September if it doesn't require too much Defra resource, i.e. if BMNH could organise.

Action: CG to explore taking this forward with relevant staff in BMNH.

Date of next meeting: to be confirmed – late September to consider draft outputs from CEH-led evidence review.

Pollinators Expert Advisory Group 24 September 2013
Summary of discussion and key actions

Attendees
External experts:
Charles Godfrey (CG; chair)
Rosemary Hails (RH)
Stephen Martin (SM)
Adam Vanbergen (AV)
Tom Breeze (TB; deputising for Nick Hanley)

Defra officials:
Ian Boyd (IB)
[redacted]

1. CEH review of pollinator evidence

There was considerable critical discussion of the draft report. The suggested main points to be addressed in the final report were:
The overall tone of the report should reflect a neutral starting point, hence terms such as "declines in populations" should be replaced with "changes in populations" where appropriate.
The evidence sources should be assessed for weight, strength and rigour, i.e. is a particular piece of evidence based on just one study or are there many corroborating studies; is the evidence indicative of very clear effects, either positive or negative, or is there considerable uncertainty and/or variability that means the true effect could be positive, negative or neutral; were the cited studies sufficiently scientifically rigorous, e.g. sufficient replication, appropriate statistical tests applied, appropriate controls undertaken and were the studies correlative or manipulative.
The drivers for change in pollinator/pollination service status should be ranked by likely impact.
An assessment of existing Defra policies that might impact pollinators should be made, giving a view on whether, and how strongly, beneficial each might be for pollinators.
Indicators of pollination status should be refined to facilitate their use at the stakeholder workshop being held on 24 October.

Defra officials reiterated their thanks to Adam Vanbergen and his team for producing the report under such tight deadlines.

Actions:
All to provide any further written comments no later than 26/09.
[redacted] to collate written comments from Defra and forward to AV by CoP 26/09
[redacted] to discuss format of outputs with AV to ensure compatibility with workshop exercises
SM to provide data on ranked drivers for honey bees to AV by 26/09
[redacted] to provide list of pollinator-relevant policies

AV/TB to address comments and provide updated report by 01/10

2. Update on neonicotinoids

Defra had provided a written update on discussions with industry regarding their response to the upcoming restrictions on neonicotinoids and possibilities for collaborative work.

RH provided an update on work on the power analysis for the landscape-trial design. GK had provided RH with a draft summary of the trial design (based on the Expert Group's previous discussions) to be combined with the power analysis and submitted to IB.

It was agreed that the note on the trial should emphasise that the scale of the trial meant that industry, Government and other funding bodies, such as research councils, needed to work together to mutual benefit.

Actions:

RH/CG to consider/revise the summary note and power analysis before circulating to the rest of the expert group with a view to providing a finalised note to IB by mid-October.

[redacted]

4 October 2013

First joint meeting of Pollinators Strategic Evidence Group and Pollinators Expert Advisory Group

13 November 2013, 15:00 – 16:30 London Nobel House Room 104

Actions from joint PSEG/PEAG meeting held 13/11/13

Action	Owner	Status
Incorporate group comments into NPS	[redacted]	Complete
Combine identification of metrics for monitoring into single spec with field testing and ensure citizen science is incorporated	[redacted]	Complete
Add proposal on basic biology of pollinators to evidence programme	[redacted]	Complete

Sixth meeting of the Pollinators Expert Advisory Group
18 February 2014 at 11:00 – 12:30 in room 107 London Nobel House

Present:
PEAG - Charles Godfray (chair), Rosie Hails, Stephen Martin, Lin Field, Simon Potts, Adam Vanbergen
Defra - [redacted]

Apologies: Nick Hanley (PEAG), [redacted]

Actions/decisions

1. Natural England project on "Call to Action" under National Pollinator Strategy (NPS)
    a. **Decision:** PEAG members agreed to provide peer review of methodology and draft outputs

2. NPS consultation
    a. **Decision:** PEAG will provide expert insight into responses from consultation as needed. Additionally, at least one member of PEAG will try to attend each of the planned consultation workshops, although it was recognised that this may not be possible as dates cannot currently be finalised and workshops may be organised at short notice as time slots in Government business allow.

3. Draft design for neonicotinoids field trials
    a. **Decision:** PEAG agreed to provide comments, as individuals, on draft trial designs once they are released by industry for comment.

4. Neonicotinoids restrictions and Efsa guidance on trial design
    a. **Action:** Defra to formally request PEAG to articulate their concerns and questions around the guidelines, in particular the origin of the 7% reduction in colony size as a protection goal and the consequences for practical trial design. PEAG response to be submitted to Defra Chief Scientific Advisor via PEAG secretariat and PSEG.

5. Review of Government–funded data
    a. **Action:** Defra to formally ask opinion of PEAG on whether best use is being made of national datasets relating to pollinators and to provide summary of funding for National Bee Unit.

6. Commercial bumble bees
    a. **Action:** Defra to provide PEAG with draft impact assessment relating to proposed policy changes on licensing non-native bumble bees.
    b. **Action:** PEAG members to provide comment on any evidence gaps that emerge from the policy options.

7. Future of PEAG
    a. **Decision:** agreed that PEAG should be time limited, with the aim of disbanding in summer 2014 once the NPS is finalised.
    b. **Decision:** agreed that Defra would retain the ability to call upon the expertise of the group on an *ad hoc* basis as the NPS will be reviewed at least annually.
    c. **Decision:** agreed to review the makeup of PEAG particularly with regard to bumble bee diseases and the need for social science expertise in relation to stakeholder involve under the "Call to Action" project Natural England are developing.

[redacted]
Plant Health Evidence and Analysis Team
19 February 2014

Notes of the seventh meeting of the Pollinators Expert Advisory Group
held 6 May 2014 at 14:30 – 16:00 in room 106 London Nobel House

Present:
PEAG - Charles Godfray (chair), Rosie Hails, Stephen Martin, Lin Field, Simon Potts, Adam Vanbergen
Defra - [redacted]

Apologies: Nick Hanley (PEAG)

Actions/decisions

1. Matters arising from notes of last meeting not covered by the agenda: none

2. Neonicotinoids
   a. **EFSA RA protection criteria and simulation project to be commissioned by CRD:** Centre for Ecology and Hydrology's (CEH) calculations, using Pilling et al. (2013[1]) and CEH's own data on *Bombus*, suggested that circa 50 replicates would be needed to provide sufficient statistical power to reliably detect a 7% change in colony size over two brood cycles (as specified in the EFSA guidelines) – **PEAG agreed that this was impractical**. A more practical experimental approach using circa 10 replicates would be likely to be able to discern a "reasonably modest" 20% change in colony size over the specified in-season period.

      Action: PEAG to formally set out their conclusions on the EFSA protection goal and the error in the EFSA guidelines in a letter to the relevant Evidence Deputy Director ([redacted]) with a view to this being put up to the Defra CSA (IB).

      PEAG agreed that CRD's proposal to use a variety of existing models of honey bee colony dynamics to explore, from first principles, the ecological relevance of the 7% protection goal and derive a threshold magnitude for an ecologically significant change in colony size would provide useful and novel insight into the issues. **PEAG advised that** CRD should consider approaching one of the developers of the BEEHAVE model to join the contract team working on this.

      Action: [redacted], [redacted] and [redacted] to meet with CRD's contractor to discuss PEAG comments on project design.

[1] Pilling et al. 2013 A Four-Year Field Program Investigating Long-Term Effects of Repeated Exposure of Honey Bee Colonies to Flowering Crops Treated with Thiamethoxam
http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0077193

b. **Large-scale experiments/update on neonicotinoid restrictions:** the position on any trials, i.e. when/whether they will go ahead in the UK and under what protocol(s), is still unclear.

c. **Restatement project:** The neonicotinoids evidence restatement paper produced by the Oxford Martin School has now been accepted for publication. CG to alert PEAG secretariat when the paper is published to ensure wide circulation within Defra and across relevant stakeholders.

3. Pollinator monitoring: this project is going ahead, with the inception meeting scheduled for Friday 9 May.

4. Imported/commercial bumblebees: Proposed Defra policy is to cease licensing non-native sub-species of *Bombus terrestris*, hence risk of disease and genetic pollution from these should be removed. Defra are currently planning to consult with the commercial bumble bee industry on this proposal. PEAG raised the issue of imported bumble bees of the native sub-species (*B terrestris audax*), specifically risks from disease and potential for locally abundant commercial bees to displace wild pollinators. Defra view is that there are no further policy options/questions to be considered and, therefore, further input from evidence/PEAG is not useful [in determining the way forward]. PEAG stressed that there was a general risk for Defra, illustrated by this, in not formally consulting PEAG should later challenge be made, for example by stakeholders.

   Action: [redacted] to write to the Deputy Director responsible for this area to reiterate offer of PEAG to formally consider evidence questions in this area and ensure the DD is comfortable with any potential risks should PEAG not be engaged to comment.

5. Sharing pollinator-relevant data sets: Rothamsted Research had responded to PEAG's request for information scope of pollinator data held and barriers to wider sharing of these data. Fera are still to respond to this request.

   Action: PEAG to write to Rothamsted Research acknowledging their response and agreeing that progress is being made to make relevant data available whenever possible.

   Action: [redacted] to follow up request to Fera with a view to dealing with the Fera response by correspondence before the next meeting.

6. Asian Hornet: PEAG agreed that the Defra/Fera approach to dealing with potential Asian hornet incursions is correct with the additional advice that, should a nest be discovered in the UK, post-destruction examination should, resources permitting, include assessment of the maturity of the colony and hence the likelihood that sexual forms had already been released.

7. NPS Consultation: the public consultation closed on 2 May with circa 300 responses. The two yes/no evidence questions attracted just over 60% positive responses. Defra officials are analysing the text-based responses and may call upon PEAG to comment once the results are summarised.

8. Future of PEAG

    a. **Decision:** agreed that PEAG will continue until NPS is published with a view to having a final formal meeting in autumn 2014 to deal with any remaining issues and to capture any lessons learned from the process.

    b. **Decision:** agreed that individuals on PEAG would retain contact with the Pollinator team and would be willing to provide ad hoc comment on issues arising from the NPS on a "goodwill" basis.

9. AOB: [redacted] updated PEAG on the Go Science project, which is developing a new evidence governance model for government, and alerted the group to the possibility that they may be interviewed by the Go Science team for their views on evidence governance in Defra.

[redacted]
Plant Health Evidence and Analysis Team
3 June 2014

Notes of the eighth meeting of the Pollinators Expert Advisory Group
held 10 June 2014 at 14:30 – 16:00 in room 106 London Nobel House

Present:
PEAG - Charles Godfray (CG; chair), Rosie Hails (RH), Stephen Martin (SM), Simon Potts (SP), Adam Vanbergen (AV)
Defra [redacted]

Apologies: Nick Hanley (PEAG), Lin Field (PEAG)

Actions/decisions

1. Matters arising from notes of last meeting not covered by the agenda:

    a. Datasets – the letter from Fera (Paper 1) in response to PEAG's request for information on the dataset held on honey bees by Fera's National Bee Unit (NBU) was considered. Current ease of access to the data, the level of interest and the likely number of requests for data per year were considered. One member of PEAG had obtained anonymised data from the NBU with no problems and at what they felt was reasonable cost. PEAG's immediate opinion on number of requests was that this would be less than 10 per year, however, this would be clearer if a proper description of the data held was available. The question also arose as to where the database would sit and who would police access once the Bee Inspectorate joined the new proposed Defra agency (on 1 October 2014) and the research staff from the NBU remained with Fera (due to become a Government/private Joint Venture on 1 April 2015).

        PEAG agreed not to provide a formal response to Fera's letter at present, but to keep a watching brief on developments

        [redacted] to explore what the proposals are for BeeBase following changes to Fera

    b. Evidence action on bumble bees – draft letter to relevant DD is with Head of APHEA

2. Neonicotinoids
    a. General – no new developments reported

    b. Large-scale experiments/field trials – protocols for industry trials expected imminently. RH and CG declared an interest in that both have been involved in giving independent advice to Syngenta on trial design.

        Agreed that PEAG excluding RH and CG would comment on draft trial designs if/when these are submitted to Defra.

        [redacted] to collate information on number of replicates needed to give reasonable certainty of discerning whether EFSA protection goal has been met (as discussed at last meeting)

and submit draft to RH for comment before wider circulation to PEAG

3. Update on National Pollinator Strategy (NPS)
    a. General update – [redacted] collating comments from Defra colleagues on the latest draft of the NPS. New draft will be available in first or second week of July for comment

        [redacted] to circulate new draft to PEAG once it is ready

    b. Environmental Audit Committee – [redacted] informed the Group that the Environmental Audit Committee had opened an enquiry on the depth and direction of the NPS and would be taking oral evidence on 18 June. No members of PEAG would be giving evidence and no action was needed from the Group.

    c. NPS consultation responses on Integrated Pest Management (IPM) – a number of responses to the public consultation on the NPS had questioned the efficacy of IPM to deliver better biodiversity than conventional farming. The group discussed the quality of evidence for IPM and improved biodiversity agreeing that it was patchy and inconclusive with the best data coming from studies in tropical/sub-tropical climates. Some good evidence may come from the AgriLand project under the Insect Pollinators Initiative – due to report soon.

        PEAG agreed to quickly provide to [redacted] a short summary of the issues available evidence around IPM and biodiversity

4. Call to action

    Note: a paper had been expected on this but as the project was developing very quickly [redacted] gave an oral update instead. The Call to Action will be published in July and will consist of five or six simple steps supported by short "pop up" (on the Wildlife Trusts website where the initiative will be hosted) paragraphs. Ultimately a set of detailed of advice for managing land to help support pollinators will be produced (to be launched with the NPS).

    PEAG agreed to quickly provide comments by correspondence (as individuals) on the "pop-up" text to ensure it fits with the evidence base

5. AOB: None

6. Pollinator animation: the animation that will accompany the Call to Action was shown to those present at the meeting. Overall comments were very favourable. Detailed comments were that neonicotinoids should not be the first subject covered under the drivers of population change, as habitat change is the most important, but that this class of insecticides should still be explicitly mentioned to avoid any accusations of issue ducking.

[redacted]
Plant Health Evidence and Analysis Team
20 June 2014