Species considerations for biodiversity offsets in England

Report on a meeting of experts held in London on 16th September, 2013

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Summary

On 16th September 2013, twelve ecologists met to evaluate how species can be given consideration in biodiversity offsets in the English context. They noted that while the type, area and distinctiveness of vegetation cover ('habitat') within a proposed development site is sometimes a useful basis for assessing likely impacts on individual species, this is not always the case. If biodiversity offsetting is to contribute towards a goal of 'no net loss' of biodiversity, assessment of the impacts of a development must take into account the abundance of individual species in the wider landscape within which it is situated. An assessment process should be initiated to identify Species of Principal Importance for which habitat is not a suitable proxy to their presence or absence. This process would be based on the wealth of existing ecological evidence and methods available in England, including habitat suitability assessments and models. There is a need to designate a set of approaches to offsetting for impacts on each species requiring special consideration in biodiversity offsets. It is recommended that a central on-line repository of know-how for establishing species populations is created for use as a guide to the long-term viability of plans for offsets for species.

Summary list of recommendations

Further details are provided in the relevant paragraph.

A. An expert-led assessment process is needed to (a) produce a list of Species of Principal Importance in England that are routinely subject to the impacts of new development and, (b) for each species on the list, determine the extent to which habitat is, or is not, a suitable proxy to presence or absence for use in biodiversity offsets. *[Paragraph 13.]*

[1] This report is based on a distillation of the ideas, expertise and perspectives of individuals present at the meeting. The views and recommendations expressed in the report are not, however, necessarily the views of specific individuals or the organisations that they are affiliated to.

B. A simple, standardised and science-based knowledge base should be established to inform species considerations in biodiversity offsets. *[Paragraph 18.]*
C. It is necessary to derive a small set of procedures for the assessment of species requiring special consideration in biodiversity offsets. *[Paragraph 19.]*
D. On sites where species requiring special consideration are likely to be present, ecological assessments should include a detailed evaluation of the conditions that need to be met for a viable population to be maintained. *[Paragraph 20.]*
E. In order to establish consistency in the safeguarding of species within biodiversity offsets, Government should define appropriate spatial scales for evaluating species within biodiversity offsets, or state how this scale should be determined. *[Paragraph 26.]*
F. In all cases where an offset for an individual species is being proposed, there must be a clear written statement about which local population of the species will benefit from the compensatory action and how. *[Paragraph 27.]*
G. In order to facilitate assessment of restoration potential species requiring special consideration in offsets, Government should ensure that a system is in place to enable access to information on the conservation status of individual species. *[Paragraph 28.]*
H. Government should ensure that a central web-based public directory of experiences with ecological restoration is available for use in biodiversity offsets. *[Paragraph 29.]*

Introduction

1. On 16th September 2013, 12 ecologists met to evaluate how species should be given consideration in biodiversity offsets in the English context. The group of experts (identified in the authors above) was assembled to reflect a range of taxonomic groups and specialisms in ecology. The meeting was organised by Bruce Howard (NERC Centre for Ecology and Hydrology) with funding support from the Natural Environment Research Council.

2. The meeting took place within the period of a public consultation on options for increasing the use of biodiversity of offsetting in England (Defra, 2013). Increased use of biodiversity offsetting in England is being considered within the context of a need to improve the level of protection that the planning system provides for biodiversity.

3. Defra has published a metric for calculating the impacts of development on biodiversity, as well as the amount of compensation (offset) required (Defra, 2012). The metric is based on a view of 'habitat' as discrete types of vegetation cover.[2] Impacts are calculated in biodiversity units on the basis of the size, distinctiveness and condition of each of the habitats present on a development site. Distinctiveness scores are provided by Defra (after Treweek Environment Consultants, 2011). They are based on professional judgement. This included consideration of the number of species present within an area of habitat, and the degree to which the habitat supports species that are rare in other habitats.

[2] Examples of vegetation cover are broadleaved woodland and calcareous grassland. The Integrated Habitat System (IHS) developed by Somerset Environmental Records Centre is one way of classifying vegetation cover. It was selected as an appropriate basis for the assessment of habitat distinctiveness (Defra, 2012).

4. Offsets must provide a number of biodiversity units that is at least equal to the number determined to be present on the development site at the point a project is proposed. The calculation of offsets uses multipliers to account for factors such as time lag for offsets to reach a desired condition, the risk of failure due to technical challenges and the location of the offset in the landscape (with the view of building 'ecological networks'[3]). Species are not given explicit consideration in the metric, except for the proviso that offsetting should not affect the level of protection afforded to species named under European law (European Protected Species).

5. The meeting on 16th September was initiated because 'habitat' is not an accurate guide (proxy) to the presence or absence of some species (see, for example, Burrows et al., 2011). Accordingly, sole reliance on a habitat-based metric as the means of calculating biodiversity offsets would detract from a goal of 'no net loss' of biodiversity. While 'no net loss' is a concept open to interpretation (Gardner et al., 2013), it has been proposed as an over arching principle for biodiversity offsets in England (Defra, 2013). No net loss is a fundamental principle of biodiversity offsets worldwide (BBOP , 2012).

6. The meeting set out to form an ecologist's view on the best way to protect species through biodiversity offsets. Participants acknowledged the need for pragmatism while also respecting the stipulations and ambitions of nature conservation policy and the Biodiversity 2020 strategy for England. For offsetting in England, pragmatism requires that methods and tools are suited to the current capacities, responsibilities and interests of local planning authorities[4], developers and their advisors.

Assessing the impacts of development proposals on species

7. If biodiversity offsetting is to contribute towards a goal of 'no net loss' for biodiversity at the local, national or European scale, habitat should not be viewed simply as types of vegetation cover. For the purposes of biodiversity offsetting, habitats are best viewed as:
    a. *Communities* of species, which are interdependent with each other and connected with the wider landscape.
    b. The geographical areas that species use *currently*, based on environmental factors (climate, slope, soils etc) and the presence or absence of other species[5].

8. If an ecological view of habitat is taken, assessment of the impacts of development on biodiversity must consider the abundance and distribution of the species in the surrounding landscape. As part of this, it must identify characteristics of the landscape beyond the boundaries of development sites that underpin the existence and abundance of populations of species. Examples include landform, the mix of different types of vegetation cover and the

[3] Ecological networks are described in Lawton et al. (2010) as "a suite of high quality sites which collectively contain the diversity and area of habitat that are needed to support species and which have ecological connections between them that enable species, or at least their genes, to move." See also POST (2008).
[4] For instance, the majority of local authorities in England do not employ a professional ecologist.
[5] Ecologists refer to this as the realised niche.

presence of water bodies. Biodiversity offset schemes in other countries, such as the 'habitat hectares' metric used in Victoria (Australia), already incorporate assessment of features beyond a development site boundary.

9. Classes of vegetation types (broadleaved woodland, improved grassland etc) are a reliable guide to likely presence or absence of some species but not others. Reasons for them not being a reliable guide (proxy) are given in **Table 1**. In particular, the fact that some species are dependent on multiple 'habitat' types means that it is not appropriate to base assessments of the likely dependence of species on a land area on observations made at one point in a year.

10. 'Habitat' that is considered as being of low distinctiveness and poor condition is sometimes very important to species considered to be of high nature conservation value. For instance, the skylark is most abundant on lowland arable and mixed farmland, both of which are land use types often assumed to be low distinctiveness habitat. Areas considered to be of low biodiversity value may be important to an individual species either because the landform and vegetation cover is important in itself, or because they are part of a mix of habitats upon which the species depends.

Table 1. Reasons why the size, distinctiveness and condition of each of the habitats present on a development site is not a reliable basis for safeguarding individual species in biodiversity offsets.

Reason	Explanation / example
Habitat structure (the arrangement of features such as soil layers and types of plants) affects the occurrence of species.	See, for example, Hewson et al. (2011). Structure could be addressed through habitat condition scoring, although it is vital that critical information is not lost in the process of calculating offsets.
Some species depend on a mix of different land cover types, vegetation types and landforms.	This dependence occurs among both migratory species and non-migratory species. Studies of the association between habitat and species can help to identify cases where this applies. Ongoing work by the Biological Records Centre will assist with this.
The management of a habitat affects the mix of species present and their abundance.	Densities of farmland birds depend on particular management practices.
The existence of predators, pests and diseases affects the distribution of individual species.	For example, domestic cats associated with housing development can deter birds and other animals.
The presence or absence of a species at a particular site is often determined by the interaction of a number of factors.	Some of these factors are mentioned above. Others may include the management history of the site or its interconnectedness with other sites that host the species.

11. Biodiversity offsetting sets out to compensate for losses of all forms of biodiversity, including species that are not named in national nature conservation policy. Nonetheless, the list of Species of Principal Importance for England (defined under Section 41 of the Natural Environment and Rural Communities Act, 2006) provides a suitable basis for determining special considerations for species within biodiversity offsets.[6] Within the context of achieving 'no net loss' of biodiversity, it is not sufficient to focus efforts to safeguard species within biodiversity offsets solely on European Protected Species. A list of Species of Principal Importance that require consideration should be formed before a biodiversity offsetting policy for England comes into effect. This list will include some European Protected Species.

12. Within any group of species (butterflies, birds, etc)[7], species can vary greatly in their sensitivity to habitat conditions. They also vary over time and spatially in their habitat associations (Oliver et al., 2012). For this reason, when assessing whether habitat is a suitable proxy for the presence or absence of a species, it is not appropriate to form general policies for whole taxonomic groups.

13. RECOMMENDATION A An expert-led assessment process is needed to:
    a. Produce a list of Species of Principal Importance in England that are routinely subject to the impacts of new development.
    b. For each species on the list, determine the extent to which habitat is, or is not, a suitable proxy for use in biodiversity offsets.

    This task should not be onerous as it is principally about consolidating existing knowledge. One option would be to set up short-term review groups tasked with deriving lists of species requiring special consideration. These groups should be centrally co-ordinated and work to an authoritative framework. The assessment process should draw on the knowledge and work of existing groups with specialist knowledge in individual species. Specialist groups already in existence (including the Taxon Groups established by Natural England as part of its Biodiversity 2020 implementation activities) could support this process.

14. In deriving lists of species requiring special consideration within biodiversity offsets, the overarching goal should be the protection of the conservation status[8] assessed at the landscape or 'ecological network' scale.[9,10] For this reason, assessment of the extent to which habitat is a proxy for the species should be based on:

[6] The list is published by Natural England to guide public bodies, including local authorities, in implementing their duty to have regard to the conservation of biodiversity in England (Section 40 of the Natural Environment and Rural Communities Act, 2006). The list of Species of Principal Importance includes European Protected Species.
[7] Known in ecology as a taxon.
[8] Annex 1 of the EC Habitats Directive defines the conservation status of a species as "the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations". While the EC Habitats Directive defines this at the national level, more localised assessments are often be more appropriate.
[9] Landscape scale means working according to natural divisions in the land surface, e.g. river catchments. The National Character Areas described by Natural England embody much of this thinking.

a. Knowledge of the habitat associations of the species (combining professional expertise, habitat suitability modelling and available biological records).
b. Assessment of what pressures are affecting the population of a species in either the whole country or parts of it. Pressures might include loss of specific habitat features (such as die-back of a particular species) or climate change.

15. Once a list of species requiring special consideration has been derived under Recommendation A, a simple mechanism to enable developers and local authorities to determine whether or not their proposal will require special consideration for individual species. Information on the likely presence of species requiring consideration could be made available as downloadable layers for use in GIS (computer-based mapping software). It would be helpful if this information could be drawn together into a single national resource. An example of the type of GIS technology that would be beneficial is the Biodiversity Expert Systems Tool for County Planners produced by the University of Wyoming.[11]

16. Habitat Suitability scoring systems were originally developed by the US Fish and Wildlife Service and are one means of evaluating habitat quality and quantity for individual species. Work has been undertaken to do this at county level in England, making use of existing peer-review literature and evidence from ecological survey (**Box 1**). For plants, the necessary knowledge base for England is already well advanced (see, for example, Hill et al., 2004). For animal species such as dormice however, the evidence base is probably insufficient to derive Habitat Suitability indices.

17. Habitat suitability modelling is a statistical technique for predicting the distribution of a species across space and time which uses species occurrence records and geographic data describing the species' habitat and environment. This has been shown to have practical applications in an English context (Bellamy et al., 2013). The models use species presence data already held by Local Environmental Records Centres and the Biological Records Centre (including records accessible through the National Biodiversity Network Gateway website).

18. RECOMMENDATION B A simple, standardised and science-based knowledge base to inform species considerations in biodiversity offsets should be established. As part of this, Habitat Suitability Indices should be made available wherever possible for species for which habitat is not a reliable proxy. Localised assessments of habitat suitability should be undertaken and included where possible. National-level co-ordination and communication of this information via existing biodiversity data portals such as the NBN Gateway would be required.

[10] See Footnote 3 for a definition. For land in England, ecological networks are a broadly represented by the 12 Nature Improvement Areas. The National Planning Policy Framework states that local authorities should identify and map components of the local ecological networks in their Local Plans. Forest Research's BEETLE (Biological and Environmental Evaluation Tools for Landscape Ecology) Project is developing tools whereby ecological connectivity can be better described.

[11] http://www.uwyo.edu/wygisc/more_giscience/dss/biodiversity_expert_systems_tool_for_county_planners_introduction.html

Box 1 – Habitat suitability assessment in Somerset.

In the biodiversity offsetting system used in Somerset, Habitat Units are calculated using a Habitat Suitability Index (HSI) developed for each species. The HSI is scored according to the value of that habitat to the species on a scale of zero to six, with six being optimal and zero not used at all.

Scoring is done against the codes used in the Integrated Habitat System; a habitat classification developed by Somerset Environmental Records Centre. The IHS is a hierarchical code of all habitat classifications used in the UK. It includes codes for matrix, formation and management to further describe the habitat mean. This means that IHS is well placed for use in habitat suitability assessment. HSIs have been developed over a period of ten years through literature searches, survey data (where available) and professional judgement.

Currently, the HSI score is multiplied by a factor of between one and three for abundance, scored either for the distance from the record with reference to the spatial distribution of a species' population or the actual use of the site as recorded in site survey, to give a measure of relative importance to a site.

The process and metrics have evolved through operational use on plans and projects in Somerset since 2009, including the Hinkley Point C Nuclear Power Station Project.

For further information, see Somerset County Council (2013).

19. RECOMMENDATION C It is necessary to derive a small set of procedures for the assessment of species requiring special consideration in biodiversity offsets. A single approach for all species is unlikely to be sufficiently sensitive to the requirements of all species requiring special consideration. Therefore, one approach should be nominated for each species. Consideration should be given to the method currently in use in Somerset for offsetting based on Habitat Suitability Indices (**Box 1**). The usefulness of Common Standards Monitoring to define categories of abundance on a development site should be evaluated.[12]

20. RECOMMENDATION D On sites where species requiring special consideration are likely to be present, ecological assessments should include a detailed evaluation of the conditions that need to be met for a viable population to be maintained. This includes evaluation of the conservation status of the species at the site. Where necessary, surveys should be carried out to estimate abundance and distribution, not just presence. Appropriate measures of populations and their viability need to be included in the design of offsets for individual species.

[12] Common Standards Monitoring is currently conducted for species and habitats at sites designated for their national conservation importance. See http://jncc.defra.gov.uk/page-2199.

Ensuring that offset sites meet species objectives

21. From an ecological point of view, the task of ensuring that offset sites deliver measurable and long-term compensation for individual species is as difficult as the calculation of the impact of a development on those species. The suitability of an offset site will be specific to individual species (i.e. not whole taxonomic groups). In particular:
    i. Offset sites need to be considered within the wider landscape where larger 'metapopulations' may exist.[13] Proximity (including connectivity) of the offset site to other local populations of the species is important in determining the success of the offset.
    ii. Populations of many species are dynamic. Species are likely to change in distribution and abundance even without any offset activity.
    iii. Dispersal distances and home ranges for species vary greatly. For some species, it may be tens of metres (as in the case of fungi), for some it may be tens of kilometres (as in the case of otters) while for others it may be hundreds of kilometres (as in the case of some birds). For bats, distance to roosting sites is very important in determining whether a particular offset site becomes used.
    iv. Biodiversity offsetting should contribute to, and must not adversely impact on, the achievement of a favourable conservation status of species. This is especially important for European Protected Species.

22. From the point of view of establishing a population of a species, *creation* of offset sites (i.e. where the required vegetation cover and soil conditions do not already exist in any recognisable form) is considerably more challenging than *restoration*. The latter should be strongly favoured within biodiversity offsets in England, provided that this does lead to measurable and long-term compensation for the species that would not have happened anyway. This preference for restoration could be included in the risk multipliers for calculating offsets.

23. While restoration ecology is a long-established specialism within ecology, in the English context there are few species for which there is a reliable evidence base regarding creation of new populations. For example, restoration with a high chance of success is possible for only a minority of bird species in England. Assessment of efforts to restore calcareous grassland within agri-environmental schemes in Southern England demonstrates the difficulty of achieving targets for the restoration individual plant species (Fagan et al., 2008).

24. The goal of offset site design and management should be adequate overlap between what is lost at the development site and what is gained. This involves site selection, design and management according to best available practice to maximise the *likelihood* of success. For species, the offset population should, where possible, be within or adjacent to the meta-population present in the area of the proposed development.

[13] Metapopulation is the term used to refer to a collection of local site-based populations in which exchange of genetic material occurs regularly.

25. The conservation status of species present in England can be assessed at the local, national and European levels. For some species, different conclusions will be reached depending on the scale chosen. Assessments of Great Crested Newt presence illustrate the importance of considering multiple spatial scales (Wilkinson et al., 2011). The design of offsets that maximise the likelihood of success for individual species would be made easier and more effective if spatial biodiversity plans were in place.

26. RECOMMENDATION E In order to establish consistency in the safeguarding of species within biodiversity offsets, Government should define appropriate spatial scales for evaluating species within biodiversity offsets, or state how this scale should be determined.

27. RECOMMENDATION F In all cases where an offset for an individual species is being proposed, there must be a clear written statement about which local population of the species will benefit from the compensatory action and how. Monitoring plans must also be specified.

28. RECOMMENDATION G In order to facilitate assessment of restoration potential species requiring special consideration in offsets, Government should ensure that a system is in place to enable access to information on the conservation status of individual species. Ecological advisors to planners and developers involved in biodiversity offset proposals should be directed to (and use) the species assessment most local to the development.

29. RECOMMENDATION H Government should ensure that a central web-based public directory of experiences with ecological restoration is available for use in biodiversity offsets. This should be easy to interpret, regularly updated and show restoration outcomes for individual species. The system could provide a simple categorisation of know-how (e.g. 'potential but not yet demonstrated' or 'experience restricted to projects of less than five years duration'). It could be linked to a directory of offset projects. Risk multipliers for calculating offsets could be based on information contained in this directory.

30. With advances in technology, genetic variation in species can be detected at small scales. For example, see Vanhala *et al*. (2009). Government guidance on biodiversity offsets should indicate whether or not this should be taken into account. Within detailed guidance on biodiversity offsets, it may be appropriate to form a list of species for which the maintenance of genetic variation is fundamental to maintenance of the conservation of the species and those for which it is not.

31. Many of the experts involved in this meeting would be willing to work with Defra to formulate more detailed proposals for how to incorporate species considerations in to the design of biodiversity offsets.

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