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**JOINT NATURE CONSERVATION COMMITTEE**

**MAMMAL SURVEILLANCE REVIEW AND PROPOSED WAY FORWARD**

**Paper by Lawrence Way and Jessamy Battersby**

**1. Introduction**

- 1.1 In March 1996 the Committee considered new opportunities to start a suite of mammal surveillance triggered by the possibility of partnership investment by the voluntary sector. In 2001/02, JNCC created a mammal surveillance project within the Corporate Plan, following a feasibility study and pilots funded by DEFRA. The project has now completed further feasibility work, and established a mechanism and schemes that yield trends for just over half of the mammal species in the UK.
- 1.2 The Committee considered a draft strategy for surveillance monitoring and reporting at its March 2006 meeting and the Committee encouraged wider engagement in the strategy so that it can become a framework for surveillance in the UK. JNCC's Surveillance Programme is using the principles of the strategy to review and adjust the suite of sampling covered by the programme currently.
- 1.3 The purpose of this paper is to present the findings of a review of the mammal surveillance project using the strategy principles. The review was undertaken by the project leader working with a board of JNCC and Country Agency staff who have either mammal conservation or environmental reporting responsibilities.
- 1.4 The review recommends in section 8 some adjustment to the existing mammal sampling, an investigation of one key new area (small mammals), and a continuation of the current level of investment.

**2. JNCC surveillance programme principles**

- 2.1 Drawing on the draft strategy for surveillance, the programme is aiming to provide evidence for three main drivers:
  - i. overall nature conservation outcome objectives (as these are established);
  - ii. showing the response of biodiversity to direct drivers (pressures) on the environment in order to help influence the indirect drivers;

- iii. assessing the ongoing status of species covered by national, European and International obligations.
- 2.2 The surveillance programme aims to design sampling schemes that can deliver trend information for the UK, and smaller scales that have functional importance for the species or habitats concerned (e.g. Environmental Zones, broad habitat divisions). Ideally the schemes would achieve sampling densities that would allow country level trends. Realistically, this usually needs some supplementary sampling. It is an important goal of scheme design to make sure additional sampling can be added cost effectively, and only has a marginal effect on the core collation and analysis costs. The review looked at how far this had been achieved for mammal schemes.
3. **Mammal surveillance project principles**
- 3.1 The long-term aim for mammal surveillance overall is to deliver distribution and population trends for all mammal species, while realising that this goal may not be realistic in the short-term, given funding and survey method constraints.
  - 3.2 The short-term aim for JNCC (5-10 years) is to prioritise coverage of as many species as is reasonably economic with a detection quality that picks up major change over 10-25 year periods at the UK level.
4. **Current delivery mechanism for mammal surveillance data**
- 4.1 The JNCC mammal surveillance project delivers its surveillance effort within the Tracking Mammals Partnership, which is a multi faceted initiative involving 25 organisations, providing population trends and information on changes in distribution for a wide range of mammal species.
  - 4.2 At present there are seven main schemes operating within the Tracking Mammals Partnership, funded and run by various organisations. The National Gamebag Census, The Breeding Bird Survey/Waterways Breeding Bird Survey, The National Bat Monitoring Programme, Mammals on Roads, Living With Mammals and Garden BirdWatch, are all multi-species, delivering information on up to 17 species in each scheme.
  - 4.3 The National Dormouse Monitoring Programme is the only single-species annual surveillance scheme operating at present. Other surveys are conducted periodically to assess changes in species distribution, such as otter surveys at seven year intervals and deer surveys at five year intervals. The English House Condition Survey will be contributing data annually for two species, brown rat and house mouse, but only at the England level.

- 4.4 The schemes have been assessed for their power to deliver required trends. The consensus is that the sampling methodology employed should have sufficient power to detect at the very least a 50% change over 25 years with a 95% probability and preferably a change equivalent to 25% over 25 years (equivalent to 10.9% over 10 years), at the UK level. All the schemes are or will aim to deliver at least this level of trend information.
- 4.5 Using volunteers to collect data has been shown to be generally the most efficient and cost effective way of collecting the information and is the preferred method in most schemes.

**5. Review criteria to assess mammal surveillance against JNCC priorities**

- 5.1 JNCC provides core funding for the National Bat Monitoring Programme and funding for analysis and interpretation of mammal data from the Breeding Bird Survey/Waterways Breeding Bird Survey and the National Gamebag Census. JNCC also provides staff resources for the Tracking Mammals Partnership Co-ordinator, providing the lead role in co-ordinating the partnership, reporting on results and managing the Tracking Mammals Partnership website. These existing areas of work were reviewed as well as potential new schemes being identified to cover gaps in the existing surveillance effort.
- 5.2 The criteria used to review JNCC mammal surveillance effort within the overall surveillance programme were as follows:
- i. prioritise species for detection effort where they can be reliably and economically measured as part of multi-species, or multipurpose schemes at major ecosystems to UK scales, i.e. surveillance is highly feasible. The rationale for this criterion is to provide widespread coverage to report on biodiversity status;
  - ii. prioritise species where we have evidence or reasonable judgement that they have a functional role in the environment that is not being covered by other surveillance;
  - iii. prioritise species that are likely to respond to the main widespread direct pressures on the environment as outlined in the Millennium Ecosystem Assessment, i.e. act as indicators for the affects of those pressures;
  - iv. prioritise the obligation species (species with status under biodiversity strategies, protection legislation, European Directives, International Conventions) where these are amenable to be detected through multipurpose/multi-species schemes. However, we would not expect to detect these with higher sensitivity than other species unless they face a specific risk that is not being addressed by existing nature conservation or other measures;

- v. prioritise species with specific conservation issues that are unlikely to be dealt with by wider conservation measures and surveillance is important to establish their needs, but only if their surveillance at a UK level is economic.

5.3 In addition, when deciding on surveillance methods:

- i. prioritise technical innovation in schemes in order to make survey methods easier, to increase the surveyor base and improve sample sizes or to include additional species;
- ii. prioritise schemes that engage volunteers, because these are generally more cost effective and provide better coverage at a UK level than other types of scheme.

6. **Results of criteria review**

*Overall assessment*

6.1 In order to make an overall assessment of the current surveillance effort and to prioritise species according to the above criteria, a scoring system was used. The criteria made the following contribution to the overall score for each species:

- i. *Feasibility score.* This was included to provide maximum information on biodiversity status overall. Higher scores were given to species that could be covered economically and reliably. Species were assessed on their tractability for surveillance, with widespread and common species that were easy to recognise and survey receiving high scores, species requiring more effort to survey and for which training was essential receiving medium scores, and rare and scarce species or those for which there are no available methods or for which methods are being tested receiving low scores;
- ii. *Functional role.* Species were judged as having a functional role if increases or declines in populations were likely to have a significant affect on ecosystem functioning e.g. large herbivores and small mammals, with higher scores given to those with a large functional role;
- iii. *Ecosystem Pressures.* Species were considered in two ways in relation to the main ecosystem pressures: whether the pressure was likely to have a major affect on the status of the species; and whether the species could be an indicator of wider environmental affects of the pressure, with higher scores given to species that were both affected by pressures and could act as indicators;

- iv. *Conservation Priority.* This criterion was only applied to native species. Species were scored according to their conservation need, which was assessed according to rate and duration of historic and current decline, that is, evidence of decline prior to 1995 (historic) and post 1995 (current). Highest score was given to species that had evidence of historic decline and that were currently declining. Medium score was given to species that had declined historically but were currently stable or increasing, or those that had been stable or increasing historically, but were currently declining. Lowest score was given to species that were stable or increasing historically and currently;
- v. *Legislative Obligation.* Species that are the subject of legislation/directive annexes/Biodiversity Action Plan listing, but that are not conservation priorities as assessed above, were given an additional score.

Appendix 1 shows the detailed breakdown of species by criteria and the current coverage of surveillance for each criterion.

- 6.2 The application of the criteria gives a possible maximum score of 8 points per species if applied simply. There being no exact science to decide on the relative weighting to give each criterion, we felt that feasibility, conservation priority, and sensitivity to pressures, were equal drivers for deciding what to sample, so each takes 25% of the total weighting. The remaining 25% is split between functional role (as this is a new approach and may be difficult to interpret) and legislative obligation, as the important obligation species are already covered by conservation priority.
- 6.3 The following section takes the rules for weighting species set out above, aggregates the scoring across the different criteria and proposes a high medium and low priority for species for surveillance.
- 6.4 Once the scoring had been applied species were grouped into High, Medium and Low priority.

#### ***High priority species***

- 6.5 Covered by existing surveillance, 11 (69%): Hedgehog, greater and lesser horseshoe bats, rabbit, brown hare, grey squirrel, dormouse, otter, red deer, fallow deer, muntjac. Not covered, 5 (31%): common and pygmy shrew, Bechstein's bat, barbastelle, water vole (sufficiently). Population trend information is not available for otter, but distribution change acts as a surrogate.

#### ***Medium priority species***

- 6.6 Covered by existing surveillance, 19 (58%): mole, Natterer's bat, Daubenton's bat, serotine, noctule, common and soprano pipistrelles, whiskered and Brandt's bats, brown long-eared bat, mountain/Irish hare, rat, fox, stoat,

weasel, polecat, mink, badger, roe deer. Not covered, 14 (42%): water shrew, Nathusius' pipistrelle, Leisler's bat, grey long-eared bat, red squirrel, bank/Skomer vole, field vole, Orkney/Guernsey vole, wood mouse, yellow-necked mouse, harvest mouse, fat dormouse, pine marten, wildcat.

### ***Low priority species***

- 6.7 Covered by existing surveillance schemes, 1 (8%): house mouse. Not covered, 11 (92%): greater and lesser white-toothed shrew, greater mouse-eared bat, ship rat, feral cat, wild boar, sika deer, Chinese water deer, feral goat, feral sheep, wallaby.

### ***Summary***

- 6.8 Although there is coverage of over 50% of terrestrial mammals, some high priority species are not covered. There is also a need to provide some coverage of small mammals that have been identified as having a functional role and acting as possible indicators of environmental pressures. Small mammal surveillance would also improve coverage for environmental pressures, and conservation priority species.

## **7. Proposed way forward for the mammal surveillance project**

### ***Rationale for the proposed suite of work***

- 7.1 The majority of mammals are widespread and are affected by the broad pressures acting on the environment or are pressures themselves, e.g. non-native species. The main drivers or pressures of change have been identified in the Millennium Ecosystem Assessment and the mammal surveillance effort has been assessed against those pressures (see section 6, Results of criteria review). Very few mammals are good indicators of the affects of environmental pressures because of their generalist use of habitats. However, 5 species could act as indicators for illegal killing or over-harvesting, 10 species for different kinds of habitat transformation, 3 species for pollution, 7 for climate change and 10 for non-natives.
- 7.2 Small mammals are not covered by any surveillance scheme at present and have a big ecological function in most habitats, cycling rapidly, key in food chains, extending transferring the energy from productivity from summer to winter. They are also widely affected by environmental pressures and are potential indicators of the affects. We don't know if they can be measured efficiently, or whether trends will be simple to decipher, but our existing bird, butterfly and plant sampling do not cover this function. We think it is worth seeing if we can get trends for them.
- 7.3 The obligation species, most notably the bats, are fairly well protected and are generally not facing specific threats or we judge are likely to in the next 10 to 15 years. There is, therefore, no obvious reason specifically to increase surveillance effort for this group of species.

- 7.4 The obligation/conservation priority species that are not covered tend to fall into the category of species with restricted distributions (pine marten) that are rare or scarce (wildcat), or difficult to survey (red squirrel, Bechstein's bat, barbastelle). They are therefore more appropriately covered at a country level by the agencies responsible for conservation action where surveillance can be a cost effective component of the overall management cost.
- 7.5 There are quite a few mammal species management issues that are led by other sectors e.g. zoonotic diseases, game management, pest control. Where possible, it would be desirable to partner with these sectors in surveillance that meets our needs as well as theirs and this could lead to an increase in sensitivity or a better species cover than at present.
- 7.6 The current surveillance of mammals is achieving UK level trends for 33 species of which 19 also have Environmental Zone level trends. England trends are available for 24 species, Scotland trends are available for 17 species, Wales trends are available for 11 species and 3 species have Northern Ireland level trends. The key schemes funded by JNCC each look flexible enough to absorb extra sampling if country or other levels of geographical trend are needed. The National Bat Monitoring Programme has efficient collation and analysis and additional sampling is down to the effort put into stimulating volunteer interest in new areas. The Breeding Bird/Wetland Breeding Bird Surveys have already been very successful in increasing country level sampling, whilst the National Gamebag Census has a very high participation amongst game keepers across the UK.

**8 Proposed adjustments to the suite of mammal sampling with JNCC's surveillance programme.**

- 8.1 The project is proposing to provide trend information sufficient to detect a 50% decline in 25 years for the maximum number of mammal species that it is economic to sample through multipurpose/species schemes at a UK level. This is the minimum level of change that it is acceptable to detect and a level of 25% over 25 years is preferred. The power of surveillance schemes to detect these levels of change has to be tested and the level of change that schemes are able to detect should be specified.
- 8.2 In order to achieve this we propose to:
- i. investigate the viability of a small mammals detection scheme in order to improve overall species coverage and surveillance of a group of species considered to have a functional role in the environment and those most likely to be indicators of environmental pressures. (£24K for 2 years initially);
  - ii. continue to interpret the mammal data for a range of widespread species available from the Breeding Bird Survey and National Gamebag Census (£17K annually);

- iii. maintain the detection effort available from the National Bat Monitoring Programme, investigating if it can broaden species coverage (or geographical coverage) for the same co-ordination costs (i.e. improve its value for money). The main development issue is looking to see if technical innovation can reduce the complexity of detection and identification of bats so that less time and skill are needed, opening up detection to a wider group of volunteers. Careful consideration has to be given to the effects of any technical innovation on trend analysis. (£85K core funding from JNCC, total cost £135K). This surveillance programme covers many of the mammal species for which we have international obligations;
- iv. support the Tracking Mammals Partnership to ensure that all conservation priority species are covered and to encourage other bodies undertaking sampling to pool their efforts and make their data and interpretations accessible, and to provide a forum for discussing current surveillance needs and future surveillance strategy for mammals (JNCC contributes to publication costs and to co-ordination);
- v. the Winter Mammal Monitoring pilot is unlikely to provide sufficient additional information to existing schemes to warrant funding the scheme. It only adds one species (field vole) to the suite covered by the Breeding Bird Survey and National Gamebag Census and that species could be covered in the small mammal survey.

**APPENDIX 1**

**Table 1 Detailed results of applying the criteria to mammals.**

<b>Criterion</b>	<b>Proportion of mammals affected</b>	<b>Explanation</b>	<b>Surveillance implications</b>
Feasibility of surveillance	23 species	Species that can be picked up by multi species low sample cost surveillance	All are covered by existing surveillance effort
Functional role	21 species		11 are covered by existing surveillance effort, adding small mammals would improve cover
Environmental pressures			
- Over exploitation	12 species	Includes harvesting, hunting, & illegal killing	There is no surveillance for pine marten at present, and for other species in this criterion different methods of surveillance may be required to provide the levels of sensitivity to assess the contribution of this pressure to overall trends
- Habitat transformation	39 species are negatively or positively	Includes, agriculture, aquaculture, forestry, transport infrastructure, industrial development, and water management	21 of the habitat transformation affected species are covered, and 4 have the potential to be indicators. Small mammal surveillance would increase coverage substantially.
- Pollution	26 species	Includes non animal food production, and production of animal protein.	13 species are currently covered by surveillance.
- Climate change	21 species	Species that are likely to be strongly affected by temperature and humidity changes or habitat loss as a result of climate change	14 species are currently covered by surveillance.
- Non natives	21 non native species	4 native species are strongly affected by non native mammal species	
Conservation priority	5 high priority, 35 medium	High = populations declined historically and are still declining.	24 species are covered by current surveillance. Small mammal surveillance would increase coverage substantially.
Legislative obligation	38 species	Legal or conservation obligation within UK, 11 have IUCN listing.	21 species are covered by current surveillance