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EARTHWATCH INSTITUTE FIELD REPORT

Project Title: Mammals of Wytham Woods

Principal Investigator (s): Dr. Chris Newman and Dr. Christina Buesching

Position/Affiliations: Research Associates with the Wildlife Conservation Research Unit, Oxford University

Research Site: Wytham Woods, Oxfordshire, UK (1°20'W: 51°46'N / OS Ref: 462,082

Local Management Status of the Research Site:

Site of Special Scientific Interest (SSSI), designated by English Nature (EN) and managed by the Oxford University Wytham Management committee

Scientific names of primary species being studied:

Meles meles
Vulpes vulpes
Capreolus capreolus
Cervus dama
Muntjacus reevesii
Apodemus sylvaticus
Apodemus flavicolis
Clethrionomys glareolus
Microtus agrestis
Mustela furo / putorius
Microchiroptera ~ subfamily

...inter alia...

Key Research Objectives:

- To monitor long-term changes in, and factors effecting, the distribution and abundance of UK mammal species represented at the site, to include:
 - ▶ Responses to climatic effects
 - ▶ Responses to habitat changes / management
 - ▶ Responses to species interaction / competition

- To provide education and training in mammal identification and field-craft to amateur volunteers

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- To report on ecological findings and aspects of volunteer training and management to the JNCC's (Joint Nature Conservation Committee "Tracking Mammals Partnership" (TMP)
- To sustain long-term species monitoring at this site studying long-term population trends that has been on-going for more than 60 years

Date this report was completed: 8/7/06

Data Collection and Results

- a) Give a concise account of the data you have collected during the past field season.

Badgers: we have seen colder and dryer conditions this winter and through the early part of the spring. In response to this protracted period of limited food (worm) supply the badgers seem to have adapted this year by having their cubs almost 1 month later than the mean of mid-February, and two months later than in recent mild, wet years. With cubs born in mid-March and not emerging above ground until 8-10 weeks of age, our Annual Badger Census was effectively too early this year (though fixed to the first week in May for the last 30 years). Cubs were only observed at three setts. Subsequent trapping and observation of key setts by Earthwatch teams has allayed initial worries, as many more setts now appear to have cubs, given the time for late-born cubs to mature and explore above ground. So far this summer we have marked 31 cubs, a little down on our average of 45, though we feel there are more to capture and mark yet. This follows from the unprecedented 86 cubs born in 2005, which have had modest over-winter survival. The current population size stands close to 300 individuals.

This data further reinforces our findings that (eratic) weather patterns significantly govern badger population dynamics, making them very susceptible to the impacts of climate change.

Deer: we have continued to monitor deer numbers in Wytham through dropping counts. This data shows that deer management is significantly reducing deer numbers to sustainable levels, alleviating competition with other species which require ground level cover that high stocking densities of deer browse off. The use of volunteers to monitor the distribution and abundance of deer nationally is essential, and is recognised by the BDS (British Deer Society) and the Tracking Mammals Partnership (TMP). Our data on training and deploying volunteers to monitor deer, and our ability to calibrate volunteer estimates against PhD study estimates will be of considerable interest to these organisations and is the subject of a paper we have in preparation, pending the submission of the PhD study.

Small Mammals (mice and voles):

Bank voles ~ continued monitoring shows that bank vole numbers are still depressed in Wytham, despite deer numbers being reduced and an increasing recovery of the understorey. Full recovery of the bramble thickets and hence vole numbers will clearly take time.

Again, the long cold dry winter and early spring had very significant impacts on bank voles also. The die-back of ground vegetation this year in Wytham was extreme, removing the cover that voles find essential to conceal themselves from predators (foxes, stoats, weasels, raptors, owls etc). Trapping with Earthwatch teams this spring

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has revealed that vole numbers, even within our deer exclosures, are at an all-time low. The help from teams in monitoring these depressed numbers, with therefore low trap-returns per unit effort, have been extremely valuable and informative.

Wood mice ~ wood mice are more agile than voles and less susceptible to predation in open country. The die-back of vegetation (much like deer over-grazing) would therefore not be predicted to impact on mouse numbers significantly. However, mouse numbers (from Earthwatch trapping) are also severely depressed this year, though not as much as voles. We hypothesise that not only did the long winter kill off ground cover, it also left small rodents relying on cached seed stores for longer. It is likely that these seed banks became depleted long before the spring growing season commenced, leading to starvation in the rodent population.

With rapid breeding potential both mice and vole populations should recover quickly now (something we will follow up on with our autumn Elsevier and Blackbird Leys /children teams). Again, an impact of erratic weather.

Bats ~ species presence/absence and distribution continues to be monitored.

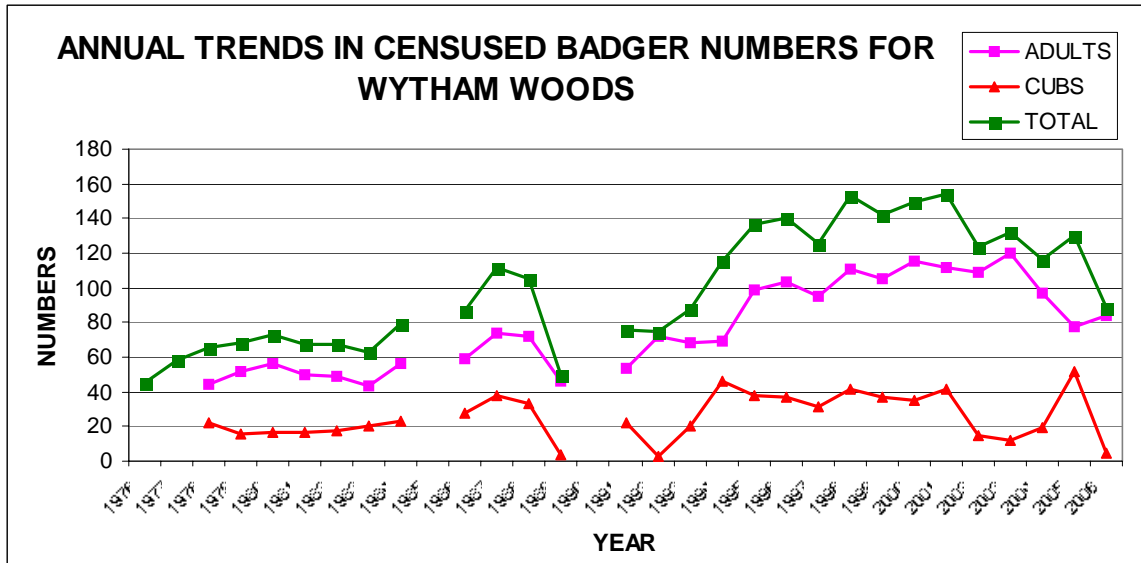
b) What progress have you made towards achieving your original objectives?

Essentially, with the aim of looking at mammal populations over the longer-term, with regard to climatic, competitive and habitat mediated ecological trends, we have added another year's data to several species databases. Also, we have gained the experience of training another 30 volunteers, adding substantially to our analyses of volunteer data validation and calibration. Very interestingly, many of our key results coming in this spring result from unusual spring weather conditions. Having had a succession of ever earlier and milder springs, the late (comparable with the late 1970s) spring of 2006 has produced some unusual results (for birds and insects, as well as mammals in the woods). These population impacts are inconsistent with recent demographic trends and therefore represent a perturbation in the population's limited ability to adapt to climate change.

c) Please provide a summary of your results: see section A.

Graph of results of badger census, noting only five cubs recorded at three locations this year, due to late emergence dates (see text).

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Significance/Benefits of Research

a) What is/are the significance/benefits of your research at the following levels?

- Local

Data collected is supplied to the Wytham Woods Management Committee and used to determine habitat and species management policy.

Our data also contributes to the local biodiversity action plan for Oxfordshire through our participation in the Oxford Nature Conservation Forum (ONCF).

The work performed with Earthwatch teams acts as a back cloth against which we can construct in-depth investigations by students, or use examples for teaching and training on graduate field-study classes.

The effective management of the woods is also important for the enjoyment of local people.

- National

Both PIs serve on the committee of the JNCC's Tracking Mammals Partnership, and both biological and volunteer management data are used by this committee. Both PIs also serve on TMP specialist committee panels, i.e. the "Small Mammals Group", the "Mustelids Group" and the "Volunteer Management Group". Via the TMP we are able to bring our results to the attention of colleagues from DEFRA, EN, the Environment Agency, the BDS, the People's Trust for Endangered Species, and the Wildlife Trusts, *inter alia*, who also serve on these committees.

The TMP aims to revolutionise the systematic monitoring and conservation of mammals in the UK.

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- International

Through scientific publications and international conferences the PIs bring findings from studies at Wytham to the attention of fellow scientists from around the world.

One area of international importance is our monitoring of mammalian species responses to changing climatic patterns (especially badger survival), which is a very significant and growing research field of global significance. Our diversification to include an additional monitoring site in Canada will assist with this.

b) How do your findings contribute to issues of sustainability?

Ecosystems can only be "sustained" if we understand how they operate, how species interact, and how the distribution and abundance of species is mediated by abiotic factors such as climate. Essentially, by monitoring ecological trends in these mammal populations, along with the influence of different habitat management regimes, we develop the tools necessary to conserve them for the future.

Dissemination of Results

Buesching, C.D. & Newman, C. (2005) Volunteers in ecological research: Amateur Ecological Monitors: the benefits and challenges of using volunteers. *Bulletin of the British Ecological Society* 36 (3): 20-22.

Root, T.L., Liverman, D. & Newman, C. (2006) Managing biodiversity in the light of climate change: current biological effects and future impacts. In *Key Topics in Conservation Biology*. Ed. D.W. Macdonald. Pp85-104. Blackwells, UK.

Macdonald, D.W. & Newman, C. (in press) Assessing the determinants of demographic change using Matrix Models: An analysis of Eurasian badger (*Meles meles*) population dynamics. *Ecology*.

K. M. SERVICE*¹, C.D. BUESCHING*, C. NEWMAN*, P. RIORDAN*, F.A. M. TUYTTENS*², C.L. CHEESEMAN[†] and D. W. MACDONALD* The function of badger latrines: olfactory 'message boards' or territorial markers? *Can J. Zool.* (Next edition)

Courtenay, O, Reilly, L., Sweeney, F., Hibberd, V., Bryan, S., Ul-Hassan, A., Newman, C., Macdonald, D., Delahay, R., Wilson G. & Wellington, E. (2006). Is *Mycobacterium bovis* in the environment important for the persistence of bovine tuberculosis? *Letters of the Royal Society* (Next edition).

Fell, R., Buesching, C.D. & Macdonald D.W. (Next Edition) The social integration of badger (*Meles meles*) cubs into their natal group. *Behaviour*.

Macdonald, D.W., Newman, C., Buesching, C.D & Johnson, P.J. (subm) Dispersal and philopatry: Patterns in the socio-spatial organisation of the Eurasian badger (*Meles meles*). *Ecography*

Macdonald, D.W. & Newman, C. (in prep) Climate Change: An example of dynamic demographic responses to trends in weather patterns, from a population of Eurasian badgers (*Meles meles*). *Ecology*.

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Kilshaw, K., Newman, C., Buesching, C.D., Bunyan J. & Macdonald D.W. (subm) Socio-spatial dynamics of group border marking; how do badgers, *Meles meles*, define their group ranges? Ecology Ethology & Evolution

Macdonald, D.W., Newman, C., Buesching, C.D & Johnson, P.J. (subm) Dispersal and philopatry: Patterns in the socio-spatial organisation of the Eurasian badger (*Meles meles*). Ecography

- Management plans and reports (in progress or completed)

Data is used locally by the Wytham Woods Management Committee for SSSI management. Data also contributes to the Tracking Mammals Partnership management plans for national conservation initiatives, and especially to the TMP select committee on volunteer management.

- Presentations (given or planned)

Presentation to Northamptonshire badger group February 16th: 25 group members.
March 17th/18th: Course for a group of 30 students from the Oxford University Department of Continuing Education.

Presentation to Warwickshire Badger Group March 21st: 40 group members.

Badger census: May 2nd, 3rd, 4th ~ 220 members of the local community, Earthwatch staff, family groups. Colleagues, wildlife groups, undergraduates etc.

PTES Badger day: May 27th: 30 trust members.

June 2nd, 6th, 8th & 13th School group visits: groups of 30 children aged 7-8 years ~ talk and badger watch.

BBOWT Wildlife Trust badger day: June 10th: 35 local enthusiasts.

June 27th: Visit to Wytham for a congress meeting on 40 members of the JNCC, EN, SNH & CCW.

Cadbury's Activity Day (Earthwatch event): pond restoration in Wytham: 28th June ~ 45 members of Cadbury's HR staff.

To come:

Presentation on Mammal Monitoring and the work of Earthwatch to the Mersey Tobeatic Research Institute, Nova Scotia, Canada. For institute member (scientists, students, government ecologists etc).

- Popular articles or films (in progress or completed)

We are collaborating with Prof. Rory Wilson at Swansea University, who has just received a Rolex funding award to develop his data-logging accelerometer based telemetry devices (tracking). Our involvement with Rory was primed with funds we received via Earthwatch, from the Martin Wills Foundation (for which we are immensely grateful).

Rolex commissions a film about the work of each of its laureates, and thus we have just finished filming a sequence on our work with Rory, trapping badgers, fitting collars, looking at recovered telemetry etc.

The film will be aired at the Rolex awards ceremony in Singapore in October (from when we can talk openly about the award), and then these films are usually distributed through Discovery Channel and National Geographic.

Last Update: 09 February 2004

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- Books, chapters, illustrations

Root, T.L., Liverman, D. & Newman, C. (2006) Managing biodiversity in the light of climate change: current biological effects and future impacts. In Key Topics in Conservation Biology. Ed. D.W. Macdonald. Pp85-104. Blackwells, UK.