Poster abstracts

Home ranges of introduced mustelids and feral Cats at Trounson Kauri Park, New Zealand
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Trounson Kauri Park in Northland, New Zealand comprises 450 ha of forest, surrounded by grazed pastureland. The New Zealand Department of Conservation aims to control introduced mammalian pests at Trounson to such a level that would allow reintroduction of locally extinct fauna and allow recovery of those native species still present in the park. Prior to and throughout mammalian pest control operations at Trounson, the minimum home ranges of four Stoats, one male Ferret and 11 feral Cats were examined by radio-telemetry. The home ranges of all these carnivores were large relative to the areas where pest control was being undertaken at Trounson. The minimum average home range of three male Stoats was 108 ± 19 ha and the minimum home range of one female Stoat was 50 ha. The male Ferret had a minimum home range of 179 ha. The average minimum home range of male feral Cats was 305 ± 74 ha and the minimum home range of female Cats was 122 ± 35 ha. All these carnivores were often located in or near the forest–pasture edges, although the Stoats were also often located near streams or swampy areas of the park.

Testing the specialist predator hypothesis
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Despite growing correlative evidence and theoretical support from modelling, the hypothesis that predation by mustelids is causing population cycles (3–5 years) of microtine rodents has not yet been subjected to rigorous testing. A large-scale predator manipulation experiment, designed explicitly to test this hypothesis, is currently being conducted in Kielder Forest in northern England. Since May 1998, the numerical response of Weasels has been suppressed by removing them from three entire clearcuts (5–12 ha) within the forest. The dynamics of the Field Vole population within each clearcut will be compared with three paired control populations using capture–mark–recapture methods. The clearcuts are surrounded to a large extent by mature forest or other unsuitable vole habitat and as such constitute essentially semi-permeable ‘natural enclosures’. The Weasel population in all sites has been monitored using tracking tunnels to confirm the efficiency of the removal. In 1998 and 1999, a total of 75 Weasels was removed from three treatment sites. Preliminary results from the control sites show a pronounced seasonal fluctuation in the number and activity of Weasels, and there is no evidence of a delay in their numerical response. Field Vole populations behaved similarly on control–removal site pairs in 1998 and reached peak densities in 1999. In 2000, it is anticipated that the control Field Vole populations will enter the decline phase of the cycle; whether or not the treatment populations do so will form the basis on which to accept or reject the study’s null hypothesis.
Mink and Polecats in Denmark: status, control and damage to poultry
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In 1998, 2100 hunters that had reported catching feral American Mink or Polecats in the 1996/97 hunting season were sent a questionnaire about the status and control of Mink and Polecats. Questionnaires were also sent to 692 poultry keepers to collect information on the level and type of damage and problems caused by Mink. In total, 1465 (90%) Mink hunters, 416 (88%) Polecat hunters and 600 (87%) poultry keepers replied to the questionnaire. Mink and Polecats were widely distributed across Denmark, although Polecats were absent from a number of islands. The Danish Bag Record indicates that Polecat and, especially, Mink populations are increasing. The geographical distribution of Mink closely reflected that of Mink farms, with the highest number of Mink bagged in areas that also have a high concentration of Mink farms, i.e. the western and northern regions of Jutland. Out of 571 poultry keepers, 135 (24%) reported attacks by Mink 1–5 times during 1991–97, eight (1%) experienced 6–10 attacks, and 10 (2%) experienced more than 10 attacks; 31% of the poultry keepers regarded Mink as a problem for their poultry stock. Among 720 Mink hunters who were also poultry keepers, 80% regarded Mink as a problem.

Survival rate of captive-born released Least Weasels in southern Finland
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For experimental and conservation purposes it is often desirable to introduce captive-born animals into the wild. Using radio-tracking, we estimated the survival rate of 27 captive-born Least Weasels of varying age that we released into the wild at different times of the year in southern Finland. We also radio-tracked six wild weasels for comparison. Of the released weasels, 41% died during the 2 weeks after release and only 7% survived beyond this period; 11% of the weasels were tracked for less than 2 weeks and the fate of the remaining 41% remained unknown, usually because the radio-collar dropped off or the animal moved off the site. Four of the wild weasels survived for 2 weeks while two died. The survival rate of captive-born weasels was higher when they were released during the summer and hence were younger. The weasels released during the summer were 12–17 weeks old and their daily survival rate during the study period was 99.94%. Weasels released in the autumn, winter or early spring were 18–40 weeks old, and their daily survival rate was 90.85%. The daily survival rate of the wild weasels was 98.12%.

The paradox of variable reproductive effort in female Stoats during rodent cycles
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The variation in reproductive effort made by female Stoats in response to changes in the density of rodents should in principle be similar in New Zealand beech forests and in the high arctic. However, in New Zealand Stoats are more easily sampled year-round and are affected to a lesser degree by other predators. Larger peak-year litters are due to reduced mortality of pre-independent young, not to increased fecundity of adults. Stoats of both sexes born in peak rodent years grow larger when young, and remain larger than average in condylar base length for life. However, their mortality rate is higher, especially in males, and their
individual reproductive success is lower, because they are prevented (by delayed implantation) from breeding until the rodent population is declining or has already crashed. The paradox is that all of these effects are the opposite of those predicted by the so-called ‘silver-spoon’ syndrome, which expects a lifetime advantage for individuals born in a year of abundant food supplies.

Resource partitioning in the diet of British mustelids

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Recent studies have hypothesized that coexistence of ecologically similar mustelids in the British Isles is facilitated by partitioning of food resources according to prey size. Support for this hypothesis has been derived from evidence for community-wide character displacement in skull and canine size. I reviewed quantitative studies of the diet of mustelids in Great Britain and Ireland and tested whether this hypothesis was supported by real dietary data. Male mustelids did tend to take larger prey than females. However, there was no consistent relationship between predator size and prey size between species. For example, in Britain, Pine Martens took a greater proportion of small mammalian prey (29%) than the smaller Polecats (18%) and Mink (11%). Similarly, Stoats took a larger proportion of medium sized mammalian prey (40%) than the larger Polecats (33%), Mink (26%) and Pine Martens (4%). Therefore, the available dietary data did not appear to support a hypothesis of resource partitioning among mustelids according to prey size.

Using gamekeeper trapping records to monitor the abundance of Stoats and Weasels

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Mean numbers of Stoats and Weasels trapped by British gamekeepers have been decreasing since 1975 and 1961, respectively, giving rise to concern that populations of both species may be declining. I surveyed 203 gamekeepers and found that the most significant factor affecting the numbers of Stoats and Weasels trapped was trapping effort. Gamekeepers that relied on hand-rearing game birds for shooting made substantially less trapping effort than gamekeepers that relied on wild game birds. In 1997, a typical keeper who relied mainly on reared pheasants set approximately 40 traps for 6 months of the year and caught 10 weasels and 19 stoats. By comparison, a keeper who relied on wild Pheasants and Partridge set approximately 94 traps for 9 months of the year and trapped 28 Weasels and 34 Stoats. The national decline in the numbers of Stoats and Weasels trapped in Britain is consistent with a reduction in trapping effort, corresponding to an increasing reliance on hand-rearing game birds. Gamekeepers’ records can be used to monitor Stoat and Weasel populations, but only if gamekeepers record the number of traps set in each month and monthly totals of animals killed. Ideally, the sex of each animal and whether it was trapped or shot should also be recorded.
Stoats as conservation pests in New Zealand
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Stoats, Ferrets and Weasels were introduced to New Zealand in the 1880s in an attempt to control Rabbits. Although Stoats were quickly implicated in the decline of native birds, the extent to which they still contribute to the decline of native species is only now becoming clear. Their impacts on threatened and endangered birds are of particular concern. Kiwi, endemic to New Zealand and the smallest of the ratites, have declined significantly since human settlement. Predation of young Kiwi by Stoats is thought to be the most important factor in the continuing decline of mainland populations. Stoats have a detrimental impact on endemic hole-nesting birds such as the Yellowhead (an insectivorous forest passerine), Kaka and parakeets (forest parrots). Mustelids are believed to have been the major cause of the decline of an endangered shorebird, the Southern New Zealand Dotterel, and Stoats have also been shown to have a dramatic local impact on the northern subspecies. Stoat control in New Zealand will have to be ongoing if some endemic species are to survive on the mainland. Currently, control relies largely on labour-intensive trapping. Trapping techniques are being refined and other techniques, such as aversion, exclusion and poisoning are being investigated.

Predation risks to native fauna following outbreaks of Rabbit Haemorrhagic Disease in New Zealand
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Where introduced Rabbits are abundant in New Zealand, they are the primary prey of introduced predators, such as Ferrets, Stoats and Cats. Native species, such as the endemic Banded Dotterel, which are of secondary importance in predator diets, suffer increased rates of predation when Rabbits decline. Predation of Dotterel nests increased from 23% (95% CI, ± 4%, n = 12) during years with normal Rabbit densities, to 56% (± 10%, n = 4) when Rabbit Haemorrhagic Disease reduced Rabbit densities by up to 90%. Mustelids accounted for 30% of this predation. Population surveys of Dotterels, Rabbits and predators indicated that annual rates of change in Dotterel numbers were negatively related to the ratio of predators to Rabbits, such that Dotterels rapidly declined when there were few Rabbits available per predator. This situation arises immediately after reductions in Rabbit populations, but before predator numbers decline in response to prey shortage. It may be necessary to avoid this situation either by reducing Rabbit abundance only gradually or by maintaining them at stable levels. Alternatively, predator control may offset the effects of increased predation. Predator kill-trapping in parts of the same study area reduced predation to normal levels. We found 16–46% nest losses at three trapped sites, compared with 45–68% nest losses at three untrapped sites. Trapping was most successful at sites where the density of nests was very high, suggesting that Dotterels may find ‘safety in numbers’.
The social organization of Eurasian Badgers in Spain
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Most information about Badger social organization comes from high-density populations where groups of Badgers share a territory and a communal main sett. Group-living in these areas has been interpreted through the Resource Dispersion Hypothesis. This states that spatial patchiness of key resources has required primary animals to establish an oversized territory which then allows additional individuals to stay in the territory at low cost to the primary owner. I have studied Badger social organization at two different low-density populations in south-west Spain. One of the populations lived in groups, where only one of the adult females bred. The other population consisted of pairs made up of one female and one male sharing the same territory. Territories were between 1 km² and 10 km², depending on territory quality. Territory size was determined by the energetic requirements of breeding females during the season of trophic stress, while males tried to maximize their access to females. Group-living was dependent on the seasonal overabundance of profitable prey, such as fruit and young Rabbits. In the group-living population, dispersal occurred during the mating season. I propose a theoretical framework for explaining the variability in Badger social organization and highlight future research needs.

Delayed response of Stoats to a cycling lemming population in north-east Greenland
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This study was designed to explore the links between lemming Dicrostonyx groenlandicus population cycles and predation by Stoats in north-east Greenland where these two species form a single predator–prey relationship during much of the year. Over 11 years we have documented predation in a 1000-ha plot by counting lemming winter nests and the proportion occupied by Stoats. These nest surveys revealed a cyclic pattern in lemming populations with peaks that occurred at intervals of 4 years. The peaks resulted from a massive reproductive output in the subnivean environment and were associated with a lag of at least 18 months in the response of Stoats. The decline in lemming numbers took place when Stoats were most abundant and occupied large parts of the range. A decrease in the ratio of lemmings to Stoats resulted in an increase in the intensity of predation that reached a maximum during the deep depression in lemming numbers. Once this was achieved, then Stoat populations sharply declined to very low levels. At a threshold ratio of approximately one Stoat nest for every 100 lemming nests, a reversal of the trend in lemming population dynamics was initiated leading to a new increase phase.
Home range size, utilization and spatial organization of Pine Martens in Białowieża National Park, Poland
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The spatial organization and home range size of 17 radio-collared Pine Martens were studied in Białyń National Park from 1991 to 1996. Home ranges were small in spring (on average, 195 ha in males, 123 ha in females) and large in summer (227 and 131 ha). The minimum daily distance covered by Martens was greatest in summer (on average, 8.2 km in males and 8.6 km in females), when males used 114 ha/day, and females 79 ha/day. In winter, males moved only 3.4 km/day and used 31 ha/day, while females covered 1.8 km/day and used 13 ha/day. In winter and spring (but not in summer), large males occupied larger ranges than smaller males. In females, home range size was related to diet. Females that preyed mainly on small mammals had smaller ranges than those feeding on other prey. Home range fidelity was high in both sexes. The mean overlap of ranges was 9% between males and 2% between females. Range overlap between the sexes was highly variable. Three strategies of space-use by males were found: (1) some young males used very large areas; (2) other young males used small home ranges entirely overlapping with female home ranges; and (3) adult males used home ranges overlapping those of 3–4 females. In the last case, male utilization of their home ranges in summer depended on the distribution of females.