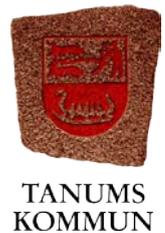


Hedgehogs in rural landscapes

Summary of the conference at Nordens Ark, 5 May 2011.



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Preface

In northern Europe and Scandinavia only one species of hedgehogs is present, *Erinaeceus europaeus*. New evidence shows that although the species has a wide distribution range, populations are diminishing in abundance and in some places becoming locally extinct. There is no clear single factor causing this pattern, but it appears to be a combination of several factors. Food availability plays a major role in their distribution and behaviour, e.g. in Finland the home range of hedgehogs is larger than in Sweden or the UK. Since their ability to disperse is quite limited and that large numbers are killed by road traffic, there is a high isolation effect in the areas of low hedgehog population. The general change in rural landscape towards large-scale monocultures and less complexity, traffic mortality and a greater badger population are some of the causes that might influence the disappearance of hedgehogs in rural areas.

Hedgehogs were included in the national red list in Sweden, but from the list in 2000. In UK, they are included in the national Biodiversity Actions Plan. Here we present a summary of the latest research results on the hedgehog's ecology and status in Scandinavia and UK that was presented at the workshop held at Nordens Ark in may 2011. During the workshop, we raised a question: are we facing an extinction threat or just a tolerable diminishing of the population?



Using the web-based inquiry to estimate hedgehog abundance in the region of Fyrbodal, Sweden

Mattias Olsson and Ingvar Olofsson

Concern has been raised about the status of the Hedgehog population in Sweden. European studies have revealed a high mortality rate with several underlying factors, including traffic mortality, predation (badger, red fox, etc) and mortality during hibernation. However, the lack of recent Swedish studies makes it impossible to estimate the population status and spatial distribution for hedgehogs in Sweden. The aim of this study was to get a first and preliminary overview of the abundance and spatial distribution of hedgehogs in the region of Fyrbodal (14 municipalities) in Southwestern Sweden. A web-based platform was used to collect public sightings during 2010, and the respondents could also report historical sightings in the formula. Respondents were asked to report several factors related to each sighting, including date, location, reproduction and habitat features where the hedgehog was observed. The public was informed about the project and how to answer the enquiry by local and regional media (newspapers, TV and radio), through NGOs and the municipalities web-pages.

In total 641 reports of hedgehog occurrence (yes/no) were registered during 2010, and 570 of those were positive reports of hedgehog sightings. Within those 570 reports, 652 individual hedgehogs were reported. 87 % of the reports were from the 4 major cities within the study area; Trollhättan, Vänersborg, Uddevalla and Åmål. Only few and scattered reports were from smaller cities such as Strömstad, Dingle, Hällevadsholm, Smögen, Fjällbacka, Ljungskile and Grebbestad. 511 reports contained detailed information about location, of these 7% (37) were observations from rural areas, outside cities or villages.

The public involvement in reporting hedgehog sightings was impressive and preliminary baseline information about the situation in Fyrbodal could be collected. Based on these observations it appears that hedgehogs are absent in large parts of the rural landscape and minor cities, areas where it was present just some decades ago. However, the method has disadvantages, and cannot be used as a stringent method for density estimates, inventories etc. since the reporters are not a controlled group, and that sightings may vary within different landscapes and with human densities and human activity patterns. Nevertheless, the preliminary results from Fyrbodal indicate only scattered documented sightings of hedgehogs outside the larger cities and it implies the need for a stringent inventory across different landscape types.

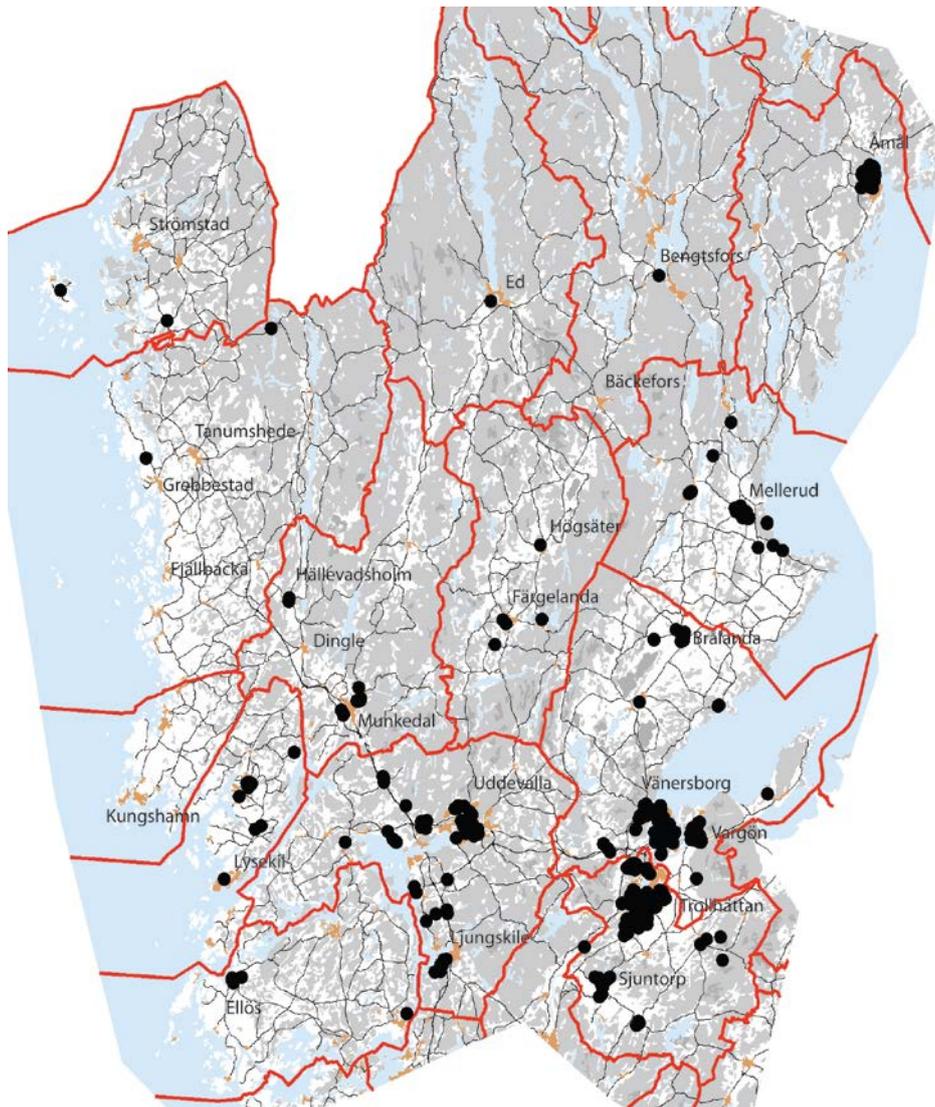


Figure 1. The 511 reports of hedgehop sightings with detailed information about the location. In this study approximately 7 % of the sightings were from rural areas and mostly reports were from urban areas; cities, and predominately from villages in the outskirts of cities.

Hedgehogs in Sweden- historical background and recent research.

Görgen Göransson

Hedgehogs moved into Scandinavia using the land bridge between Scania and Denmark, approximately 10 000 years ago. The oldest Swedish remnants from hedgehogs were found in Segebro, Malmö and date back to 4000 BC. Several illustrations and notes in books indicate abundance during the mid-ages, where Olaus Magnus book of the Nordic people (1555) is one example. Since 1850 it appears that hedgehogs has rapidly increased their geographical distribution and now are found along the northeastern coast up to the Finnish border. The latest national inventory was an enquiry by Kristiansson (1984).

Recent Swedish research about hedgehogs include studies on traffic mortality on the road between Lund and Revingeby, 1972-1976, and radio-tracking of hedgehogs in Södra Sandby and Tullstorp in 2003 respectively 1997-2004. In the road kill study, clusters of carcasses were found at road segments within villages and towns, and very few carcasses were found on the countryside. Males and females were killed at different time periods. Males dominated in May, there was an approximately equal amount of males and females found in June/July, to a shift where females dominated in late July/August. This pattern coincides with the mating system, where males are travelling long distances and are actively seeking partners during early summer, and thus killed in a high number during this time. Also, the risk of an animal to get killed in traffic depends on how feeding areas are situated in relation to daytime cover areas.

The radio-tracking study of hedgehogs in Tullstorp, was designed to evaluate the effects of highway construction of E6, Ringledden around Malmö. Differences in movement pattern pre and post highway construction clearly revealed that the highway created a barrier for the local population. Also, the barrier caused a drastic decrease in mean hedgehog home range size since the remnant divided populations lost one great connection in the landscape when the highway was finished. The studies also revealed that this urban population selected gardens during feeding routs, and avoided cereal fields, roads, and other homogenous habitats.

General hedgehog ecology. Hedgehog survey methods. Background of hedgehog in Britain.

Nigel Reeve

The Western European Hedgehog, *Erinaceus europaeus*, is widely distributed in Western Europe. In the UK, where it is the only species of hedgehog, there is evidence from a number of studies of long-term decline in terms of abundance, distribution and local extinctions. Surveys based on road-kill show greatest negative trends in the South East. The hedgehog has been a UK Biodiversity Action Plan (priority) species since 2007. However, there has never been a national survey of hedgehogs in the UK. Despite concerns about its decline, the species remains widespread and the evidence of decline is inconsistent across the UK regions. On the Western Isles of Scotland an introduced population of hedgehogs has rapidly increased in the absence of predators and the availability of an abundant food supply.

This paper briefly reviews the ecology of hedgehogs and both natural and anthropogenic factors that may be involved in limiting hedgehog abundance and distribution at a population level in the UK, including the potential effects of climate change. This paper also reviews work towards a standardised method that could be used locally and nationally to monitor change in hedgehog populations. Trials, by 30 volunteers for the Mammal Society of a standardised nocturnal walk of 1km (in which animals were detected by a combination of listening and spotlighting) found lower than expected detection rates. This probably reflects a real low level or absence of local populations because detection rates in urban areas were significantly higher. There was no significant effect of varying weather conditions, month, start time or duration. Although the method has the potential to yield good data at very low cost, it was clear that such low detection rates required a greater sampling effort (more time, more surveyors or a greater route length) to raise the encounter rate but that such additional effort might not be acceptable to volunteers. It was concluded that a more general survey method including hedgehogs as one of several mammal species to be recorded could be more cost-effective for volunteers.

The Mammal Society, in partnership with the British Hedgehog Preservation Society and The People's Trust for Endangered Species, is now also conducting trials of a different standardised hedgehog survey method using footprint tunnels; initial results are expected in spring 2012. Other ways of detecting hedgehogs in the field are also briefly reviewed including field signs (faeces), the use of dogs, trail cameras and thermal imaging.

A study of the hedgehog *Erinaceous europaeus* distribution and its decline in Great Britain.

Anouschka Hof

The main aim of the research was to better understand the extent of, and the mechanisms behind, the apparent decline of the West European hedgehog (*Erinaceous europaeus*) throughout Great Britain since 1960. The current distribution and relative abundance of hedgehogs was assessed by using a nationwide public participation survey and drivers behind geographical variation and changes over time were identified by comparing this data with data from the 1960s from the UK National Biodiversity Network. An additional aim was to identify mitigation measures necessary to ensure the viability of hedgehog populations. The impact of agricultural management on hedgehogs with particular reference to agri-environments schemes was investigated by means of a radio-tracking field study. An in-depth study of change in hedgehog presence between the 1960s and the 2000s in Greater London investigated the role of urbanization.

The findings in this thesis indicate that although hedgehogs are still widely distributed, their numbers have been falling considerably, which was mainly correlated with an increase in badger abundance, loss of suitable habitat and increased fragmentation. Recently, contrary to that expected based upon the known habitat preference of hedgehogs, hedgehogs were more prevalent in the arable-dominated lowlands of Great Britain than in the pasture-dominated lowlands. This was mainly because of differences in badger abundance and major road coverage. Our results suggest that hedgerows and field margins, features frequently adopted in agri-environment schemes, are highly favoured by hedgehogs. Furthermore, agricultural landscapes may represent “landscapes of fear” for hedgehogs in the presence of a high number of predators, as hedgehogs were on average situated closer to edge-cover in areas with predator presence.

Since both practical and ethical issues are likely to arise with predator control, it seems imperative to seek effective non-lethal methods to preserve hedgehogs. The implementation of agri-environment schemes that include wide field margins and dense, well established hedgerow on farmland is expected to increase hedgehog populations. In urban areas the need or sound ecological management in new development plans emphasising habitat connectivity seems essential. Raising awareness amongst the general public and stressing the importance of wildlife-friendly features in, and connectivity between, urban green-spaces is also likely to benefit hedgehogs.

On the northern edge – behavioural ecology of European hedgehogs (*Erinaceus europaeus*) in eastern Finland

Anni Rautio

There are very few studies on the ecology of hedgehog in its northernmost range. The earlier Finnish studies have focused primarily on species distribution and hibernation physiology. We aimed to explore the ecology of the hedgehogs in an urban environment. The study focused on the behaviour of hedgehogs in their urban habitat: home range, habitat use, activity patterns, nest construction and structure. The study took place between 2004-2007. Main study method was VHF radio telemetry and in total 25 adult hedgehogs were tracked.

Home range size differed between seasons and sexes. In boreal areas the seasonal home ranges are clearly larger than the home ranges of hedgehogs that live in more southern latitudes. The seasonal home ranges of males (80 ha) were larger than those of females (30 ha). It is likely that along with food availability, also parental care among females and consorting with females among males, affect the home range sizes. The home range overlap was different depending on season and with which sex the range overlaps. Although hedgehogs are not territorial we found an interesting pattern with low number of female-female core area overlaps. Females avoid each other's core areas to ensure their own food availability and this may be more pronounced in boreal area, where the time to accumulate fat storage is short.

The nests are ecologically very important for hedgehogs and they spend most of their life in the nests. In this study overall 349 nests were located and 288 of them were day nests, 14 breeding, 36 autumn and 11 winter nests. Most common nest-building materials were leaves, grass and twigs. Almost half of the nests were located in forest and other half was located in garden or park. The majority of autumn and winter nests were located in coniferous forests. Forest is an important environment also for urban hedgehogs. There are plenty of safe places to build a nest and the human disturbance is low. This study shows that forests, wastelands and differently managed parks and gardens are very important in the maintenance of urban diversity.

Measures promoting biodiversity within the rural development programme

Katrin McCann

The county administrative board works with providing information and advice to the country's farmers. We receive applications for EU support and we make decisions in accordance with EU rules.

There is a wide range of tools to promote a certain species such as the hedgehog within the rural development regarding funding opportunities. Farmers can, by following different schemes, during a five year period, take measures towards maintaining and developing biodiversity on the farm and receive funding for those measures. These are a few measures regarding with funding opportunities available to farmers and landowners that can help to promote the hedgehog:

- Nature promoting measures / environmental protection control on cropland
- Maintaining and restoring pastures and hay meadows
- Maintaining and restoring natural and historical monuments and areas within the rural landscape

Within the rural development programme there are several opportunities to deliver messages and education with regards to biodiversity in the rural landscape. The five year plan mentioned above is a document of how and why different environmental precautions are important and necessary. As well as drawing up five year plans the county administrative board gives courses, does visiting work on farms and produces articles and other written information.

By cooperating with other organisations, such as for example the Swedish forest agency, the work towards maintaining biodiversity can reach landscape level. By complementing each other regarding information about different parts of the landscape and offering complementing funding opportunities cooperation can lead to successful projects such as action plans and large scale restoration projects.

At the minute the new rural development programme for 2014- 2020 is being planned and structured by the Swedish board of agriculture and the Swedish forest agency. Hopefully the important tools for preserving and developing biodiversity will remain in the new programme. The trend within the current programme has been an increase in the amount funding opportunities towards specific environmental measures. My hope is that this trend will continue to benefit the hedgehog and other threatened species within our rural landscape and that we will be able to work together in networks on a landscape level.

Do not hesitate to contact me for further information about our work within the rural department of the county administrative board of Västra Götaland. I would be happy to receive ideas on how to continue and develop our work with regards to the hedgehog and its preservation.

Afterwords

Clear examples from Sweden and UK show that, though still widespread, the hedgehog's population is diminishing and disappearing locally in some cases (Olsson, Hof). Some of the parameters that were mentioned during this meeting that could explain this population trend are: traffic mortality, high predation pressure, landscapes barriers, chemicals such as pesticides and difficulties in finding optimal nest sites during winter.

A more variable environment in rural areas, with traditional agricultural landscape, particularly hedgerows and forest edge environments would benefit hedgehogs. Some of these environments could effectively be created using the EUs- rural development program as a way to finance the actions, and inform the landowners about management actions. Hedgerows and field edges are key habitats today for hedgehogs (and beneficial also to other species), particularly when badgers abundance is high.

If a negative trend is on-going, if the long term threats are still present, and if there is a lack of knowledge, then the status of the hedgehog population on a national scale should be considered and the species included in the national red list. Many questions are unsolved about the underlying factors that diminish hedgehog populations across Europe. Probably a combination of many factors is the real threat. Therefore it is important to start with conservation actions plans combined with monitoring to evaluate methodologies to safeguard the future for this species.

