

Eighty years of hibernation surveys: from banding to monitoring and protection

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Forty years ago, a collective of authors described the population trends of a number of bat species in the Netherlands in a special issue of *Lutra*: 'The Dutch bats: population trends in winter and summer roosts' (Daan et al. 1980). The motivation for this special issue was the legal protection granted to bats in 1973 by the *Natuurbescherminswet* (Nature Conservancy Act) combined with the more or less simultaneous decrease in government financing of bat research and consequently, available knowledge. There was a heightened awareness among those involved of the need for more cooperation and exchange of information. The 'bat world' at the time consisted of staff members of two university research groups (Utrecht University en University of Amsterdam), two government organisations in the field of nature management (Rijksinstituut voor Natuurbeheer / Research Institute for Nature Management and Staatsbosbeheer / State Forestry Service) and two natural history museums (Rijksmuseum van Natuurlijke Historie, now Naturalis Biodiversity Center, in Leiden and the Maastricht Natural History Museum). Furthermore, two volunteer groups were involved: the mammal study group of the NJN, (A)CJN (youth organisations for nature study) and the 'groevenlopers' ('quarry walkers') of the Studiegroep Onderaardse Kalksteengroeven (study group for

subterranean marl quarries), part of the *Natuurhistorisch Genootschap* (natural history society) in Limburg. Apart from these organisations, there were a number of people who were at the time or formerly interested in bats. Everyone included, the 'bat-world' summed up to about 40 people. The responses to a survey carried out among them showed wide support for the establishment of a coordinating council. Representatives from the groups mentioned above formed the Committee for the Study and Protection of Bats, which joined the Dutch Mammal Society and was expanded with participation from the responsible ministry (at the time, the Ministry for Culture, Recreation and Social Work). The committee advised on the execution of the bat counts and the granting of permits, which were required as of 1973. The committee also realised right away that more understanding of population trends was needed both to prove the need for and aid in the implementation of protective measures. It was decided that all available data from bat surveys would be brought together and published. The result was the aforementioned special issue of *Lutra* with contributions from 17 authors, including a chapter of conclusions.

Most of the available data were collected in the marl quarries of southern Limburg. A major part of it originated from banding studies that were started by the founder of bat research in the Netherlands, L. Bels (1952), and were continued by the zoology department of Utrecht University. After banding here stopped in

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1957, the 'Utrecht' data were seen more as counts than as captures. Research by the Animal physiology department of the University of Amsterdam, carried out between 1950 and 1970 was aimed at the relationship between climatology and hibernation in the quarries and required surveys based on floor plans of the quarries. Many new floor plans were drawn up by staff members of the National Institute for Nature Management who participated. These 'Amsterdam' data were on the one hand based on more complete surveys, but on the other hand usually ran for only a few winters and each study involved different quarries which limited the number of quarries with long-running series of surveys. Only in part and only as of approximately 1965 were surveys by volunteers, particularly by the mammal study group of the NJN and (A)CJN and the "quarry walkers" able to provide additions. Out of approximately 35 quarries considered the most important for bats at that moment, 16 were found to have sufficient data available on them to calculate a trend for eight species, albeit on the base of a average numbers over periods of five winters. Due to gaps in survey series, data from fewer quarries were available for trend calculations. Among others, the quarries on the Dutch side of the St. Pieterberg, where originally the highest numbers of bats were found, had to be disregarded. Calculations based on total numbers made the significant decline from 'before' to 'now' evident immediately (Daan 1980). The log scale graph based on these calculations (figure 1) was much quoted as a source and thereby became iconic.

To answer the question whether this was a national or a regional trend, data from elsewhere in the country were taken into account. However, the number of hibernation sites outside the marl quarries proved to be very limited, both in number and in geographic spread. The Utrecht banding study was expanded as of 1950 to a number of brickwork forts in the Nieuwe Hollandse Waterlinie. The State Forestry Service and RIVON (predecessor to RIN, the Rijksinstituut

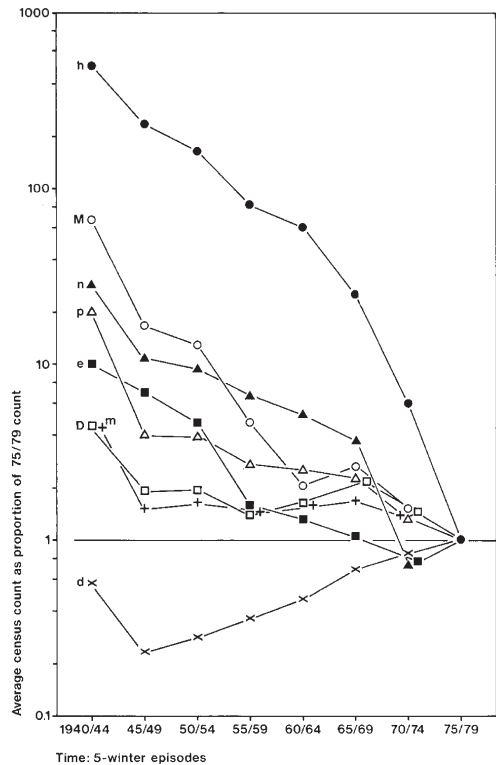


Figure 1. Relative numbers of bats in 16 marl quarries, compared to the corresponding survey average for the 1975-1979 winters. h = *Rhinolophus hipposideros*; M = *Myotis myotis*; n = *M. nattereri*; p = *Plecotus* sp.; e = *M. emarginatus*; m = *M. mystacinus*; D = *M. dasycneme*; d = *M. daubentonii* (taken from Daan 1980).

voor Natuurbeheer / Research Institute for Nature Management) performed studies of castle basements as hibernation sites around 1960 and of ice cellars around 1967. With the inclusion of a few 'accidental discoveries', no more than 55 objects outside the marl quarries were known to be hibernation sites, most of them located within a limited area in the centre of the Netherlands. They were 17 forts and other brick defense works, 7 castle basements, 21 ice cellars and 8 'other' constructions, plus 2 concrete bunker systems which had recently been visited for the first time. However, long-term surveys were only available from a number of forts. From castle basements and ice cellars, practically the only data available dated

from shortly after their discovery. To obtain recent data about 30 constructions were visited again in the winters of 1977 and 1979. The data from these three categories, though modest in numbers, supported the trends found in the marl quarries. The concluding chapter therefore stressed the need for protective measures to accompany legal protection. Furthermore, it posed that more study was needed to support the selection of effective measures.

At the time, the 17 authors of the special issue constituted about half of all people involved either professionally or as a volunteer in study or surveys of bats around 1980. This number gradually increased in the following years and several of them, using the experience gained in the marl quarries, discovered new hibernation sites, which in many cases were surveyed yearly. These surveys too were coordinated by the Committee, including the permits needed. In the winter of 1987 no less than 140 objects were surveyed outside the marl quarries by 25 'survey leaders', resulting in a sum total of more than 2000 bats counted. A new impulse was given by the start in 1987 of the 'Vleermuis-atlasproject' (VAP, 'bat atlas project') which attracted many new bat workers to bat distribution study with bat-detectors. Many of them too went along on winter surveys, became enthused and gained experience and made sure more hibernation sites were found. Among those sites were the first purpose-built new bat hibernation cellars, besides existing structures which had lost their function, like the ice cellars of before. From 1990 onwards, all hibernating bat surveys were coordinated by the board of the VLEN (Vleermuiswerkgroep Nederland, Dutch Bat Society) which, just like the by then no longer existing committee, is part of the Dutch Mammal Society.

Meanwhile, from the point of view of nature policy, the need for a better understanding of current developments in distribution and numbers of plant and animal species grew. For example, the population development of hibernating bats in the marl quarries of Zuid-

Limburg was studied once more (Weinreich & Oude Voshaar 1987).

Besides the National Databank Flora en Fauna (National Database Flora and Fauna) for distribution data, these developments led to agreements with the societies for the study and protection of species groups, such as the VZZ (Dutch Mammal Society), on monitoring projects for certain species and species groups. After a preliminary study, among other things into the suitability of hibernation surveys as an instrument for trend monitoring and possibly distribution monitoring (de Wijs 1995) this led to the Mammal monitoring project as a commission from various government authorities, such as the Ministry for Agriculture, Nature management and Fisheries, for the VZZ. From the entry and analysis of the data from hibernation counts up to 1995 it was determined that the data from the 1986 winter onwards were suitable as the starting year for the monitoring. As a consequence of this commission, the VZZ office took over the organisation of the hibernation surveys. This now well established system of staged coordination through the various provincial mammal and bat study groups that had arisen, was henceforth maintained. However, a somewhat stricter protocol for the execution of hibernation surveys was laid down, with a more clearly defined survey period among other things. Also, buildings situated near each other that were formerly considered a single system and object, but were not always all counted, were numbered as separate objects to allow comparison across surveys. Furthermore, since then photographic evidence is requested in cases where rare species are found for the first time in objects. In marl quarries, this concerns horseshoe bats, Bechstein's bat, grey long-eared bat and Western barbastelle. Outside the quarries, greater mouse-eared bat, Geoffroy's bat and pond bat are included.

Where bat winter surveys until the end of the 1960s were mostly in the context of scientific banding studies of migratory behaviour and the physiology of hibernation in the

marl quarries, in the following decades monitoring of population numbers, trends and protective measures gained more attention from the perspective of nature policy. Meanwhile the 'natuurtoets' (environmental impact assessment), in which the expected effects of a planned activity on protected flora and fauna occurring in the region are assessed in the light of the Wet Natuurbescherming (Dutch Nature Conservation Act), is obligatory for project developers. This is associated with more knowledge about and experience with bat at consulting agencies. With the devolution of state nature policies to the provinces, we also perceive an increased interest in bat monitoring. In the Natura 2000 European network of protected areas too, there is increased attention for the functions these areas provide for bats, such as swarming behaviour and hibernation, and for protecting and expanding them. Yearly surveys are and remain an essential tool in shaping this protection.

Now, forty years after the 1980 special issue, in the winter of 2019-2020 back then unimaginable numbers of survey leaders and assisting surveyors, in then unimaginable numbers of objects (including marl quarries) counted a then unimaginable total number of nearly 20,000 hibernating bats. The enthusiasm for this kind of bat research has remained, as

has the search for explanations for changes in survey results.

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