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Ecology and Conservation of Tengmalm's Owl *Aegolius funereus*

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If we want to undertake protective measures, we first should know about the distribution and populations of the species in question: we need a census. This is much more difficult in owls than in most diurnal birds, because of their nocturnal life. Knowing more or less the appropriate habitat, our normally diurnal life has to be changed into a nocturnal one, that is to say for much of the year we have to be active from dusk to dawn! As an example I present here a short report on my own long-term research on Tengmalm's Owl in SW-Germany:

A Tengmalm's Owl population has been studied by us in the mountain forests of the Black Forest and the Swabian Jura from 1962 up to now. The typical habitats are extended, mostly coniferous forests with aged firs, spruce and pines, mixed with some beech and other deciduous trees.

We visit these forests regularly from about February to mid-summer as often as possible. The most important season to find the owls is late winter and early spring, when unpaired males sing intensively on calm nights. But early in the year the forest floor is often covered by snow. Therefore in many cases the excursions have to be made on skis.

It is important to begin very early in the year, as males of Tengmalm's Owl only sing intensively as long as they are not mated. After being paired, males are rather quiet and soon stop singing at all. Other vocalizations may be heard occasionally, often only if provoked by playback.

This is the most important point for censusing owl populations: the knowledge of vocalizations. Every species has a vocabulary in which the territorial song is the most prominent. But in many species the activity of singing decreases dramatically after mating. Therefore, knowledge of other vocalizations in the whole vocabulary is needed. This may be difficult in regions where other night birds with similar vocalizations might occur.

Therefore bioacoustic studies on owl voices are extremely necessary, as the latter are the most important isolating mechanisms between owl species. In nocturnal birds plumage patterns are of less importance for mutual recognition than are vocal patterns. Therefore owls can afford a great variability in plumage, as well as different colour-morphs. On the other hand, in every species the whole vocabulary is entirely inherited and varies only individually. There is only rather slight geographical variation, always showing the specific pattern. Keeping this in mind, it must be clear that vocalizations of two individuals differing far beyond the "normal" scale of individual or perhaps geographical variation, must be different species!

In Tengmalm's Owl the individual variability of the territorial song is rather large for an owl. So single species may be easily distinguished "personally" from others. This is very striking, when several males may be heard singing from one point. This individual variability is found in all populations of that species in the Holarctic. But the typical specific character of the song is obvious in all cases.

Tengmalm's Owl can afford a large individual variability of song, as it does not have to compete with similar species of the same size in its habitat. On the other hand the locally rather high density of populations allows selection for the females and their personal recognition of certain males.

For a census we control an area of several km^2 in one night. The song of Tengmalm's Owl may be heard at large distances (often over 1km). Beyond that we use a directional telemicrophone with amplifier and earphones for listening. The songs are recorded on a portable tape recorder (cassette or DAT) for analysis by sonagraph and stored in the laboratory. By this method we are quite often able to recognize the same male over the course of some years, without having controlled its ring. By banding we could prove this assumed hypothesis in several cases. Tengmalm's Owls mostly sing near a potential nest-hole (or nest-box), and males tend to keep to certain breeding sites for several years. This is an aid in censusing.

All recorded males are mapped on copies of a topographical map 1 : 25 000, on which we also mark the breeding-place. So population density and annual fluctuations become apparent.

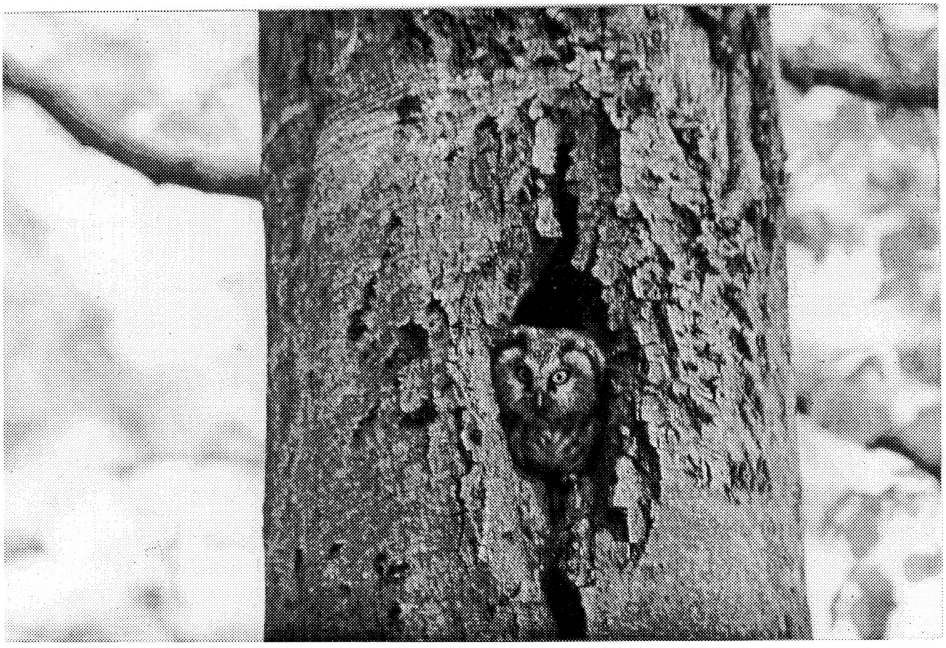
We also map records of other owl species in the study area. We therefore from the beginning, included another threatened species in our research: the Pygmy Owl *Glaucidium passerinum*, living in the same habitats in the Black Forest.

Like many owls, Tengmalms' Owl populations depend on the abundance of small rodents. So in years when mice are scarce, only a few

males sing and breeding is very rare. Also the number of eggs laid and breeding success are much lower than in normal years. In the following season the situation may be different. Therefore census should be made over the course of several years, in order to obtain realistic data for the status in certain areas. Pygmy Owls are less dependent on the abundance of small mammals, as they are able to feed to a large extent on birds. Therefore the annual populations do not show such enormous fluctuations as is normal in rodent-eating owls. The study of pellets and other prey remains is, therefore, very important for monitoring possible fluctuations in owl populations.

Many species nest in cavities, mostly in abandoned woodpecker holes. Therefore forests with aged trees are of great value if they contain nesting

Figure 1. Female Tengmalm's Owl peering out of a natural cavity made by a Black Woodpecker. Photo: C. König.



holes. It is important to contact the forest authorities for conserving old trees with woodpecker holes. Nest-boxes are accepted by owls in many areas and are often a great help for studying breeding ecology. But we should keep in mind that they should not totally replace natural nest sites. They are doubtless a protective measure, but should not be overestimated in comparison with the ecological value of natural habitats and nest-sites!

Tengmalm's Owl may be polygamous. We found some males each paired with two females breeding both at close range. In other cases we could observe

Figure 2. Natural nest hole protected by cuffs of sheet-iron.
Photo: C. König.

that a female mated with a second male during the same season, after a brood with the first male had been destroyed by a predator. These observations are unquestionable as the birds were ringed.

Controls of potential nest sites provide information on the number of cavities occupied by females. Normally a faint scratching of the tree-trunk is sufficient to provoke the breeding female to peep out of the nest hole. This is an inherited reaction in response to the scratching noise made by Martens climbing up the trunk. Beyond that the female camouflages the entrance of the nest-hole with her head. If the predator comes too close, the female normally leaves the nest. But just before hatching she very often stays but crouches down in order to protect the clutch or newly-hatched chicks. In this case she too will be a victim of the predator. Where Martens are abundant, their predation on clutches and breeding females may influence the population dramatically. We therefore evolved measures to protect natural cavities and nest-boxes from predating Martens (*Martes foina* and *Martes martes*): we fix cuffs of sheet-iron around the tree-trunk above and below the nest-hole. The diameter of every cuff is about 50cm. This method proved rather successful, especially at natural nest sites (holes of Black Woodpecker *Dryocopus martius*). Nest-boxes may be protected in a similar manner, or by covering the whole front with sheets of plastic. If the opening of the nest-hole is close to other trees (less than 4m), Martens may jump from a neighbouring branch into the aperture of the cavity. This may occur above all with nest-boxes hung up too close to neighbouring trees, a point to be considered when artificial nest-boxes are being used!

These measures may help to reduce the influence of predation on the breeding population, but there are other dangers against which almost nothing can be done. Among these the most important is the dying of the forests due

to acid rain. Storms often do the rest and large areas of forest disappear.

Among potential dangers one curiosity is worth mentioning: breeding females of Tengmalm's Owls and their offspring may be endangered by the activities of Nuthatches *Sitta europea*, which may close openings of Tengmalms' nest-holes with mud and leave only a small hole. Controlling nest-holes occupied by owls, we several times found the entrance almost totally closed. Breaking this open, we encountered female owl and chicks inside the cavity. The male had been feeding the female through the small hole left by the Nuthatch. After we had cleaned the females and returned them, further development of the brood was normal and the young fledged.

The measures mentioned may be applied to most owl species breeding in cavities. Large species such as Tawny, Ural *Strix uralensis* and Barred Owl *Strix varia* are rather aggressive and therefore less endangered by predators. They accept nest-boxes as well as Tengmalm's Owls. My friend and colleague Pertti Saurola has long experience with nest-boxes in Finland, and has established an important production of northern owls. But in certain areas of Central Europe with populations of Tengmalm's and Pygmy Owls, it is not appropriate to favour Tawny Owls by hanging up large nest-boxes. In regions with dense populations of *Strix aluco*, the latter has proved to be a dangerous predator for smaller owls, not only for Tengmalm's but also for Little and Scops Owls.

An abundance of nest-sites is very important for owl populations. But above all, the conservation of appropriate, rather natural habitats with an undisturbed ecosystem, is one of the most important tasks in the protection of owls. In hard winters feeding of Long-eared Owls *Asio otus* near their daytime roosts has proved successful. At the beginning, I mentioned the importance of vocalizations and I wish to emphasize the necessity of much more bioacoustical studies in many species of owls. There are so many taxa very similar in size and plumage that they are quite often considered as conspecific. Recent studies on bioacoustics have shown clearly that in most cases several species are involved. Indeed, bioacoustical studies in owls suggest that the number of species in the world is much larger than has been previously estimated. Up to now these investigations have always been backed up by molecular-biological research. So some taxa will have to be split, and several races will reach the status of full species.

These results are not only of academic interest. They have great importance for conservation. We now have to consider that some taxa, generally thought to be races of a species, are in reality separate species which perhaps need protective measures to survive. In the future we doubtless will meet with such situations, above all in Asia and in the Tropics of the Old and

New Worlds. Therefore taxonomy is an important aid for conservationists, who should encourage studies on ecology and behaviour in most species of owls. Scientific research and conservation cannot be separated - both are parts of a unity which we urgently need in our common efforts for the protection of species.

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