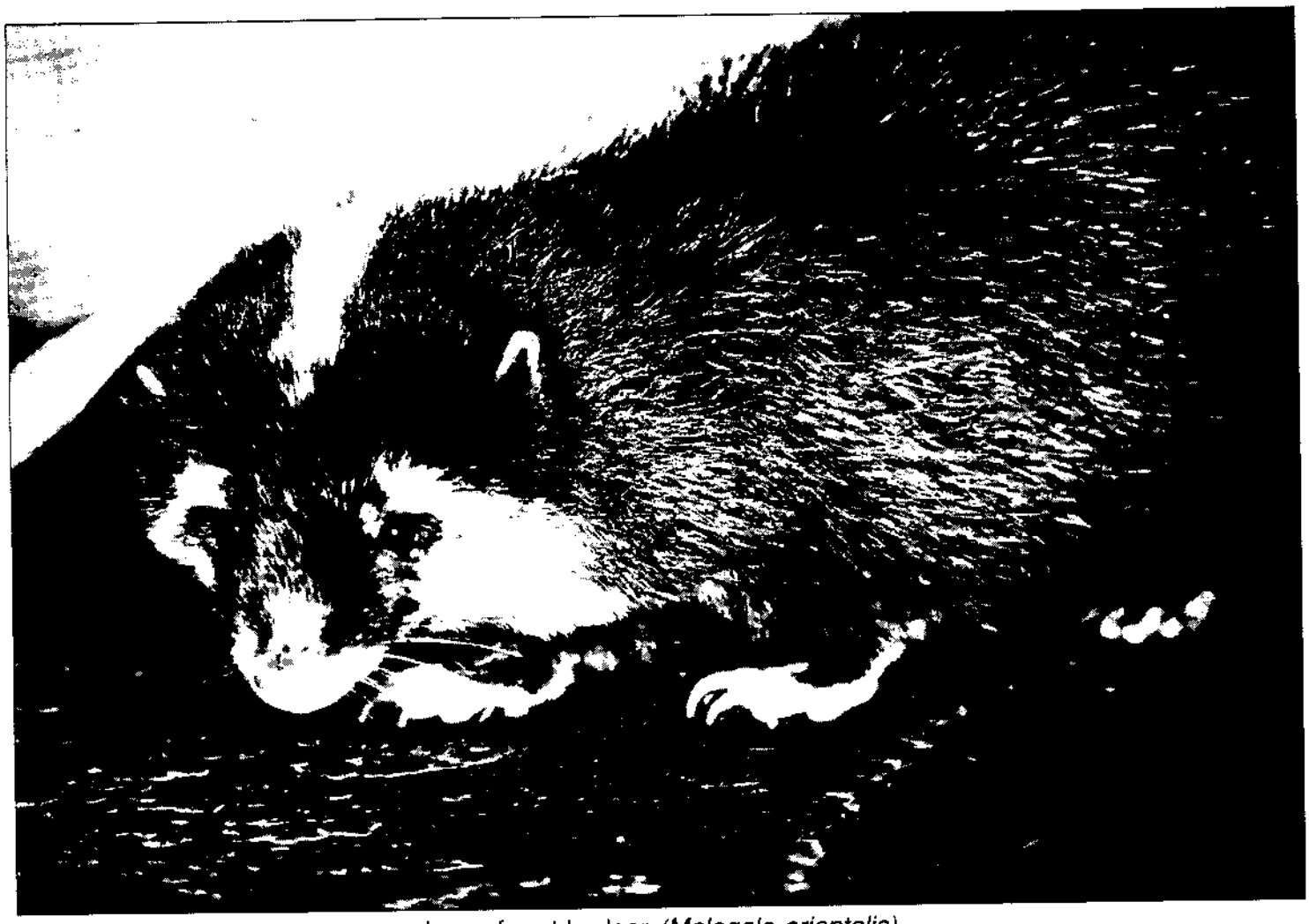
MUSTELID & VIVERRID CONSERVATION

The Newsletter of the IUCN/SSC Mustelid & Viverrid Specialist Group

Number 5 October 1991



Javan ferret-badger *(Melogale orientalis)*.
This rare mustelid was photographed in Ragunan Zoo, Jakarta, by M. Riffel.

This number was produced with the support of
the "Royal Zoological Society of Antwerp", Antwerp, Belgium,
and the "Metropolitan Toronto Zoo", West Hill, Ontario, Canada.

Mustelid & Viverrid Conservation

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We are particularly grateful to Walter Rasmussen for reading the manuscripts and improving the English style.

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The aim of this newsletter is to offer the members of the IUCN/SSC M&VSG, and those who are concerned with mustelids or/and viverrids, brief papers, news items, abstracts, and titles of recent literature. All readers are invited to send material to:

Mustelid & Viverrid Conservation
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EDITORIAL

As from this year the IUCN/SSC Mustelid & Viverrid Specialist Group has become the IUCN/SSC Mustelid, Viverrid & Procyonid Specialist Group. Mustelids, viverrids, and procyonids look like a rather strange combination of not very closely related families to assemble under one umbrella and in practice it is even more complicated.

The group is responsible for all the lesser known mustelids but not for the comparatively popular otters (Lutrinae), and our responsibilities for the procyonids include the Lesser panda *(Ailurus fulgens)*, which some argue is not a procyonid at all. However, looking after the Greater panda, certainly one of the world's most widely known and beloved carnivores, is excluded from our duties. The viverrids, in comparison, look rather straightforward in this respect in that SSC has entrusted us with the responsibility for the whole family -if indeed it is one family, as mongooses may not be closely related to the rest of the viverrids and quite likely constitute a family of their own.

So, what then have all the animals assembled under the umbrella of the Mustelid, Viverrid & Procyonid Group in common and why has IUCN's Species Survival Commission chosen to entrust one Specialist Group with responsibility for such a mixture of taxonomic groups?

The answer is quite simple: these are the forgotten small carnivores without the public appeal of the cats, canids, bears, seals, and otters. While it may seem as if SSC is looking at the MV&PSG as the "dumping place" for all the forgotten and unwanted small carnivores, quite the opposite is correct. These small carnivores, only because the general public and to some extent also the scientific community is not very interested in them, are ecologically or scientifically no less important or, for that matter, of lesser conservation value than their more glamorous cousins. IUCN has a special role for the Mustelid, Viverrid & Procyonid Specialist Group to play: we need to ensure that all the little known and little studied carnivores receive their share of attention and conservation action. Rather than being the Specialist Group of the "unimportant" carnivores, this is a particular challenge for us.

With this in mind, how have we fared in the last three years or rather since the production of the Action Plan for Mustelid & Viverrid Conservation in 1989? There have been some successes...

Galidictis grandidieri, only described in 1986, has been found alive and not even seriously threatened at this time in Madagascar by Chris Wozencraft.

Liberiictis kuhni, not previously seen alive by any scientist is now being kept in a zoo for the first time, its continuing (albeit threatened) existence in Liberia was confirmed and the species has now also been found to occur in Ivory Coast's Tai National Park. The Metro Toronto Zoo made a considerable financial commitment to the conservation and research programme for the Liberian mongoose in Liberia and it is very disappointing that this project, which would have been so important not only for the Liberian mongoose but also as a forerunner for similar projects we hope to initiate with other zoos, came to an abrupt end due to the suddenly erupting political turmoil in Liberia.

In India the group assisted in getting initial survey work on *Viverra civettina* started. The results of this work, competently carried out by Ashraf Kunhunu of the Wildlife Institute of India, assured us, at least, that the Malabar civet is not yet extinct as feared. However, it also confirmed that the species is seriously threatened and the task of rediscovering the species is negligible compared to the challenge of now ensuring its survival.

Closer to my home we contributed to finally getting the European mink (*Mustela lutreola*), one of Europe's five most endangered mammal species, on the agenda of the decision makers (see this issue of the newsletter). Again, while this is an important step forward, a comprehensive recovery effort for the species is still to come.

The only seriously threatened species under the auspices of the group now well on its way to recovery is the Black-footed ferret *(Mustela nigripes)*. Our American colleagues have demonstrated how a combination of research, education, and captive breeding can have dramatic results. The highly successful captive breeding programme resulted in a rapid increase from a world population of only 17 black-footed ferrets in 1988 to well over 300 animals at present. A first reintroduction attempt may be carried out this year and as a result of a well run publicity campaign there is now protected habitat available for possibly several thousand ferrets, while there was none when the project started.

Joy over the success of the black-footed ferret programme should, however, not lead us to forget that we still do know next to nothing about most of our threatened species. During the last couple of years we made no progress whatsoever in elucidating, for example, the whereabouts of *Mustela felipei*. This species is still only known from four museum specimens. We still know hardly anything on the otter civet *(Cynogale bennettii)* in Asia, a unique species which is probably now seriously threatened. And these are just two out of several dozen similar cases.

I must end my editorial remarks therefore with a plea to all of you to take up the plight of one of these forgotten small carnivores and take a lead in implementing some action for their study or conservation.

For the first time we also have some difficulty filling the pages of the newsletter. Therefore, please do provide Harry Van Rompaey with articles, notes, news clippings, etc. relating to small carnivore conservation.

Roland Wirth
Chairman IUCN/SSC
Mustelid, Viverrid & Procyonid
Specialist Group

As from 1992 "Mustelid & Viverrid Conservation" will become "Small Carnivore Conservation".
After merging with the Procyonid Specialist Group we will be concerned with about 150 species of small carnivores, so the name "Small Carnivore Conservation" seems appropriate enough.
We could not really call the newsletter "Mustelid, Viverrid & Procyonid Conservation"!
At the same time we would like to welcome Angela Glatston as an editor of the newsletter.

An update on the Javan ferret-badger *Melogale orientalis* (Horsfield

Michael RIFFEL

The ferret-badgers represent a group of mustelids endemic to the Oriental biogeographic realm. Morphologically and ecologically they form a link between the martens and the badgers.

The genus *Melogale* has been a taxonomist's nightmare for a long time as its members are morphologically rather similar. For that reason the composition of the species group is rather heterogenous.

As long as no taxonomic study is available it appears to be wise to accept four species: the Large-toothed or Burmese ferret-badger, *Melogale personata* (Geoffroy, 1831), the Small-toothed or Chinese ferret-badger, *Melogale moschata* (Gray, 1831), the Kinabalu ferret-badger, *Melogale everetti* (Thomas, 1895), and the Javan ferret-badger *Melogale orientalis* (Horsfield, 1821).

The Javan ferret-badger was originally thought to be restricted to Java (Van Strien, 1986; Van der Zon, 1979) and therefore to represent the only endemic carnivore species of that island.

The Javan ferret-badger is distributed throughout the island. Two subspecies have been described: *Melogale orientalis orientalis* (Horsfield, 1821) in the eastern part and *Melogale orientalis sundaicus* Sody, 1937 in the western part of Java. The eastern subspecies tends to be larger (Sody, 1937).

For a long time Java has been known for its human overpopulation and concomitant dramatic decline of natural habitat. Therefore a number of species endemic to Java are nowadays given the highest conservation priorities, a policy that also applies to the mustelids and viverrids. Four taxa, the Javan yellow-throated marten, *Martes flavigula robinsoni*, the Javan small-toothed palm civet, *Arctogalidia trivirgata trilineata*, the Indonesian mountain weasel, *Mustela lutreolina*, and the Javan ferret-badger, *Melogale orientalis*, have been listed in the mustelid and viverrid conservation action plan and Java has been identified as one of seven co areas worldwide for conservation action to be taken for that group of carnivores (Schreiber *et al.*, 1989).

The Javan ferret-badger is virtually unknown with respect to its ecology and conservation status. Data on habitat requirements and distribution are scant. Most of the museum material outside Indonesia is labelled "Java" only and thus useless for identifying the distribution limits of the species.

However in the meantime the material of Museum Zoologicum Bogoriense in Bogor, Indonesia, has been examined and an extended map was drawn using these data (Fig. 1).

The collection of Museum Zoologicum Bogoriense provided first evidence of the occurrence of the Javan ferret-badger in Bali. An immature specimen labelled "Bali" was collected by De Jongh in Bali in 1979. However information on habitat, elevation of the collection site, and detailed data of collection are lacking.

On 27.07.1991 I found a dead Javan ferret-badger on a forest trail approximately 300 m south of Lake Buyan in Central Bali at an elevation of 1,180 m. It had obviously been killed by a motorcycle for the skull was completely smashed. The specimen was fully grown but as the flesh had almost been eaten by maggots the sex could not be identified. The habitat at the locality consisted of secondary forest and a rubber plantation. Human settlements are found 2 to 3 km east of the location.

The Javan ferret-badger has so far not been listed among the mammals known to occur on Bali (Sody, 1933; Van der Zon, 1979; Van Strien, 1986) and has therefore to be omitted from the list of endemic mammals of Java.

Although the known range of the species has now been extended and the existing habitat of the above mentioned locality

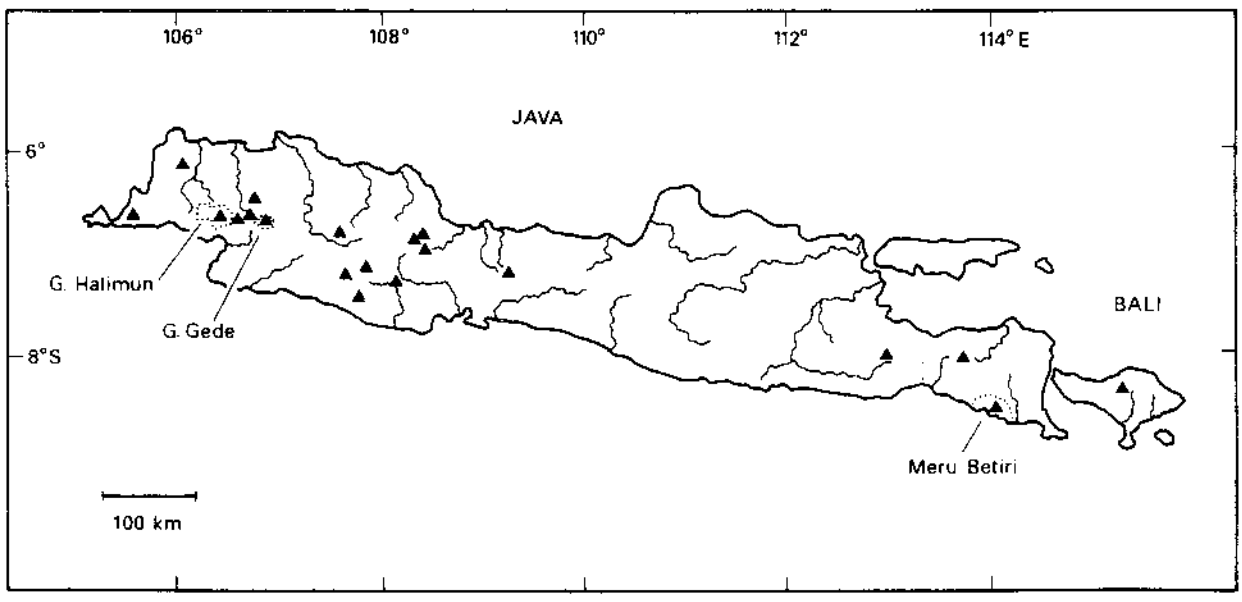

Fig. 1. Distribution map with known records of the Javan ferret-badger (*Melogale orientalis*)

Field To

ves some indication that the species is not dependent on primary forest its conservation status is still unknown.

When looking at the data of occurrence of the Javan ferret-badger in protected areas only three records have been confirmed within the last few decades: G. Gede-Pangrango National Park where three specimens were collected in 1970, Meru Betiri National Park (Seidensticker *et al.*, 1980) where the Javan ferret-badger was reported to occur near Sukamade in the centre of the reserve, and Gunung Halimun Nature Reserve, where a survey conducted by the Biological Science Club revealed the species' continuing occurrence in that area (Yossa *et al.*, 1990).

Hence populations of both subspecies are known to occur in protected areas: the western subspecies *Melogale orientalis sundaicus* in Gunung Halimun Reserve and Gunung Gede-Pangrango National Park and the eastern subspecies *Melogale orientalis orientalis* in Meru Betiri National Park.

Records of Javan ferret-badgers in captivity are scant with most of them dating back to the end of last and the beginning of this century with a record from Artis Zoo (Amsterdam) in 1921 being the most recent one (Schreiber *et al.*, 1989).

A male Javan ferret-badger died in Ragunan Zoo (Jakarta) in 1982 and its remains are preserved in the collection of Museum Zoologicum Bogoriense. In the summer of 1990 a pair of Javan ferret-badgers was kept at Ragunan Zoo and both were still alive in August 1991. The geographic origin of the animals is unknown (Madinah, pers. comm.). Interestingly the two ferret-badgers spent most of the time on a board attached to the back wall about 1.5 m above the cage floor. They were also observed climbing in branches in the cage. This gives some indications on the arboreal abilities of this species.

Another Javan ferret-badger was offered for sale at the Pramuka bird market in October 1990. The specimen however was in a very bad condition and died the day after.

As a conclusion of the new data it could be noted that the Javan ferret-badger appears to be the best known among the Javan mustelid taxa identified as threatened by the IUCN/SSC Mustelid, Viverrid & Procyonid Specialist Group since almost no new information on the other taxa has turned up during the last years.

Acknowledgements

I would like to thank Drs. Boeadi, curator of the Mammals Section of Museum Zoologicum Bogoriense, for his kind assistance and access to his collection, and Drs. Madinah of Ragunan Zoo, Jakarta, for his most valuable information on the captive Javan ferret-badgers.

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Survey of the carnivores of Gunung Halimun Nature Reserve, Java

The Indonesian island of Java is home to 17 species of carnivores, six of them belong to the family of the mustelids and another six are members of the viverrid family.

Java has been identified as a 'conservation priority area' for the mustelids and viverrids, and field surveys were strongly recommended (Schreiber *et al.*, 1989).

The Gunung Halimun Nature Reserve in western Java comprises the largest area of evergreen lowland and hill rainforest remaining in Java: 400 km² have been protected area since 1979. It is situated approximately 20 km west of Bogor. Unlike the well known Ujung Kulon National Park Gunung Halimun has never been thoroughly studied despite its outstanding importance for the survival of many endangered species.

The Biological Science Club, a Jakarta-based student organisation, has been conducting a biodiversity project at Gunung Halimun for several years. Within this program a study of the carnivores which was mainly based on questionaires among the local people was initiated by the 'IUCN/SSC Mustelid, Viverrid & Procyonid Specialist Group' and fully funded by the 'Zoological Society for the Conservation of Species and Populations', Munich, Germany.

The survey took place in December 1990 and January 1991. Besides confirmed records of the Javan leopard (*Panthera pardus melas* G. Cuvier, 1809) and evidence of a small population of the Javan tiger (*Panthera tigris sondaica* Temminck, 1844) the expedition found some of the mustelids and viverrids to occur in obviously healthy populations. The Asian small-clawed otter (*Amblonyx cinerea cinerea* Illiger, 1815), the Javan ferret-badger (*Melogale orientalis sundaicus* Sody, 1937), the Malay badger (*Mydaus javanensis javanensis* Leschenault, 1818), the Javan mongoose (*Herpestes javanicus javanicus* Geoffroy, 1818), and the Common palm civet (*Paradoxurus hermaphroditus javanicus* Horsfield, 1824) were common within the vicinity of the reserve. Two species, the Binturong (*Arctictis binturong penicillatus* Temminck, 1841) and the Javan small-toothed palm civet (*Arctogalidia trivirgata trilineata* Wagner, 1841) were only rarely encountered by the local people.

No information however could be obtained about the Small Indian civet (*Viverricula indica rasse* Horsfield, 1823), the Banded linsang (*Prionodon linsang gracilis* Horsfield, 1821), the Indonesian mountain weasel (*Mustela lutreolina* Robinson & Thomas, 1917), and the Javan yellow-throated marten (*Martes flavigula robinsoni* Pocock, 1936).

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Stone martens and cars: A beginning war ?

Nicole LACHAT

Introduction

The Stone marten *(Martes foina)* is a carnivore and a member of the mustelid family (Fig. 1). In Europe, this family counts 12 species. The best known are: weasel, ermine, polecat, otter, badger, wolverine, pine- and stone marten.

Stone martens came originally from Asia. They colonized Europe after the last glacial period. Now, we find them from Mongolia and Himalaya to south-west Europe (Fig. 2). They are absent from most of the Mediterranean islands except Crete, and also from Great Britain, Ireland, and Iceland. The northern limit of their range is Denmark. (Note that Pine martens live in the whole of Scandinavia).

In Switzerland, stone martens live everywhere (up to 2,500 m high), including towns. But their optimal habitat is in the fields, near or in human settlements. Stone martens generally sleep in straw or hay, in wood piles or under tiles. These lodgings are distributed over their complete home range.

Stone martens are more omnivorous than carnivorous generalists. Their diet is based on a great variety of food (animal and vegetable) but also on refuse and carrion. They are great opportunists, using the first easy-found food and keeping the more difficult to catch prey for bad conditions. The best hunting areas are wooded pastures, selvedges, and dry stone walls.

Stone martens are almost exclusively nocturnal. They spend the day inside, beginning their activities only with darkness. Contrary to the other members of the family, stone martens have been in expansion for about twenty years. Very well adapted to humans, they put up with their presence. Furthermore, they use them to find shelter, food, and heat. This cohabitation is not always easy...for both species!

A strange phenomenon

Since the end of the seventies, garage mechanics have noticed an increase of untypical damages in cars: these damages were not due to natural oldness of the material. First, mechanical damages preventing starting were identified as well as "malicious" damages like cut cables and tube's tears. Then, the cars were very well inspected and biologists and hunters interrogated. Particular signs were found in the vehicles. Sometimes, rests of food and hairs were collected. Finally, stone martens were charged with this damage. In fact, teeth prints were really obvious on tubes and rubber parts. Since then stone martens were often called "rodents", although the bite was typically carnivorous. Even strong cables like those of the starter system may be cut with only one bite.

Now, why do stone martens "attack" cars?
The answer is not established with enough scientific accuracy yet. However various reasons have been investigated for several years, especially in the Justus-Liebig-University of Giessen (Germany). The first suppositions, saying that stone martens eat those "pieces of cars", were rapidly shown as inexact. After the bite, all pieces are in general still there. Many tests were carried out to establish whether some materials, odours, or temperatures were more attractive than others. Those tests were rather unsuccessful. Finally, the easiest and most sensible explanation is that the marten's bite is playful, like a dog with slippers. Most of the time, only the easiest reached cables and tubes are damaged. This biting behaviour could be a part of an intensive exploratory behaviour, leading to a broad trophied niche. Besides, statistics reveal a seasonal pattern to car damage: in the springtime, after the stone marten cubs are born, there is an increase in the number of attacks on cars. The mother brings her cubs in cars to discover for themselves what items are nutritional or not. By the time the cubs leave their mother in autumn, the attacks begin to decline. They have discovered that there is nothing interesting to eat in cars.

Fig. 1. Stone marten *(Martes foina)*. Photo by N. Lachat.

Fig. 2. Distribution of the Stone marten in Europe.

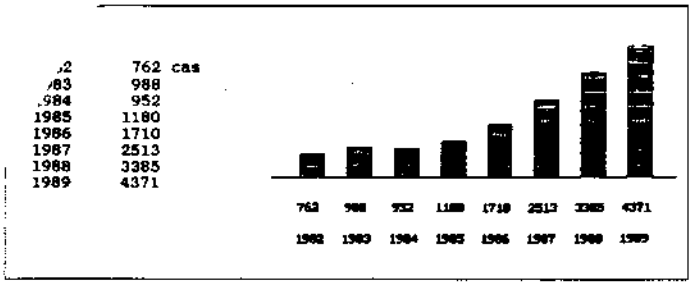

Fig. 3. Statistics of the Swiss Touring Club show increasing reports of car damage cases.

The parts that are most often damaged are: electric cables or their insulation, starter cables or their insulation, cold water tubes, tubes of the windscreen washing system, tubes of the air system, and cold- or noise preventing insulation under the bonnet. There is not yet any precise report on the damage on brake systems, gasoil tubes, or tyres. The hardest parts are normally of less interest.

Historical account

This phenomenon is not new. It began in 1976/77 around Winterthur, in northeast Switzerland. Isolated cases were signalled also in several European countries, but they were generally attributed to mice or rats. During the eighties the problem increased, especially in southern Germany and in northeastern Switzerland. Then it expanded to the southwest, reaching also the French-speaking part of Switzerland.

As mentioned before, stone martens are now in expansion, not really in the fields, but rather in towns. Thus, it is probable that, in the future, drivers in Germany and Switzerland will have to deal with stone martens, the more so because they have no predators except for human ones.

Why do only odd stone martens play in cars? It seems that the potentialities of discovery are very different from one stone marten to another. Probably, stone martens of many regions have not yet learnt that cars can be amusing sites for experiments.

Solutions and advice

What can we do against "car eaters"?
Although the real reasons of this phenomenon are not yet known, solutions should be found rapidly. Damage to cars is very expensive.

Solutions:

1. Population reduction/management: this is the most radical method to fight damage. However, catching stone martens is very difficult because they are so artful and cautious. Therefore it is not *the* suitable solution for car drivers and owners.
2. Use of repulsive products: moth-balls, mint pomade, and other grandmother's recipes or new specialized products like sprays. They are not really effective.
3. Use of light-flashes: stone martens get rapidlyused to this.
4. Mechanical protection: sheaths can be installed on "endangered" parts or a cover fixed under the engine. This should be made by a specialist and is very expensive but no doubt effective.
5. Protection by noise or ultrasonic installation: even the ticking of an alarm clock should frighten the stone marten. These methods seem effective after a few tests. However, stone martens are very adaptable animals and it would be surprising if they would not get used to it.
6. Use of electric kits (put on the market by Audi and Mercedes) converting the current of the battery into high voltage across a plate underneath the engine: laboratory tests showed that a single jolt of high voltage was enough to discourage the curiosity of a stone marten without harming the animal in any way. But this is expensive, not very practical, and probably not working in all conditions.
7. The best solution is without any contest a hermetically closed garage.

For those who do not have a garage the motorist's associations enjoin:

- avoid to leave the car by night with a warm engine near a garden, forest, or vacant site.
- when a car has been damaged by a stone marten, it is not enough to repair it. You have to wash the engine very carefully because, visited once, the car is "marked", and the stone marten will surely come back again.
- treat the "endangered parts" with a transparent rust preventive product.
- if using a repulsive spray, renew the application after a long or rainy trip.

Even though the number of damaged cars is low, the phenomenon is increasing (Fig. 3), and there are only few companies that cover the expenses. So, be careful!

But on the whole, stone martens also pay a high tribute... to the traffic! It could be exaggerated to say that "eating cars" is a revenge. However, who knows?

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The Nilgiri marten, *Martes gwatkinsii* (Horsfield, 1851)

The Nilgiri marten is one of three small carnivores endemic to the Western Ghats of India and identified by the MVPSG as of conservation concern. It is the rarest and least known species of the true martens of the genus *Martes*.

Its taxonomy is not completely agreed on. While some authors regard it as a subspecies of *Martes flavigula*, most consider it as a full species.

According to Pocock (1941), it is distinguished from *flavigula* by the structure of the skull, which is low and flattened, and with zygomatic arches that are less arcuate when viewed from the side (see drawings in Pocock, 1941:342). Also the colour above is much less varied than in *flavigula*, being uniformly dark brown from the head to the loins; the abdomen also is deeper brown, and the throat varies from rusty yellow to nearly lemon-yellow. A male measured: head & body, 515 mm; tail, 419 mm, and weighed 2,040 g.

The most recent sighting of the species we are aware of dates from 17 April 1990 and is by Mr. K. N. Changappa of Arivikad Estate, Munnar, Kerala. Mr. Changappa was driving home when at about 11 p.m., just near his bungalow, a Nilgiri marten was running in front of the car for about 100 yards (K. N. Changappa, in litt., April 1990).

Apart from such annecdotic sightings very little seems to be known on the species and *M. gwatkinsii* never was the focus of a special research or status survey project. Nevertheless what little is known seems to suggest that the species is not critically endangered at this time, at least no more than the Brown palm civet *(Paradoxurus jerdoni)* with which it seems to be largely sympatric according to Dr. Ajith Kumar (A. Kunhunu, in litt., Oct. 1990).

To be on the safe side the MVPSG would nevertheless like to see some investigations being implemented shedding more light on the life history and status of this little known relative of our intensively studied palearctic martens.

Until recently we thought that no photo of a Nilgiri marten existed, when Messrs. Tuinman & Tuinman Ezns., Holland, provided us with one they discovered in a book which was published early this century (Hutchinson, 1923: 301-307). As few of our readers may have seen this book, we are pleased to reproduce the photograph here by courtesy of Tuinman & Tuinman Ezns.

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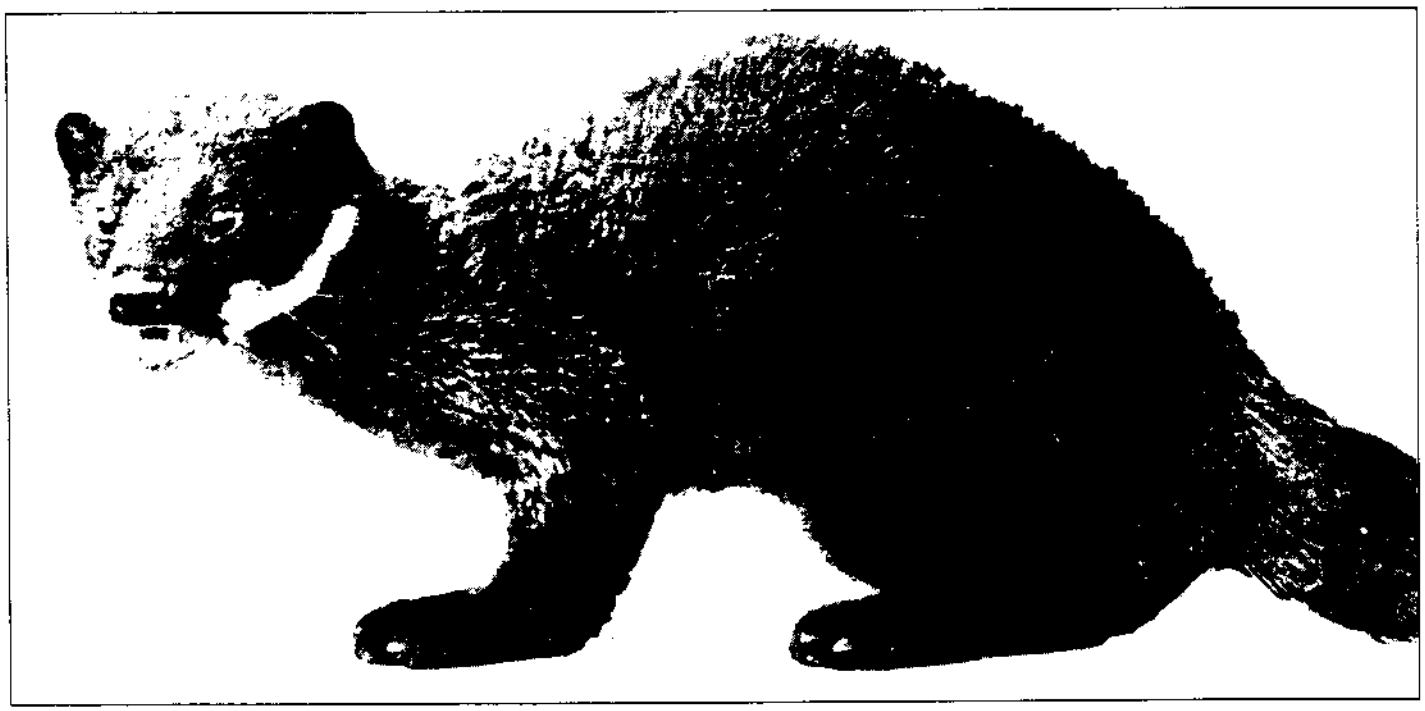

The conservation status of the badger *Meles meles* (L.) in Europe

Huw I. GRIFFITHS

Although the Badger is one of the most familiar components of the European mustelid fauna, remarkably little is known of its population status or distribution. Although the species has been extensively researched, much of this work has been either eco-ethological or coupled to medical and veterinary studies of the role of the badger as a reservoir of rabies or bovine tuberculosis.

Attitudes to the badger vary widely throughout Europe (Fig. 1). In the UK and Ireland, the animal is viewed very positively and protected for its own intrinsic value, despite being very abundant. Similarly, the species is vigorously protected in the Benelux countries, although there it is rare. A number of other states protect badgers, including most of the Mediterranean countries, Hungary and most recently, Albania. Elsewhere they may be regarded either as a game species (e. g. France, Germany, and Fennoscandinavia) or as a pest (e. g. Austria and Denmark). Most countries that permit the hunting of badgers do attempt to regulate hunting through the operation of a closed season, although protection is minimal or absent in Portugal, Finland, Bulgaria, and parts of Austria (Griffiths, 1991).

In some parts of eastern and northern Europe the badger is still regarded as a commodity species (Griffiths, *in press*). Badger pelts are of poor quality when compared to those of most other mustelids. Despite this they are extremely tough and make excellent rugs and floor coverings. Badger leather is still used in some areas for the production of hunting bags and knapsacks. The use of hair for making brushes is well known (although now uncommon). Less commonly the hairs are woven into cloth (as in Romania). There is widespread use of badger fat and lard for the production of folk medicines and ointments and for water-proofing shoes. In parts of Albania, Yugoslavia, Czechoslovakia, and Finland the flesh is eaten, a practice only recently discontinued in Germany and the Low Countries.

There are no reliable estimates of the number of badgers in Europe west of the Soviet border, although it must exceed 1,500,000 animals. As many countries have little idea of the size of their badger populations, this is almost certainly an underestimate. Of these animals, over 50% appear to inhabit either the UK and Ireland or Fennoscandinavia (all of which are rabies-free). Many populations in mainland Europe are currently depressed following the passage of the rabies epizootic and attempts at its control. Badgers are a significant secondary host of the virus and highly susceptible to infection (Steck, 1982). In the early days of rabies control, the gassing of fox earths and badger setts, coupled with the placing of poisoned baits (e. g. eggs dosed with strychnine) had a profound effect upon populations, some of which were also intensively hunted. In Wallonia (Belgium) and parts of Germany, badger population levels fell to 10% of their former levels (Libois, 1983). Similarly the Czechoslovak badger game-bag decreased by over 60% during the mid 1970's (Hell, 1987). The French badger population is currently estimated at about 80,000 animals, although it is known that in the early 1960's annual game-bags were in the order of 60,000 animals/year. Fortunately the success of fox vaccination programs has now removed the need to use gas in most countries. As the rabies virus disappears from the fox population, it is also lost from secondary host species. At present only Switzerland and Belgium have succeeded in almost completely eradicating rabies from within their frontiers. However, the current political climate augurs well for increased co-operation and efficacy of rabies management programs.

The badger is not an invasive species and has been termed contractionist by Kruuk & Macdonald (1984). Populations develop slowly and are slow to recolonize their former ranges. Studies by Anderson & Trewhella (1985) estimated the mean nett annual rate of badger population increase as 20%. This figure is obviously labile and derived from natural and anthropogenic mortality of both adults and cubs. Whether there is any density dependant regulation of populations remains the source of some debate. Outside of the context of studies of rabies and tuberculosis, there is little information available on possible causes of badger mortality. The species is certainly host to a wide variety of parasites and pathogens (Hancox, 1980), and many of these may cause morbidity or mortality under the appropriate conditions. Non-disease mediated mortality is even less well understood. A study of 1,050 badger skulls showed that about 1% of the animals had almost certainly died from dental abnormality or loss (often with associated infection)(Hancox, 1988). Badgers are also frequent victims of road traffic. In the UK road and rail kills are estimated to account for 47,000 animals/year. Similarly, in the Netherlands the annual road-kill almost equals the annual production of cubs. As a result, the main thrust of Dutch badger conservation efforts is the protection of badgers from road traffic (Vereniging Das & Boom, 1990). It is extremely difficult to assess the effect of road-kills on badgers throughout Europe, although it is known to be a problem in many countries.

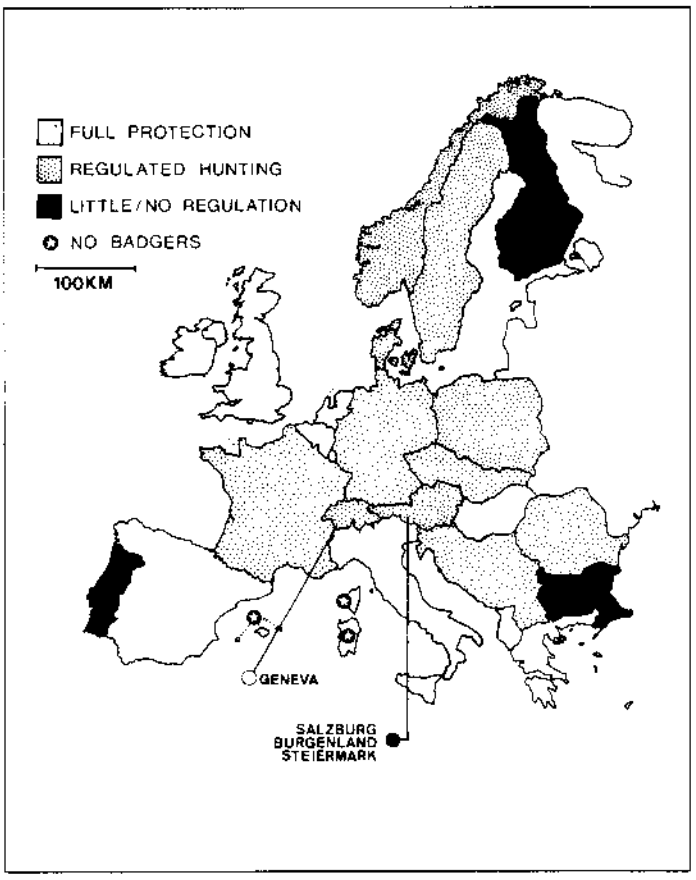

Fig. 1. The legislative status of the badger in Europe.

To these may be added mortality derived from permitted or illicit hunting. Hunting data can be difficult to obtain and countries that forbid the hunting of badgers obviously keep no game-bag statistics. There is little doubt that at least 120,000 badgers are hunted in Europe each year and the genuine total is probably higher.

It is interesting to compare badger statistics from the UK and the Netherlands. Both have badger populations that are well-researched, protected in law and free from immigration from neighbouring states. Britain is estimated to host about 250,000 animals. Annually about 9,000 are illegally hunted, 47,000 run over and 700 killed to control bovine TB (Cresswell *et al.*, 1989; RSNC, 1990). In the Netherlands there are about 1,200 animals, of which 250-300 are run over and about 50 poached (Vereniging Das & Boom, pers. comm.). By calculation, both populations appear to be close to stasis through the action of anthropogenic causes of mortality. The British population (being more than two orders of magnitude larger) is effectively buffered against other random causes of mortality. This is not so for the Dutch badgers, to whom the advent of rabies or any other epizootic could prove catastrophic. The most recent Dutch badger survey appears to show a slight population increase (Wiertz, pers. comm.). This has only been achieved through the payment of state incentives to game-keepers and land-owners not to disturb setts, the operation of a compensation fund, and an active reintroduction program.

In most of the rest of Europe, badger populations are in recovery from the effects of rabies. Population levels are still lower than in the pre-rabies period, but appear to be increasing. Most European countries have now ratified the Bern Convention with the result that they are obliged to safeguard and to monitor badger populations. Various non-selective and inhumane types of hunting are also forbidden. Where populations are competently monitored a surplus may be revealed for harvest (in those countries that so wish). However, most countries are hunting "blind" and monitor their populations exclusively through game-bag returns. Certainly there are difficulties associated with undertaking badger censuses, the short-comings of population monitoring through hunting statistics are equally evident. Hunting outside of the closed season, by prescribed methods and in forbidden places will obviously not be declared. Many legitimate kills will also fail to be reported by hunters unless there is some active incentive to do so.

Perhaps the most important improvement in European badger conservation would be the development of appropriate game-management strategies by those states that wish to continue to hunt. In all countries (except possibly Sweden) badgers are a minority game species. For example, compare the 14,000 badgers killed in Germany in 1990 with the 2,100,000 roe deer hunted in the same year. Nevertheless, this does not represent a justifiable source of complacency. Populations in Lithuania and Albania are certainly decreasing. Finland, Romania, and possibly Sweden all hunt at levels that may not prove sustainable. Germany, Austria, and Norway also take comparatively high numbers of badgers without any real idea of the size of the populations under their jurisdictions. A moratorium upon hunting in some areas would appear wise, at least until populations re-attain their pre-rabies levels.

Overall, the status of the badger in Europe is not a cause for concern, with the exception of those countries previously mentioned. According to the Mustelid & Viverrid Group acti (Schreiber *et al.*, 1989) only the endemic sub-species of Cre Rhodes are a cause for real concern. Complacency is unjusti however, as the status of the populations of much of mainla Europe remains suboptimal.

Ackowledgements

Many thanks to all my collegues around Europe for their generous help. I would also like to thank Christine Griffiths and Amanda Rouse for their helpful comments on this rather hastily prepared article.

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Mustelids in Ladakh, India

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This report is based on information collected as part of a continuing survey of the ecology of Ladakh. Fieldwork was carried out on 7 visits, totalling 21 months, between 1980-1989. The survey has mainly concentrated so far on the larger mammals, but records of mustelids were also collected (Mallon, 1991). The study area covered ca 15,000 km^2 in south-central Ladakh (Fig. 1). Records from outside the study area were collected from local informants and from the literature. Ladakh is situated at the northernmost tip of India in the state of Jammu and Kashmir, and lies on the northern, rainshadow side of the Himalaya. The area is entirely mountainous in character, with an arid-montane environment typical of Transhimalayan areas. There are close ecological affinities with Tibet and Central Asia. Altitudes range from ca 2,800 m to over 6,400 m. Most of the land lies above 3,000 m. The high plains and hills of eastern Ladakh form part of the western rim of the Tibetan plateau. The climate is arid, with large annual and diurnal variations in temperature.

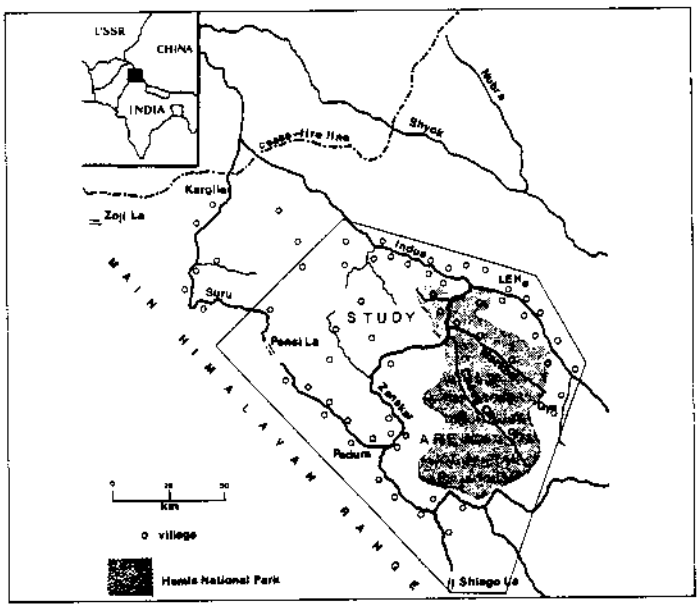

Fig 1. Location of the study area

Martes foina Stone or Beech marten

Distribution and status: Distributed widely but thinly in mountainous areas, with records from many parts of the study area. No population estimate available. No evidence was found of a population decline or change in status during the years 1980-1989.

Habitat: It appears to favour rocky valley beds at 3,750-4,000 m with some vegetation, water, and rocks and scree. Pikas *Ochotona* or their tracks were usually found nearby and probably form an important prey item.

Notes: Martens enter buildings where they may consume stored apricots, especially in autumn, and one set of droppings examined was composed almost entirely of the remains of apricots. There were also some local reports of martens entering monasteries and eating butter which had been left in offering lamps.

Conservation: Possibly hunted illegally for its fur, especialy in western Ladakh, but few confirmed occurrences were found. No other obvious threats. Large areas of its range lie in remote terrain with low levels of human activity. Occurs in the Hemis National Park (4,100 km^2), and probably occurs in other proposed reserves.

Mustela altaica Mountain weasel

Distribution and status: The commonest mustelid in Ladakh, with records from all areas. No evidence found of reduction in range or decline in numbers.

Habitat: Found in all habitats: gardens and fields; flat, alluvial plains; riverine thickets; mountain valleys, rocky slopes and passes up to 5,100 m. There is one record from 5,400 m on the Lanak La pass in eastern Ladakh.

Notes: Diurnal and frequently seen, especially around field terraces and stone walls. Seen to prey on pikas *Ochotona*, and birds caught in nets. Also presumed to prey on small rodents.

Conservation: Not hunted. Occurs in the Hemis National Park, and several other proposed reserves.

Mustela erminea Stoat

Distribution and status: Recorded at only three localities on the southern edge of Ladakh, along the northern slopes of the main Himalayan range, at altitudes of 3,000-4,000 m. It is more common in neighbouring areas on the southern side of the Himalaya. Local people do not have a name for this species and it is evidently rare, and occurs in Ladakh only at the edge of its range.

Mustela eversmanni Steppe polecat

Distribution and status: There is one specimen in the British Museum (Natural History) obtained in Ladakh in 1879. None of my local informants knew this species.

Lutra lutra Eurasian otter

Distribution and status: Sign was found very sparsely along the Indus River to a point 15 km above Leh (local reports suggested it may occur some 50 km further upstream); and along the Zanskar River to above Nierak. Local people said it did not occur in the upper Zanskar Valley, and no sign was found there. It was also reported in the Suru Valley of western Ladakh, and in the Nubra and Shyok Rivers. All local informants agreed that it was uncommon or rare.

Conservation: Possibly subject to illegal hunting for its fur, which is valued in Ladakh. No instances of otter hunting were found in the study area during field surveys. A short section of its range lies inside the Hemis National Park. A further section of its range will be included if a recommended extension to the park is confirmed (Mallon & Bacha, 1989). Otters should also occur in the proposed Karakoram Wildlife Sanctuary in the Nubra-Shyok Valley.

Conservation

All mammals, including mustelids, are protected under the Jammu and Kashmir Wildlife Protection Act of 1978. A small amount of illegal hunting takes place, especially in western Ladakh. No detailed studies of mustelids in Ladakh have been carried out, so no population estimates are available. No specific conservation measures have been drawn up for mustelids, but the three most widespread species are known to occur in the most important protected area in Ladakh, Hemis NP. Several other proposed reserves probably contain mustelids, though their exact boundaries have not yet been delineated.

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Badgers and otters - pesticides and pollution: A European perspecti

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Rachel Carson's 1962 "Silent spring" raised the alarm over pollution, a concern not diminished nearly thirty years later with reports of DDT in both the Arctic and Antarctic in fish, penguins, seals, and skuas; DDE and PCB's in otters even in the remote Hebrides; and organochlorine/PCB/mercury levels in beluga whales, dolphins, and seals such that they could be classified as "toxic waste".

Despite the ubiquitous nature of pesticides, the real impact of pollution is surprisingly hard to assess for any given species however, the clearest evidence coming from the organochlorine-related decline of golden eagle, peregrine, sparrowhawk, and otter, and to a lesser extent, owing to its broader dietary niche, of buzzards in Britain. Both barn owl and kestrel populations were shown to be vulnerable via rodent prey feeding on even supposedly less harmful autumn sown corn, while only the woodland foraging tawny owl amongst raptors was relatively unaffected by the widespread use of pesticides in the late 1960's (Chanin, 1985; Jefferies *et al.*, 1973; Mellanby, 1970). Woodpigeons could acquire a lethal dose of dieldrin in just five hours feeding and three to five such pigeons could kill a fox or peregrine; some 1300 foxes died in the 1959-1960 winter alone, whereas the relatively few badger cases recorded (Table 1) perhaps resulted from most deaths occurring underground, and a greater tolerance to dieldrin: mean lethal liver level 34 ppm (parts per million net weight) contrasted with 24 for *Apodemus*, 17 for kestrel, and only 5 ppm for fox (Jefferies, 1968, 1973). The greater fat stores of badgers also provide a buffer effect since thrushes tolerate 63 ppm of dieldrin in fat, 17 ppm in brain or liver being fatal (Jefferies *et al.*, 1973). The inert storage of organochlorines and PCB's may lead to sudden death of birds or mammals however under conditions of physiological stress such as breeding, moult, migration, overwintering or even circadian roosting.

Early studies suggested the concentration of pesticides through the food chain, fish and aquatic invertebrates being particularly prone to bioaccumulation since oxygen must be "respired" from high volumes of water with a concentration of only 9 cc/liter (at 5°C) compared to 210 cc/liter in air, and thence on to piscivores such as otter or heron. Earthworm specialists such as badger, mole, common shrew, turdids, and waders are also vulnerable to high levels of toxic chemicals variously concentrated in worms according to species, including organochlorines, dioxins and heavy metals: up to 25 ppm of dieldrin or 10 ppm of the even more toxic endrin in worms and slugs associated with soft fruit spraying; and even though under a fifth of the heptachlor from worms was assimilated by American woodcock they suffered a three to four fold concentration (Jefferies, 1986; Ma, 1987; Ma & Broekhuizen, 1989; Satchell, 1983).

Fatalities may result rapidly from prey with acute poisoning, and often showing abnormal anti-predator behaviour e. g. in fish shoals or bird flocks, from very localised sources: a minute's feeding on some 11 contaminated worms being sufficient to kill American robins following DDT spraying of orchards or for Dutch elm disease, or via the abrupt metabolisation of fat stores. The importance of sublethal effects of chronic poisoning is even harder to assess however, but is potentially of greater significance via impaired fecundity. The organochlorines, PCB's, and heavy metals have all been implicated in otter population declines (Table 1). PCB's may be a particularly toxic "new hazard" to mustelids such as the badger and otter, with reproductive failure in mink at 50 ppm in fat, and a level of 62 ppm in an unweaned otter cub in the Minsmere reintroduction area despite some improvement in other pesticide burdens, as well as impaired fecundity and immunosuppresive vulnerability of seals in the distemper viral epidemic (Anon., 1988; Aulerich & Ringer, 1977; Jefferies *et al.*, 1985 1988).

In a world where humans and human breast milk may be "unfit for human consumption" due to pesticide residues, perhaps 1992 and E. C. setaside and de-intensification of agricultural and sylvicultural practices are long overdue, together with much greater regulation of industrial pollution of air, water, and land.

Table 1.

Categories of toxic chemicals and their importance

1. Pesticides

Insecticides, etc. can be passed to young in the milk.

Badger: deaths from dieldrin (Jefferies, 1969; Wilson, 1972), organochlorine (Baines, 1986); impaired spermatogenesis suspected (Neal, pers. comm.); poor cub production suspected in 1962-1969 in English intensive arable areas: Sussex, Herts., E. Anglia (Harris, 1989, 1990; Neal, 1986); selective feeding on DDT sprayed experimental oats plots (Ibbotson, 1955). Despite phasing out of worst organochlorines, the less persistent current organophosphorus insecticides are still a hazard post-spraying.

Otter: deaths and impaired fecundity in Britain especially during 1963-1973 (perhaps also in N. America); dieldrin & heptachlor rather than DDT; eels, a favourite prey, concentrate poisons more than other fish species (Jefferies, 1985; Mason, 1986).

Rodenticides

Badger: rat and mouse control: local deaths from thalium in Denmark (Clausen & Karlog, 1974), in Germany (Wijngaarden & Peppel, 1964). Irresponsible use of e. g. alphachloralose, endrin, fluoracetamide or difenacoum for warfarin-resistant rats pose threat to wild predators, dogs, raptors, etc. (Mellanby, 1970). Grey squirrel control via warfarin taken by non-target species including badgers (Wood, 1977).

Other "vermin" control

Badger: deaths from strychnine-worms in mole control (Ratcliffe, 1974); eggs or other baits laced with strychnine, herbicides (illegally), etc., occasional deaths in Belgium, Britain, Holland (Howes, 1988; Wiertz & Vinck, 1986; Wijngaarden & Peppel, 1964). Often difficult to distinguish between deliberate poisoning or accidental pesticide contamination cases: Essex (Batty & Cowlin, 1969), Gloucester (Gallagher & Nelson, 1979), Hants. (Barker, pers. comm.; own observation, 1970).

Otter: similarly cases of "incidental" poisoning e. g. at fish farms in W. Scotland.

Molluscicides

Metaldehyde or methiocarb slug pellets irresponsibly used on crops or gardens lead to some deaths of wild carnivores, dogs, etc.

Vermicides

Chlordane/syldane (breaks down to persistent heptachlor), or lead arsenate used on bowling greens, golf courses, airfields (to prevent aircraft strike) is responsible for "secondary" deaths of worm specialists including some birds. Copper fungicide used on orchards may decimate worm populations, impairing soil fertility and structure (Mellanby, 1970; Satchell, 1983).

Herbicides

Otter: possible blindness (Chanin, 1985).

2. PCB's

Polychlorinated biphenyls and dioxin/furan breakdown products, derived from industrial processes or as contaminants in 2,4,5-T (Agent Orange) or sylvex herbicides: fat storage, damage to liver metabolism, to endocrine and reproductive functions, to spleen and lymphatic hence immune system, carcinogenic.

Badger: apparently not sought for, but dioxin contaminated worms caused mole deaths after the 1976 Seveso accident in Italy (Satchell, 1983).

Otter: deaths and reproductive impairment; decline in Sweden, probably America and Britain; potential sterility via milk and transplacental contamination (Anon., 1988; Jefferies, 1985; Mason & Macdonald, 1986).

3. Heavy metals

Cadmium, copper, lead, mercury, and zinc. Essential trace elements (Cu, Zn) accumulate in hair, so live sampling is feasible; Pb in bone.

Badger: Cd, Hg, Mn, Zn, and Pb: all five metals acquired via worms, particularly unbonded from acid soils, all except Cu increase with age. Nephrotoxic levels of Cd in badgers and moles, toxic Pb levels in moles (Chudik & Mankovska, 1985; Clausen & Wolstrup, 1979; Ma, 1987; Ma & Broekhuizen, 1989).

Otter: alkyl and methyl organomercury via pulp industry effluent or seed dressings linked to decline Swedish populations, as well as sea eagles, hawks, owls, and predator deaths (Mason & Macdonald, 1986; Mellanby, 1970). Potentially harmful highlevels of Hg, Cd, and Pb in fish in 1982 survey; Cd and Pb together may inhibit spermatogenesis (Chanin, 1985; Jefferies & Freestone, 1985; Mason & Macdonald, 1986).

Traffic fumes yield high, even toxic levels of Cd in old urban foxes (perhaps badgers), or Pb in urban dogs and verge side small mammals; impaired I. Q. in man (Harris, 1986; Jefferies *et al., 1973).*

4. Miscellaneous

Badger: gassing with chloropicrin, cymag, phostoxin decimated populations in rabies or TB control (Hancox, 1990). Silica may immunosuppress affecting TB resistance and epidemiology (Higgings, 1985). Excessive use of organic or nitrogen fertilizers may curtail worm populations, lead to high metal levels (e. g. Cu) or spread of pathogens (e. g. TB bacilli) into worms or livestock (pigs via chicken manure)(Francis, 1958; Satchell, 1983; Wiertz & Vinck, 1986).

Otter: oil: fur thermoregulation impaired; if ingested, risk of death via haemorrhagic gasteroenteropathy. Fish population levels and species composition linked to water quality: nitrogen and sulphur oxides produce acid oligotrophic waters (more disolved metals); organic or nitrophosphate fertilizer may reduce oxygen levels hence shift from salmonids to cyprinids via eutrophication (Mason & Macdonald, 1986).

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Badger sett protection in Britain

Politics have been described as the 'art of the possible', and studies of the history of wildlife legislation reveal a similarly piecemeal resolution of problem areas often dictated by political expediency (Lyster, 1985; Parkes & Thornley, 1987). The use of badger setts by foxes as a temporary refuge or for cubbing has greatly hampered progress in badger legislation; vested sporting interests including both hunts and 'badger diggers', apart from other shooting and farming considerations. The 1973 Badgers Act was hence a watered down compromise, and ironically, with the discovery of the first English tuberculous badger in 1971, culling badgers was legalized under the special powers Badger (Control areas) Order 1977.

The badger is an Appendix III animal under the 1979 Bern Convention, but signatory countries vary widely in the protection afforded under national implementation (Hancox, 1991). No provisions for sett protection were made under the British corresponding Wildlife & Countryside Act 1981, even with the 1985 amendment, the badger being placed on Schedule 6 as 'not endangered', whereas the otter holt is protected on Schedule 5. Although the 1985 amendment changed the onus for diggers to prove they were not after badgers, only a temporary improvement in court convictions resulted and their legal representatives were often more experienced in the relevant legal minutiae than the prosecution (Clark, 1990, Griffiths, 1991).

Badger populations have been greatly reduced in some parts of Britain, notably by diggers in for example Yorkshire and south Wales, and excessive stopping by hunts is also a problem (Cresswell *et al.*, 1990; Griffiths *et al.*, 1990). Continuing efforts to get improved legislation on the statute books were blocked by sporting interests in 1990, but have finally been successful this year. The Badgers Act and Badgers (Further Protection) Act 1991, together with an amendment to the Criminal Justice Act will help to protect setts from being destroyed, damaged or obstructed (apart from temporarily by hunts), and convictions may result in 5,00... pound fines and/or six months in jail, as well as dog confiscatio... and a ban on owing or having custody of dogs which are a majo... tool used by diggers. Whilst not wishing to detract from thes... successes, it is nevertheless worth remembering that many digger... are unemployed, often on legal aid with nothing to lose, an... magistrates are hence reluctant to impose other than derisory fine... or to confiscate vehicles used by offenders, and culprits are by n... means deterred from further 'sporting endeavours'; indeed in some cases a conviction adds to the challenge! Improved legal protectio... for badgers on paper is to be welcomed, but as in other Europea... countries, the proof of the legislation ultimately lies in the courts and in public attitudes to the 'protected species' and wildlife i... general.

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Griffiths, H. I. 1991. *On the hunting of badgers*. Piglet Press, Brynna.
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W. Hancox, 72 Bisley Old Road, Stroud, Glos. GL5 1NB, UK.

INFORMATION WANTED

Shoko Sukigara is researching the Masked palm civet (*Paguma larvata*) in Japan and trying to locate material for ecological and taxonomic study. Any museum or zoo, willing and able to help, please contact:
Shoko Sukigara, Japan Wildlife Research Center, 2-29-3 Yushima, Bunkyo-ku, Tokio 113, Japan.

New information on European and American minks in the Iberian Peninsula

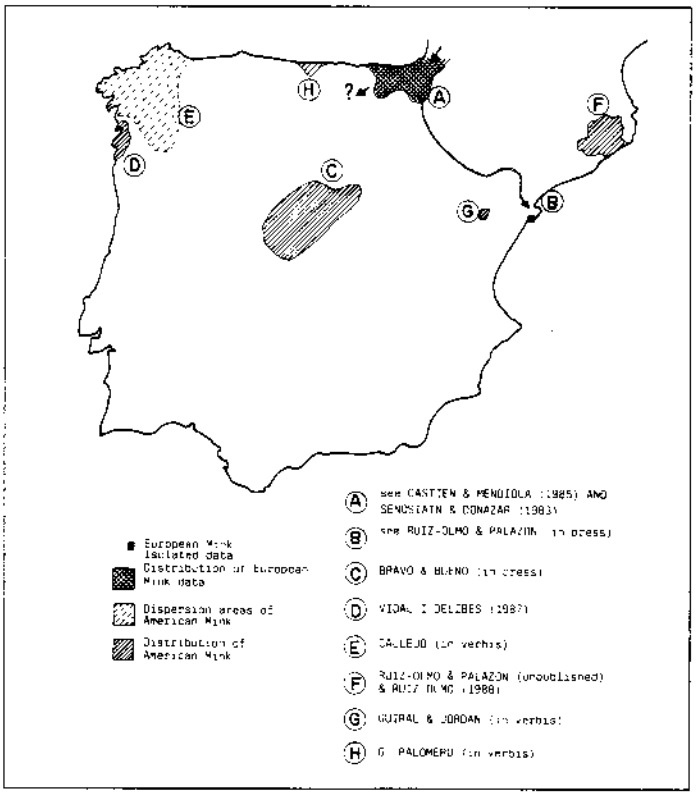
Jordi RUIZ-OLMO and Santiago PALAZON

In the previous number of 'Mustelid & Viverrid Conservation' we can find a detailed article from our collegue F. Palomares on the situation of the European mink *(Mustela lutreola)* and the American mink *(Mustela vison)* in the Iberian Peninsula. This work, although very informative, refers to the situation in the middle of the last decade (see Senosiain and Donázar, 1983; Castien & Mendiola, 1985; Ruiz-Olmo, 1987; Vidal & Delibes, 1987). His conclusions from these data can be summarized as follows: It is necessary to study the status, ecology, and behaviour of both species in the Iberian North, as well as the safety measures in the American mink farms. Besides pointing out that, at the moment, there are no studies on the two species, he stresses the importance of co-ordinating efforts with French institutions in order to assure the survival of the European mink.

Unpublished data from recent years have become available and show a different dynamic in research.

Recent research on the genus *Mustela* in northern and central Spain has shown an important expansion of *M. vison*. If in the middle of the last decade only three populations of this species were known, nowadays there are two more: one in the Cantabrian area (G. Palomero, pers. comm.) and the other in the southeast of Aragon (J. Guiral & G. Jordan, pers. comm.). But in addition to these new distribution areas, the existing ones have expanded their distribution: in central Spain the occupied area is 65% larger (Bueno & Bravo, in prep.), in Catalonia 120% larger (Ruiz-Olmo & Palazon, in prep.), and in Galicia the expansion is also noticeable (A. Callejo, pers. comm.).

In addition to the studies on the distribution of the American mink, Spanish researchers, especially C. Bueno and C. Bravo in central Spain, and the authors of this article in northeastern Spain are studying the ecology of this species. Our work (northeastern Spain) is related to the diet (unpublished data show a very diversified diet: mammals, birds, amphibia, fishes, insects, fruits, etc.), their relationship with other carnivores in the area (*Mustela nivalis, Martes foina, Genetta genetta*) and their eco-ethology by using radio-tracking techniques, both with wild animals and freed farm animals in order to study the process of colonization (Palazon & Ruiz-Olmo, unpubl.). At the same time, their parasites are studied in collaboration with Dr. C. Feliu and Dr. J. Torres (Faculty of Pharmacy, University of Barcelona).



As for *M. lutreola*, new locations and specimens have been found. Remarkable is the discovery of an adult male found dead in a crayfish trap in the Ebro River delta, close to the Mediterranean Sea in 1989 (see Fig. 1, Ruiz-Olmo & Palazon, in press). This location is far from the typical distribution.

Moreover, it must be pointed out that in 1991 a study on the distribution, ecology, and systematics of the European mink has been started. This study is being financed by ICONA with 50,000 US$ and is coordinated by the authors of the present article together with E. Castien. Close contact will be made with a similar study started in France also in 1991 (C. Maizeret & M. P. Migaud, pers. comm.). A French-Spanish meeting has been set for the end of the summer of 1991.

Finally, in April 1991 the first meeting of specialists on the European mink took place in Strasbourg (France) at the European Council, according to the Bern Treaty. The result was a Project of Recommendations which has to be endorsed by the Council. The Project contains numerous recommendations to the different governments, but two of them are really important: 1. to carry out different studies on the status of this mustelid (started in France and Spain already), 2. to prohibit the building of new American mink farms in areas where *M. lutreola* occurs. However, in spite of the real and effective applications of such recommendations, we agree with our colleague Palomares that there is still a long way to go in order "to guarantee the survival of the European mink in Western Europe".

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Jordi Ruiz-Olmo, Servei de Proteccio i Gestio de la Fauna, Direccio General del Medi Natural, C/Corsega, 329, 5, 08037 Barcelona, Spain

Distribution and status of minks in Byelorussia

Vadim E. SIDOROVIC
(translated from Russian by Jerzy Romanowski)

The European mink *Mustela lutreola* was replaced by the ecologically similar mink *Mustela vison* in many parts of its original range in the last few decades. Here I present the process of replacement and the present status of the two species of mink in Byelorussia.

For the purpose of my studies I identified 309 skulls and 1738 furs of mink shot during the period 1984-1990. I also included 77 visual observations of live animals. American minks were identified on following criteria: absence of white spots on the upper lip and presence of two roots in the first upper premolars (Danilov & Tumanov, 1976). In addition, winter censuses of mink tracks were carried out in different regions of Byelorussia (Sidorovic, 1988).

European mink was common in all of Byelorussia up to the end of the 1940's. The decline of its population was noted in the middle of the 1950's and continued until the mid 1970's, when European mink disappeared from the south-west of Byelorussia. At the beginning of the 1980's low numbers of European mink were still present in two separated populations in southeastern and northern Byelorussia (Fig. 1).

Currently (1984-1990) only small numbers of European minks survive in northeastern Byelorussia in the regions of the rivers Drissa, Obol, Lovatc, Luzesnienka, Ovsienka, Orsica and possibly the river Lucosa. The European mink population in NE Byelorussia is estimated at 150-200 individuals. The population is decreasing, and without urgent protection measures it will probably be extinct in 10-20 years.

It has been proposed that European mink could also survive in the south of Byelorussia in the basin of the rivers Stviga and Ubortc, where American mink is still absent or rare.

Introduction of American mink in Byelorussia started in 1953 (Serzanin, 1961). In the periods 1953-1954 and 1957-1958, 865 American minks were released in a large area (Fig. 1). Some American minks immigrated to Byelorussia from surrounding republics, where they were released earlier or simultaneously (Pavlov *et al.*, 1974). In the early 1960's American mink became a common member of the fauna of Byelorussia (Serzanin, 1970). Now American mink inhabit almost all of Byelorussia with an average density of 17.8-20.1 individuals per 100 km^2 at river basins. The population is estimated at 56,000 individuals, and an increase in numbers up to 70,000-75,000 can be expected (Sidorovic, 1988).

The coincidence of introduction of the American mink with the decline of European mink seems to confirm the negative influence of introduced species on native ones. Yet the presence of large areas where European mink became extinct or extremely rare in Byelorussia, and where American mink is still not present, indicates the role of other, possibly anthropogenic factors, negatively influencing the population of European mink.

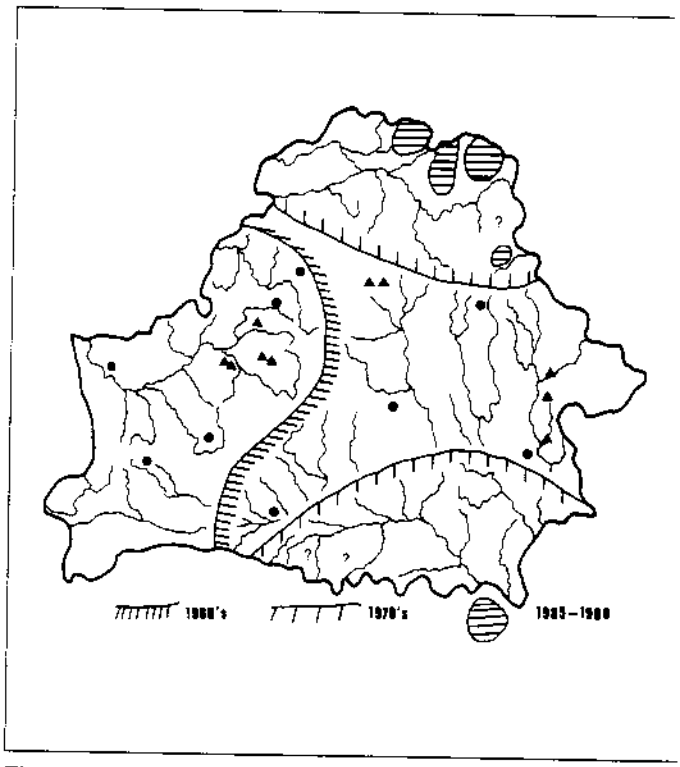

Fig. 1. Map of Byelorussia.

● Fur farms with American minks (1960-1980).

▲ Location of American mink releases.

? Probable presence of European mink.

Indicate boundaries of European mink ranges.

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Institute of Zoology, AN BSSR, 220733,BSSR, Minsk, ul. Skoriny, 27.

Council of Europe: First meeting on the European Mink

The first meeting of the 'Group of experts on the European mink' was held 4-5 April 1991 in Strasbourg, France. It was organized by the 'Council of Europe' under the title 'Convention on the Conservation of European Wildlife and Natural Habitats'. Dr. Heikki Henttonen (Finland) was elected chairman; C. Maizeret (France), P. Migot (France), Prof. R. Schroepfer (Germany), Prof. L. Boitani (Italy), J. Ruiz-Olmo (Spain), and M. Riffel (Germany) attended the meeting.

Among the topics addressed were the 'Causes of disappearance of the species': It is not clear why the species has decreased in numbers so rapidly in recent years. However, some factors are likely to have affected the species to a greater or lesser degree:

Habitat change (including prey shortage):

In some areas crayfish is thought to have been an important element in the diet of the European mink. The aphanomicosis epidemic has decimated crayfish populations. Other species preyed upon by the European mink have been affected by river pollution. The European mink is not a particularly brilliant hunter and it depends much on the relative abundance of prey. So prey shortage may have severely affected its populations.

The modification and more intensive use of lake shores and river banks has made these habitats less suitable for mammals, which can no longer find shelter in them. The European mink hunts very close to the river margins and their degradation has also meant the disappearance of the insects, amphibians, rodents, and aquatic birds on which it feeds.

Competition with the American mink:

The American mink is a more opportunist species than its European counterpart. Unlike the European mink, it can look for food relatively far away from watercourses or lake shores, so it is able to compete for food rather successfully. Being also bigger than the European mink, it is not excluded that its males may succeed in having, in some circumstances, preferential access to European mink females. This does not result in offspring, as the embryos are absorbed, but its consequence is the reduction of the fertility rate of the European mink. The American mink is also relatively resistant to pollution (more than the otter, for instance) while the European mink needs clear brooks with sandy or stony bottoms.

Trapping:

Trapping for muskrat and for American mink (where it exists) is considered one of the main mortality factors for the species, although precise information is scanty. European mink used to be trapped in large numbers in Romania in the 1940's. Trapping for the muskrat (not using plant baits) is still very widespread and is likely to be affecting the European mink. Trapping of the American mink, in areas where the European mink is present, can also be very common, so presumably European mink also get caught.

National reports on the status of the different mink populations and the conservation efforts made were received from Spain, France, Romania, Soviet Union, Finland, Poland, and Germany. Finally a 'Draft Recommendation of the Standing Committee on the Protection of the European mink *(Mustela lutreola)* was drawn up:

A. Recommending that relevant Contracting Parties:

1. Draw up conservation plans for the species in view of assuring viable populations.
2. Encourage the protection of wetlands and river banks where the species is present; ensure, in particular, the conservation of the highly organized vegetation and structure of the river banks.
3. Reinforce anti-pollution measures in rivers known to be inhabited by the species.
4. Take measures to reduce the numbers of American mink where the European mink still survive
5. Forbid the installation of new farms of American mink in areas known to be occupied by the European mink.
6. Forbid indiscriminate methods of capture or killing in habitats which are occupied by the species; encourage the use of methods of capture for carnivores that do not kill the trapped animal.
7. Promote plans to inform people using traps, on the legal protection of the European mink and on the morphological differences between this species and the American mink or the European polecat (*Mustela putorius*).
8. Establish breeding stations for keeping stocks of different populations of the species; assure that a stud-book is kept in each station registering the origin and biological characteristics of the animals; promote exchange between different breeding stations without mixing stocks.
9. Consider the possibility of carrying out reintroduction or restocking programmes in areas where the species has been extinct or is endangered; carry out the necessary genetic studies, including ecotype variation, in order to avoid possible negative effects of introducing individuals from genetically different stocks.
10. Inform the Standing Committee of the Convention, the World Conservation Union, and, if relevant, the governments of neighbouring states of reintroduction projects on the species and coordinate, as far as possible, reintroductions amongst the states concerned.
11. Encourage research on all aspects of the biology of the European mink and the American mink that may permit to guide conservation actions of the former species; promote in particular the research on its genetic variation, its reproduction potential, foraging strategy, use of river bank habitat, and competition with other predators; carry out the monitoring of the size, biological characteristics, geographical distribution, and dispersal patterns of its population; promote also studies on the habitat of the species, in particular on the physiognomic characteristics of river banks and wetlands.
12. Develop, where appropiate for scientific purposes, bilateral or multilateral contacts with other states and conservation bodies and agencies, including those situated outside the present scope of the convention.

B. Furthermore recommending that France and Spain:

13. Carry out a very detailed geographical survey of the remaining populations and the necessary studies on genetic variation.

C. Invites other European states which are not Parties to the Convention to consider implementing the above recommendation.

Pilot study on the conservation of the Malabar civet

A preliminary survey of the Malabar civet *(Viverra civettina)* in the Western Ghats of southwest India was made in 1990 (see Newsletter No. 3:19-20, October 1990). Since August this is followed up by a pilot study on the conservation of this species by the' Wildlife Institute of India' on a budget of 87,200 Rs. The study is undertaken by Dr. Ajith Kumar and Mr. Nitin Rai.

Justification & Objectives

The Malabar civet, endemic to southwestern peninsular India, was considered 'possibly extinct' by IUCN in 1978 until two dead specimens were recovered from Elayur in northern Kerala State (Kurup, 1987). There have been, however, no confirmed sightings of the species since the 1950's. Understandably, it is considered one of the highest priority species for conservation action by the IUCN (Schreiber *et al.*, 1989). It is also the only civet in Schedule I of the Indian Wildlife Protection Act 1982.

A survey of the Malabar civet was recently conducted by the Wildlife Institute of India (Ashraf, 1990). The main objectives of the 3-months survey were to identify some surviving populations, to assess their conservation status, and to suggest future course of action. The survey concentrated on areas in northern Kerala from where the Malabar civet had been reported (Kurup, 1987). No live animals were sighted during the survey, but two more recently killed specimens could be collected. The survey concluded that isolated populations still survive, but most probably only in heavily populated areas in south Malabar from where forest cover has disappeared almost entirely. These populations are under serious threat from hunting and habitat loss. A brief survey in two protected areas (Kudremukh National park in Karnataka and Indira Gandhi Wildlife Sanctuary in Tamil Nadu) found no evidence of the species.

The survey concluded that the following measures were urgently required to rescue the Malabar civet from immediate extinction:

1. Conduct ecological studies in order to assess the habitat requirements of the species and causes of its current status.
2. Conduct a more intensive survey of the protected areas in Western Ghats to explore the presence of Malabar civet.
3. Plan a captive breeding and reintroduction programme with animals from the surviving and highly endangered populations.

The course of action suggested above forms the major objectives of the project.

Methodology

Considering the urgency of the situation, a long-term ecological study and survey of the species will have to be carried out at a later date. The project will instead conduct a short-term ecological study, lasting about seven months, to meet the above objectives. The ecological studies will be carried out on already identified populations in northern Kerala. Attempts will be made to locate live animals through extensive use of camera traps and lure, but tracks and analysis of scats will be more relied upon in the study of habitat use and feeding.

Based on the ecological studies, a survey of about two months will be carried out in selected protected areas of the Western Ghats, to explore the presence of Malabar civets. A preliminary assessment of potential capture and reintroduction sites will also be made.

Expected conservation output

The following are the expected conservation outputs:

1. Greater protection to surviving populations through their inclusion in the protected area network, specific habitat improvement programme, or greater antipoaching activities.
2. An assessment of the desirability and feasibilty of a captive breeding and reintroduction programme.
3. Depending on the results of the survey, identification of a few protected areas critical to the survival of the Malabar civet.

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Kurup, G. U. 1987. The rediscovery of the Malabar civet, *Viverra megaspila civettina* Blyth in India. *Cheetal* 28(2):1-4.

Schreiber, A., Wirth, R., Riffel, M. & Van Rompaey, H. 1989. *Weasels, civets, mongooses, and their relatives. An Action Plan for the Conservation of Mustelids and Viverrids.* IUCN, Gland. 100 pp.

Mustelids and viverrids in Japan

In our previous number we published Hiroshi Sasaki's "The present status of mustelids and viverrids in Japan". Unfortunately the references arrived too late.

Imaizumi, Y. & Yoshiyuki. 1989. Taxonomic status of the Japanese otter (Carnivora, Mustelidae), with a description of a new species. *Bull. Natl. Sci. Mus. Tokyo.* A,15(3):177-178.

Uraguchi, K. & Saito, T. 1988. The distributions of the feral mink and the Japanese weasel and the interrelation between these two species in Hokkaido. *Honyuri Kagaku (Mamm. Sci.)* 28(2):86-87. (In Japanese)

Watanabe, S., Kawamoto, Y. & Harada, M. 1985. Genetic distance of Korean weasel and Japanese weasel. *Zool. Sci.*, 2:1011. (Abstract)

Obara (1991) found a different karyotype between the Common weasels *Mustela nivalis* in Hokkaido and in Aomori Prefecture, and proposed that *Mustela nivalis namiyei* in Aomori should be classified as a valid species, *Mustela namiyei* while the Common weasels from Hokkaido should be classified as *M. nivalis nivalis*. Aomori Prefecture is located in the northern region of Honshu.

News

from Paul Marchesi...

Returning from the Ivory Coast I would like to inform you that I observed a live Gambian mongoose *(Mungos gambianus)* which was trapped by hunters in the village Monogaga situated on the coast between Sassandra and San Pedro. At the back of the village is an evergreen forest relatively well conserved.

From an unpublished report I am enclosing a list of observed mustelids and viverrids in Ivory Coast from September 1989 to January 1991.

Region Grabo - Fété - Tiboto: Otter sp.
Mont Kopé: Two-spotted palm civet *(Nandinia binotata)*
Siahé - Haute Dodo: Honey badger *(Mellivora capensis)*
Niégré: Slender mongoose *(Herpestes sanguineus)*
Monogaga: African civet *(Civettictis civetta)*, Gambian mongoose *(Mungos gambianus)*
Dagbego: Marsh mongoose *(Atilax paludinosus)*, otter sp.
Maraoué NP: Honey badger *(Mellivora capensis)*
Comoé NP: Large-spotted genet *(Genetta pardina)*, Marsh mongoose *(Atilax paludinosus)*, Cusimanse *(Crossarchus obscurus)*, White-tailed mongoose *(Ichneumia albicauda)*
Tai NP (near the IET Research station): African civet *(Civettictis civetta)*, Marsh mongoose *(Atilax paludinosus)*, Cusimanse *(Crossarchus obscurus)*, Two-spotted palm civet *(Nandinia binotata)*.
Yapo: Two-spotted palm civet *(Nandinia binotata)*

Route de St. Legier, 9, 1800 Vevey, Switzerland

from K. C. Searle...

I have recently returned from a short visit to the Ba Bao Shan Reserve, Guangdong Province, China. They have a very small "museum" attached to the reserve in which I found two mounted specimens of *Prionodon pardicolor*, an adult taken in December 1989 and a half grown animal taken in November 1987.

Ba Bao Shan is in the northern part of Guangdang on the border with Hunan at about 25°40'N, 113°E and is part of the Nan Ling Mountain Range. Unfortunately the best primary forest under the Ru Yang Forestry Bureau is outside the Ba Bao Shan Reserve and I suspect that that is where the specimens were obtained.

I was told that the Spotted linsang is not "common" in the area but is not "rare" either. Exactly what that means is difficult to evaluate particularly since the animal is nocturnal, small, and partly arboreal. All one can say is that it is still extant and that at the present there is plenty of suitable habitat.

This would appear to extend the known range of the species both to the north and east. Meteorological records taken at the lowest point in the Reserve between 1980 and 1982 revealed an annual average temperature of 17.5°C, maximum of 34.4°C and minimum of -3.6°C.

At the moment the Hong Kong Zoological & Botanical Gardens hold 4.2 *Prionodon pardicolor*, of which 2.1 were born there although 0.1 was conceived in the wild.

604 Gloucester Tower, 11 Pedder Street, Hong Kong

Recent publications

Bibliography of the European mink

Youngman, P. M. 1991. A bibliography of mustelids: Part IX: European mink. *Syllogeus* No. 66, 45 pp. Published by the Canadian Museum of Nature, P.O.Box 3443, Station D, Ottawa, Ontario K1P P64, Canada.

The author has listed 634 publications from 1549 to 31 October 1990, the criterion being that a publication, or thesis, mentioned the European mink, no matter what the context. An invaluable tool for everyone interested in or working with the European mink.

On the hunting of Badgers

Griffiths, Huw. 1991. On the hunting of Badgers. An enquiry into the hunting and conservation of the Eurasian badger *Meles meles* (L.) in the western part of its range. Piglet Press, Brynna, 44 pp.

After a short introduction the booklet consists of two sections:
1. 'The badger in Europe' in which the author sums up our knowledge (and ignorance) on the hunting and status of the badger in 27 countries ranging from Albania to Yugoslavia.
2. 'The badger in the UK (England and Wales)' which digs deeper into the subject of Prosecutions under the Badgers Act 1973.

Eighty nine references conclude this work.

The booklet can be obtained from the author by sending a cheque for £ 3.50 to: H. I. Griffiths, Environment Laboratory, School of History and Archaeology, University of Wales College of Cardiff, PO Box 909, Cardiff, CF1 3XU, UK.

Please note that the **price includes** postage and a **donation to badger conservation.**

Binturong studbook update

Robinson, P. 1990. Regional studbook of the Binturong *Arctictis binturong*) in the British Isles. Number 3, Southport Zoo, UK. 33 pp.

For the second time Paul Robinson has updated his 'Regional Stubook of the binturong in the British Isles'. Following subjects are treated: summary of the UK population 1990, summary of changes (births & deaths), currently living population by location, currently living captive population, historical list of captive population, population status (age structure, age specific mortality rate, age specific fertility, survival vs inbreeding), and recommendations.

The 1990 population size of 25 is the lowest so far recorded since the start of the studbook in 1987. This decline is the direct result of the high number of deaths (8) to occur during 1990.

With a comparatively large number of zoos keeping binturongs (at least 6 in Germany and 28 in the USA) it is to be hoped that Paul Robinson may, in the future, be able to extent his studbook worldwide.

International Panda Workshop held in the USA

An International Panda Workshop, dealing with both the Red and Giant pandas was held in Front Royal, Virginia, from 2-9 June. The Workshop was hosted by the National Zoo Washington working in close cooperation with the Captive Breeding Specialist Group and WWF. It was attended by approximately 100 people including zoo personnel and scientists from the United States, Europe, and Australia plus delegates from Nepal and the People's Republic of China.

The majority of participants were involved with various aspects of giant panda conservation. However, there were sufficient red panda experts present to form two very active and productive working groups; one dealing with the management of red pandas in zoos and the other discussing the situation of this species in the wild. The outcome of the deliberations of the working group dealing with the field situation was not reassuring; to date there has only been one detailed study of red pandas in the wild and that was undertaken in the Langtang National Park in Nepal in the mid 1980's. Extrapolating from the data obtained in this study indicates that there could be as few as 300 red pandas still living in Nepal. Furthermore these animals are probably divided between a number of virtually isolated subpopulations, not a very encouraging situation. Indications are that a similar situation prevails in the People's Republic of China and fortunately there is already a field study planned in China which should commence in 1992. However, the working group concluded that there was an urgent need for a thorough survey to be undertaken to determine the numbers of red pandas throughout their range.

The working group dealing with captive management concluded that the preservation of viable populations of both currently recognised subspecies of red panda in zoological gardens was a realistic proposition. In order to further the development of this aim, the International Red Panda Management Group (IRPMG) was formed. This group comprises the red panda regional breeding programme coordinators of Great Britain, Europe, North America, Australasia and Japan plus a genetic advisor and its mission is to promote and enhance international cooperation in captive management and to develop ways to integrate captive breeding with field conservation. An invitation was also extended to the Chinese Association of Zoological Gardens to nominate a regional coordinator to represent Chinese zoos in the IRPMG.

As a consequence of the discussions of both of the working groups dealing with red pandas, the newly formed IRPMG issued its first recommendation during the Front Royal Workshop. This recommendation was directed towards preventing further red panda imports and is as follows:

Following genetic and demographic evaluation of the world captive population of red pandas and considering the apparently fragile status of the wild population, the International Red Panda Management Group advises all present and future keepers of red pandas that no further animals of either subspecies are required from the wild to maintain the captive population. The IRPMG further advises that all movement of animals be coordinated through the appropriate regional coordinators.

In order to facilitate the execution of the IRPMG recommendation and the policy of the Chinese Ministry of Forestry that only second generation captive born red pandas should be exported to foreign zoos, all individual red pandas must be identifiable. This means that, regardless of their origin or present location, all captive red pandas should be registered in the appropriate regional studbook and the International Studbook. Furthermore, zoos should only agree to import animals which are properly registered and only where that import is deemed necessary for enhancing captive management and conservation objectives as indicated in regional and international management plans.

It is to be hoped that the registration of all captive red pandas will be realized in the near future when the Chinese Association of Zoological Gardens have appointed a regional studbook keeper.

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Black-footed ferret population exceeds 300

Only 17 known living Black-footed ferrets *(Mustela nigripes)* existed in early 1987 when the last of these animals were taken into captivity. Today, only 4 years later, due to an extremely successful captive breeding programme, the world's black-footed ferret population is well over 300.

A four-months'breeding season at the Sybille Wildlife Research and Conservation Education Unit (Wyoming) added 105 specimens to the captive population. The captive breeding success of five litters totalling 28 black-footed kits born at the Henry Doorly Zoo (Omaha, Nebraska) is noteworthy enough, but as of August 9, all kits are alive and appear to be doing well. The Conservation & Research Center at Front Royal (Virginia) had 11 healthy kits from three litters. A female that did not became pregnant the last two years, whelped a litter of six this year and all the kits are surviving.

Two new facilities did not yet produce litters or had litters which died. Three of the six females at the Cheyenne Mountain Zoo (Colorado Springs) whelped litters, but unfortunately, all nine kits died. None of the females at Louisville Zoo became pregnant but considering the small number of animals available, the chances for a successful breeding season were slim. Phoenix Zoo is constructing a captive breeding facility.

By the time of publication of this newsletter a first attempt is underway to reintroduce captive-bred black-footed ferrets to the wild.

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