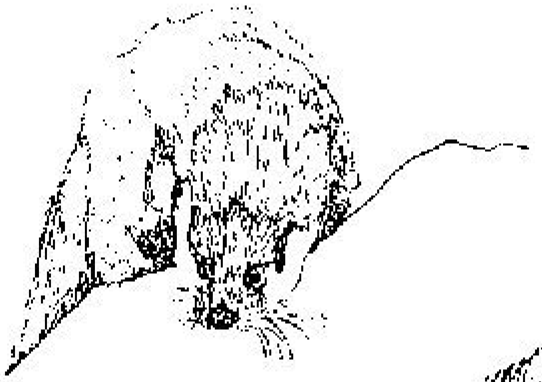
# I.U.C.N. Otter Specialist Group



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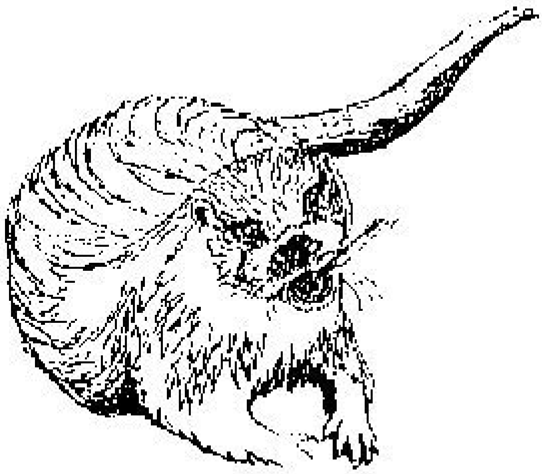

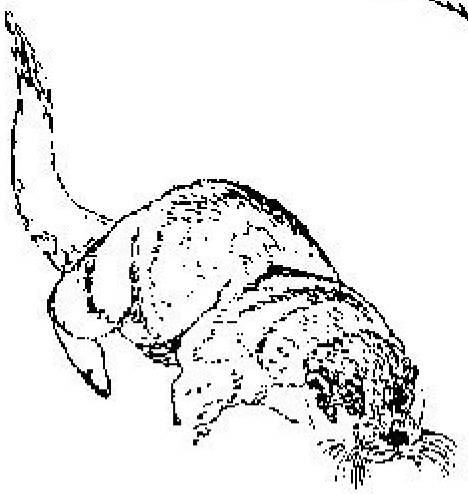

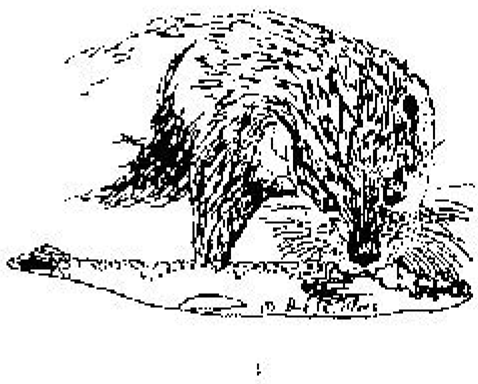

March 1990

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## LITERATURE



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# REPORT

## THE OIL SPILL IN PRINCE WILLIAM SOUND, ALASKA

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**Abstract:** Following the Exxon Valdez oil spill in Prince William Sound Alaska, on March 24, 1989, treatment centres for sea otters were set up at Valdez, Seward and Homer. Otter survival rates were lower at Valdez than at Seward, probably because the animals collected were closer to the spill in time and space, and oil toxicity was at a maximum. Otters collected in Prince William Sound were predominantly female and pregnant or lactating. Weathered oil persists in otter habitats throughout the spill zone - long term studies are underway to assess the effects of this.

On March 24, 1989, the Exxon Valdez oil tanker ran aground on Bligh Reef in northeastern Prince William Sound, spilling more than 11 million gallons of crude oil. The spill was the worst of its kind in North America, and in terms of the quantity of wildlife affected, it was probably the worst of its kind in the world.

For three days after the spill, calm seas and light winds buoyed hopes that the large oil slick could be contained; however, on March 27, strong northeasterly winds rapidly pushed the slick southwesterly into important wildlife habitats. Within days, oil had moved out of the southwestern corner of Prince William Sound into the Gulf of Alaska where it was picked up by the westerly flowing Alaska Coastal Current. Slicks of oil were carried along the south coast of the Kenai Peninsula to Cook Inlet and across to the Kodiak Archipelago and Alaska Peninsula. Oil sheen and mousse were eventually seen as far west as Chignik and the Shumagin Islands, a distance of more than 700 km from the spill site.

Sea otters were probably the most abundant and ubiquitous of marine mammals inhabiting coastal waters in the path of the oil spill. Because they rely on a thick coat of fur to trap air for insulation, sea otters are considered one of the most sensitive marine mammals to ail contamination. Concern for their well-being in the wake of the oil spill resulted in a massive and sometimes controversial effort to capture and clean sea otters that came into contact with oil. Two otter treatment centers, one in Valdez and one in Seward, were established to wash, treat and hold sea otters. The Valdez treatment center opened 6 days after the sill began; the second treatment center opened later in May. A third otter facility was established near Homer to hold otters prior to release back into the wild. An intensive effort was also made to collect as many marine birds and mammal carcasses from the oil spill zone as possible. Carcass collection centers were established in Valdez, Seward, Homer, and Kodiak.

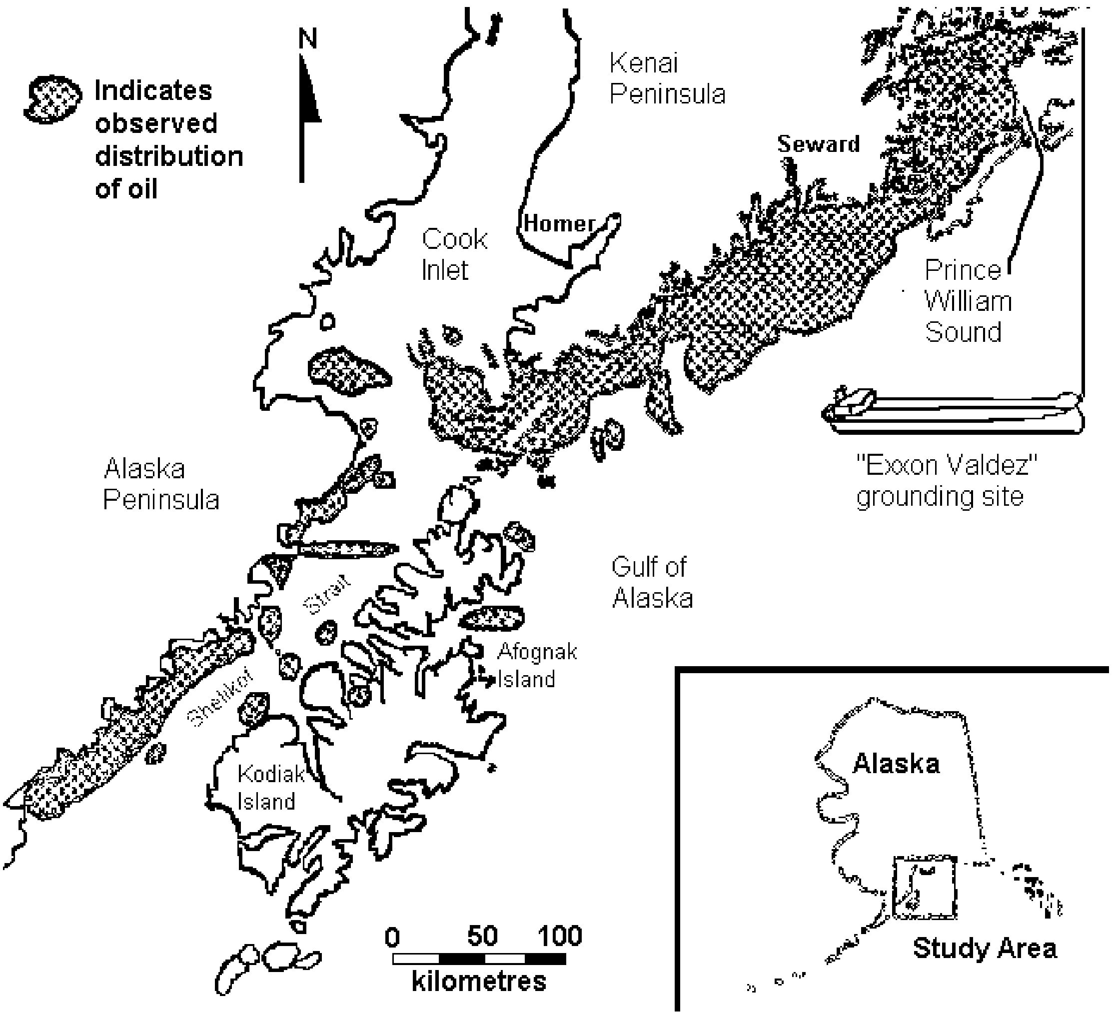


**Figure 1**: Composite map of the distribution of 'Exxon Valdez' oil observed on aerial overflights between 24 March and 29 My, 1989. Absence of oil on map does not necessarily mean that oil did not occur in an area - only that it was not observed (e.g. due to weather constraints on flying or visibility). Figure courtesy of John Piatt.

There was a 7-day lag between the time of the grounding of the Exxon Valdez and the arrival of oiled and dead otters in Valdez. This lag reflects both the time it took Exxon and government agencies to notify and mobilize people, boats, and aircraft for a response and the delayed movement of the oil slick into wildlife-rich habitat. The lack of facilities for caring for oiled wildlife and the lack of contingency planning were painfully evident at the outset. The first oiled sea otter arrived in Valdez on 30 March, just hours after a makeshift treatment center came on-line. Within three weeks of the spill, nearly 85% of the sea otters that were to be caught in Prince William Sound had been admitted to the Valdez treatment center. The majority of sea otters admitted to the Seward treatment center had been caught by the ninth week after the oil spill. A total of 329 sea otters were admitted to the Valdez and Seward treatment enters; 48% of those were from the Kenai Peninsula, 30% were from Prince William Sound, 6% were from Kodiak, and less than 1% were from the Alaska Peninsula. About 58% of the sea otters admitted to the Valdez treatment center died compared to only 15% mortality at the Seward treatment center. While it is tempting to conclude that the disparity in mortality between .the two centers represents superior treatment and handling protocol for sea otters that were admitted to Seward (and in fact the Seward center was developed with the deficiencies of the Valdez center in mind), it more likely results from the fact that most of the sea otters exposed to oil immediately following the spill, when the oil was most toxic, were from Prince William Sound and were admitted to Valdez. Nearly all the sea otters rated as heavily oiled were admitted to the Valdez center from Prince William Sound and 73% of those died. Most of the sea otters admitted to the Seward treatment center were rated as lightly oiled. In general, survival of otters captured during the first two weeks following the spill was low (<25%), but increased rapidly to about 45% through week three and to more than 70% thereafter. Necropsy of sea otters that died in the otter treatment center indicate that exposure to oil, particularly soon after the spill, resulted in acute pathological effects including pulmonary emphysema, subcutaneous emphysema, hemmorhagic enteritis, and liver and kidney dysfunction.

Results of the massive effort to capture, clean, and rehabilitate sea otters indicate that mortality was particularly acute in Prince William Sound within the first three weeks following the spill. During this period, the oil was more toxic and more widespread in habitat occupied by sea otters, resulting in a high probability of exposure to oil. Outside of the Sound, the probability of otters becoming exposed to oil was lower than in the Sound, and the oil was more weathered and less toxic. Sea otters admitted to the Seward treatment center were generally in much better condition than those brought to Valdez end consequently their survival was higher.

A summary of the results from the otter treatment centers provides an incomplete picture of the effects of the oil spill on sea otter populations. An unknown number of sea otters died after they came into contact with oil. To date, 885 sea otter carcases have been recovered in or adjacent to the oil spill zone. About 58% of those were from Prince William Sound, 21% from the Kenai Peninsula, 18% from the Kodiak Archipelago, and 5% from the Alaska Peninsula. Most of the carcases were recovered early in the spill period; by 19 May, 70% of the carcasses had been cataloged. Preliminary analysis of the sex and age composition of the sea otters that died following the spill suggest that adults predominated in Prince William Sound and along the Kenai Peninsula; pups were more prevalent in the collections from the Kodiak Archipelago and Alaska Peninsula. Female was the predominant sex of sea otter carcasses collected in Prince William Sound and along the Kenai Peninsula. Of the adult female carcasses collected from all areas, more than 60% were classified as pregnant or lactating at the time of death.

No estimates of the total number of sea otters killed as a result of the Exxon Valdez oil spill are currently available. Based on oiling status, up to 80% of the carcasses collected thus far may represent oil spill-related mortality. Analysis of a carcass recovery experiment conducted at Kodiak Island and analysis of pre- and post-oil spill surveys for sea otters in the oil spill zone may allow us to put some bounds on a future estimate of mortality.

Weathered oil persists in many habitats occupied by sea otters throughout the oil spill zone. Long term studies to investigate the effects of the spill on sea otters are underway in Prince William Sound where the impacts from the spill were most acute.

## REPORT

# DISTRIBUTION OF *LUTRA MACULICOLLIS* IN RWANDA: ECOLOGICAL CONSTRAINTS

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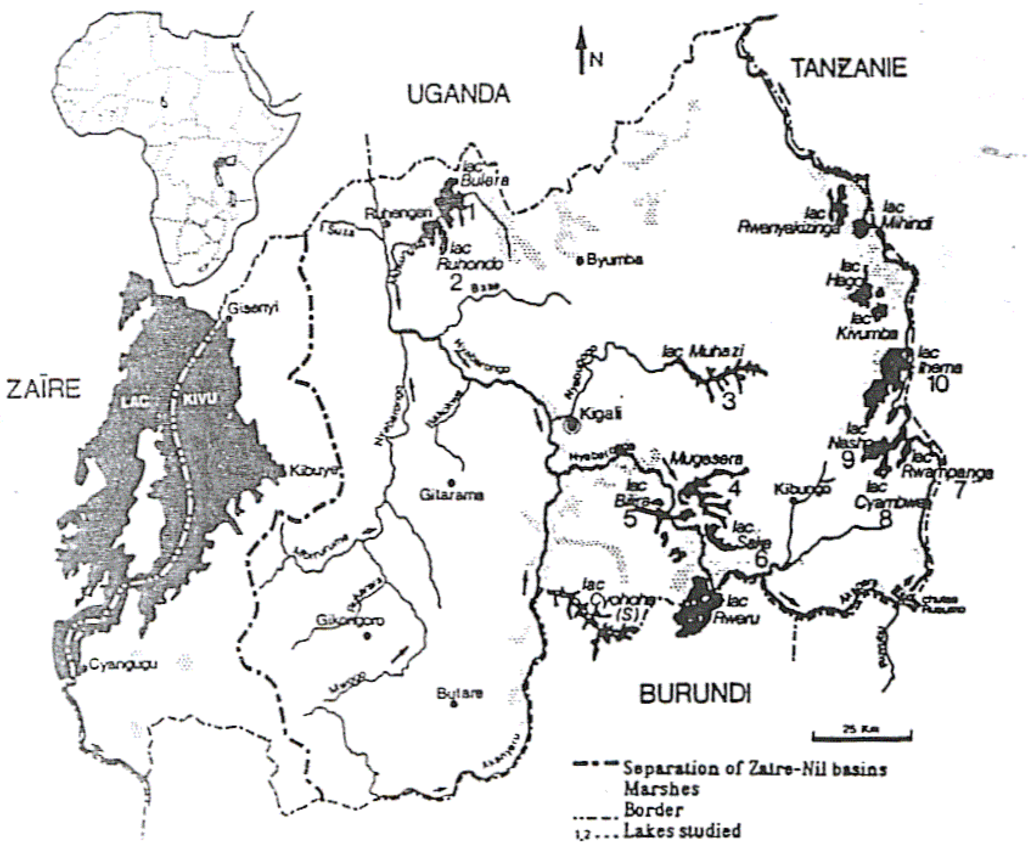
**Abstract:** The study of 10 rwandese lakes, where there are still quite important populations of *Lutra maculicollis*, has pointed out a few characteristics of the habitat favorable to the survival of these populations. The ecological constraints for the survival of these populations are: the abundance of small fishes, the continuity of the lake side vegetation, the absence of crocodiles and pollution by pesticides, and the low level of predation by man.

### INTRODUCTION

Three species of otters still live in Rwanda : Lutra maculicollis (LICHTENSTEIN), Aonyx capensis (SCHINZ) and Aonyx congica. The most abundant is the small spotted necked otter which is named INZIBYI. Contrarily to the Cape Clawless otter (IGIHURA) mainly observed in the marshes, the spotted necked otter lives exclusively in the open waters of the rwandese lakes, where it mainly preys on fish.

With the exception of lake Kivu flowing into the Zaire basin, the twenty small rwandese lakes (from 600 ha to 10.000 ha) are part of the Nile basin through the Nyabarongo and Akagera rivers (see MAP 1.). These numerous lakes harbour more or less abundant populations of spotted necked otters.

These variations of abundance depend on various ecological factors which we will try to point out by a comparative study of ten of these lakes.




**Map 1**: Lakes of Rwanda

**METHODS**

As a hydrobiological study of 8 rwandese lakes was undertaken by the "Bureau National d'Etude des Projets" (BUNEP, 1989) in view of the development of their fisheries, we have observed the presence and. the abundance of otters in each of these lakes.

Previously, from 1980 to 1986, an important study of lake Ihema. in the Akagera National Park, was carried out by FRANK & al.( 1984), PLISNIER & al. (1988) while we were observing the mammals on the lake sides (LEJEUNE, 1986).

Next an ecological study of lake Muhazi was carried out from 1985 to 1987 by the project "Etude et Amenagement Piscicole du Lac Muhazi" (EAPLM) (FRANK et al, 1986).

Finally a study of the Nyabarongo and Akagera marshes realized by SOGREAH (1989), gives some indications on the presence of *Lutra maculicollis* in these valleys.

The study of these 10 lakes are based on identical methods and are perfectly comparable:

- The transparency is measured by the Secchi disc method.
- The proportions of the different species of fishes are obtained by analysing the results of a standard program of experimental gillnet fishing : 4 nights for each season (4), coastal and pelagic, near the surface or near the bottom of the lake. The battery of monofilament gillnets is composed by 10 sheets of 50 $m^2$ with mesh sizes varying from 8 mm to 60 mm bar.
- The lake side vegetation is described by a botanist NVUKIYUMWAMI, as part of the BUNEP study.

- The density of human populations are estimated according to 4 zones:

    1. the North zone (Bulera, Luhondo - see MAP 1)
    2. the lake Muhazi zone
    3. the South-East zone (Sake, Bilira, Mugesera)
    4. the East zone (Mpanga, Nasho, Cyambwe)

  Lake Ihema is situated inside the Akagera National Park, theoretically without any human population. In fact a few dozen of Banyambo fishermen live in the Akagera marshes on the border between Rwanda and Tanzania and more or less fifty rwandese fishermen work for the Ihema fishery (ORTPN).

- For each lake the presence and the abundance of otters have been estimated by direct observations (for example for the lakes Muhazi, Luhondo, Sake) or by indirect observations ( damage of otters to experimental gillnets and enquiries from the local people). The damages of the otters in the experimental nets are easily identified (LEJEUNE, 1989 a): the fishes caught in the gillnets are only partly eaten. These damages are very different of those of crocodiles which swallow the entire fish and tear completely the net.

**RESULTS**

The otter densities have only been estimated for lake Muhazi where they have been studied for 2 years. Their overall number is situated between 200 and 400 for a lake of 3400 ha bordered by 145 km of shores. The density is about 20 otters for 10 km of shore (14 to 30 otters/10 km). The population of lake Muhazi is thus specially abundant compared with the estimations of ERLINGE (1967) in Sweden (3.6 to 5.6 *Lutra lutra* / !0km of lake shore) and VAN DER ZEE (1982) in South Africa (4 to 7 *Aonyx capensis* / 10 km of coast line).

In all the other rwandese lakes, the otters are less abundant. Observations are made regularly on lake Luhondo, Mugesera, Sake (personal observations and depredation of experimental fishing nets), occasionally on lake Bulera, Birira, Mpanga, Nasho and Cyambwe (no personal observations but presence confirmed by fishermen and local population) and exceptionally on lake Ihema (2 observations in 5 years and no depredation of nets).

Some characteristics of these 10 lakes are presented in TABLE 1.

Table 1. Characteristics of 10 Rwandese lakes

| | Lake | Altitude m | Depth (max) m (mean) | Transparency cm | Fishes Haplochromis %W,N, TW (kg)[1] | | Lakeside Vegetation[2] | Human Population inh/$km^2$) | Crocodiles | Otters |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Bulera | 1862 | 173<br>(100) | 120< | W<br>N<br>TW | 47%<br>97%<br>62 | P. maur (2m)<br>exploited | 378 | 0 | ++ |
| 2 | Luhondo | 1764 | 68<br>(40) | 74-120 | W<br>N<br>TW | 83%<br>99%<br>209 | P. maur<br>T. lat<br>exploited | 378 | 0 | +++ |
| 3 | Muhazi | 1443 | 12<br>(6) | 65-70 | W<br>N<br>TW | 78%<br>99%<br>189 | P. maur (5m)<br>T. lat, M. vio.<br>C. pap. | 230 | 0 | ++++ |
| 4 | Mugasera | 1350 | 4<br>(4) | 30-50 | W<br>N<br>TW | 64%<br>96%<br>231 | C. pap. (4m<)<br>E. pyr. | 260 | ++ | +++ |
| 5 | Bilira | 1350 | 6.5<br>(6) | 39-49 | W<br>N<br>TW | 13%<br>60%<br>9 | E. pyr.(3m)<br>P.rec. | 260 | ++ | ++ |
| 6 | Sake | 1350 | 4.3<br>(4) | 40-78 | W<br>N<br>TW | 41%<br>71%<br>127 | C. pap. (40m<)<br>E. pyr. | 260 | ++ | +++ |
| 7 | Rwampanga | 1250 | 7 | 64-90 | W | 23% | Forest gallery | 90 | +++ | ++ |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | (5) | | N | 58% | | | | |
| | | | | | TW | 194 | | | | |
| 8 | Cyambwe | 1290 | 6.7 | 35-70 | W | 33% | Forest gallery | 90 | +++ | ++ |
| | | | (4) | | N | 72% | | | | |
| | | | | | TW | 199 | | | | |
| 9 | Nasho | 1290 | 6.3 | 48-65 | W | 41% | C. pap. (1m) | 90 | ++ | ++ |
| | | | (3) | | N | 91% | + P. rec., E. pyr. | | | |
| | | | | | TW | 153 | | | | |
| 10 | Ihema | 1290 | 7 | 55-60 | W | 28% | A. ela | <5 | +++ | + |
| | | | (4.8) | | N | 58% | | | | |
| | | | | | TW | 148 | | | | |

[1]W = Weight; N = Number; TW = Total Weight (16 nights fishing)

| | | |
|---|---|---|
| [2]P. maur | Phragmites mauritianus | |
| T.lat | Typha latifolius | |
| C. pap. | Cyperus papyrus | |
| E. pyr. | Echinochlos pyramidalis | |
| P. rec. | Phoenix reclinata | |
| A. ela. | Aeschinomene elaphroxylon | |
| Density | (1985) Rwanda mean = 240 inh/km$^2$ | |
| Abundance | 0 | Absence |
| | + | Very Rare |
| | ++ | Rare |
| | +++ | Abundant |
| | ++++ | Very Abundant |

We shall try and point out the main factors influencing the high density of otters in lake Muhazi :

1. The altitude of lake Muhazi (1443 m) is "mean" compared with the other rwandese lakes (1290 to 1862 m).

2. The depth is rather shallow (5 to 12 m) compared with the great depths of the Northern lakes, although lake Muhazi is deeper than the lakes of the Akagera valley.

3. The transparency of the water does not seem to be a key factor as the water of the lake Muhazi, very rich in phytoplankton, is turbid (mean transparency : 65-70 cm). The Northern lakes which have clear waters only support very few otters.

4. On the other hand the relative abundance of *Haplochromis sp*, most preferred prey of *Lutra maculicollis* (LEJEUNE, in press) should play a most important role. These small cichlids, underexploited by the local fishermen, make up for 75% of the ichtyomassa of lakes Muhazi and Luhonda.
   During 16 nights of experimental fishing, we have captured respectively 189 kg, 209 kg, 231 kg and 172 kg in the lakes Muhazi, Luhondo, Mugesera and Sake against only 62 kg and 9 kg for the lakes Bulera and Bilira. The Akagera lakes are also very rich in small cichlids but other ecological factors seem to limit the otter density: lakeside vegetation and crocodiles.

5. The vegetation of the lake side seems to be an essential factor. The otter spends at least 16 hours out of 24 in this vegetation, for cover and reproduction (LEJEUNE, 1989 b). The shores of lake Muhazi are fringed with a thick row (2 to 7m) of *Phragmites mauritianus*. At the end of the lake arms, marshes of *Cyperus papyrus*, *Typha latifolia*, *Miscanthidium violaceum* replace the fringe of *Phragmites*.
   On the otter hand, the banks of the Northern lakes are bare following the overexploitation of the *Phragmites* by the peasants for constructions, fences, ... The *Phragmites* are sold at 1.5 to 2 RwF/piece (85 RwF = 1 US $). The vegetation of the Eastern lakes is very different: the marshes of *Cyperus papyrus* alternate with meadows of *Echinochloa pyramidalis* or with forest galleries of *Phoenix reclinata* and *Aeschinomene elaphroxylon*.

6. The impact of the human population on the density of otters is quite relative as the lake Muhazi basin bears a density of 230 inhabitants/km$^2$, for only 5 inhabitants/km$^2$ around lake Ihema.

Man becomes a limiting factor if his activities harms the otters: clearing of shores, overexploitation of the fishes chased by the otters, hunting of otters for their pelts... Until 1973, the spotted necked otter was intensively hunted in Rwanda; more or less one thousand pelts were bought yearly at 300 RwF/piece by a private tannery in Gisenyi (DEWALQUE, pers. com.). Since 15 years the trade of otter pelts is forbidden in Rwanda and they are only rarely seen in the tanneries. The traditional hunting of otters (on a canoe with a spear) has been replaced by the hunting of small predators such as civets and genets. This type of hunting, using dogs causes the death of a few dozens of otters each year around lake Muhazi.

7. The presence of crocodiles (*Crocodilus niloticus*} could also be a limiting factor for the otter population. If the small crocodiles eat mainly insects, the greater specimens prey on fishes and mammals. It is very probable that the otters, sharing the same habitat, are often predated by crocodiles. In the Nyabarongo and Akagera valleys (Eastern lakes) crocodiles are still quite abundant. On the other hand, they are totally absent from lakes Muhazi, Bulera and Luhondo.

**DISCUSSION**

They are only very few informations on the dispersion of Lutra maculicollis in Africa (ROWE-ROWE, 1989) and the characteristics of their habitats.

ROWE-ROWE (1977, 1985) comparing 2 species of otters (*Lutra maculicollis* and *Aonyx capensis*) in South Africa concludes that L. maculicollis chases by sight and needs transparent waters, unpolluted and rich in small fishes, crabs and frogs. The pollution of rivers by agriculture and industry would be the first cause for the disappearance of spotted necked otters (STUART, 1985).

The abundance of otters in the turbid waters of some of the rwandese lakes seems to counter this hypothesis. It is necessary to distinguish here turbid waters with a low transparency from polluted waters. The low transparency of the rwandese lakes is caused by an abundant phytoplankton and suspended organic matters, but is not the result of any industrial or agricultural pollution, still absent in Rwanda.

This pollution as described in South Africa on the Orange River (STUART, 1985) might be responsible for the decline of otters in this region but - in our opinion - not because the water has become less transparent but rather because of the decline of fish stocks or the concentration of pesticides in the tissues of the otters at the top of the alimentary chain (ROWE-ROWE, 1989).

The development of the gillnet fishery in Africa does not seem to be a limiting factor as it was supposed by STUART (1985) or MONFORT (1985). At lake Muhazi, where the gillnet fishery is very intensive, the numerous otters are only very rarely caught in these nets (one observation in 5 years). Furthermore otters have learnt very well to take profit of this type of fishing by eating part of the fishes caught by this static gear (LEJEUNE. 1989 a). The presence of man is not either directly a limiting factor for the otters in Rwanda as these are very rare in the Akagera National Park, a region protected of human influence and very abundant in lake Muhazi situated in a very highly populated area. On the other hand, the abundance of fishes of small size (genus *Haplochromis*} is an essential factor. Small fishes are in fact easier preys than big ones (ROWE-ROWE, 1977; LEJEUNE, in press).
Even if they eat big fishes (*Clarias gariepinus* and *Tilapia nilotica*) coming from gillnets, the main part of their diet is composed of fishes under 15 cm total length. These little fishes must be available in very great quantities so as to compensate the small biomass of each prey (mean weight = 3.9g). It only takes two dives for the otter to capture one prey (LEJEUNE, 1989 b).

Finally, an important fringe of vegetation all along the shoreline of the lake gives a good cover necessary to the rest and the breeding of the otters. The draining of marshes for new farmlands, the harnessing of rivers and streams (for roads, for electricity generating,...) and the overexploitation of the lake side vegetation are as many threats for the important populations of *Lutra maculicollis* in Central Africa.

**CONCLUSION**

The abundance of small fishes in the lakes, the unbroken vegetal cover along the shores, the absence of crocodiles and also certainly the ban on the trading of pelts are the main factors for sustaining or even increasing the populations of spotted necked otters in Rwanda.

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# REPORT

## OTTER DISTRIBUTION AND PROTECTION IN SOUTH AFRICA

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**Abstract:** This paper draws together current knowledge on the distribution of otters in South Africa. *Aonyx capensis* is more widespread than *Lutra maculicollis*, which is adapted to feed on fish, and hence is limited to areas which can support them, whereas clawless otters are adapted to eat the more widespread crabs and frogs. Otters are protected in reserves and national parks. Hunting outside of these areas is not a serious threat, but habitat degradation and loss due to rapid expansion of the human population.

Two otter species occur in South Africa : the Cape clawless otter *Aonyx capensis* and the spotted-necked otter *Lutra maculicollls.*

### DISTRIBUTION

The most recent detailed information on otter distribution in each of the four provinces of South Africa has been separately presented by Lynch (1983) for the Orange Free State, Rautenbach (1982) for Transvaal, Rowe-Rowe (1978) for Natal, and Stuart (1981) for the Cape Province. The records have been combined to indicate overall distribution of each of the two otters in South Africa (Figure 1 and Figure 2).*A. capensis* occurs throughout the eastern half of the country and along the southern coast. It is absent from the arid western interior, occurring only along the perennial Orange River. *L. maculicollis* is not as widely distributed as is *A. capensis*, being limited to inland waters in the eastern half of South Africa, and not extending as far north as does *A. capensis*.

There are no published records of otter occurrence in the coastal littoral between the Cape Province and Natal (Transkei), and the local nature conservation authorities have not undertaken faunal surveys. Anglers have, however, reported sightings and signs of otters, therefore I believe that the distribution of *A. capensis* is continuous from Natal to the Cape Province.

In South Africa rainfall decreases from east to west: 750 mm to over 1000 mm in Natal, decreasing to less than 100mm on the west coast. Otters occur mainly where rainfall exceeds 500 mm, roughly east of 25º E and along the southern coast. *A. capensis* enjoys a wider distribution and is more abundant than is *L. maculicollis* . The reason appears to lie in the fact that *A. capensis* has evolved primarily as a feeder on crabs, whereas L. maculicollis is better adapted for fish capture (Rowe-Rowe, 1977). Fish populations in South African inland waters are low, therefore *L. maculicollis* has to supplement its diet with crabs. Owing to its smaller size and less molariform teeth, L. maculicollis is limited to taking small crabs (Rowe-Rowe 1977). In the waters of central Africa, which support large freshwater fish populations, L. maculicollis lives almost entirely on fish, and is the dominant otter (Lejeune and Frank, 1990) . In South Africa the opposite obtains with *A. capensis* existing in streams in which there are few or no fish, but where crab and frog (*Xenopus*) numbers are adequate. Along the southern coast, marine organisms are also taken (van der Zee, 1981).

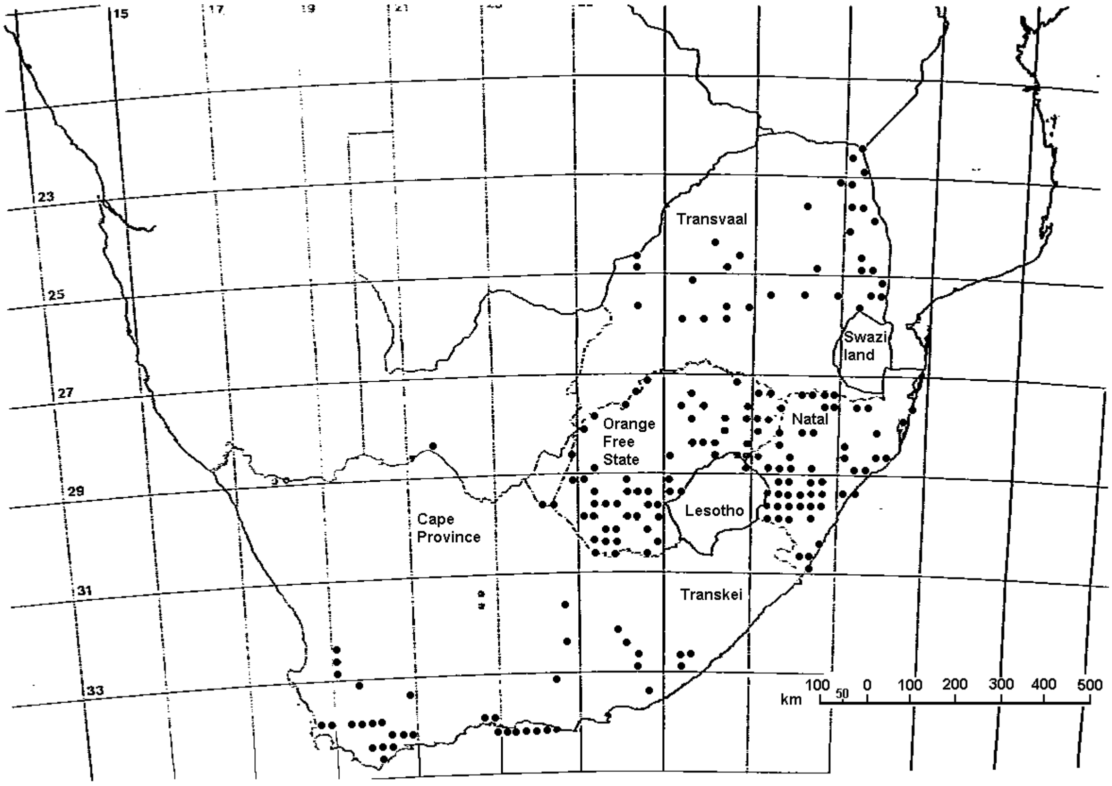


**Figure 1**: Distribution of *Aonyx capensis* in South Africa, based on data from Lynch (1983), Rautenbach (1982), Rowe-Rowe (1978), and Stuart (1981).

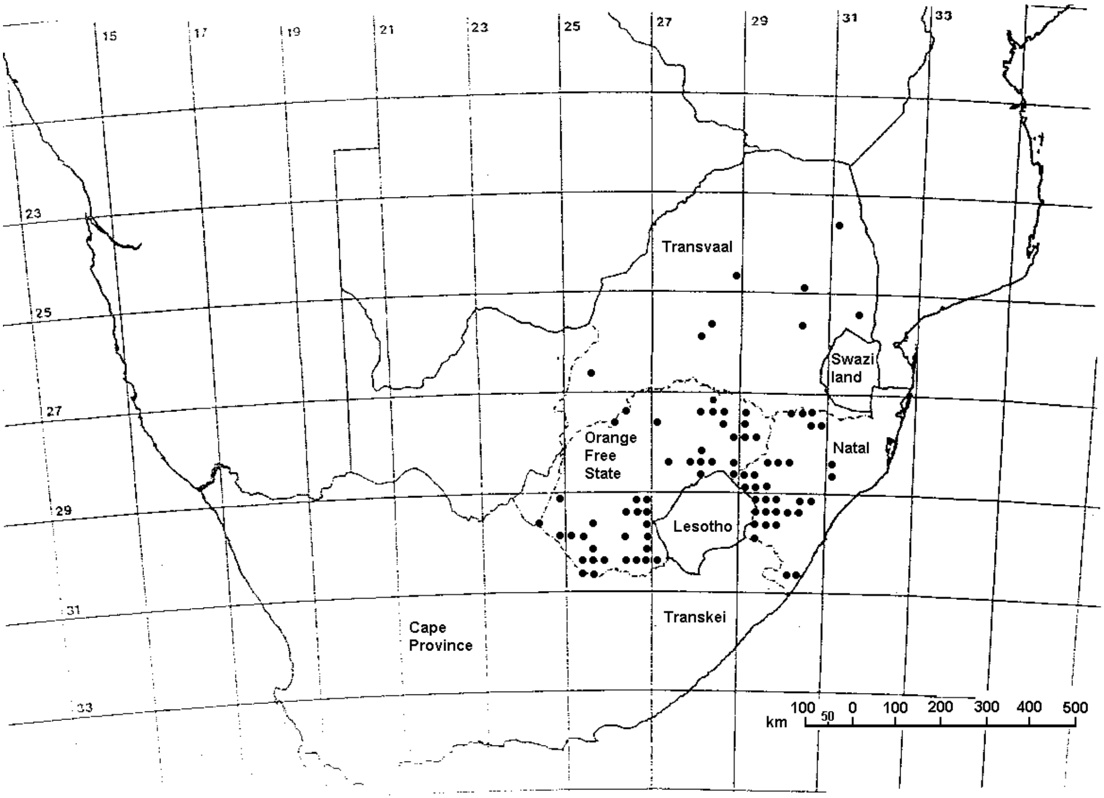


**Figure 2**: Distribution of *Lutra maculicollis* in South Africa.
See Figure 1 for sources of information

## PROTECTION

Each of the four provinces in South Africa has its own nature conservation ordinances. In the cape province, *Aonyx capensis* (*Lutra maculicollis* does not occur there) is protected in nature reserves and may not be hunted without a permit outside of protected areas. In the other three provinces, otters are protected in nature reserves but are not listed as protected animals outside of reserves. Trade in live animals or animal products is not allowed, however.

Recently collected information (1989) indicates that protection within nature reserves appears to be adequate. Otters occur in 65 reserves in the Cape Province, 34 in Transvaal, 33 in Natal, and 11 in the Orange Free State. In addition they are present in nine national parks, controlled by the National Parks Board. The total number of protected areas in which otters occur is therefore 152 out of the national total of 249 areas.

Some of the protected areas in which otters have been recorded are small (100- 300 ha), and may include only a few hundred metre of stream. The fact that otters occur there, however, suggests that the habitat of the surrounding land is still in good condition. On the other hand, many other reserves are large (30 000 to 80 000 ha) and include important mountain catchments with numerous streams (particularly in Natal and the Cape Province), or large wetlands.

The killing of otters outside of protected areas is not a serious threat. They are shot occasionally by some farmers who believe that otters have a major impact on sport-fishing, or when poultry losses are experienced. In some areas traditional hunters with dogs, or dogs on their own, harass otters. (The increasing number of dogs in South Africa impose threats to most forms of wildlife). The real threats to otters emanate from South African's rapidly increasing human population. Urban expansion is responsible for loss of habitat and industrial pollution. The need to produce more food, and to grow cash crops, means that more land (particularly grassland) comes under the plough each year. Overgrazing, particularly in subsistence farming areas is also a serious problem, leading to increased water runoff, soil loss, and siltation of streams.

Nature conservation and Department of Agriculture authorities are doing their best to promote environmental awareness and conservation. In Natal, for example, there are over 30 wildlife extension officers in the field, outside of protected areas, who liase with agricultural extension officers in promoting wise use of resources and sound agricultural practices.

***ACKNOWLEDGEMENTS*** *- Dick Carr, Niël Ferreira, and Peter Lloyd are thanked for the information on the occurrence of otters in protected areas outside of Natal..*

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# REPORT

## RECENT INFORMATION ON THE CONGO CLAWLESS OTTER

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**Abstract:** Distribution data for *Aonyx congica* is reviewed. Little is known about the ecology of this species. Over much of its range there is little human population, but elsewhere habitat degradation has occured. There is a particular need for a detailed study of *A. congica*.

### INTRODUCTION

The distribution of the Congo clawless otter *Aonyx congica* in central Africa has been broadly described by Coetzee (1971). In the course of a questionnaire survey conducted during 1989, to collect information for the IUCN Action Plan for otter conservation, data were obtained on the current distribution and status of the Congo clawless otter.

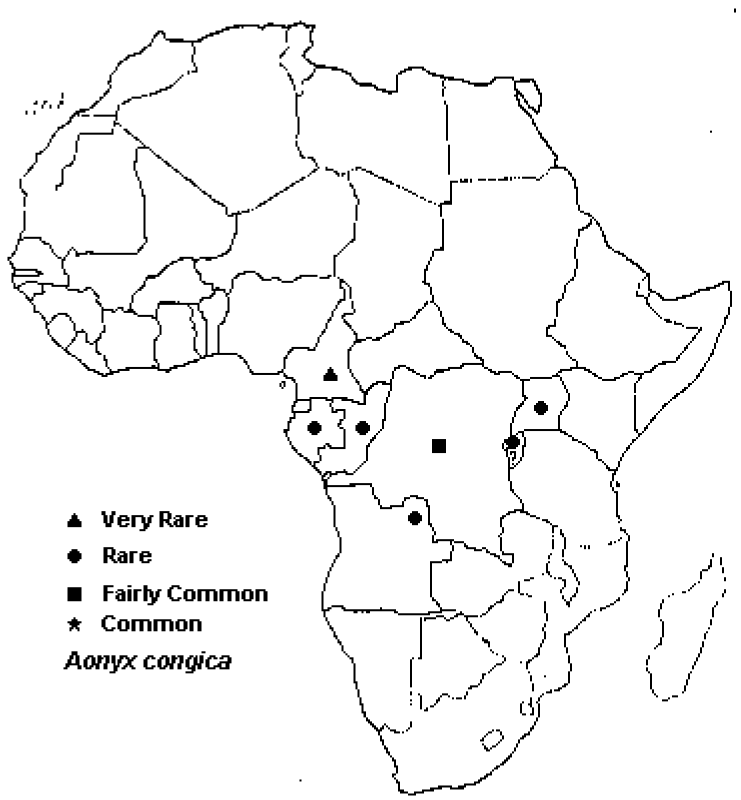


**Figure 1**: Distribution of *Aonyx capensis* in South Africa, based on data from Lynch (1983), Rautenbach (1982), Rowe-Rowe (1978), and Stuart (1981).

This otter is reported to be widespread and fairly common in Zaire; rare in Gabon, Congo, Rwanda, south-western Uganda, and north-eastern Angola; and very rare in Cameroon (Fig. 1). No assessment of its status was made in Burundi, where the otter is believed to occur. Coetzee (1971) reported *A. congica* from the upper Cross River in south-eastern Nigeria, near the Cameroon border. In the current survey the otter was reported from the upper Cross River in Cameroon, so may still occur in Nigeria.

An unconfirmed report was received of *A. congica* in the Ubangui River, which forms part of the border between Central African Republic and Zaire.

Very little is known about the ecology of *A. congica*. It has been reported from forest rivers and streams, as well as in swamps and other wetlands. Kingdon (1977), in reviewing available literature on the otter's diet, suggested that it lives on worms, insects, molluscs, crustaceans, and amphibians. Pygmies in the Ituri Forest of Zaire stated that *A. congica* lives on fish and crabs, that the otter is both diurnal and nocturnal, and that shelter is taken in natural cavities along river banks (Carpaneto & Germi 1989).

No serious threats to *A. congica* were identified. In most of the countries within its range some otters are caught in fish nets or fish traps. Otters are also killed by those who regard them as competitors for food (fish), or because they damage fish traps. Most of the regions in which *A. congica* occurs are still sparsely populated by humans. In areas where human populations are fairly dense, deforestation, draining of wetlands, and increased agricultural activity have changed the otter's habitat.

The status estimates reported in this article are subjective, and their limitations are recognised. Some respondents commented on the fact that little was known about otters in their countries, and identified the need for field surveys. There appears to be o particular need for a detailed study on *Aonyx congica*, concentrating on habitat requirements, diet, and behaviour.

***ACKNOWLEDGEMENTS*** *- The following are thanked for providing information: J. Baranga, J . Crawford-Cabral, C. Dominique, G. Dubost, S. Gartlan, A. Lejeune, A. Mackanga-Missandzou, G. Makosso Vheiye, H.P. Mertens, and D. N'Sosso.*

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# REPORT

## FISH FARMING AND OTTERS IN FINLAND

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**Abstract:** The results of a questionnaire sent to all fishfarmers in Finland are presented; 45% replied. There appear to be good otter populations in Finland. Frequency and amount of damage to stocks is discussed. An electric fence system that has been found useful in excluding otters from fish farms is described. Only a few farmers consider otters a grave pest. The major threat to otters in Finland seems to be traffic accidents as car numbers increase. Further information is needed to confirm the findings, and to ensure confusion with mink does not occur.

### INTRODUCTION

Fish farming in Finland has very much increased in the 1980s. Rainbow trout (*Salmo gairdneri*) is the main (99%) product with a record yield of 13,000 metric tons in the year 1988. At the same time our natural catch of salmonids was much lower (1.2 metric tons in 1986) (Anonymous. 1988; 1989).

Otters are not protected at fish farms and the Finnish state does not yet compensate for losses. Therefore in early 1980 a questionnaire was sent by WWF to all known fish farmers (n = 778) to determine how many otters have been killed and how great have been the financial losses. Other questions were also included. Some 45% of the farmers returned the form.

## RESULTS

### 1. Distribution of Otters in Finland

Because there are fish farms all over the country, the present data probably describe the main distribution of otter populations in Finland. Otters are rare or absent in the coastal regions (Figure 1) while there are good populations in inland, central and eastern parts of the country. Also populations in southern and western Lapland seem to be viable, even though it is difficult to determine what constitutes a viable population.

### 2. Frequency of Visits

Most fishfarmers (69%) reported that otters visit in autumn and winter. Mostly they stay for a couple of days twice a month. However, sometimes otters lived on the farms almost continuously round the whole year. But 61 persons wrote that otters never visited the farms although they lived on the adjacent areas. There was no correlation with e.g. the latitude and the frequency of visits.

### 3. Numbers of otters killed on the fish farms.

Altogether at least 76 otters were killed In the 1980s (Figure 1). Most of them (at least 42%) were shot while only 16% were killed with traps. The rest were caught e.g. in live-traps, drowned in fish traps or killed by dogs. Only 23 otters were killed before the year 1980 in fish farms. This may reflect both the increasing population of otters and the growth of fish farming.

### 4. Damage done by Otters in Fish Farms

The total yearly losses were about 75,000 US dollars. One third of them was reported from the Oulu province (Figure 1) but occasionally otters caught much fish elsewhere too. In an extreme case, in the year 1988, two otters ate 4500-5000 trout of two years age . Their value was estimated as 7500 US dollars.

Sometimes surplus killing was apparent. Once in late winter seven trout of 1kg were found in snow. Each of them had been bitten in the throat. There were only otter tracks on the river bank. Likewise in autumn 1988 altogether 19 trout of 1.5kg were once found in western Lapland on a 200m length of river bank. They had not been eaten, only bitten in the throat. There was no snow at that time, thus the killer could have been a mink. But up to five otters were seen together there.

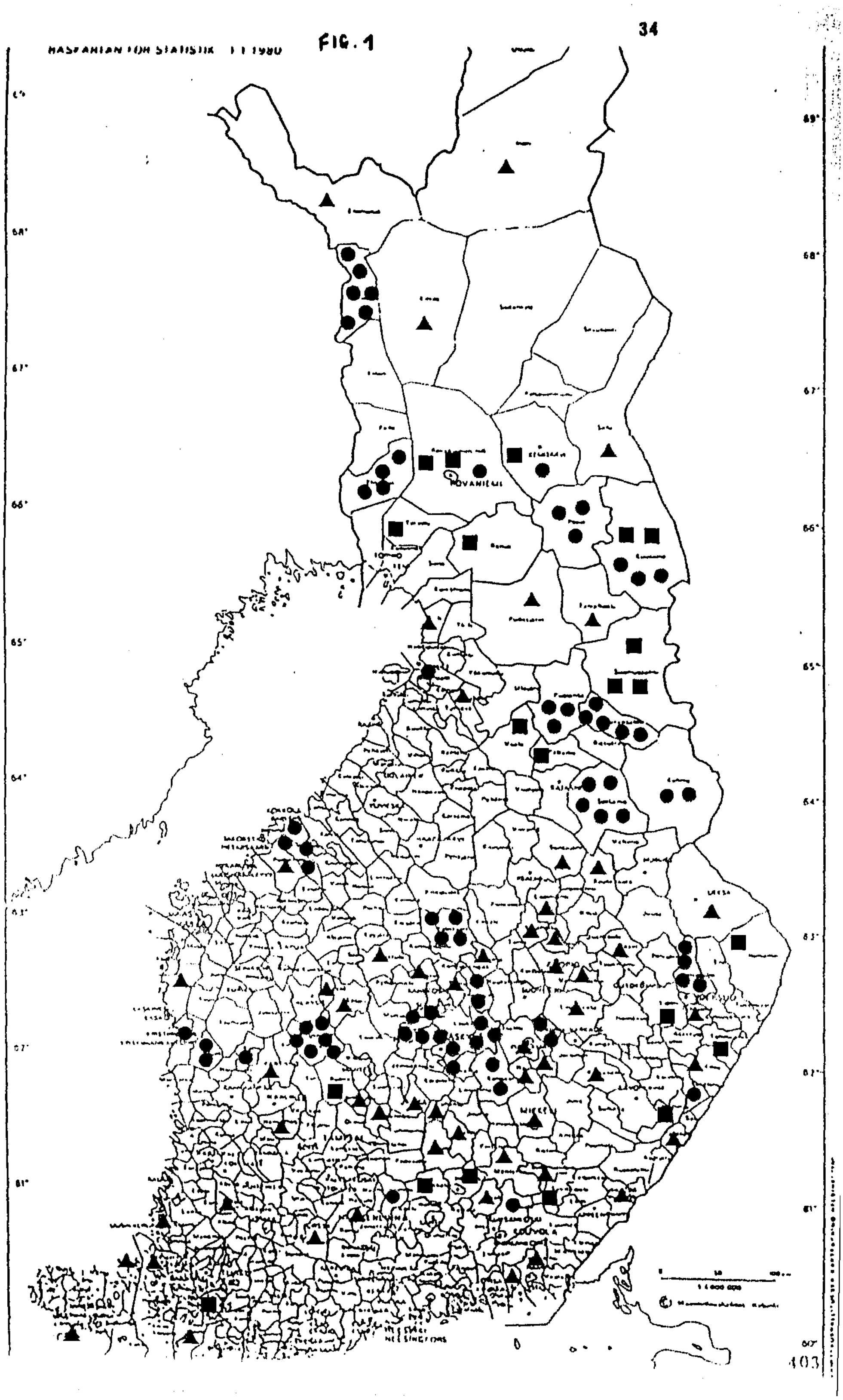


**Figure 1**: The main populations of otters in Finland in the 1980s according to fish farmers.

● = one otter killed in fish farms.

■ = fish farm reporting damage by otters.

▲ = no damage but otters were present in 1988-1989.

## 5. How to prevent the Damage

Several fish farmers have tested different fences to prevent otters coming in. Possibly one of the best is a 50cm high, 20-50mm mesh metal fence made of 1mm wire. Five cm above it is a low voltage electric wire normally used to constrain cattle (Figure 2). After snow storms, the snow along the fence was trampled under foot.

FIG. 2.

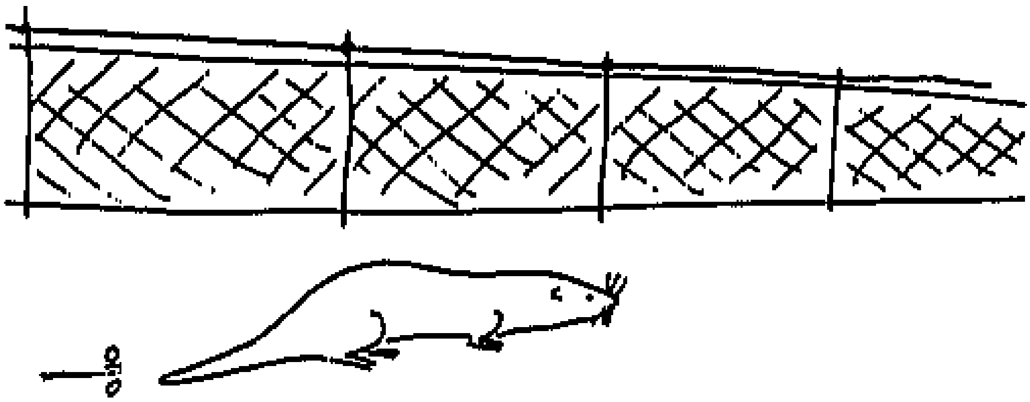

Figure 2: An electric fence preventing otters intruding into fish farm

In snowless areas, a I5 cm high fence suffices. This fence consists of light glass fibre stakes and two electric cattle-wires 10 and 15cm from the surface of the earth.

An old man was once looking out of the window when an otter came its usual way into the fish farm without knowing that there was now a new, low electric fence. It ran into the fence, jumped up and returned quickly. Later the otter always went round the fence at a distance of 100m.

## 6. Attitude to Otters

Over one hundred fish farmers said they would, in principle, give the trapped otters to WWF in order to transport them to other areas. But the problem remains to find a place remote enough from fish farms. Some wrote that it is nice to see otters and the damage they do is not too great. Only a few farmers consider otters as serious pests and curse that it is very difficult to get rid of these intelligent animals. Many farmers would give the carcasses of killed otters to zoologists if collection was organized.

## 7. Discussion

Certainly additional data are needed to clarify the distribution of otters in Finland. According to the map of Vikberg et al (1989) otters should also be found in several places on the coastal area. In the present material there are two reports even on the Åland Islands which are otterless according to both Kaikusalo (1984a) and Vikberg et al (1989). It. is possible that there is some confusion with mink - or otters are returning to the archipelago.

Many otters are probably killed each year in Finland. Certainly many cases are not reported at all. At least 180 otters were brought to Finnish museums in the 1980s (pers. comm.). A minimum of 256 otters were killed in Finland during the last ten years.

Kaikusalo (1984b) estimated. based on questionnaires that tens of otters die annually in Finland in fish traps and traffic accidents. The last named are an increasing menace because the number of cars grows rapidly. At the same time, hunters demand the restarting of otter hunting.

In Sweden, otter populations seem to be low even in the best areas. Dead otters are given to Naturhistoriska Rijksmuseet in Stockholm. Between 1965-85 altogether 65 otters were received (Olssen et al, 1985).

Vikberg et al (1989) suggested that the growing fish farming has been a *benefit* to otters because they now get plenty of food. However, otters are also killed in fish farms. The increasing fish farming cannot be the reason for increasing numbers of otters in the 1980s, because salmonids form only a minor part of the food of otters thus far studied in Finalnd (Skarén, unpublished data).

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## REPORT

# EUROPEAN OTTERS AND PREVENTIVE MEASURES IN FISH-FYKES (ON THE MATTER OF THE PROPER MESH-WIDTH FOR STOP-GRIDS)

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**Abstract:** Drowning in fish-fykes causes proportionally high mortality in a vulnerable otter population. Stop-grid mesh sizes recommended in Denmark and Great Britain assume that juveniles do not enter the nets unless following adults - this is not the case in the Netherlands. A smaller grid size is recommended, which may also improve the quality of eel catch.

Otters drowning in fish-fykes form a serious threat for the well-being of the population as a whole. In the period between 1965 and 1987 26 cases of otters drowned in fyke nets were recorded. This is 27% of the total of recorded mortality in the same period (van Moll & Christoffels, 1989).

Considering the low productivity of the European otter, this mortality cause has to be reduced as much as possible. European otters reach the age of reproduction only after 1.5 to 2 years. Otter cubs remain with their mother during a span of one whole year. This results in a reproduction of three litters as a maximum for every female otter whose average age (in the Netherlands) is estimated to be six years The size of the litter also is small: average of 2.8 (Wijngaarden & Peppel, 1970). It may be concluded that drowning in fish-fykes forms one of the major direct threats to the otter in the Netherlands.

### MOMENTARY APPLICATION OF PREVENTIVE MEASURES

A simple and effective solution to prevent otters from drowning in fish fykes is the application of stop grids. These are metal devices which are to be placed in the first compartment of the fyke. Of course, waterfowl and muskrats also will be prevented to enter the fyke by this device.

At this moment systematic application of stop-grids has taken place in Denmark (Madsen, 1986). Here also research has taken place of the catch-results and possible loss of catch by fishermen when the grid is used. The mesh which is used, is made of steel and knows a mesh-width of 85 x 85 mm. In Great Britain also a study on the fishing efficiency is made (Vincent Wildlife Trust, 1988). Included was the testing of different otter-guards. The report of the Vincent Wildlife Trust suggests that the use of other types of guards than the grid is recommendable depending on the situations and conditions in diverse areas.

In the Netherlands fishing efficiency has been tested in two nature-reserves of the Society 'Natuurmonumenten', named 'De Wieden' and 'de Nieuwkoopse Plassen' in the east and middle of the Netherlands. The test has been set up to determine the loss of catch. Here steel-grids were used with a mesh-width of 80 x 80 mm (pers. comm. Warden Natuurmonumenten).

**MESH-WIDTH IN STOP-GRIDS (G-GUARDS)**

A problem with the application of stop-grids arises with the mesh-width. In literature no consensus on the required mesh-width exists. In the Danish experiment a mesh-width of 85 x 85 mm is maintained. Jefferies et al.(1984) state that this size refers to the maximum width which is acceptable for adult otters. The choice in Denmark for this maximum size is inspired by the fact that in a period of five years (1980 - 1985) no juvenile otters were counted amongst the 36 otters drowned in fish-fykes (pers. comm. Aksel Bo Madsen) The report on otter-guards from the Vincent Wildlife Trust states following:

"In any guard allowing the ingress of eels but not otters, the size of the space or spaces need to be as large as possible but obviously need to be limited to dimensions slightly smaller than those of the smallest adult or independent immature otters. Fortunately, cubs need not to be taken into account in these dimensions because they follow the mother when being taught to swim and hunt and stay with her for a period of around ten months, by which time they are close to adult size and weight. Consequently, although family parties have been drowned in fykes (...), these consisted of the mother and cubs; no dependant-aged cubs have been found drowned individually. Thus if the mother can be prevented from entering this should largely prevent cub-mortalities. As the adult female is smaller than the adult male, it is her dimensions which are critical for the guards." (Vincent Wildlife Trust, 1986)

Unfortunately this is not true, in the Netherlands in diversion to the reports from Denmark and Great-Britain this certainly is not the case. For the Netherlands over a period of 22 years the following numbers are recorded:

Table 1:Otters drowned in fish-fykes in the period 1965 - 1987 in the Netherlands (van Moll & Christoffels, 1989)

| Sex | Age | | | |
|---|---|---|---|---|
| | Adult | Juvenile | ? | Total / % |
| Female | 5 | 1 | 0 | 6 = 21.4% |
| Male | 1 | 4 | 0 | 5 = 17.9% |
| ? | 2 | 7 | 8 | 17 = 60.7% |
| Total / % | 8 = 28.5% | 12 = 43% | 8 = 28.5% | n = 28 |

Jefferies, Green and Green (1984) tell us that the diameter of the skull of adult female individuals varies between 74 - 80 mm and the diameter of the neck varies between 73 - 83 mm. The chest sizes also are given.

They do not mention the sizes of juvenile otters. For these only a mesh-width much smaller than 85 mm seems to be safe. On this Reuther (1980) speaking of stop-grids and stop-nets gives a maximum width of 50 mm to prevent juvenile otters from drowning. He makes no differentiation between grids and nets.

**DETERMINATION OF THE MESH-WIDTH**

Various factors play a role in determining the mesh-width of otter-guards. First of all the recorded cases of drowning. As can be concluded from above there is a difference in the findings from different countries. Secondly the anatomic development of otters. At the third place the relation between head and body. At this moment still it is not known whether and how otters might get stuck in a stop-grid or any other device, whatever size it has. The question can be put forward if this the case already as soon as an otter is able to stick his head through a mesh, or rather until he pushes through and gets stuck with his neck or body.

Also we have no information whether young, unexperienced individuals run a greater risk than more experienced otters.

As a principle one needs to start from the most secure norm for the mesh-width: this means on the basis of the skull-size, being the 'hardest' part of the body. After all it is better to have a too tight mesh, than a too wide.

## SKULL-SIZES OF JUVENILE OTTERS

It is remarkable that in the otter-literature concerning skull-measurements and skull sizes of otters almost no data are available on juvenile otters. Kleijn and Van Bree (1966) though, do mention minimum-sizes to discern juveniles from adults. One of the measures they give is the zygomatic breadth, which could give us an indication of the size of the skull, with exclusion of the musculature.

Juvenile males have a zygomatic breadth up to 69 mm, juvenile females up to 64 mm. It is known that the size and length of an otter skull increase considerably from the moment of birth. Whereas the size of the chest (body) at first will not surcumpass the size of the skull. The development of the otter skull and body nevertheless never have been described in full uptill now.

Starting from the norms established by Kleijn and Van Bree for the zygomatic breadth, we find in Fairley (1972) some measurements of juvenile otters. The smallest size amongst drowned fish-fyke casualties is for female 60 mm, for males 66.4 mm.

## CONCLUSIONS AND DISCUSSION

Although elaborate and precise measurements of otter skulls to determine a safe mesh width are not at hand, in particular measurements of juvenile otters, it must be concluded that the mesh-width of 85 x 85 mm (Denmark) and 80 x 80mm (The Netherlands) do not take into account the sizes of juvenile otters

Records from the Netherlands do show that juvenile and subadult otters do most certainly drown individually in fish-fykes. A percentage of 43 of drowned otters were juveniles. This being more than half of the total casualties recorded amongst juveniles.

It is necessary when applying otter-guards to start from the principle of a mesh-width of 50 mm (cf Reuther, 1980) based on the 'hard' parts of the body of the otter. This as long as no precise information is at hand on the actual functioning of guards.

From the age of 3 to 4 months the fur of the cubs has become watertight. This means that juveniles run the chance to drown in a fyke before they have become independent. In their mutual closeness it did happen that complete otter-families drowned in eel-fykes. To illustrate this: in 1975 in "De Wieden"-area two juveniles and a female adult drowned. In July of that year one of the juveniles drowned in an eel-fyke at the Leeuwterveld. Only one month later at the very same location the other juvenile and its mother were hauled up together.

### Positive effects on catch results by the application of stop-grids

Various positive side-effects are known when stop-grids are applied. Stop-grids (and other guards) guarantee a more selective catch in eel-fykes, more than ever before. We mention the following side-effects:

1. Stop-grids with a mesh-width of 60 mm will shut out musk-rats, which prevents damaging of the nets by a rat that will try to bite its way through the nylon in attempting to free itself;

2. By the application of stop-grids less water-birds will be caught indeliberately;

3. Stop-grids prevent the catch of larger coarse fish, which increases the catch of eel, which is no longer deterred by caught fish, struggling to escape

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## REPORT

# RESTORATION PLAN FOR THE OTTER HABITAT IN THE NETHERLANDS

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**Abstract:** This paper reviews the provisions of the new otter recovery plan for the Netherlands, launched in July 1989. Threats to otters are reviewed, and mitigation measures specified, along with maximum levels of pollutants. Improvement in water quality is the first aim of the scheme. A principal role is given the the Stichting Otterstation Nederland.

In July 1989 the Minister of Agriculture. Nature management and Fisheries of the Netherlands launched a recovery-plan for the otter in this country. This plan "De otter in perspectief. een perspectief voor do otter: herstelplan leefgebleden otter" (The otter in perspective, a perspective for the otter: restoration plan otterhabitats) gives an analysis of the causes of the decline (and extinction) of the otter in this country and contains an action plan for the measures that are to be taken to achieve the survival of otters in the future. The threats described are the deterioration of water quality (pollution with PCBs. eutrophication etc.) and water quantity (lowering of the water level), fragmentation by urbanization, motorways etc. disappearance of bank vegetation and reedbeds, disturbance by water-based recreational activities, drowning in fyke-nets and road casualties. The report gives a scheme of how to cope with all these problems, like

- promotion of the preparation and implementation of regional schemes, including measures such as constructing and maintaining reed beds, adaptation of mowing regimes, taking zoning measures with respect to recreation, reducing the height at. intervals of about 300m where sheetpiling is too high etc
- promotion of source oriented control of environmental pollution
- promotion of the reduction of the use of toxic antifouling layers
- prevention of the filling-in of valuable waters in the context of land development projects

- taking compensatory measures in the event of inevitable damage to an otter habitat
- purchase of habitats which are important for the otter
- promotion of the construction of tunnels under roads
- promotion of the use of stop-grids in eel traps

The restoration plan has a summary in English of 6 pages, from which the above mentioned measures are an abstract. Worth mentioning is the formulation of a number of target criteria with respect to the quality of the bank zone, the lack of disturbance and the quality of the water. These criteria have been formulated for the sake of the implementation of this plan and to facilitate the evaluation of the otter habitat policy. They are not definitive, but based on the best professional judgement at present.

**BANK STRUCTURE AND VEGETATION**

- Banks higher than 30cm and with a steepness of > 60% are not to exceed 300m in length. However, if there are no alternatives, a number of arrangements are to be made to facilitate the otters climbing into and out of the water (e.g. lowering or shifting sheetpiling). The minimum required length of these provisions shall be 5m, and they are to occur at regular intervals of about 300m (500m max).
- The banks of the various lakes, ditches, canals and other waterways are to be covered with ground cover bank vegetation for at least 60% of the total length.
- This bank vegetation shall be at least 1m in breadth and 3m in length and is to be within 50cm of the average land/water division. To qualify as ground cover vegetation, the vegetation (reed. trees and shrubs, scrub) shall be at least 50cm high
- The intervals between the ground cover vegetation is not to exceed 500m.

**DISTURBANCE**

- Core areas shall have one reserve per 20 sq km of at least 1 ha. which can serve as an exclusive seclusion area and is suitable for breeding and rearing cubs.
- Core areas shall have at least four otter refuges per 20 sq.km.; areas of at least ¼ ha width can afford the otter optimum cover

**WATER QUALITY**

- The highest possible quality as defined under the national long term indicative Plan (IMP) for Water 1985-1989 (IMP Water 1985-1989,appendix 2,3) shall be aimed for with regard to the water quality of lakes and pools, canals, ditches, bog holes and other watery areas. To the parameters used in this IMP (such as oxygen, pH, chloride, phosphate) a norm should be added concerning PCBs, as the latter play a crucial role in the survival and reproduction of the otter.
- Fatty tissues of otters are not to contain more than ca. 10mg PCB per kg fat.
- The concentration of PCB in potential otter food (eel and various other fish) should be on average lower than 0.025 mg PCB per kg. food.
- The allowable concentration of PCB in sediment is fixed at a maximum of 0.001 mg PCB per kg sediment on average.
- The concentration of PCB in water is not to exceed 0.025 x $10^{-6}$ mg PCB per litre of water.

In the meantime the implementation has been started. In Friesland. one of the core-areas, the government has financed a (+/- #500,000) restoration project. Other projects will follow. In the future a re-introduction project will be set up. depending on an improvement of water quality. This Improvement is the first aim. An otter centre for research, breeding and education will be set up. A central role in this field has been given to the Stichting Otterstation Nederland (Dutch Otter Foundation).

The publication is well illustrated. It is to be hoped that the Dutch government will succeed in the implementation of this integrated plan.

## REPORT

# THE END OF THE OTTER AND OF OTTER REINTRODUCTION PLANS IN SWITZERLAND

Darius Weber

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**Abstract:** Otters are now extinct in Switzerland. Switzerland has to be considered as a country where viable otter populations cannot exist now and in the foreseeable future, because PCB levels in fish are much too high and not decreasing. Reintroduction programs cannot be justified. The message to the public is that sometimes nature cannot be repaired, pollution is out of control and we must learn from the lesson of PCB-caused otter extinction.

## THE OTTER GROUP SWITZERLAND, ITS PLANS AND THE QUESTIONS TO ANSWER

In 1984, the Otter Group Switzerland started its work. Members of the group were both governmental (Wildlife service. Nature conservation, Fisheries, Veterinary service) and non-governmental (WWF Switzerland, Nature Conservation Organisation, otter-studbook keeper). Founding for projects was provided by the federal agencies concerned.

It was the goal of this group to re-establish a viable otter population in Switzerland by means of habitat protection, habitat improvement and eventually reintroductions. From the beginning it was clear that the recommendations of the IUCN otter specialist group would be followed.

In 1984, the available information on otters in Switzerland suggested, that the reintroduction of the seventies had been successful and that there were some additional otters surviving in the western part of our country and probably also in southern parts (in contact with Italian otter populations).

The main questions to be answered before planning actions were:

1. Where do otters still live in Switzerland and what is the status of eventually existent otter populations?
2. Habitat:
   a. Does habitat quality in Switzerland match the needs of a viable otter population (of at least 50 individuals)?
   b. If not, what must be done to improve habitats, and where are the key regions to do it?
3. Do the factors responsible for the otter decline still operate?
4. Are otters for eventual reintroductions available?

Within the last six years, the otter group tried to answer these questions an seriously as possible, based on a series of specific baseline studies. Some of these studies will be published. Unpublished reports are available from the author of this paper.

## THE ANSWERS

### 1. Status of the Otter in Switzerland

There is only one place in Switzerland with freeliving otters (probably only one individual left in 1989); the decline has continued during the seventies and eighties even in the best protected otter habitats of Switzerland. The reintroduction of 1975 was unsuccessful, although reproduction has occurred at least once (1982) . Due to an insufficient scientific program, we know hardly anything about the reasons of this failure.

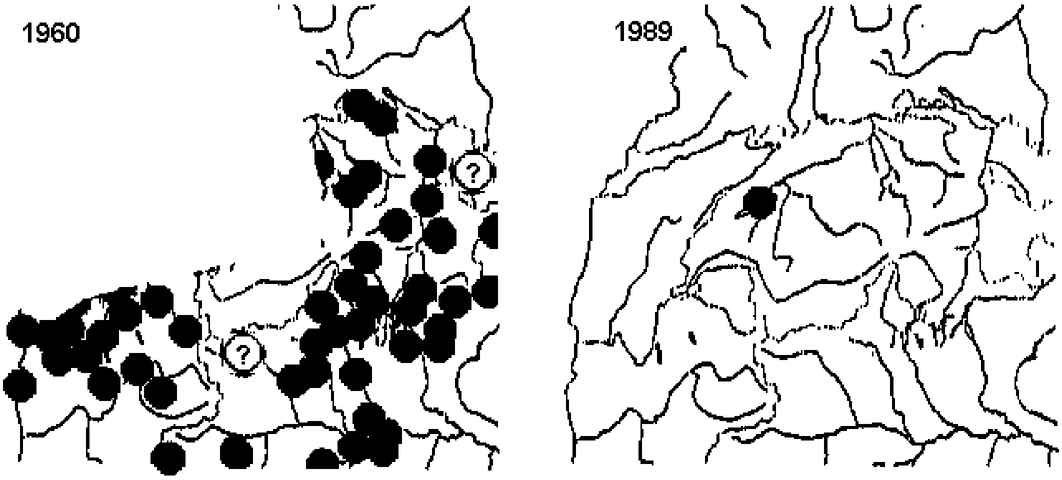


**Figure 1**: Presence of Otters in and around Switzerland 1960 and 1989

## 2. Habitat Quality

Habitat quality was evaluated applying a habitat suitability model especially developed on the basis of the relevant scientific information available in 1987. The main factors incorporated in this model are fish-biomass-density, cover, absence of. nocturnal human activities, presence of undisturbed areas. It was concluded that there are several regions in Switzerland, which still match the needs of an otter population. In habitats classified as insufficient, most often fish biomass was considered the crucial factor.

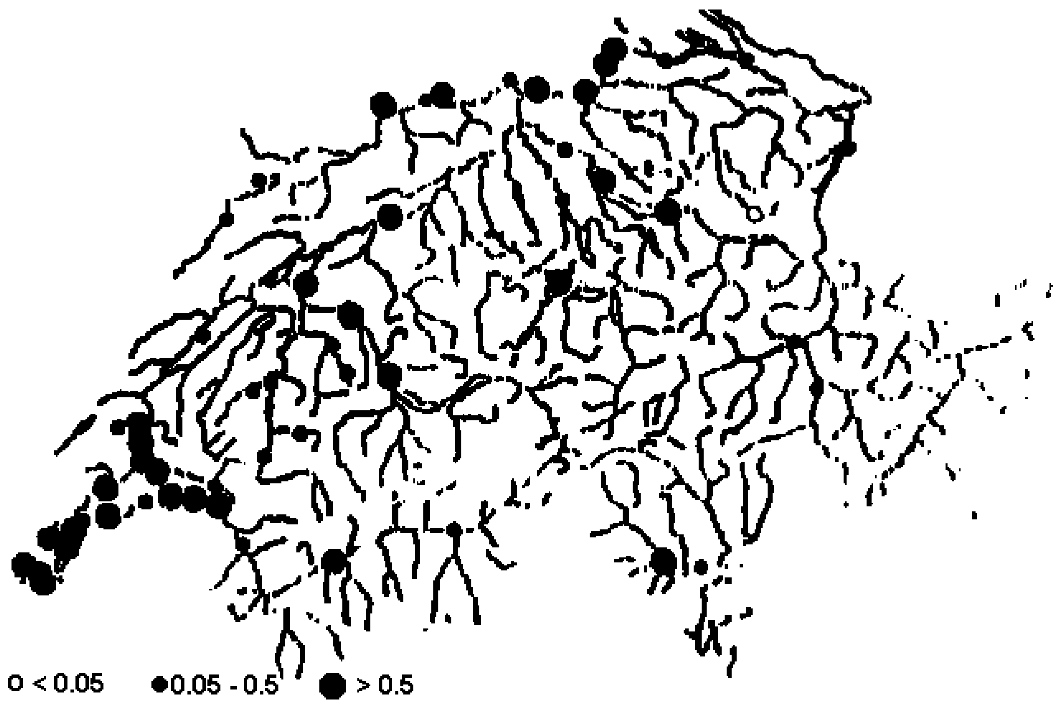


**Figure 2**: PCB-Levels in Fish from different Sites in Switzerland: whole fish, ppm fresh weight, mainly trout, no eels)

### 3. Factors Responsible for the Otter Decline

It is not possible to exactly state to which extent different factors have contributed to the otter decline in Switzerland. However, it is puzzling that otters have disappeared in "untouched" river systems in Switzerland as well as in the neighbouring parts of France and Italy, where they had survived until the seventies (and locally until the mid-eighties). The only hypothesis explaining sufficiently this phenomenon is contamination of fish with organochlorine substances, especially PCBs (a review of the available data showed that levels of heavy metals and organochlorine pesticides are relatively low in fish in Switzerland). The otter group therefore initiated a study on PCB-contamination of fish in those watercourses which are considered providing the best otter habitats in Switzerland. Together with other data on PCBs in fish, the results of this study are appalling: PCB-levels range from 0.04 to 8.4 mg/kg (some ten whole trouts per site homogenated, fresh weight). For comparison: Minimum concentrations affecting otter populations are estimated 0.02 - 0.05 ppm (Sim Broekhuizen and Mats Olsson, pers. comm.). The PCB contamination in Switzerland is considered stable; there is no sign of a decrease.

### 4. Otters for eventual Reintroducing

Captive breeding success in several zoos of Switzerland would allow reintroduction projects without otters caught in the wild.

## CONCLUSIONS

The otter group concludes, that

- Instead of considerable efforts to save the otter, t**he species is now extinct** in Switzerland.

- Based on the current knowledge, **Switzerland has to be considered as a country where viable otter populations cannot exist now and in the foreseeable future, because PCB levels in fish are much too high and not decreasing.** This conclusion is independent of the fact, that we do not exactly know whether and to which extent other factors have also contributed to the decline of the otter in Switzerland.

- **Reintroduction programs cannot be justified** as long as the PCB concentrations in fish is not drastically reduced or future research has not led to a rejection of the PCB-otter hypothesis.

## INFORMATION OF THE PUBLIC

The otter group has decided to use its energies to inform the public on its conclusions, trying to spread the following general rules and messages:

- **Sometimes, nature cannot be repaired**, even when money and manpower are available. Therefore try to conserve nature as long as there is something left to save.

- **Things are out of control**. There is not even an idea of how we could eliminate the PCBs from the biota affected. Nobody has yet formulated a convincing concept about how we could prevent the large quantities of diffusely spread PCBs in the technosphere to enter the food-chains.

- **Learn from the PCB-lesson**: Do no longer allow industrial production of a chemical before there are methods available to detect it in the biosphere (even in very low concentration). Do immediately stop the production of any chemical suspected to be dangerous (not only some applications) . Do not buy and use products containing halogenated hydrocarbons.

## PUBLICATIONS IN PREPARATION

**Nicollerat, M.S., Rossel, D., and Tarradellas, J. (1989)**: Results of the analyses of PCBs and DDT in fish from lakes and rivers of Switzerland

**Weber,D., Weber; J.-M. and Müller, H. -U.** Otters in the Schwarzwasser-Sense-catchment: documentation of an unsuccessful re-introduction project, (Gerrnan; French and English summary)

**Weber, J.-M., Weber, D. (1989)** The otter (*Lutra lutra* L,) in Western Switzerland.

**Weber, D**. The extirpation of otters in Switzerland: a history of the changing problems in conservation, (in German)

**UNPUBLISHED REPORTS AVAILABLE**

All mandated and financed by the Federal Office of Environment, Forests and Landscape, Berno)

**Weber, D. (1987)** A model to evaluate potential otter habitats in Switzerland. (50p; German and French version available)

**Weber, D., Weidkuhn, C. and Hohl, C. (1988)** Western Switzerland and Ticino as potential otter habitats. (64pp; German and French version available)

**Weber, D. and Weber, J.-M. (1989)** The otter in western Switzerland (14pp; in German and French)

**Weber, D. (1990)** PCBs as the cause of the otter decline in Europe and in Switzerland: hypothesis, facts, missing evidence. (17pp; in German)

**Weber, D. (1990)** The extirpation of the otter in Switzerland. (15pp; in German and French)

## CALL FOR INFORMATION

Rosemary Green is collecting information on causes of otter mortality (killed by traffic etc ). She would be grateful for any data, you can give her. The address is -

Barjarg,
Barrhill,
Girvan,
Ayrshire
KA26 0RB
UK

## REPORT

# OTTERS AND BIO-ACCUMULATING POLLUTANTS: FIRST DATA FOR WESTERN FRANCE

Lionel Lafontaine[1], Guy Joncour[2] and Patrick Menanteau[3]

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[2]*Veterinary Surgeon, F-22160 Callac*
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**Abstract:** Otters are still common in eastern France but extinct in the west. Following the deaths of three otters in Brittany, the authors analysed the specimens for pollutants, and compared the results to those found in Mink in the same area. This is the first such assay done on aquatic mammals in France. This preliminary study has allowed the authors to demonstrate contamination of wetlands by several pollutants: the presence of PCBs, mercury and in a tiniest measure Dieldrin and lead, is worrying, or at least preoccupying, for two water basins in western France. It confirms also that investigations must not be limited to insignificant measures as concerns water, sediments, moss or cyprinids, but must focus equally and especially on aquatic predators: salmonids, pike and carnivorous mammals. Also the particular importance of these basins for human populations and economic activities dependent on water quality (oyster faming, for example) would merit an alertness on the part of local authorities.

Otters, being at the top of the food chain and feeding largely on fish. are likely to be especially vulnerable to the effects of bio-accumulating pollutants. In Europe levels of these compounds (organochlorines, heavy metals) have been reported from samples of Otters in Scandinavia (Olssen & Sandegren, 1983), the British Isles (Chanin & Jefferies, 1978; Mason et al, 1986) and the Netherlands (Broekhuizen & De Ruiter-Dijkman, 1988).

Such analyses on aquatic predators have never been done in France with the exception of Alzieu & Duguy (1979) on marine mammals (range 84.6 - 319.5 mg $kg^{-1}$ fat of PCBs from four grey seals).

Recently three otters (Lutra lutra) were killed by traffic on the same road in Brittany (NW France 52°91N; 5°58W). We therefore grasped this opportunity to measure the contamination of those specimens. We had two objectives: to widen our pathological and toxicological knowledge, of which little is known in France, of a rare wild species which is now the subject of an active campaign of protection and awareness; to learn of habitat pollution by pooling several faunal specimens, to accumulate the first evidence of contamination from one of the basins where otters are still common in France (Figure 1).

**CURRENT STUDY**

Between March 1987 and February 1988, three otters were found dead at a roadside near the Gulf of Morbihan in southern Brittany, following collisions with cars. Concurrently, with the approach of the national "Network SOS-Otters" lobbying local authorities to build otterways in this particularly murderous area for the species, we have undertaken this analysis. To widen the study, we have analysed freshwater fish and water. Finally, we analysed bodies of three American mink from the northern Breton coast, thus extending the geographic span of this contribution.

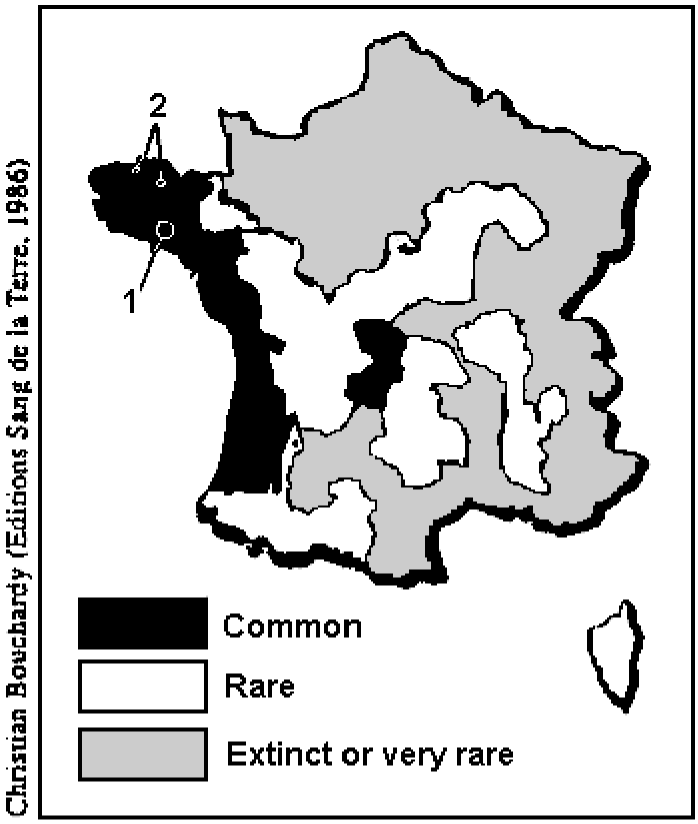



**Figure 1**: Distribution of Otters in France.
Origins of specimens analysed here:
1: Otters
2: Minks

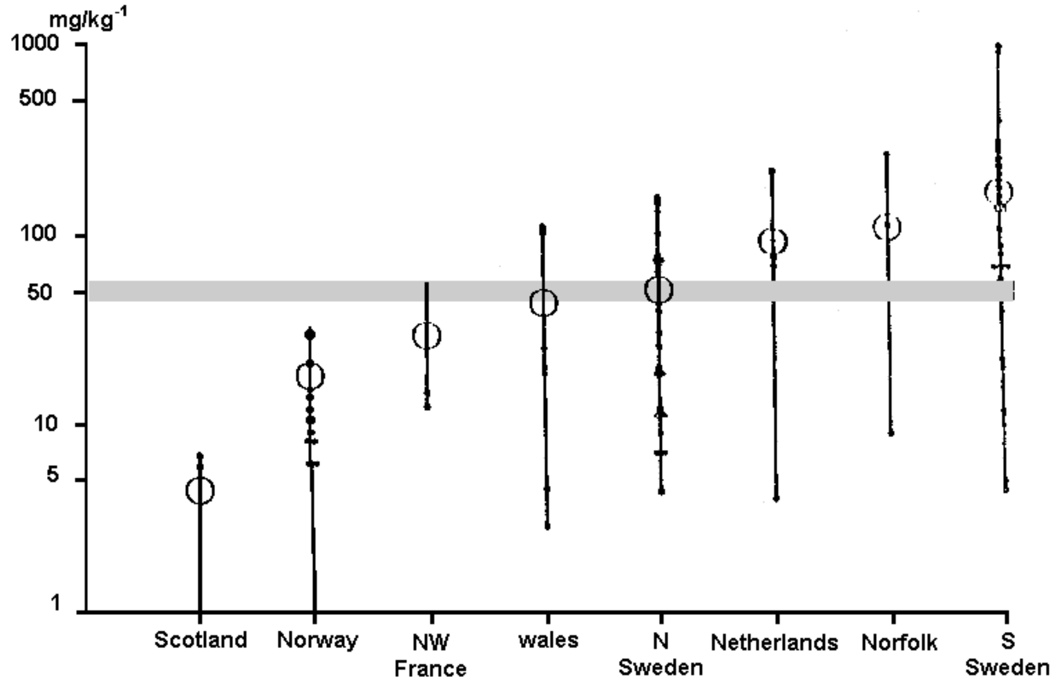


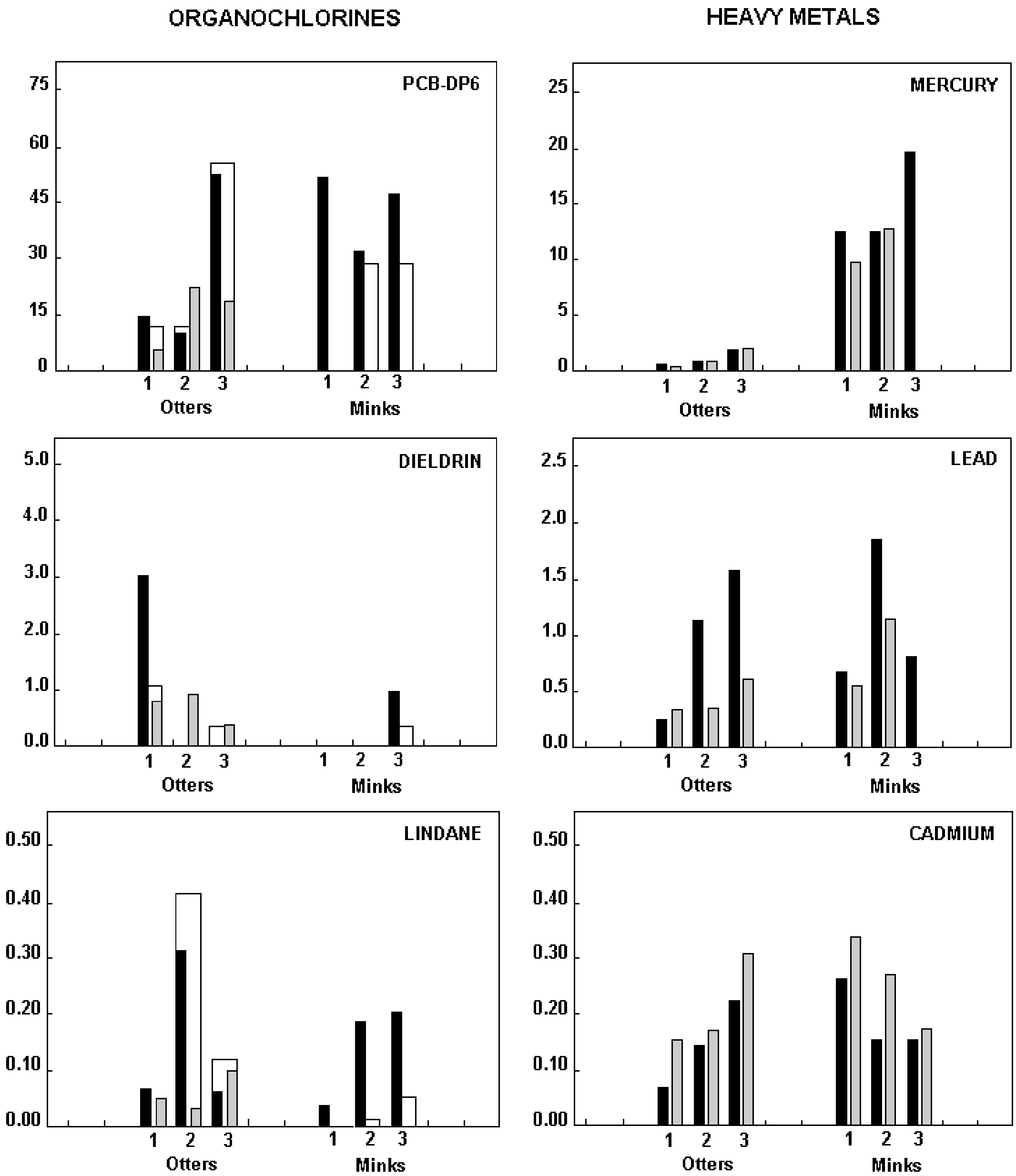

**Figure 2**: Ranges and mean values of PCB concentrations (mg $kg^{-1}$) muscke fat) found in otters from several countries of Scandinavia (Olsson & Sandegren, 1988), Great Britain (Mason et al, 1986), the Netherlands (Broekhuizen & De Ruiter-Dijkman, 1988) and NW France (Current Study), in comparison with the PCB level in muscle fat of mink exhibiting reproductive failure.

## ECOTOXICOLOGICAL ANALYSIS

Within the organism, fatty tissues are a preferential target for the fat-soluble organochlorines. The main fat. usually used, comes from the kidneys but is limited within the otter to a thin strip. This is why we had to take out the conjunctive fat of the pericaudal area. The lipid-rich encephalon was also removed. After consulting foreign studies, we also removed muscle samples from the deep gluteal area, as well as the liver and the kidneys. The levels of organochlorines and heavy metals in otter and mink tissues are shown in Table 1. For each specimen, they tally to the first three tissues where the highest concentration has been observed. Similarly, of ten organochlorines prospected, shown here are only three compounds which display the highest levels : PCB (-DP6 or Aroclor 1260). dieldrin and lindane. The seven others were absent or present as traces. One must specify that DDT, DDD and DDE can be hidden on the chromatogram by PCBs and this could explain an apparent absence.

These results show that PCB concentrations are nowhere negligible, and even significant in the muscle of the third otter (56ppm) and in the livers of the first and third mink (52ppm and 48ppm). We know that at this threshold breeding can be affected. We are, nevertheless, far from the levels observed in England, the Netherlands or Sweden. Dieldrin and lindane concentrations were low though the first otter had a Dieldrin level of 3ppm in liver. Mercury concentrations were on the whole negligible in otters but significant in mink. The lead concentrations are low but constant for the whole of the sample. Cadmium concentrations were negligible.

**Table 1**: Levels of pollutants found in three otters and three minks from Brittany, NW France.




| | | |
|---|---|---|
| | Black bar | Liver |
| Organochlorines mg kg$^{-1}$ fat | Grey bar | Pericaudal Fat |
| | White bar | Muscle (except Otters/Lindane = encephalon) |
| Heavy Metals mg kg$^{-1}$ dry weight | Black bar | Liver |
| | Grey bar | Kidney |

| | | | |
|---|---|---|---|
| Otter 1 | subadult male 9 kg | Mink 1 | adult male 1.2 kg |
| Otter 2 | adult female 7.2 kg | Mink 2 | adult male 0.9 kg |
| Otter 3 | adult male 7.5 kg | Mink 3 | subadult female 0.7 kg |

## DISCUSSION

This series of analyses, never published in France for aquatic predators such as otters or mink, amounts to only a preliminary study taking into account the small size of this sample;. However, it allows us to examine some tendencies regarding the contamination from toxic residues in some areas of French wetlands.

The fish diet of the otter is well known and these prey are responsible for most of its contamination. Keck (Veterinary National School of I.yon) shows PCB levels in roach in most rivers and French waterways today at several ppm. A French departmental order of February 1988 gives 2ppm PCBs in fresh weight as the upper limit for fish healthiness in freshwater for human consumption. This level must next be reduced to the tolerance threshold of 0.5 ppm set by the Central Laboratory of Food Hygiene of Paris.

Some surveys carried out in 1988 by the local Sanitary Commission in the pool frequented by these otters, and which supplies the town of Vannes with drinking water, came out with negative results: this water would seem to be drinkable. PCBs are determined at 1.5 ng $l^{-1}$ in the water, the other organochlorines vary from several thousandths to several hundredths of one ppm. But our analysis of some fish from this pool clearly illustrate the bio-accumulation process: thus, for example, compared with the level of Dieldrin in the water, we find a mean concentration 20,000 times stronger in eels and 150,000 times stronger with the 1st otter analysed.

## CONCLUSION

This preliminary study has allowed us to demonstrate contamination of wetlands by several pollutants: the presence of PCBs, mercury and in a tiniest measure Dieldrin and lead, is worrying, or at least preoccupying, for two water basins in western France. It confirms also that investigations must not be limited to insignificant measures as concerns water, sediments, moss or cyprinids, but must focus equally and especially on aquatic predators: salmonids, pike and carnivorous mammals. Also the particular importance of these basins for human populations and economic activities dependent on water quality (oyster faming, for example) would merit an alertness on the part of local authorities.

The levels of pollutants found in this small sample of otters cannot exclude a possible effect on the reproductive potential of the species from western France. The chronological decline of French otters has clearly occurred from east to west and it will be useful to know, as Or. Olsson has suggested for the whole of Europe, if PCBs could explain also this decline in France. The current setting of a national otter programme supported by the French government will allow investigations on 15 other otter specimens. It will therefore be possible to observe possible differences in levels of pollutants found in otters from several French regions, especially from non-residential areas and industrial ones. The map of PCB contamination found in human blood (Figure 3) suggests already such significant differences from SE to NW France

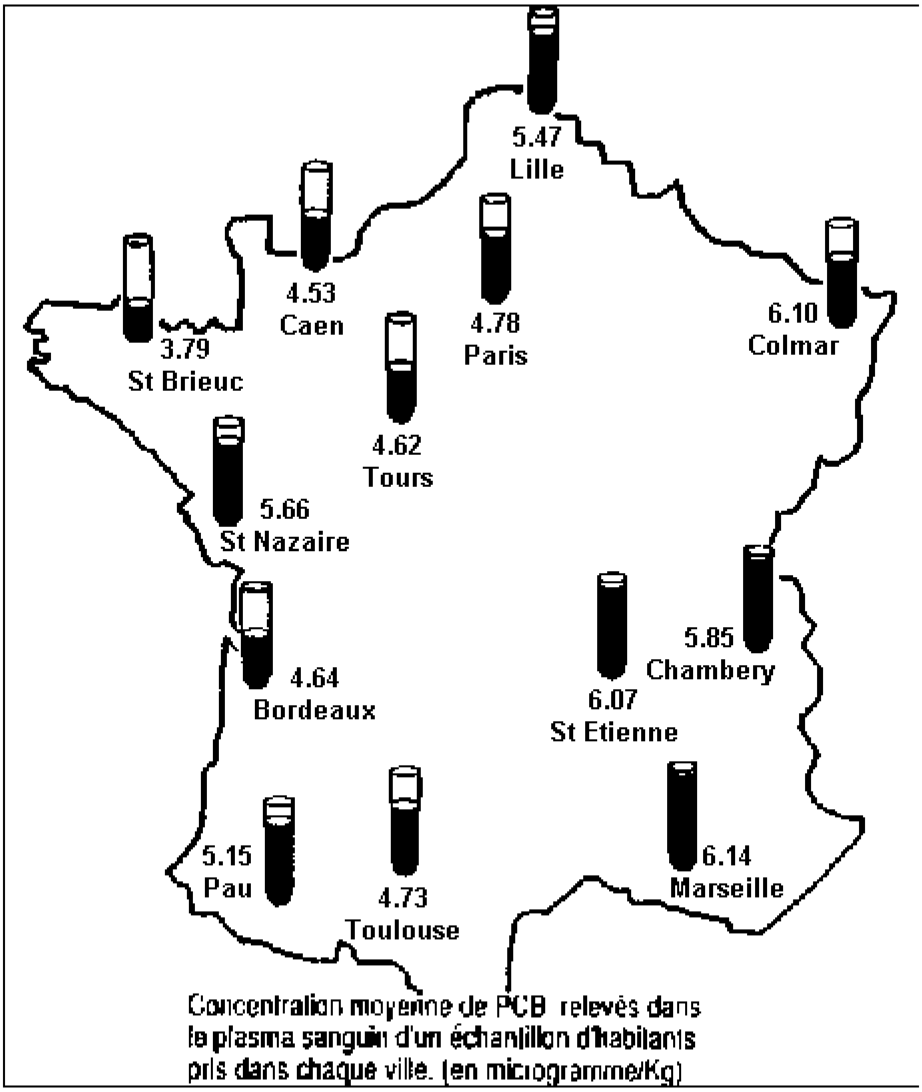



**Figure 3**: Distribution of Otters in France.
Origins of specimens analysed here:
1: Otters
2: Minks


***ACKNOWLEDGEMENTS*** *- We are extremely grateful to Drs D. Jefferies (Nature Conservancy Council, UK), M. Olssen (museum of Natural History, Sweden) and C. Mason (University of Essex, UK) for their valuable comments. This work was carried out with the financial support of a local fellowship (A.P.P.I.I. F-22160 Callac) and the Morbihan Departmental Hunting Federation.*

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# REPORT

## SOME OBSERVATIONS ON THE OTTER POPULATION IN THE HOMEM CATCHMENT (N.W. PORTUGAL)

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**Abstract:** It has always been assumed that the otter population was good in Peneda-Geres National Park in northern Portugal. This study examined the River Homem catchment in detail, and found that the population was less good than expected, and isolated from other otters by the reservoir of the Vilarinho das Furnas dam. The authors consider that the current dam-building policy is not conducive to the conservation of otters.

### INTRODUCTION

In general terms, the compatibility between socio-economical activities and the preservation of animal species and habitats is of great concern to conservationists. When such compatibility is required in protected areas, several problems arise which are often very difficult to solve.

To define the measures of intervention and management necessary in the water courses located within a protected area, an interdisciplinary project was established. The area under study was the National Park of Peneda-Gerês and investigations were made on macro-invertebrates, fish, reptiles, amphibians, mammals and vegetation. Two species of mammal associated with the freshwater environment - *Galemys pyrenaicus* and *Lutra lutra* - were especially investigated.

Field work was carried out between May 1987 and October 1989 and the preliminary results presented here relate exclusively to the European Otter. The situation of this species in Portugal is frequently mentioned as one of the most viable in Europe.

### STUDY AREA

The National Park of Peneda-Gerês is located in north western Portugal and comprises an area of 72 ha. Due to its altitude and latitude, it has one of the heaviest rainfalls in the country (average 3400 mm year from 1950 - 1980). Therefore the wooded area is extensive and the hydrographic system is extremely developed. This protected area includes Albergaria and Palheiros, two important English Oak (*Quercus robur*) woods which are considered of high natural value in Europe .and integrated into the European Network of Biogenetical Reserves. The River Homem flows through both woods

The selected working area corresponds to a sector that includes the River Homem from its source (1307 m alt.) down to the beginning of the backwater at the hydroelectric power reservoir of Vilarinho das Furnas. together with its main tributaries.

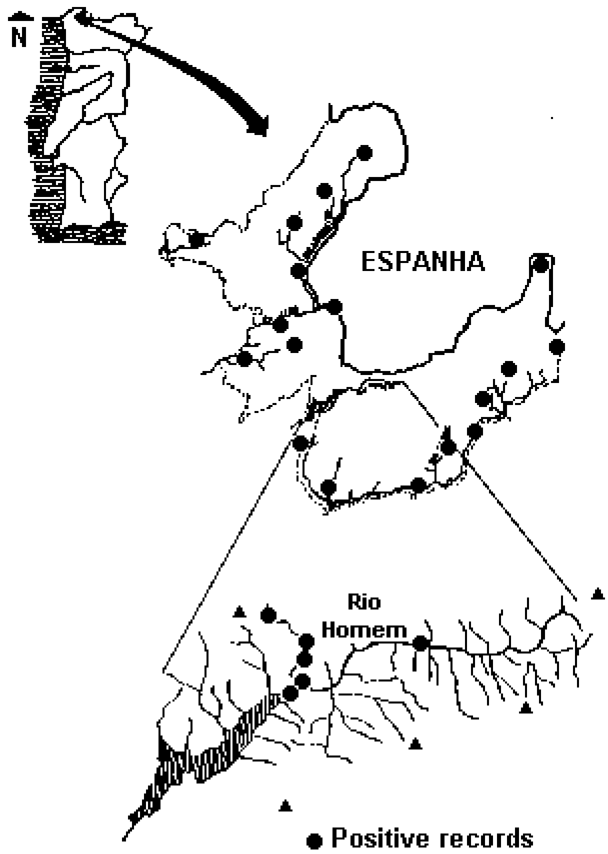


**Figure 1**: Study Area

All the streams are of torrential regimen, clearly unpolluted and quite unmanaged . The water is oligotrophic , hardly mineralized and slightly acid. The streams flow on a granite substratum. There is a general lack of the most characteristic riparian vegetation and the oak trees come very near to the water edge. The presence of boulders on the river bed is very common and trout, .*Salmo trutti*, is the only fish species to be found.

Fortunately, human pressure is not: excessive and only during spring and summer are a few places used for bathing and angling.

## METHODS

Initially during 1987, an enquiry was made to the 75 villages within the limits of the National Park in order to gather a general view of the species distribution and status. It was composed of 25 questions including parameters connected with the activity of the informer (hunter / fisherman), with the water streams characterization and utilization, and with the presence and habits of the species.

The second stage of this work was developed in a selected area where a survey for otter signs was made. The banks of the Rivers Homem and Maceiras and of the Gramelas and Monçao brooks were examined as were, whenever possible, the river beds. Whenever the presence of otter was noticed, a printed form was filled in with the characterization of the habitat suitability. Spraints were collected and later analysed.

## RESULTS

### National Park - General Enquiry

The aim of the enquiry was to describe otter distribution and status in the National Park and the results show that the: species is well distributed there. This information, however, is not sufficient to define the exact status of the otter population. The construction of dams along rivers in the whole area is certainly a negative indirect factor against the species. However the situation was assessed as being between stability and the beginnings of a decline in population.

**Selected Study Area**

***Monçao and Maceiras Brooks***

During the research made along these water streams, neither direct observations of the otter nor signs of the species were found

***River Homem and Gramelas Brook***

Three direct observations were made and some signs of the species presence were visible such as spraints and potential holt sites in the Homem River near the beginning of the backwater of Vilarinho das Furnas dam. On that river, two potential holts, respectively on the left and right bank, were found in piles of large rocks above the maximum river flood height and the presence of spraints was detected there.

At Gramelas, otter spraints were collected and two direct observations were made.

Of the 33 spraints found during the work, 25 were collected from the Homem River and 8 from Gramelas brook. Remains of snake, most probably *Natrix maura*. were found in 1 spraint collected from the Homem River. All 33 spraints contained fish bones or scales of *Salmo trutta*. *Chondrostoma* sp. remains found in 3 spraints collected on the Homem River suggest that the otters may also use the dam for feeding.

**DISCUSSION**

In the area, the biotic and abiotic parameters are propitious to the existence of the species and direct and indirect factors presented as the cause of its decline are almost absent. Initially, we believed that a numerous population of otters would exist. However, the frequency of signs in the study area was very low. The average was one sign per 600m. This number is much inferior to that found by Macdonald and Mason (1982) in central Portugal, where the lowest frequency was 1.5 signs/200m.

It is known that otters can change their ranges with season as the habitat and availability of resources change, especially in torrential streams. In this area dry river beds with scattered pools become torrents in winter, but even so there is little difference between the frequency of signs found during winter and summer.

We believe that the relative scarcity of this animal is related to prey availability. In fact few potential prey items were observed and the fish biomass levels are very low (Homem River - spring/summer - 11.6/21.6 kg/ha; Gramelas brook - spring/summer - 14.2/14.0 kg/ha. L. Rogado, pers. comm.).

Most otter signs were found downstream on the Homem River near the beginning of the backwater at Vilarinho das Furnas. The average river flow characteristics allow a richer fish fauna and feeding may be easier for otters there.. From the data collected and because there is a lack of information before 1986, one cannot definitely conclude what the exact situation of the species is. Therefore it is uncertain if we are in the presence of a small stabilized group, or if the species is in fact endangered due to a recent decline in numbers.

Bearing this in mind we would like to draw attention to the possibly delicate situation of the otter population above the Homem Diver dam. Small isolated groups of otters have generally a quite low viability. In fact, the hydro-electric power reservoir is a very important physical barrier to the movements of the species and this group is presently isolated from others down river below the dam.

The maintenance and improvement of the biotopes still propitious to the existence of otters as well as the renovation of the damaged ones is indispensable to the maintenance of the existing population and must be the priority in a future conservation strategy. We also recommend fish restocking in the Homem tributaries, as commonly happened some years ago.

The energy and agriculture policies in the north of Portugal are presently in favour of the construction of reservoirs along waterways, some with EEC funding. These actions are clearly not conclusive to otter population maintenance and the attention of the European environment departments should be drawn to these matters in order to avoid funding on the one side for development and on the other for conservation.

Note: In spite of doubts on the reliability of the use of spraints to monitor otter populations stated by Kruuk et. al. (l986); Kruuk & Conroy (1987) and Conroy & French (1987), this was the only way to relate otters and habitats in the present situation.

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## SHORT COMMUNICATION

# THE FIFTH INTERNATIONAL OTTER COLLOQUIUM

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The forested countryside of Lower Saxony in the Federal Republic of Germany provided the setting for the V. International Otter Colloquium. Organized by Aktion Fischotteschutz ,e.V., and held at their Otter-Zentrum in Hankensbüttel during 4-8 September 1989, the Colloquium brought together 126 participants from 38 countries to discuss the conservation and biology of the world's otters.

During the weekend preceeding the Colloquium, members of the IUCN/SSC Otter Specialist Group met to complete work on their Action Plan. On Sunday, early arrivals were treated to a guided tour of the impressive educational and research facilities of the Otter-Zentrum, then to a welcome party In the beautiful village of Lüben, where we "picked our brains" and toasted the good health of one and all.

Monday. 4 September, was the official opening day of the Colloquium. Following the introductory addresses, reports were given on the status of otters world-wide. Nine species - in Europe, South America, Africa, and Asia - were regarded as threatened or endangered due to habitat loss or hunting. Relevant international conservation treaties and programs were discussed subsequently.

Studies and reviews of the biology, ecology, and behavior of otters were the subjects of Tuesday's lectures. A revised classification of the subfamily Lutrinae was offered by Dr. van Zyll de Jong, and appeared to be well-received. In the afternoon, participants were given the opportunity to present results of their own research, using posters, exhibits, slides, videos, and informal lectures.

Causes for the decline of otter populations, and the monitoring of otter distribution, were reviewed on Wednesday. Perhaps the most disturbing news presented at the Colloquium was Dr. Mats Olsson's warning of the serious problem of toxic PCBs accumulating in the world's aquatic food chains. Unless the spread of PCBs and other environmental contaminants can be brought under control, even our most well-intentioned restoration efforts might be for naught. The last lecture sessions covered the care of captive otters, concerns about priorities in otter re-introductions, and educational topics. The Colloquium concluded with adoption of the final resolutions.

The V International Otter Colloquium was a great success, not only because of the broad range of subjects, findings, and opinions presented, but also because of the hard work and efficiency of the organizers. Grateful thanks to the Colloquium coordinator, Ralf Röchert, and to our host, Claus Reuther, for their tireless efforts. Finally, a special acknowledgement is in order to the Chairman of the Otter Specialist Group, Pat Foster-Turley, for her diplomatic poise and leadership.

# REPORT

## OTTER SURVEY OF THE ISLE OF SKYE, SCOTLAND (*Lutra lutra*)

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**Abstract:** A survey of otters on Skye is being undertaken in order to develop a method of systematic recording of otter sightings, and to increase public awareness and interest in otters. Skye has a good population of mainly coastal otters. The results to date are presented and discussed. There appears to be little correlation of sightings to tidal state, and the animals seem to be mainly diurnal; there is evidence of a breeding season which may correlate with food supplies.

To date a lot of research on otter distribution has taken place in areas where otter populations are under threat. It was particularly disturbing to read in IUCN bulletin No 4 of the probable extinction of the Eurasian otter from the Netherlands; it was only three years ago that a delegation from that country visited Skye in order to examine our habitats with a hope of saving their last remaining otter populations. It is important in conservation to have data readily available a long time before any threat to a population occurs.

The otter survey of Skye is being conducted with two very important alms: firstly, to develop a method of systematically recording otter sightings and secondly to make the public more aware and appreciative of the otter and its vital place in the ecological system. This awareness and understanding will play a large part in governing its future survival.

The Island of Skye, off the north-west coast of Scotland, is ideally suited for the purposes of this survey. Skye is a manageable size for such a project and many of the developments effecting the whole of the Highlands are occurring here. These include the widespread expansion of Fish Farming, Tourism, Forestry and the related infrastructure. The island does have a healthy population of otters and in terms of the state of the Eurasian otter in the rest of Europe it is true to say that the island is one of its last remaining strongholds.

The results after two years of the survey provide detailed information on the distribution, and will act as a framework for future monitoring of the condition of the otter on Skye. By using direct sightings and observations it will also give much needed information on the habits and behaviour of the animal.

To date records of 802 sightings have been received over the two year period.

### METHOD

The use of spraint to monitor otter populations has recently been the subject of much debate but the Skye survey is based on actual otter sightings. An added advantage of sightings records is that it is possible to study breeding and general activity and family groups and so build up a far more accurate picture of otters, their behaviour, distribution and population.

Additional spraint analysis work was undertaken for one local otter. This was done on a weekly basis for a period of twelve months and has shone some light on the seasonal feeding habits of Skye otters.

### RESULTS

For recording purposes the island was divided into ten kilometre grid squares of the National Grid System, giving a total of 33 survey squares.

In 20 of the grid squares, otters were observed on a regular basis and in 4 squares less than four sightings were recorded. In 9 of the squares no otter sightings were recorded at all and these were therefore surveyed in detail using indirect signs, mostly sprainting points. All these other squares showed signs of otters. The areas concerned are very remote and rarely visited by humans; it la therefore more likely that the lack of sightings was related to this fact rather than that are less otters or that they are more shy here.

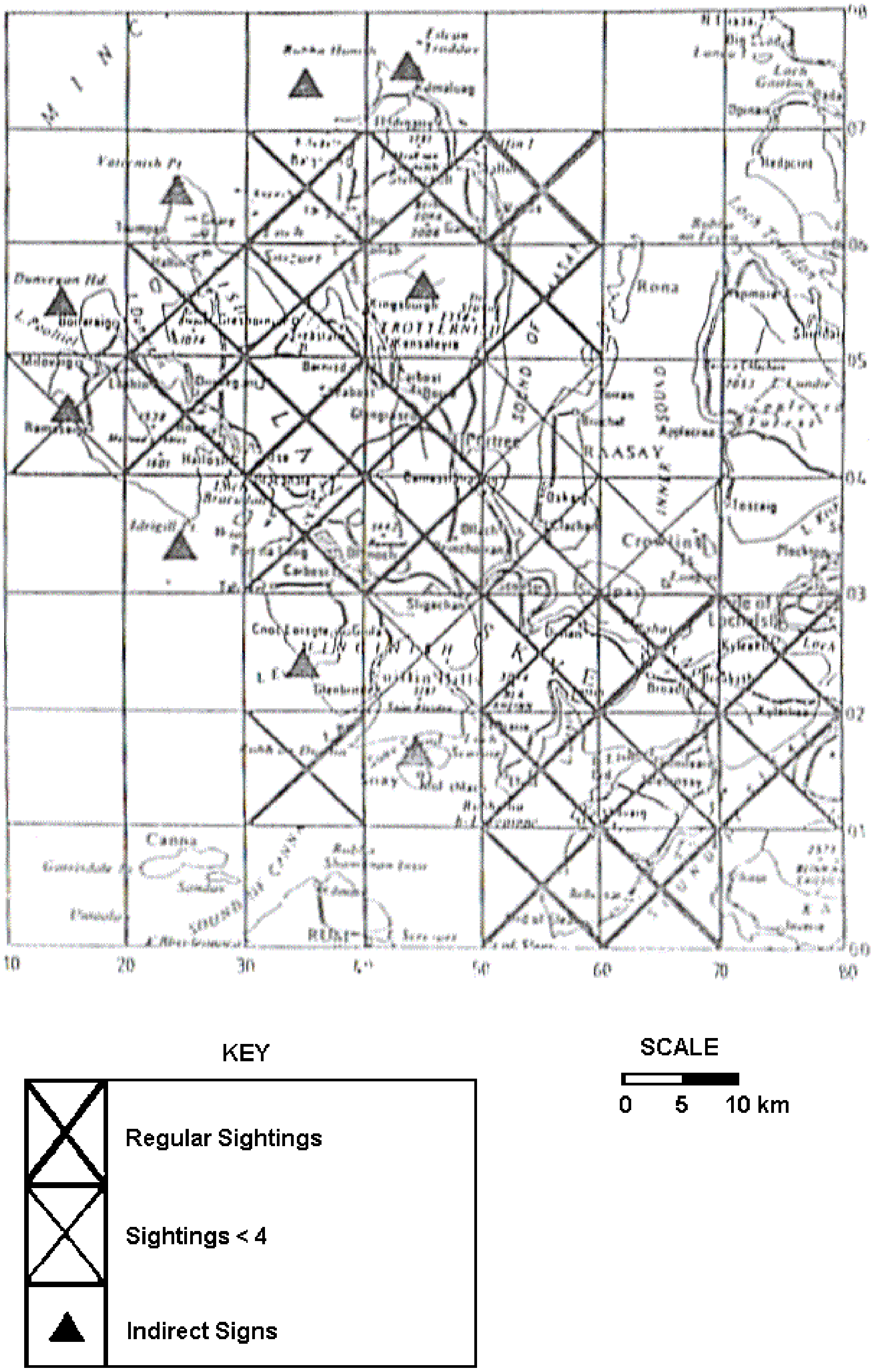


**Figure 1**: Study Area

Most of the data comes from coastal otter sightings which represents some 97% of the data. In some areas of the island a distinct distribution of otter home ranges has been established, and these can be seen to occupy a coastal strip from 1.5-2.0 km long. These otters do not seem to roam a great deal probably due to the abundance of food in the coastal zone habitat.

The data and observations seem to contradict many of the long-established "facts" about otters: for example that they are shy, elusive, nocturnal and solitary animals which may be observed early in the morning, late at night and on an ebbing tide. In fact there is a distinct lack of correlation with regard to sightings of otters and the time of day or tide state, as shown in the accompanying graphs.

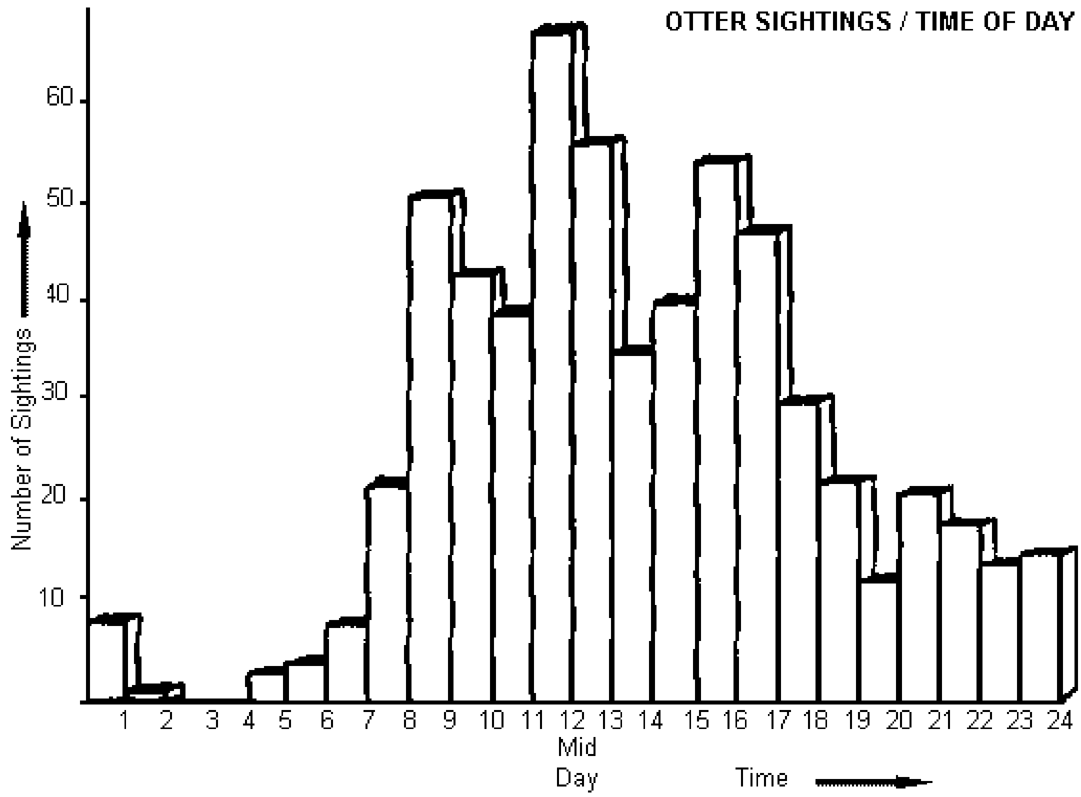


**Figure 2**: Otter Sightings by Time of Day

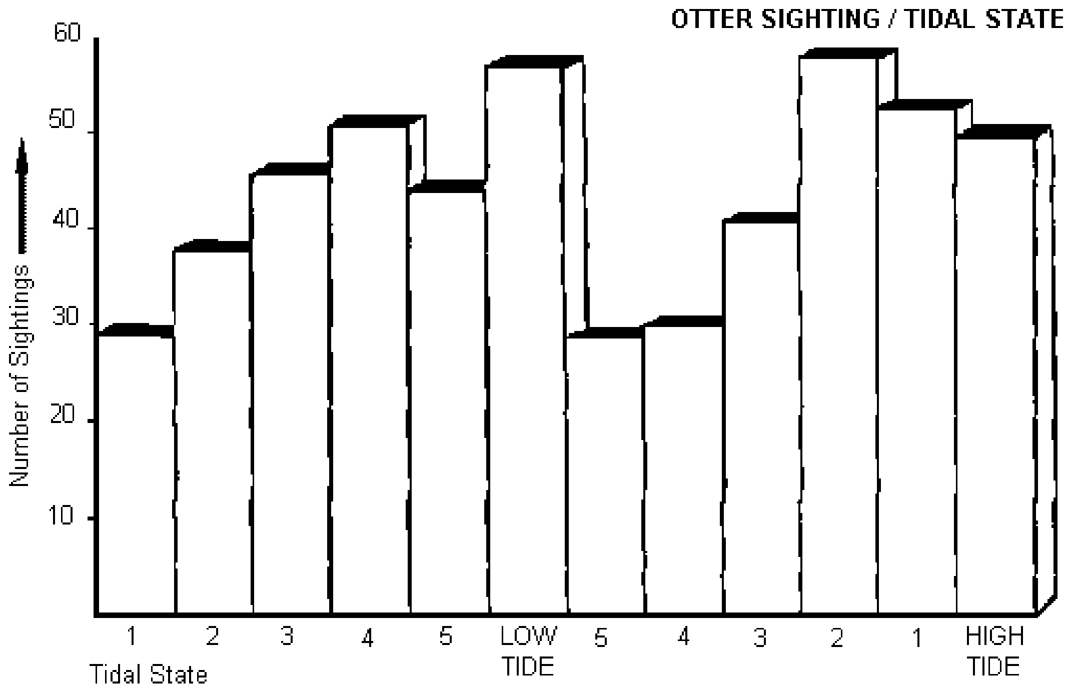


**Figure 3**: Otter Sightings by Tidal State

Spraint analysis has revealed a definite variation in diet according to season. For example, frogs and toads formed a large part of the diet early and late in the year but were not so common at other times. This is probably related to the activities of the amphibians themselves as they are easier to catch around the time of their hibernation. Various fish also had peaks at different times of the year which was often related to their breeding season. For example, sand eels are generally more offshore but come further in to breed in the autumn, and this is when they appear in the spraint.

However, it must be recognised that this spraint analysis only shows the seasonal variation in diet of this particular otter. As Watson (1978) points out it is likely that individual animals will have their own dietary preferences. It has bean observed generally that in other spraints the animals seem to prefer shellfish in summer and fish in winter. This again would appear to be related to activity of the prey, in that shellfish move into deeper water and cracks in the rocks in winter and are therefore harder to find, so the otters resort to fish, which do however require more energy to catch. Therefore in summer it is easier to take shellfish which are readily available. However, the otter under study would seem to show a personal preference for fish generally for the whole year rather than turning to shellfish in the summer. Furthermore personal observations have shown that individual otters can show a distinct preference for poultry including hens and ducks as large as Muscovy ducks. They have also been seen stalking geese, but to date these have remained safe!

## BREEDING SEASON

There does seem to be some evidence for a definite breeding season on the island and weather and availability of food would seem to govern this. All the detailed data on mating comes from areas on Skye where regular information, often on an almost daily basis, is being collected. Only four tines were otters actually observed mating, although on another two occasions they were seen courting, which involved rapid racing and playing. On one occasion the otters drew attention to themselves during this courting activity by the noise they made calling out. The observations of mating and courting occurred during the months of February through to May. On each occasion the pairs were seen to remain together for a period of half an hour to an hour with mating following a period of vigorous chasing, swimming and playing.

The first sightings of mother and cubs were in the summer months from June to July. If we allow for the gestation period and the time they remain within the holt all such sightings would appear to correspond with the mating season in February to May. The mean litter size was 2.3 cubs and on average 3 weeks after leaving the holt the cubs are fully weaned and can be observed independently of the mother. However their relationship can last into December and January and on some occasions the previous years' cubsa have been seen with the mother and her present cubs. This would without doubt indicate a strong social bond between the family group, particularly as the male is sometimes also seen in the group. In some areas the male seems to be faithful to the bitch and the home range.

## DISCUSSION

The island of Skye does hold a healthy population of mostly coastal otters. However there is a continual increase in pressure on the island with a four-fold increase in fish farming, increased use of the sea-bed by crustacean fishing, widening of roads, and increased tourist pressure.

If we look at otter deaths recorded to date we see that road mortalities among otters is the most alarming cause of non-natural mortality. Obviously as developments increase and roads are widened with increased traffic these deaths will rise.

If the population is to remain stable with these developments then it is only by getting the indigenous human population to understand and respect this animal. Many of the sightings have been given by local people who have formerly taken otters almost for granted and our aim to increase awareness and concern is therefore being achieved. By using actual otter sightings we are not only developing a new framework for otter research but also encouraging man's interest and respect for this animal.

## FUTURE WORK

The survey is to be continued with the following aims: to reinforce local awareness for the wildlife and in particular otters and to encourage development in harmony with the environment: regular recorders are to be encouraged to learn to recognise individual animals in order to build up a better picture of behaviour and breeding patterns; more information is necessary on mating and the appearance of cubs to confirm the existence of a definite breeding season, although it can be difficult to be certain of the age of cubs particularly for casual recorders; to monitor distributions and populations.

A full report is available on request from the authors.

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**REPORT**

# FLUCTUATIONS IN THE OTTER POPULATION IN PARTS OF SOUTH-WEST ENGLAND

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**Abstract:** The author has kept detailed records of otter sightings in a 4100 sq km area of south-west England since 1969. Otter numbers declined dramatically until 1984, with many rivers showing no otters whatsoever for long periods, and recolonisation attempts by transient animals failing to establish. Since 1988, otter numbers have started to recover, but surveys must continue to discover whether this is a true recovery or if otter numbers will once again decline.

Since 1969 I have been keeping records of the presence and absence of Otters on the rivers and wetlands of parts of Devon and Somerset. The results show some interesting trends and pose some important questions.

## THE AREA

The area recorded extends some 70 km from North to South, and 60 km from East to West. I use a grid of 42 ten kilometre squares, based on the National Grid; one of these squares is entirely covered by sea, so the total area recorded is 4,100 sq, km. This sounds a lot, but of course only the water courses and marshes are of valid interest to a survey of Otters.

The western boundary is the river Exe which runs almost due South for over 55 of the 70 km. To its east, and also running South into the English Channel, are the rivers Otter and Axe. To the North are the short rivers which rush down off Exmoor, and the Tone /Parrett river system, which drains into the Bristol channel through part of the Somerset Levels, an extensive series of marshes and peat moors covering some 685 square kilometres.

## METHOD

I have recorded all reliable information about Otters, from whatever source, ranging from regular and organised surveys to casual sightings by fishermen. Whenever possible I check these myself, and I undertake methodical fieldwork as often as I can, but there is no regular methodical pattern from which statistical base lines could be estimated. This approach seems surprisingly efficient at detecting the presence or absence of Otters. I know of no instance of an Otter having been around for any length of tine unknown to the records (there are several test instances: for example an Otter which ventured into an unoccupied part of the levels for about a week was picked up in the records four times from various sources. I think that the information is reasonably complete, if not always very thorough or detailed.

## THE SIGNIFICANCE OF THIS AREA

The results and trends in this area are of some national significance. In the 1977 National Survey most of this area was omitted; Its significance comes from the differing levels of Otter activity recorded on either side of it. In the 250 square kilometres directly to the West there were 14 positive 10 km squares out of the 25, but only two to the East. In 1977 in my area I recorded work in 23 of the 41 squares, which was evidence of more than 17 different otters. There were 2 dead Otters, and four reports of breeding. So at the time of the first N.C.C. survey this was a well used area on the eastern margin of the main West Country population, and ideally placed to show which way the trend was going.

By 1984 this quite healthy picture had given way to a very fragmented and discouraging situation, only 11 records from 7 widely separated squares, and most of those containing only one record for the whole year. It seemed as if the Otter was almost certainly going to disappear from this area as it already had from so many others.

## CHANGES IN RANGE

Although the earliest years of my records are too random and incomplete to provide direct comparison on an annual basis, an amalgamation of the years 1972, 1973, and 1974 shows that Otters were recorded from 22 of the 41 squares, and were spread across the whole region. At least 7 more of the Squares must have contained Otters at some time in the year: it is almost impossible that the Otters recorded from either side of these squares never crossed the invisible and arbitrary cartographical dividing lines. This gives an occupied Range of 29 squares out of the 41. In 1977 alone there were records from 23 of the squares, and a similar amalgamation of the years 1975-1979 shows that Otters were still present throughout the region, in 33 of the squares. But despite an increased amount of interest and effort, the three years 1980 -1982 give only 19 positive squares, and of those only 11 were positive in more than one year.

1984 was the low point in both numbers of records and range. My 9 records show a split into two separate groups, one based on the river Exe, and the other in the Somerset Levels. Two further records, one from the river Otter, and one from the river Axe, both right at the very end of the year, were passed on to me by one of the N.C.C. surveyors doing the National resurvey.

Since this lowest point of 1984 there has been a period of steady increase and range expansion, with recolonisation of areas which had been void for several years. 1988 showed 24 squares in use, and 1989 ( a difficult year because of the drought) 22. The combined total was 29 different squares, which compares with the former years of plenty. It can be shown that these are real trends and not just products of the random nature of the observations. For instance, in 1979 I recorded 19 positive records from 11 squares, and 74 negative records from 21 squares; a total of 22 squares were investigated, half of them totally negative. Whereas in 1989 I had 181 positive entries and 62 negatives from 25 squares investigated, of which only 4 were entirely negative. In 1979 20.4% of the entries were positive, and 50% Of the squares: in 1989 77.5% of the entries and 84% of the squares were used.

Unfortunately by 1983 the whole process of recording the decline had become so dismal and dispiriting that I could no longer face the listing of negatives, so a full range of percentages is not available.

## OCCUPATION OF RIVERS

There is an obvious limitation to this geographical method of analysis of the records, and that is that it gives the same amount of emphasis to a square with many records from resident Otters as to a square with only one record of a transient. The other possible method, of comparing the total number of records, has its drawback too, in that the results are not the product of a constant or even measurable amount of observer input. But examination of the records by totals for each river system does indicate a pattern. ( Although the very large numbers of records from the river Tone do not reflect many Otters, but observer density; in other words, I live there.)

Analysis river by river shows that every river with the exception of the river Exe underwent a long period without any Otters. That the occasional transitory wanderer was picked up by the system makes me confident that the blanks do represent an absence of Otters rather than missing them through inadequate searching. The river Otter was recolonised and the population failed to reestablish itself. This finding has been confirmed by regular, thorough and complete searches. Although we have no idea how many Otters were present in the years of recolonisation, it gives rise to two vital questions. Where did the colonists come from? If from the Exe, there appears to have been plenty of available territory space on its tributaries at that tine. And what caused then to fall? The pattern of all my graphs does hint at sudden and dramatic drops in population rather than steady wastage.

Such a sudden and unexplained drop was definitely demonstrated in a methodical survey I undertook on the Southern half at the Somerset Levels in 1980, at the suggestion of the Somerset Trust for Nature Conservation. Following a full search of the Levels by four fulltime surveyors in 1977/78, which revealed a very full usage of the entire area, t was asked to examine a part of it in more detail. As my basis I took a sprainting survey where a large number of bridges had been checked 5 tines in 1977/78. I selected for rechecking all those sites which had been positive 3 times or more out of the 5, 32 sites with a better than 50:50 expectation of a positive result. I made a total of 74 site visits, but recorded only 2 spraints on adjacent bridges on the same day. The whole area had been virtually abandoned by the Otters in under 18 months, and remained so until 1988 at least. Death or emigration can be the only possible causes of such a rapid drop off.

By looking at so large an area as 4100 sq. km, these effects are blurred somewhat in the total figures, because the sudden decline does not occur simultaneously on every river; but the individual rivers each show a similar if not synchronous pattern, and the area as a whole seems to have suffered a major drop-off in both 1978 and 1984.

The recent build-up has been much greater in numbers and extent than previous partial recoveries, and it appears to be spreading successfully off my patch towards the East. I feel it is important to monitor it as accurately as possible, either to register its success, or to realise if another reverse occurs.

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Note: All publications on otters (or references thereto) will be gratefully received for future issues of the Bulletin to maintain this section as complete as possible - Editor.

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