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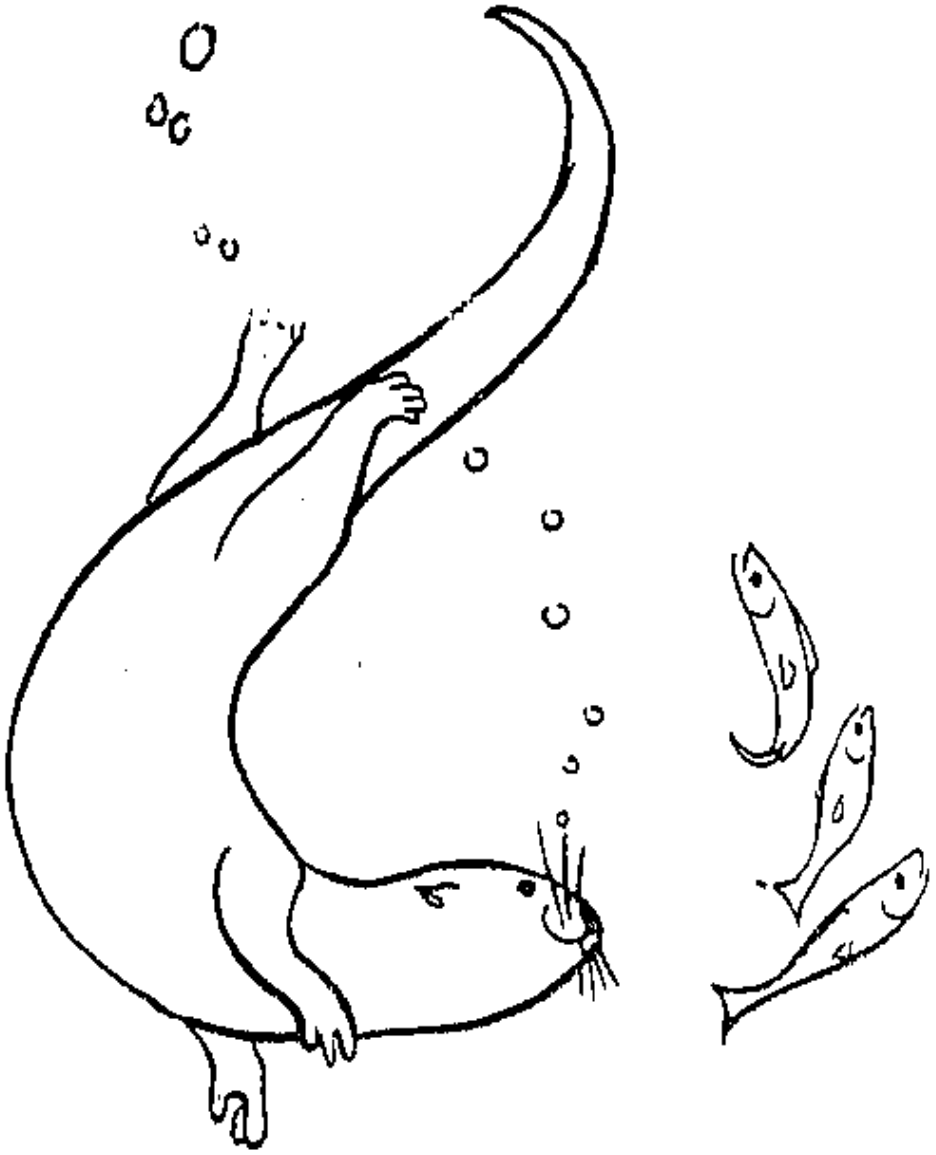

WWF

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IUCN OTTER SPECIALIST GROUP BULLETIN

The Bulletin appears annually. News items, short articles, reports, symposium announcements and information on new publications are welcome. All submissions should be typed in double-spacing. Articles should not exceed 2000 words in length i.e. about 7 pages of double-spaced type, including diagrams and tables.

Submit articles for publication to Dr D T Rowe-Rowe, PO Box 662, Pietermaritzburg, 3200 South Africa.

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IUCN/SCC OSG GROUP

Greetings for 1992. Last year was a momentous one for the Otter Specialist Group and with more hard work this year should be even more fruitful. Our Action Plan was published and distributed to many international agencies, biologists and to all of us. Also in 1991, we revised out list of members and sent invitations for the next triennium. Invitations mailed out in August should have been received by everyone and responded to by now. Soon you will all receive an updated address list to help you correspond with other OSG colleagues.

Dr Padma de Silva has graciously agreed to be the Asian Coordinator for our group. You can contact her at the Department of Zoology, University of Peradeniya, Sri Lanka. We are looking for a small grant to cover Padma's mailing expenses to enable her to begin an Asian otter newsletter, and to start planning an Asian otter workshop in Malaysia. If you would like to help her with these projects, she would be delighted to hear from you.

Dr Claudio Chehebar, our Latin American Coordinator, has translated the Latin American portion of the Action Plan into Spanish and he has a number of copies to distribute. IF a Spanish version of this portion of the Action Plan is useful to you in your own efforts, please contact him. Claudio is also seeking a small grant to cover his mailing costs and to plan a future Latin American otter meeting. To help him with these projects, please contact him at Admin, dc Parques Nacionales. Intendencia del Parque Nacional, Nahuel Huapi, 8400 San Carlos de Bariloche. Rio Negro, Argentina.

All of our coordinators still have a limited number of extra copies of the Action Plan to distribute. It is very important that these get into the hands of governmental and funding officials who can help us conserve otters. We do not have copies to waste and these should only go to officials that you are already working hard to persuade. Please given your coordinators the names and addresses of these officials, a short synopsis of your dealings with these individuals so far and a ghostwritten individualised letter for your coordinator to mail with each copy. For contacts in Latin America and Asia, please also send me a copy of this information, as I can cover these mailings from the Marine World Foundation until other funds are found for these efforts. You can also send me drafts of letters to write to officials on your behalf and I would be happy to customise these letters as well. The more material we can get into the hands of power, the more action we can create on the behalf of our programs and conservation efforts

For the rest of this triennium locating funding for our group's efforts and for individual otter projects is our first priority. Now that I have finally obtained my PhD from the University of Florida and am back again full time at the Marine World Foundation, I can focus my attention on fund-raising efforts. Please contact me at the Marine World Foundation, Marine World Parkway, Vallejo, California 94589 or by Fax 1707-644-0241] with your fund-raising ideas and pmjncl proposals and I will see what I can do to help. I look forward to working with all of you to rnaK' a better world for otters in 1992.

Dr Pat Foster-Turley, Chairman

CALL FOR INFORMATION

The IUCN Action Plan for Otter Conservation has now been available for over a year and all OSG members together with other contributors should have received a copy. It is important that we have some idea of your reactions to the Action Plan. Did you view it simply as an academic exercise which provides you with an up-to-date overview of otter distribution and conservation problems? Or have you been able to use the Action Plan to help you to raise funds for projects? Did publication of the Plan result in any increased interest by your government officials or by non-governmental organisations in otter conservation issues?

We would be grateful for feed-back, both negative and positive, from you. Without your information it will be impossible to assess the usefulness of this publication. Thank you for your help.

Please reply to either: Chris Mason or Sheila Macdonald
c/o Dept of Biology, University of Essex, Wivenhoe Park, Colchester CO4 3SQ. United Kingdom.

REPORT

SOME KEY FACTORS IN BREEDING, CONSERVATION, AND SOCIOLOGY OF OTTERS

Martin Hancox

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Abstract: With the almost universal decline of otter populations worldwide due especially to over hunting and habitat impairment, captive bred releases for local restocking, or to either augment numbers or enhance genetic diversity may become increasingly important. And yet, otters have proved to be surprisingly difficult to breed in captivity. Life history characteristics of eight species of otter are reviewed, and the evolution of their sociobiology suggested. Recent reintroductions have had a low success rate, with animals vulnerable to the same environmental pollutants as probably caused their extinction in the first place.

With the almost universal decline of otter populations worldwide due especially to over hunting and habitat impairment, captive bred releases for local restocking, or to either augment numbers or enhance genetic diversity may become increasingly important. And yet, otters have proved to be surprisingly difficult to breed in captivity. Harris (1968) remarked that "comparatively little is known about the breeding of the otter, and it would seem that the only forms to have been bred successfully in captivity are the European *Lutra lutra*, the North American *Lutra canadensis* and, recently the Indian smooth-coated otter *Lutra perspicillata.* N. American otters were apparently initially easier to breed successfully, but Philip Wayre's pioneering use of underground observation dens viewed through a window from a darkened hide proved a success for badgers, beavers, as well as perhaps the 1970 first European otter breeding since those born at London zoo in 1846 and 1856, of which two individuals lived for over six years (Wayre 1972, 1979, Flower 1931).

Table 1: Overview of life history features of eight otters

Otter	Longevity (captive)	Puberty	Gestation	Litter Size	Development
Lutra lutra	11 - 13 y	♀1.5 - 2 y	60 - 63 d	1 - 5	Eyes open 30 - 35 d Wean 15 wk Independent 1 y +
L. canadensis	13 - 23 y	♀2 - 3 y	245 - 380 d (delayed impl.) 60 - 63 d true?	1 - 5	Eyes open 30 d Wean 12 - 17 wk Independent 1 y
L. perspicillata	11 - 15 y		60 - 63 d	1 - 4	
L. maculicollis			60 - 63 d	1 - 4	
Pteronura brasiliensis	12.8 y		65 - 70 d	1 - 5	Wean 12 - 17 wk Independent after next litter
Aonyx capensis	11 y +	♀1 y	63 d	2 - 3	Eyes open 30 - 35 d Wean 10 - 12 wk Independent 1 y +
A. cinerea			60 - 64 d	1 - 6	Eyes open 40 d Wean 11
\enhydra lutris	19 y	♀4 y ♂5 - 6 y	120 - 365 d (delayed impl) 60 d true?		

The difficulties of breeding otters in captivity are hardly surprising, since even allowing for the gaps in knowledge of the eight best known species (Table 1), otter spacing and reproductive behaviour ranges from the solitary and territorial to "non-social" aggregations of sea otters 2000 strong; litters every six months or only in alternate years; and with or without delayed implantation in the two closely related-holarctic species. Given that otters are long-lived; slow to achieve independence and puberty; and that the basic small-based territoriality of mammals must be adapted to an amphibious life style (Hancox 1988), it is nevertheless possible to discern an underlying pattern to the sociobiological prerequisites for successful captive breeding. The closest approximation to the ubiquitous single-sex territoriality of carnivores is seen in the European otter, where current Scottish work (Kruuk pers. comm.) suggests partly overlapping adult female ranges but defended core fishing areas plus breeding dens both in freshwater and marine environments, and adult males of differing dominance status defending their breeding "rights" over several female ranges. N. American otters probably have a similar social organisation, and it hence is not surprising that males may only rejoin older family groups sporadically when the females are less intolerant of their presence. By contrast, a progressive tendency towards greater paternal care and long term membership of more closely bonded family groups is shown at the Indian *Aonyx* and giant otters (Partridge 1991).

Ecological conditions may determine local behaviour adaptations, but there are remarkably little data on for example, breeding holt criteria in even the well-studied European otter, and although litters have been found in clumps of blackthorn or bramble, reedbeds or yellow flags; at high density or in northerly regions a more secure holt may be an essential defence against possibly infanticidal males, and cold, using suitable bedding material (Harper 1981, Mallinson 1978, Wayre 1979). Further studies of seasonally in breeding will doubtless show close links to water level or climatic factors in food availability, as with precocial pups of sea otter and the variable delay in implantation in both N. American otters. Body size and the latitudinal potential for rapid maturation as shown contrastingly by short-clawed and sea otters, are at opposite poles in terms of reproductive strategies.

Perhaps the most interesting question concerning otters is the evolutionary origins of their sociobiology. Loose aggregations may occur as a result of short term ecological conditions over-riding flexible territorially in European and N. American otters, while other groups may consist of immature or subdominant non-breeders, particularly males, evicted or on local migration in spot necked and sea otters. Sociality in carnivores has been attributed elsewhere to either cooperative hunting as in lions and wolves; or a defence of kills or against raptors as in mongooses foraging in loose packs diurnally for invertebrates. The large rafts of sea otters may conceivably serve to confuse cruising sharks; but amongst the less "social" breeding population, pups weakened by storms or starvation may be very vulnerable to bald eagle predation, amounting of 20 % of pup deaths in Amchitka. The related white-tailed eagle (*Haliaetus*) kills otters occasionally in Scandinavia and scavenges off the remains of otter

prey, but surprisingly there appear to be no records of golden eagle attacks on coastal otters in Scotland even though they attack fox, wildcat, badger, marten and polecat, as well as wolf and lynx on the continent of Europe. Giant otter families may mob prowling caiman (Dunstone pers. comm.). There is very little evidence of cooperative hunting amongst otters either, although N. American females and cubs, and two families of Indian otters were reported herding fish into the shallows. Giant otters may similarly show cooperative fishing, although group members may merely benefit from confusion of the prey, just as pied kingfishers are commensal benefiting indirectly from Cape clawless otter foraging. Differences in foraging behaviour may have an alternative impact on sociality, however, since whereas giant and river otters {*Lutra*} catch very mobile fish prey with the mouth most efficiently via solitary hunting; prehensile hands and exploratory playful behaviour are epitomised by anvil and other tool use and relatively stationary favoured shellfish foods of *Aonyx* and sea otter. There is thus little food niche competition amongst the sympatric clawless and spot-necked otters and marsh mongoose in S Africa (Rowe-Rowe 1977). The development of sociality in otters may hence have arising almost by default, there being no selective pressures against group foraging, particularly on crabs or in muddy rivers in the tropics (Hancox 1988), quite apart from additive secondary advantages in reproductive strategies.

The importance of captive bred releases and translocation has so far been best demonstrated as regards the European and sea otters, but monitoring these projects has also revealed the inherent pitfalls. Reintroducing sea otters to parts of their former range has been partly successful, but only 31 out of 60 individuals in one translocation survived locally in 1988, and perhaps lethal levels of TBT anti-fouling boat paint were found in autopsies elsewhere (International Zoo News 206:37). The Otter Trust reared 30 European otter cubs between 1976 and 1981; four groups were released in East Anglia between 1983 and 1985 amounting to some 13 otters by 1988, which had in turn given rise to a dozen or so wild bred cubs. The decline of populations has been variously attributed to dieldrin and heptachlor pesticide in Britain, organomercury pesticide or pulp industry effluent in Sweden and elsewhere, and PCBs in Sweden and Oregon. Although there has been an improvement in water quality with the banning of the worst of the organochlorine pesticides, such toxins are still found in even Hebridean otters. Otters and other mustelids may be particularly vulnerable to PCBs, and one unweaned Minsmere cub was probably already sterile via maternal contamination. Pollution may also present a hazard to populations as well as reintroduction schemes, in countries such as France, Greece, Holland, Italy, Portugal and Spain (Anon 1988, Chanin 1985, Jefferies 1988, Mason & Macdonald 1986).

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REPORT

THE OTTER IN AUSTRIA: A REVIEW ON THE CURRENT STATE OF RESEARCH

Arno Gutleb

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Abstract: As the status of the otter and the results of research work done in Austria have not been summarised within the last years, this article is an attempt to fill this gap. Status, habitat, captive animals, ecology and pollutant burden are reviewed. No national survey has been carried out, but the main otter distribution is along the northern and southeastern border. The northern population seems safe but the southern one is likely to be fragmented by developments such as planned hydropowerstations. There are some conflicts with fish farmers but compensation is paid. There is a breeding colony of otters in Alpenzoo Innsbruck and another group at the WWF station Grünau, which has not yet bred. Recent pollutant assay results are discussed, and heavy metal levels presented.

As the status of the otter and the results of research work done in Austria have not been summarized within the last years, this article is an attempt to fill this gap.

The main activities on otters are coordinated by the Institute for Wildlife Biology and Game Management at the University for Agriculture, Vienna and by the WWF Austria.

STATUS

No national survey has been carried out for different reasons. The status of the otter varies greatly between various parts of Austria (see Fig. 1). The main area of its distribution is along the northern and southeastern border. Especially Waldviertel (Lower Austria) is keeping a good population. In Mühlviertel (Upper Austria), in the south of Burgenland and Styria populations seem to be in good condition at the moment, but are restricted to only a few watercourses and are therefore possibly threatened by planned hydropowerstations and recreation activities. Siber (pers. comm.) found tracks in 1988 and 1991 at some places along the river Inn, bordering Germany. For Carinthia the results of a survey are in preparation and although there have been several reports on the existence of otters, only three positive sites were found (Wieser 1992). We know about observations of hunters and fishers, who told about having seen otters, so there might be a chance of finding otters in some other areas.

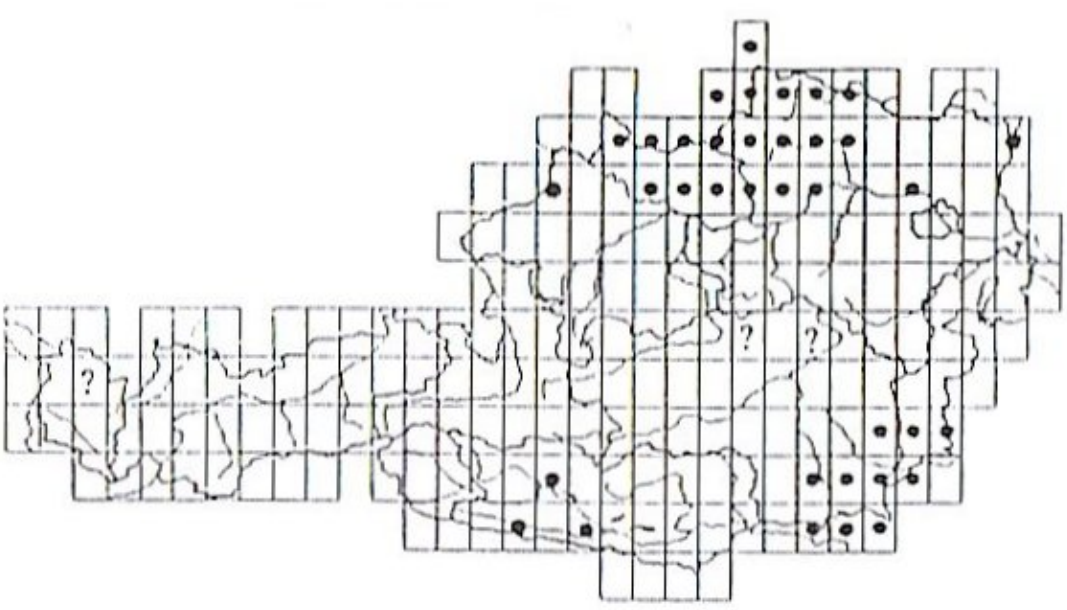

Figure 1. Distribution of *Lutra lutra* L. in Austria (modified according BMfGU (1988) with additions of: Gutleb, Hafner. Kranz, Kraus, Lutschinger, Pichler, Straker, Sieber, Wieser).

HABITAT PROTECTION

WWF spent about 250 000 U$ within the last six years for public relations and habitat protection.

In some parts of Waldviertel there are increasing otter populations which cause problems as otters sometimes kill a lot of adult fish in cultures, kept in small ponds (up to 10000 m^2) mainly during the winter. Together with the NÖ Landesjagdverband und NÖ Landesregierung, WWF is paying compensation in these cases. Nevertheless these occurrences decrease public acceptance of the otter and there is some evidence for illegal trapping although it has not been possible to verify one case so far. Michaela Bodner (WWF) is studying the possibilities of protecting these small ponds.

WWF has also rented parts of river systems (60 km) in order to create protected areas where no fishing is allowed. There fish populations are stocked according to ecological points of view.

In more or less intact habitats, the need for the otter to mark on certain places seems to be so strong that environmental influences like bankcover, usage of land between five to fifty metres from the bank, or disturbance from streets have no influence on marking behaviour. This means that spraints are not appropriate parameters for differentiated statements on suitability of habitats for otters (Baas et al. 1984; Gormally et al. 1983; Green et al. 1985; Jenkins et al. 1980; Prauser 1985).

The seasonal scent marking behaviour of otters on a 31 km stretch of river was investigated by Andreas Kranz. Marking during the winter (without strong ice) was more frequently than in summer. At the beginning of November the number of fresh spraints started to increase and stayed at that frequency until February; corresponding to results of Macdonald et al. (1987) and other authors from western Europe. As the climate of Waldviertel has a much more continental character than Great Britain, this fact seems remarkable. During the weeks of strong freezing otters concentrate on few places free of ice. As a result the assessment of marking behaviour in that period is difficult.

Andreas Kranz did another study on the evaluation of otter habitats with respect to hydromorphological aspects on the river Kamp. This river in the southeast of the Bohemian Massive runs to river Danube with a river basin of about 1750 km^2. The length of the river Kamp together with its tributaries wider than 3 m is 224 km.

The course of the river was subdivided into 11 areas, based on hydrogeographic and morphologic aspects. All parts of a size large enough for at least one family (Green et al. 1984; Erlinge 1967; historical findings). These areas were investigated for their hydromorphologic parameters (natural, hard regulated, storage lake deeper than 20 m). Along the more natural upper course (97 km) 2800 spraints were found in 1990. The next 35 km consist of storage lakes with deep water bodies and precipitous banks, so only 10 spraints were found. On a river going to the storage lake (16 km) and on the following 22 km watercourse down the dam (both being natural and with a lot of fish) altogether only 6 spraints were found. Before 1986 the parts of the river down the dam were used by otters. Further down no otter spraints were found owing to human activities (villages, embankments and water pollution) in 1986 and in 1990.

The river Kamp is an example of the hazard of isolation of otter populations owing to large dams (fish are not easily available anymore). Twenty two kilometres of natural habitat in regard to fish population and cover, and without disturbance, is too small to keep an otter population with rare contact with other populations for a long period.

Barbara Rauer-Gross (Institute for Wildlife Biology and Game Management) carried out a study on the feeding ecology of otters in the Waldviertel on the river Kamp between Arbesbach and Rosenburg (Rauer-Gross 1989).

The following results are given in absolute percentage, i.e. the percentage of spraints containing remains of different animals. As there are often remains of more than one animal in the spraint, the summing up of percentages is more than 100 %. The size of the most important feeding fish trout (*Salmo trutta f. fario*) and grayling (T*hymallus thymallus*] was determined by using the scales of 30 animals of each kind as a standard. For the determination of trout size, the total radius of the scales was used, whereas for the grayling it was possible to use the number of annual rings.
Trout is one of the main fish for the otter in all areas. The importance of other fish varies. High values for bull head (*Cottus gobio*) in one area and for grayling in another area are worth noticing. Except one area amphibians are found in equal parts: Crayfish is important in one area.

CAPTIVE BREEDING AND REPRODUCTION

In Austria there are two places where otters are held in captivity. Three otters (1,2) are kept in the Alpenzoo Innsbruck and another four (2,2) are in the WWF station Grünau. The station consists of four enclosures altogether 15 000 m^2. Whereas breeding has been successful in the Alpenzoo several times, no cubs have been born in Grünau so far, although all animals showed reproductional abilities before coming to Grünau. The reasons are still unknown. The enclosures seem to be very good and the diet is the same as in the Alpenzoo Innsbruck. In addition to the breeding attempts various research activities are conducted.

Henriette Lehmann (Institute for Biochemistry, University of Veterinary Medicine, Vienna) is studying various hormones in the faeces of captive and wildliving otters in order to get data on the reproduction cycle and the sex of the animals leaving spraints in the field.

The otter has, like other mustelids, an induced ovulation, and pregnancy diagnosis on the animals themselves is therefore impossible. The Institute of Biochemistry has established methods for monitoring the oestrous cycle using faecal samples. Measurement of progesterone metabolites (progestagens) in faeces is a non invasive method of *corpus luteum* monitoring in various species.

Five faecal samples from male and thirty faecal samples from female otters were obtained from the Alpenzoo Innsbruck and the WWF Otter Station in Grünau.

Results showed low progestagen values in non pregnant and in male otters (x - 0,5 ± 0,2 µmol/kg). Higher concentrations (x = 10,1 ± 3,5µmol.kg) were found in one female otter; this animal must have ovulated and might have been pregnant. For testing and reassuring this method progestation values in faecal samples from minks, both male and female (pregnant) were measured and the results were x - 0,3 ±0,1 µmo√kg in male minks (n = 171), compared with I 1.7 ± 3,6 µmol/kg in female minks (n = 40) after implantation.

Concerning wild otters, determination of the sex by faecal steroid analysis would be helpful.

The presence of an otter in a certain district is in most cases detected only by faeces, which the animal leaves on exposed places along the river banks to mark its area. An enzyme immunoassay for 17-oxo-androgens, which are excreted mainly in faeces, showed evidently different androgen concentrations in the samples from male otters compared with those of females.

The values were x = 34,6 ± 2,5µmol/kg in males and x = 0,1 ± 0,02 µmol/kg in females. The samples for this project were collected in spring (breeding season) The results offer the possibility to gain more information about the structure of otter populations.

These methods, giving good results so far, might be useful for getting more information and facts about the biology of otters, and maybe other endangered species.

ECOLOGY

Andreas Kranz (Institute for Wildlife Biology and Game Management) studied the value of spraints for field studies (1990). The area of investigation is situated in Waldviertel in the southeast of the Bohemian Massive, 600 to 800 m above sea level. The ecologically interact rivers belong to the trout and grayling-region (rhithral) and are up to 15m wide. Between January 1988 and February 1990 6300 spraints were counted.

Spraints are excellent means to prove the existence of otters living in a certain area, as long as longer parts of watercourses (up to some km) are investigated (Kruuk et al. 1986). By looking for spraints it was possible to show that otters are inhabiting even smallest watercourses including headwaters and marshes.

Average total length for trout was estimated to be 168,4mm. The average length of grayling was 250,4 mm.

In 70 spraints (3,66 %) mammalian hair was found; 21,42 % from mustelids. A more specific determination was impossible owing to the similarity of mustelid hair, but it must definitely be from otters as a result of fur cleaning. Feathers were found in 41 spraints and 46 % of them could be identified to be from *Anas* sp.

Two projects on otters in Upper Austria (Mühlviertel, north of the river Danube) were carried out by Johanna Sieber (Konrad Lorenz-lnstitut für Vergleichende Verhaltensforschung). The results of a study for the Upper Austrian Government (Siber 1991) showed good otter populations on the river systems of Mühl and Aist. Also tracks of young otters were found. The populations of the rivers Rotbach and Maltsch are connected with populations in the CSFR. In contrast to Kraus (1986) no evidence of otters on the river Rodl was found in 1991.

POLLUTANTS

A study on the contamination of otters with heavy metals, organochlorine pesticides and PCBs (polychlorinated biphenyl) was initiated by WWF Austria. Otters, which were killed by traffic, fish and spraints are collected for this purpose.

The analytical work is still in progress but Arno C. Gutleb (Institute for Medical Chemistiy, University of Veterinary Medicine, Vienna) found cadmium and lead levels in otters (1992), comparable with those, which are assumed to be of no concern to otters (Mason 1989). Levels of zinc and copper in otters are within the known physiological range for mustelids (Stejskall et al. 1989), but are higher than levels reported for otters from the Netherlands (Broekhuizen 1987).

The levels of heavy metals in the spraints which have been already analyzed are within the range known from literature (Mason et al. 1986; Mason 1989). except one high value of 32,8 ppm for lead and the high values of zinc.

Table 1: Cadmium, lead, zinc and copper (mg kg^{-1} dry weight) in otter and spraint samples; n.d. = not detected

	cadmium		**lead**		**zinc**		**copper**	
	liver	**kidney**	**liver**	**kidney**	**liver**	**kidney**	**liver**	**kidney**
Otter 1	n.d.	0.030	0.359	0.370	150.3	327.0	42.5	12.2
Otter 2	0.104	0.045	0.071	0.420	101.9	37.7	33.3	6.5
Otter 3	0.032	0.312	0.166	0.732	43.7	65.3	28.5	10.4
Spraint from	**cadmium**		**lead**		**zinc**		**copper**	
Limbach/Burgenland	0.100		0.230		556.7		12.6	
Thaya/Waldviertal	0.217		32.801		246.8		22.4	
Thaya/Waldviertal	0.713	0.552	798.0	23.6				

A more detailed version including literature and figures will be obtained on request.

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R E P O R T

ANALYSIS OF ONE HUNDRED OTTERS KILLED BY ACCIDENTS IN CENTRAL FINLAND

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Abstract: This is a preliminary report of otters brought to Kuopio Museum, 1967 - 1991. The population living in North Savo, Central Finland seems to be relatively healthy. However, there are some reasons for concern. 108 otters were analysed. Cause of death, sex ratio, reproductive status, age, weight, radiation and heavy metal levels, and stomach contents are reviewed.

This is a preliminary report of otters brought to Kuopio Museum, 1967 - 1991. The population living in North Savo, Central Finland seems to be relatively healthy. However, there are some reasons for concern.

MATERIALS AND METHODS

108 otters were brought to the museum in 1967 - 1991 This material was roughly classified as follows: Age group I, juveniles. Coronal suture visible (5♂♂, 8♀♀; means 2,8 and 2,0 kg). Age group II, subadults. Edges of parietale and frontale appear as two more or less parallel lines along the developing crista sagitallis (22♂♂, 20♀♀; means 4,1 and 3,4 kg). Age group III, adults. Sagittal crest forms the base of a 'Y'-figure. All specimens in this group were classified as matures (25♂♂ , 18♀♀ means 7,9 and 5,1 kg).

The radiation level was measured in the laboratory for foodstuffs in Iisalmi with a "Mini-Assay" analyzer. The skull, tail, paws and the alimentary canal were removed from the skinned carcass which was then cut into pieces to fill the counting chamber to about two litres. The levels of some metals were determined in the laboratory of the Department of Environmental Conservation at the University of Helsinki using the method described in Nuorteva (1990). For prey analysis the content of the stomach

was washed, dried and examined under a stereomicroscope. The present material includes the demographic data published in Skarén (1987).

CAUSES OF DEATH

In seven cases no comments are available on the cause of death. In the remaining 101 animals the figures are as follows: traffic 42, fish traps 41, no visible cause 7, shot 3, mink or muskrat traps 3, dog 2, killed otherwise by humans 3.

The most dangerous period is from October to February: 50 otters were killed by cars and fish traps. In October-January 29 otters (69 % of all the 42 deaths to traffic) occurred. This is somewhat astonishing because more cars are used in summer when speeds are also higher. February seems to be the record period for deaths in fish traps: 12 otters (29,3 % of 41) were drowned. This may reflect local difficulties in catching fish, because there is least open water in February.

The proportion of cars as otter killers has rapidly increased during the last three years: more otters have been killed by traffic than in the preceding 20 years. This difference is clear (Chi-square - 6.76; $P < 0,01$) when comparing the two main causes of death: In 1967 - 1988 cars vs fishtraps was 19 (38 %) : 31 (62 %). In 1989 - 1991 the ratio was 23 (70 %) : 10 (30 %l. This may be related to the increase in number of cars in Finland. Unaccountably otters seem often to climb onto the road, even at places where there is a concrete tube under it. Possibly some animals fear these tubes, as where there is an ordinary bridge, otters cross the road under it.

Some otters may have also been poached. On occasions I have seen large fox traps put on the otter tracks. But possibly this is a minor cause of death.

SEX RATIO

Sex ratio was even in the entire sample : 58 males and 50 females ($P > 0.05$). The same is true in mature animals (28 males, 20 females). This is possibly a surprise, because adult males are often believed to be more active than others.

AGE CLASSES

There are many young animals in the sample suggesting that the otter population is reproductively active (See Material and Methods). The proportion of young (juveniles and subadults) in the sample during the past six years (35:35) did not differ significantly from that during the previous six years (18:10). The periods compared were 1980 - 85 and 1986 - 91.

WEIGHT

Mean weights of the age classes are given in Material and Methods. Thus far no very large (> 10 kg) males have been found. Some old females were relatively lean possibly owing to famine. On the other hand there are a few juvenile males which may gain weight rapidly, e.g. one Finnish male otter which was found on 23 August as a small (800 g) cub weighed 5 kg six months later. However, it was reared in the room by humans (Sulkava & Sulkava 1989).

REPRODUCTION

According to epididymal smears six adult males had spermatids in spring (16.II. - 1 .IV) or in autumn (24.IX - 30.X). The lightest baculum of such a male weighed 1 g after boiling in water and cleaning. Seven large adult males with big bacula did not have spermatids. One was killed in June, the others in October-March.

There were only two pregnant females in this material. One (28 June 1991) contained a large 70 g embryo. The other killed on 1 2 November 1991 contained two 37 mm embryos. Apparently few lactating females are killed in accidents. A female with thick mammary gland tissue and two placental scars died on 13 October 1986. One year later a car killed another lactating female. She had three elongated mammae, but no placental scars. I do not know how long the scars are visible in otters after parturition. Probably both these females had given birth in late summer or early autumn.

Most juveniles (11) were killed in October-January. Only two died at some other time. According to these figures most otters seem to have been born in the summer.

Among the adult females were individuals which apparently had not reproduced e.g. in May-June four large adults were killed without signs of reproduction. One could expect to find small embryos at this time. In many small rodents it is exceptional to find mature females which do not reproduce in the main breeding season.

RADIATION LEVELS

In 1986 before and after the Chernobyl accident, the cesium levels of two adult otters from the present study area were determined. The contents in the leg muscle were 270 and 1810 Bq/kg, respectively. Later (11 October 1987 - 16 February 1990) the total radiation levels of 20 otters wEre calculated in Bq/kg:

Age Group	Range	M ±	SEM	n
I	933-1662	1244±	217	3
II	246-2116	246±	2116	7
III	18 - 734	276±	92	10

Radiation level seems to be lower in the older animals. There is a significant difference between the age groups I and III: $t = 4, 10$, $P < 0,01$. This is hardly due to different original fall-outs, because two of these juveniles were found in the area of least radiation.

Twelve of these animals were found in the area of a moderate (3 - 20 kBq/m^2) Cs 137 fall-out. The other eight originated from areas of less than 3 kBq/m^2. However, this may not be very important, because the animals had time to migrate from one area to another.

METALS

Mercury

There seems to be a positive correlation in Hg-levels and age (ppm in fresh weight of liver):

Age Group	Range	M ±	SEM	n
I	0,05 - 2,50	1,32 ±	0,67	8
II	0,97 -4,10	2,55 ±	0,25	24
III	2,30-31.0	8,99 ±	1.26	28

The difference between the two young age groups is not significant ($t = 1,73$; $P > 0,05$), but there is a clear difference between the groups II and III : $t = 5,0$; $P < 0,01$.

For comparison 29 hair samples were also analyzed. Most of these were taken from otters with known liver contents (Table 1). The increasing tendency to accumulate Hg with age is significant also in the hair samples (t-test, $P < 0,01$ between all the groups). But the values are 2,3 - 3,9 times higher than those in the livers of these same animals. There were some surprisingly high levels (60 ppm) in the hair samples. In human hair Hg contents over 50 ppm may cause a central nervous disease (Nuorteva 1 976), but we do not know how much an otter can endure.

Table 1: Mercury contents of otters in ppm of fresh weight.
A = hair, all specimens. B = hair, specimens with liver data, too.
C = Hg contents in livers of the same specimens as in B.
M = mean, SEM = standard error of mean.

	A				B				C			
	Range	**M**	**± SEM**	**n**	**Range**	**M**	**± SEM**	**Range**	**M**	**± SEM**	**n**
I	1,7 - 5,8	3,6 ±	0,84	4	3,4 - 5,8	4,23 ±	0,79	0,7 - 2,5	1,85 ±	0,59	3
II	2,7 - 18,0	9,7 ±	1,20	17	2,7 - 18,0	9,12 ±	1,26	0,5 - 5,7	2,37 ±	0,34	15
III	17 - 60	33,2 ±	3,17	18	17 - 59	32,17 ±	3,39	2,5 - 3,1	10,59 ±	2,08	14

Other Metals

In addition to the mercury, some other metals were determined in the livers of 12 otters. This sample consisted of (our juveniles, two subadults and six adults. The results were pooled (n = 12), because no apparent correlation with age could be seen. The values are in mg/kg of fresh weight:

	Range			M	±	SEM
Fe	120	-	420	208,33	±	23,12
Zn	22	-	75	40,08	±	11,58
Cu	4,9	-	32	15,53	±	2,34
Mn	1,6	-	6,5	3,42	±	0,43
Cd	0,01	-	0,23	0,08	±	0,02
Pb	< 0,1	-	0,2		-	

Aluminium and nickel were also analyzed, but the contents were below the detection levels: <10 ppm (Al) and <0,5 ppm (Ni). Possibly these levels are not dangerous to otters.

FOOD

Of 71 stomachs examined, 34 were empty. The other 37 were from otters killed in different seasons. Contents are summarised in Table 2.

Table 2: Per cent frequency of prey in 37 stomachs from Finland

	n	%
Mollusca	1	2,7
Crayfish	4	10,8
Mammalia	4	10,8
Rana sp.	10	27,0
Pisces	35	94,6
- *Perca*	17	45,9
- Cyprinidae	12	32,4
- *Acerina*	4	10,8
- *Lota*	4	10,8
- *Esox*	4	10,8
- *Cottus* sp.	2	5,4
- Salmonidae	3	8,1

Fish was the main prey. Apparently the relatively high levels of mercury must originate especially from *Perca*, *Acerina*, *Esox* and *Lota*. The other prey animals were of minor importance. Frogs were found in ten stomachs, but in low contents. Crayfish and mammals (*Neomys fodiens*. *Ondatra zibethica*) were both found in four animals. One stomach included remains of *Anodonta* clams, possibly as a prey of muskrats.

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REPORT

NUMBERS OF OTTERS AND APPROACH TO POPULATION ESTIMATION IN BYELORUSSIA

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Abstract: Estimates of current otter numbers in Byelorussia were made. Tracks and other otter sign were surveyed for, and water bodies characterised into different types. A computer database was used to handle the figures. The number of otters in Byelorussia has substantially decreased since 1988. We attribute this fact to excessive poaching. Further decrease in the numbers of otters seems possible because in some areas, there are severe disturbances in population structure. More efficient protection measures are urgently needed for this species. At present more otters could be supported but this is likely to be impacted by a large-scale drainage amelioration project for Northern Byelorussia.

Estimates of otter numbers currently (1989 - 1991) in Byelorussia were made, based on recommendations by Teplov (1952) and Ternovsky (1973), as well as on our own data.

To evaluate numbers of otters on a particular body of water (river, lake, canal and pond), this body of water is subjected to intensive survey. In winter with snow and ice, ponds are surveyed on foot; in summer a boat is used (kayak or inflatable boat), or more rarely, surveyors walk along the bank. In case of summer survey, those bodies of water are only examined which have places where otters necessarily leave their tracks. These are usually sand drifts near the bank which are typical for many Byelorussian rivers. On these sand drifts, otters often mark the site with excrements, eat food, dry hair, or have a rest at night. In addition, otter's footprints are easy to see at all artificial bodies of water (canals and ponds). Here otters leave their footprints on sand or mud drifts, on barren ground exposed through shallowing, on ground under numerous small bridges, near locks, arid other water-development works.

When a body of water is surveyed along the bank, otter's tracks are recorded. The length of a hind paw print is measured, and in the case of excrements the sex is identified. With males, urine traces lie far ahead of the faeces, while with females it lies slightly behind. Using these signs we have distinguished between neighbouring individuals (inhabiting adjacent zones) to count their numbers for a particular body of water. Numbers of young individuals in a litter which already follow their mother (over 3 months old) has been found in a similar way, while differentiating by sex and hind footprint size, in sites of joint marking with excrements. In some cases, the number of young individuals in litters has been counted by means of footprints on passages, or by visual observation. In case a litter is detected while the number of cubs is unknown, we have assumed the average number of 2,4 (n = 133) which is typical for Byelorussia (Sidorovich 1990).

The method described to evaluate otter numbers, may be considered exact and unbiased proceeding from the following: The tracks of otters are constantly renewed owing to their activities and to precipitation. Normally, otters do not need to travel long distances within several days. Typically, they stay at a particular place for several days. Moreover, as is clear from repeated observations of otter activities using their tracks as well as from hunting practice, it is common that otters stay at a particular area for a long time (up to several years). In doing so, however, otters may move away from the place at times and then return home. For this reason, this method is unlikely to show more otters than actually live at the place. The risk of underestimating the numbers is not too high. Proceeding from basic probability considerations, the probability that individuals of the same sex and with almost the same hind footprint length (at differences of 1 cm and less) live in adjacent areas has been found as low as 0,01 - 0.95. In addition, our observations suggest that adult males do not live in the vicinity of one another.

Otter population density has been calculated per 10 km of length for water courses (rivers, canals), while for non-running bodies of water, (lakes, ponds) it has been calculated per 5 km of the bank length. Because of this, a length of 1 0 - 20 km has been selected as a unit. In some cases, however, the unit section might be less than 10 km with a short water course, or more than 20 km (20 - 40 km) with a low density of population. Unit sections to count numbers of otters in case of non-current waters have been selected in similar manner.

Another necessary factor to extrapolate the numbers on a certain territory, apart from count of the numbers for particular bodies of water, is a typology of bodies of water at otter sites. A typology of this sort has been developed (Sidorovich, 1988) depending on potential density of population which corresponds to ecological capacity of a water body. This problem has been investigated for six years for those territories where otter hunting is banned (Berenzinsky biosphere preserve, Naliboksky hunting reservation) and hence the density of otter population has been formed naturally, depending on the ecological capacity of the environment. The following can be said about the typology developed. The typology of rivers as main permanent sites of otters, is based on water height, current speed, flood rate, or flood-lands. It is in these factors that rivers grouped by density of population of otters, differ from one another, while important factors within each group being bank's structure and beavers' building activities (Sidorovich 1988). Canals are grouped in terms of their water height and age, and also of density of population of beavers which is determined by forest and bush density of riverside biotopes. As to non-current bodies of water in Byelorussia, otters stay here only for iceless seasons; for this reason, those bodies of water have not been taken into account when extrapolating.

The surveys to take stock of otters are scheduled in such a way that diverse bodies of water are represented to evaluate the density of population for different sites.

The data on population density of otters for particular bodies of water in Byelorussia, are placed into the databank of near-water mammals of Byelorussia. This databank includes:

1. databases, i.e. data about numbers of otters and other near-water mammals which are properly arranged, formalized and loaded into the computer's memory;
2. algorithms and programs to process the data (data input, accumulation, update, search, manipulation, statistic processing);
3. technology and personnel to maintain and support the databank.

The main software used is ASPED-5 programme complex, developed by the Computation Center of the Byelorussian Academy of Sciences. Detail on how this programme is employed and the type of data recorded may be obtained from the authors. For each observation data on 20 items are entered, covering locality, water body, and resident animals. The results discussed below, have been obtained using this databank.

Abrupt variations in numbers are not typical for otters. For this reason, calculations to evaluate average values of density for diverse bodies of water, use otter account data over several (2 - 3 years). These average density values for particular bodies of water have been extrapolated to the total of bodies of this sort, which gives numbers of otters within a certain territory as a result of simple arithmetical computation. In our opinion, the extrapolation of this kind is exact because differences in environment of diverse bodies are taken into account.

In our previous study (Sidorovich 1988), numbers and density of otters were evaluated in Byelorussia for 1984 - 1988. The number of otters for that period was about 12 000, while the average density, in basins of big rivers, ran from 2,1 to 6,5 individuals per 100 km^2.

Now we re-calculated the numbers and density for basins of big rivers according to 1989 -1991 data. The results are given in Tables 1 and 2. For the whole of Byelorussia otters number about 7000 individuals, while the density ranges from 1,1 to 3,7 individuals per 100 km^2. The distribution with water bodies of different kind is shown in Table 3.

Table 1: Density of otter population on different types of bodies of water in Byelorussia over period of 1.04.1989 - 1.07.1991

Type of Body of Water	Min	Max	Mean	SD
Big rivers with diverse floodlands (n = 26)	1,2	4,0	2,19	0,62
Slow-current medium-size rivers with high medium flood rate (n = 10)	0,6	4,2	1,32	0,82
Moderate-current medium-size rivers with low flood rate (n = 23)	0,7	4,3	2,16	0,50
Moderate-current medium-size rivers with medium flood rate (n = 41)	1,2	5,0	2,47	0,42
Slow-current small rivers with heavily swamped floodlands (n = 9)	0,0	2,0	0,71	0,52
Moderate-current small rivers with moderately swamped floodlands (n = 31)	0,0	3,2	1,27	0,50
Rapid-current small rivers with slightly swamped floodlands (n = 34)	0,0	6,0	1,84	0,99
Relatively deep soil reclamation canal (n = 48)	0,0	1,5	0,18	0,23
Canalized small rivers for forest reclamation and other forest canals (n= 13)	0,0	1,9	0,62	0,44
Deep canals (water supply, navigation) (n = 7)	0,3	1,4	0,77	0,35
Glacial lakes (n= 1 6)	0,0	2,5	0,42	0,82
Water storages (n = 8)	0,0	1,3	0,56	0,37

NOTES
1. Density of population is given in individuals per 10 km of length for water and in individuals per 5 km of bank length for non-current waters.
2.In case of non-current waters, density of population is given for the iceless period because otters do not dwell there when ice-bound.

Table 2: Numbers and density (n/100 km^2) of otters in Byelorussia

Basin of big river	Numbers	Density
Zapadnaya Dvina	2000	3,7
Niemen	1200	2,2
Dnieper (including Sozh and Berezina)	2800	3,0
Pripyat	900	1,2
Zapadny Bug	200	1,1
Total in Byelorussia	7000	

Table 3: Distribution of otters between water courses of different type, in individuals

Water Type	Zap. Dvina	Niemen	Dnieper	Pripyat	Zap. Bug
Big rivers	146	161	548	124	35
Medium rivers	391	445	744	256	45
Small rivers	1360	368	1262	267	79
Forest reclamation canals	34	92	119	70	23
Soil reclamation canals	30	87	135	203	41

It is obvious that numbers of otters in Byelorussia has substantially decreased by 41 % compared with 1984 - 1988. We attribute this fact to excessive poaching.

Winters of 1988 - 89 and 1989 - 90 were relatively warm and snowless. Those periods were favourable for otters in terms of food, but at the same time, the hunting was extremely successful. Besides, the lack of snow cover severely complicated protection of otters, for which reason poaching became popular during those winters. Successful otter hunting by means of traps in periods like those, is determined by the following: The lack of snow allows poachers to set as many traps as they did in autumn; the traps might be left for a comparatively long time (4-10 days) without major fears that someone will trace footprints and take the traps away together with the bag. The lack of frost substantially simplified setting traps and keeping them operating.

Further decrease in the numbers of otters seems possible because some fragments of the population show severe disturbances in structure, such as low density of population and deficiency of adult males which brings about considerable deterioration in reproduction within the population (Sidorovich 1990). Because of this, more efficient protection measures are urgently needed for this species, particularly, to make a network of special otter preserves on the most capable pond systems. *Lutra lutra* is generally regarded as endangered in Europe (Chanin 1985; Reuther &Festetics 1980; Foster-Turley et al. 1990).

Considerable possibilities are still available to increase numbers of otters because, to our estimations, the ecological capacity of Byelorussia allows for about 19 thousand individuals (Sidorovich 1988).

However, this ecological capacity is likely to dramatically decrease as a consequence of a large-scale drainage amelioration project for Northern Byelorussia.

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REPORT

AKTION FISCHOTTERSCHUTZ E.V. (GERMAN CAMPAIGN FOR OTTER PROTECTION) ACTIVITIES 1991-92

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Abstract: Following reunification, the work of Aktion Fischotterschutz has intensified. In the east, due mainly to hunting reserves for politicians, otter populations and habitat is currently good. As the east reaps the benefit of reunification, and development begins, this is likely to rapidly change. We must act quickly to avoid the mistakes made in the past in the west. In West Germany, the focus is recovery of habitat, with a new project, Otter 2000, intended to reconnect isolated otter populations through the provision of habitat corridors. Reports on other projects are also presented.

The Situation After The Reunification

The German reunification brought a wide intensification for the AKTION FISCHOTTERSCHUTZ work. This is because of the very different situation of the otter populations in East- and West-Germany. The distribution of otters in Germany shows a clear east to west decline. In the federal states of Mecklenburg-Vorpommern, Brandenburg and the eastern parts of Saxony the species is widespread. But in Schleswig-Holstein (incl. Hamburg), Lower-Saxony (incl. Bremen), Saxony-Anhalt, Berlin, Southeast Bavaria and possibly Thuringia only isolated populations remain. In all other federal states (Northrhine-Westphalia, Hesse, Rhineland Palatinate, Saarland, Baden-Württemberg) the otter seems to be extinct.

Even if we proceed on the assumption that the higher population density in East Germany is based on the historical situation of an at all times higher number of otters, and possibly based on better original and natural habitat structure (e.g. a higher density of waters network), we have to realize that the recent situation is closely connected with the economic powerlessness of the former GDR. The political circumstances (e.g. large scale protected hunting areas for politicians) and the economic impotence of the political leaders as well as of the political system itself prevented large areas from being developed.

Figure 1. Recent distribution of *Lutra lutra* in Germany

The legend which is created now, that the remaining natural habitats have been protected because of ecological understanding by the former GDR government is wrong. The proof can be seen in all those areas where economic or prestige aspects have got the chance to be realised (e.g. the chemical centre of Bitterfeld of the brown coal surface mining in the Lower Lusatia).

Now - after the reunification - economic potency is available. And in the same degree as the people of East-Germany will profit by the free enterprise economy, nature in this part of the country will be endangered. Western technology will enble the intensification of all kinds of human use of the countryside. First steps can be observed in waters maintenance, road building, agriculture or tourism.

This development will be so fast that the chances for nature conservation are low. All available energy, manpower and money are needed to avoid, in East Germany, those mistakes that were made in West Germany in the time of the so called economic miracle after World War II. And there is a chance.

Today, our ecological knowledge is much better than forty years ago and today we have the background of a powerful environmental movement.

Top priority for the otter populations in the five new German federal states must be the proteciton of otter habitats.

Therefore it is necessary

- to map the biotope structures,
- to develop management programmes,
- to raise money, and
- to intensify the lobby for the realization of the management programmes.

The problem is that this has to be done very quickly, but there are also many other conservation problems and the new administration structures in East Germany are only just starting to grow. Therefore the involvement of private nature conservation organisations - especially of those from West Germany which are well organised an experience in fund-raising - is needed.

We should be aware that damage to otter habitats in unavoidable, but it is our task to reduce the loss of otter habitats to an absolute minimum. As curious as this sounds, this damage and these losses can offer a new chance for otter protection. he increase of knowledge about otter biology and of new research techniques will give us the possibility to prove our theories about the reasons for the decline of the otter. From there we can develop new protection and restoration strategies. But that requires an immediate registration of the status quo of the habitats. Only then can we describe and analyse the changes.

In West Germany, the situation is really different. Here the protection of habitats has not top priority, but the restoration of habitats. Most areas needing protection are protected now. But there are not enough areas which need protection. In Lower Saxony for instance specialists proceed on the assumption that only 3% of the flowing waters in this large federal state are in such a natural condition that a protection is justified. This is not enough to give the otter population a realistic chance of survival.

Therefore the "Aktion Fischotterschutz" is working on a habitat connection program for Germany. It is called "Otter 2000" and is based on the idea of restoring a network of river systems which can connect the current isolated otter populations.

MAIN ACTIVITIES IN 1991

Cooperation

Because of the situation described above many small steps have been made towards a better cooperation and understanding between "otter people" in East- and West-Germany. More than a hundred enquiries have been addressed from East-German scientists, conservationists and authorities to the AKTION FISCHOTTERSCHUTZ. In many cases practical help could be given, especially in habitat conservation problems.

Research

At the research station in Hankensbüttel three main studies were done or started:

- a morphological study about the topography of the organs of *Lutra lutra* (will be published in 1992);
- an ethological study about the marking behaviour of *Lutra lutra* (will be published in 1992);
- an ethological study about the prey catching behaviour of *Lutra lutra* (will run until 1994).

Breeding

Again one litter of *Lutra lutra* with one (female) cub was born on August 28 1991. Two females (11 and 12 years old) died because of disease of the kidneys.

Habitat management

Several minor projects to protect or to restore habitats have been finished, continued or started in Lower Saxony and Saxony-Anhalt. Most of them are directed towards the restoration of isolated tributaries of rivers, the creation of protected areas on river banks, or the planting of trees on river banks, to produce cover for the otter.

River Ise Project

The revitalization of the river Ise network (more than 100 km long) makes good progress. More than 200 ha of property on both sides of the main river were bought and changed from intensive to extensive agriculture. Approx. 2 km of hedges were planted and more than 10 km will follow within the next two years, A team of 6 scientists and several students of external experts has done a lot of scientific studies within this project.

Survey

In the Northern part of Lower Saxony a survey using the "IUCN/SSC Otter Specialist Group Method" was started in autumn 1991. It will last one year and include 1000 sites.

Stop-grids

1000 stop grids for eel fyke nets and information booklets were distributed to fishermen all over Germany. The interest of the fishermen as well as of the authorities to participate in this project was very high.

Otter Centre

In 1991 ca 125 000 people visited the Hankensbüttel Otter Centre, that means that since its opening in 1988 more than 400 000 visitors have come to this nature conservation education centre. A new otter enclosure for the public - the third one - was opened in 1991: the "Otter Waterfall".

Education

A new nature conservation magazine was created and the first 3 issues published in 1991. FAUNA continues, the idea of which the education philosophy of the Otter Centre is based: each issue is dedicated to one "key-species" and introduces an animal species and one of its typical habitats.

Looking ahead

In 1992 a long term, telemetric study on *Lutra lutra* will start in cooperation with the Ministry of Environment of Mecklenburg-Vorpomrnern. It will be focused on the connections between habitat structures and the otter's behaviour.

A cooperation study is planned with the University of Essex (Ch. Mason) to analyse contaminants (PCBs, DDE, dieldrin, lindane) in spraint samples from different German otter populations.

In April 1992 a workshop is planned about sense and nonsense of otter re-introductions. Experts from several European countries and possibly the USA will report their experiences, suggestions and criticism.

In February 1992 the Proceedings of the V. International Otter Colloquium will be mailed.

REPORT

PRESENT KNOWLEDGE ON THE GIANT OTTER IN ARGENTINA

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Abstract: Historical records and local records were used to survey sightings of the giant otter, Pteronura brasiliensis, in northern Argentina. Forty years ago, most sightings were of family groups, whereas now fewer otters are seen, mostly as pairs or solitary animals. Argentina is the extreme southern edge of their range, and pressure from hunting, habitat destruction, disturbance and population fragmentation may be enough to severely affect the population. Reintroduction into Iguazi National Park may be possible.

The giant otter *Pteronura brasiliensis* is regarded as one of the most endangered mammals in Argentina (Chehebar 1990). A literature search revealed eleven references to sightings of giant otters in Argentina between 1780 and 1991: only four of which related to the present century. These records are indicated in Figure 1.

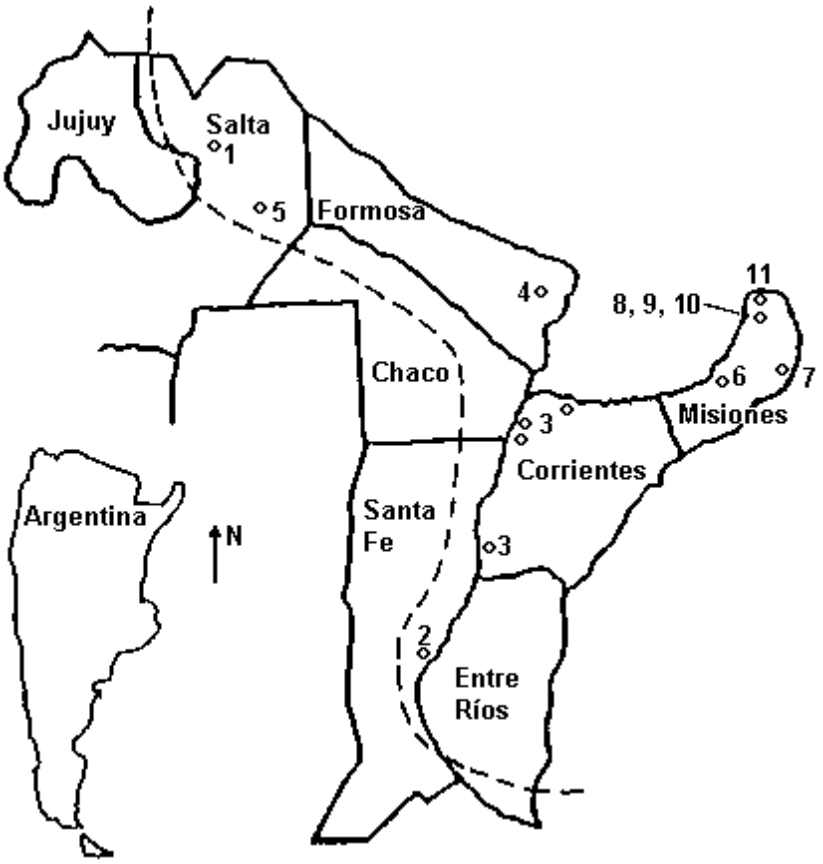

Figure 1: Published records of giant otter distribution. The numbers refer to references (available from the author).

Since 1989 field surveys have been carried out to determine possible presence in areas from : which the otter was previously recorded. Searches along rivers were conducted and local people, particularly hunters, fishermen and boatmen, were questioned. The searches revealed very little information, but from the enquiries 53 records of occurrence of the giant otter were compiled (Figure 2).

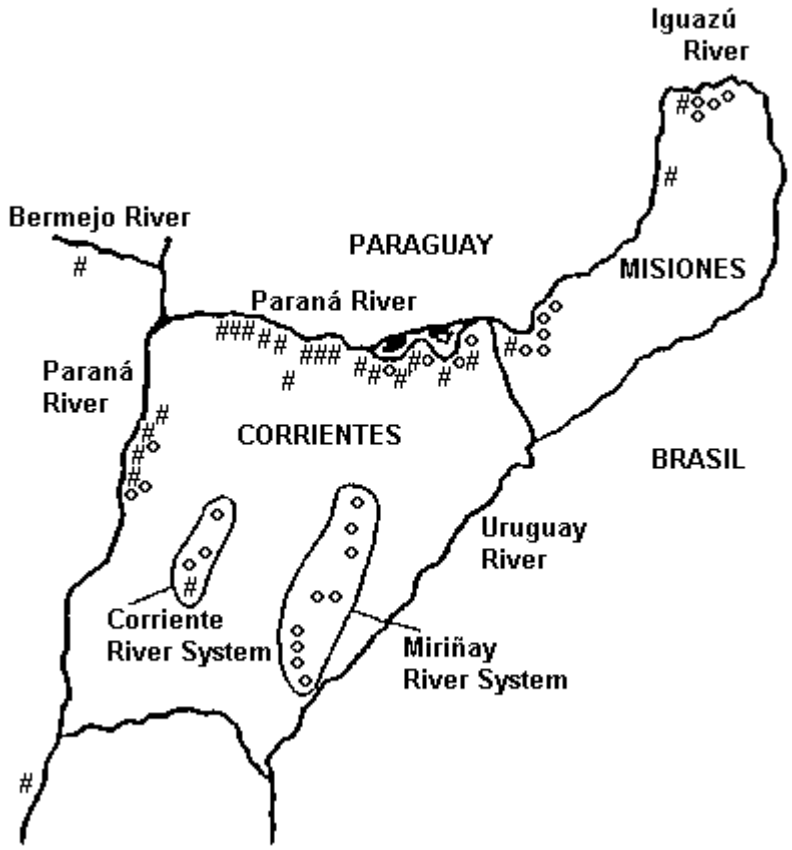

Figure 2. Distribution of local sightings of familiar groups (#) and lone animals or pairs (o).

P. brasiliensis is a social mustelid, forming close familiar groups, consisting of a stable adult pair together with their cubs and sub-adults (Duplaix 1980; Munn 1985). I considered three or more animals as a familiar group. If the data on groups and lone animals in current and former times are considered (Figure 3) one sees that there is a marked decline in the percentage of familiar groups (Figure 4).

ANTIQUITY OF THE OBSERVATION

Years / Province	40 - 25	25 - 10	10 - today
Corrientes	########## #### *	######### * * * *	* * * * * * * * * * * * * * * * #
Misiones	#### *	* * *	* * * * *
Chaco		#	
Santa Fe	#		

Figure 3. Data obtained from local people on familiar groups (#0 and lone animals or pairs (*)

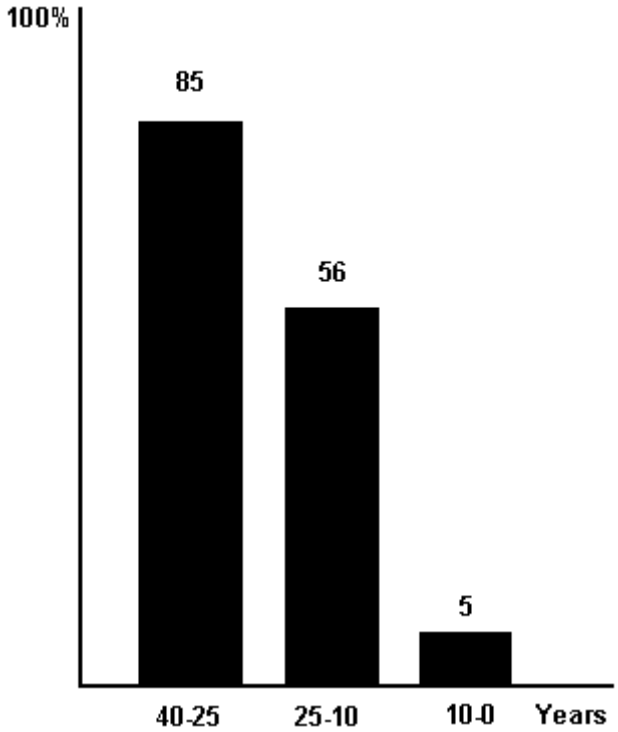

Figure 4. Percentage of observations of familiar groups in each period (data from literature)

Causes of disappearance are not clear. The commercial hunting of giant otters does not seem to have been important in Argentina in recent decades, but this does not mean that heavy hunting pressure in the past, combined with other factors, provoked the decline of the species.

Some of these factors could be:

- Disturbance by humans and dogs : the most important river courses of La Plata basin are occupied by people.
- Decline in some prey items, owing to overfishing, particularly in both Paraná and Uruguay rivers.
- Habitat destruction at certain localities.
- Isolation of remaining populations without any nearby healthy populations of recolonisation.

It is important to recognise that the giant otter in the Argentinean Mesopotamia occupies the southernmost part of its range, so minor changes in some ecological factors could affect populations more drastically than in the typical tropical areas.

There are very few places suitable for the reintroduction of giant otters. Iguazi National Park could be a prime area. It contains more than 80 km of suitable habitat and otters have been recently recorded (Perara & Bosso 1991).

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REPORT

A NEW METHOD FOR STUDYING MOVEMENTS OF THE SOUTHERN RIVER OTTER IN CHILE

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Abstract: Direct observation of Southern River Otters is difficult as they are largely nocturnal. Telemetry and radioactive isotopes were considered inappropriate for a study of this species in southern Chile. Instead, coloured sand which stains the paws and leaves coloured tracks was used, and some of the results of this are presented here. The method is simple and cheap.

A number of methods have been used to determine the spacing patterns and population density of otters. Because otters are largely nocturnal, direct observation is difficult and provides little information. Techniques such as the use of telemetry or the injection of isotopes were considered inappropriate for a study of the southern river otter *Lutra provocax*. Instead a simple method was tested, involving the measurement of tracks.

During 1990 work was carried out in the Panguipulli lake (39° 43' S, 72° 13' W), Todos los Santos lake (41° 08' S, 72° 12' W) and adjacent rivers (Figure 1). The greater part of the coasts of both lakes is steep and rocky, covered by abundant vegetation. There are few beaches, usually associated with river mouths. Mean annual rainfall, is high (> 3000 mm), occurring throughout the year.

METHODS

Tracks and signs (spraint, resting places, dens) were recorded for a year to identify places most frequently used. Because of the absence of mud or snow on the coastal surfaces it is necessary to place sand at landing spots. The technique employed was to scatter a 300 mm wide band of fine, coloured sand (Obercia Industrial, Casilla 12006. Correo 5. Santiago, Chile) at all exits or entrances to the water. When otters crossed the sand their feet become stained and they left coloured tracks on the rocks.

Once sand had been placed at all control points they were checked daily. This is important, as it is the only way to obtain an idea of the number of animals in the area. The very high rainfall makes it necessary to place the sand on the driest surfaces.

The length and width of every clear track was measured. Tracks could be further distinguished by the shape of the pad and distances between front and hind imprints. After identification, tracks were erased. Control points (dens, resting places) were also checked for spraints.

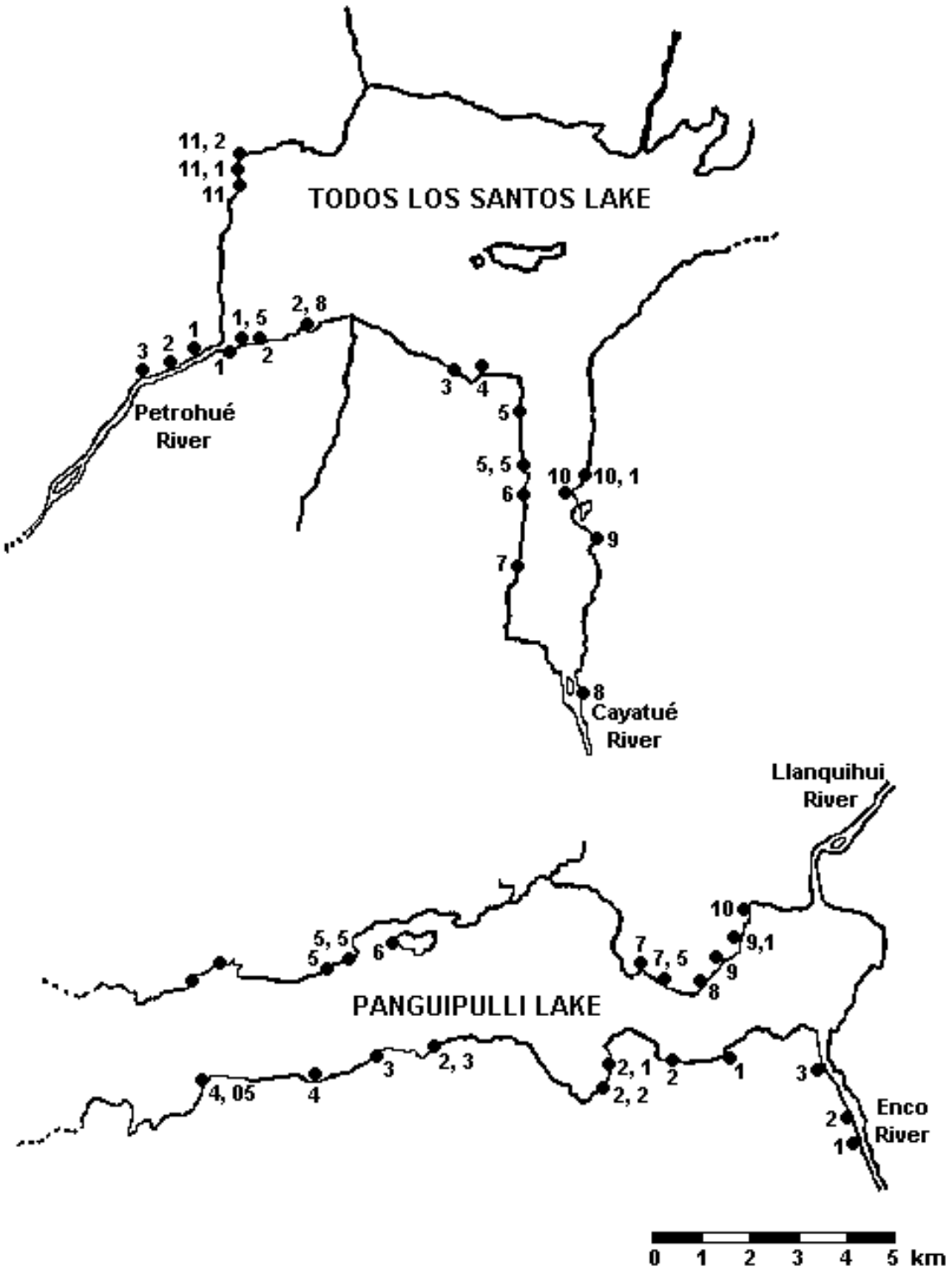

Figure 1: Location of control points at which coloured sand was placed.

RESULTS

Out of 109 occasions that control points were checked, 43 were positive, providing 160 distinct tracks, At 20 of the positive sites spraints were also found, and on only one occasion was a spraint found where there were no tracks.

Examples of data obtained from tracks on single field trips are as follows:

Panguipulli Lake

4. During five days four different otters used 50 km of coast.
5. From the track measurements it was concluded that three different otters used Control 3 during the same night.
6. The tracks found at Control 9,1 suggested a year-old otter moving from one river to the other.

Todos los Santos Lake

1. Two otters entered the lake during the field trip: A at Control 1 and the other (B) at Control 5,5.
2. Otter A moved from Control 1 to Control 10,1 (16 km) in three days, using three spraint sites.
3. Both otters used Control 9.
4. During five days these were the only two otters to use 35 km of coast.

CONCLUSIONS

The technique provides a feasible method of obtaining field data on the movements and density of the southern river otter in an area where normal tracking is impossible. Furthermore, cost of materials is low. The sand used during one year cost US $50.

REPORT

GIANT OTTERS IN PERU

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Abstract: We are in the second year of fieldwork surveying for Giant Otters in the southeastern rainforest of Peru, in three areas with differing levels of legal protection. While there is some illegal hunting still happening outside the protected areas, the main threat to the otters is badly-conducted tourism. Well-organised tourism can be a promising argument for establishing protected areas like national parks.

The Giant otter (*Pteronura brasiliensis*) is one of the most endangered otter species, once widespread all over South America, but heavy hunting from 1950 to 1970 brought them near to extinction. Little is known about the effects of habitat destruction, overfishing, or tourism. Also, there are still a lot of question marks concerning the social behaviour, population dynamics, and habitat use. Since the first longterm studies on giant otters by Nicole Duplaix (1978) in Suriname, followed a short time later by Liz and Keith Laidler in Guyana, very little has been published.

In the middle of 1990 we, the two German biologists from the Wildbiologische Gesellschaft München, with the assistance of Peruvian boatdriver Jesus Huaman, began work in the southeastern part of the Peruvian rainforest. The project is financed by the Frankfurt Zoological Society. We are now in the second year of field work, which is to be followed by one year of analyzing.

Our study area is the Department Madre de Dios, lowland rainforest with big rivers in the southeastern edge of Peru, not far from Brazil and Bolivia, and not far from the Andes. There we chose three main

streams: First the Manu river inside the Manu national Park, a more or less well protected 1,8 million hectare area; second the Tambopata river in the so called "zona reservada", with a size of 1,4 million hectare, an area with a special name but still without special law; and third the Madre de Dios river, a totally unprotected area with goldminers, settlers, hunters and wood cutters.

METHODS

In these areas we are investigating big rivers, small rivers (quebradas), and in oxbow-lakes for direct or indirect (tracks, dens, campsites) signs of giant otters. These surveys are done mainly once in the dry and one in the rainy season. When we see otters we try to get photos or videos of their individual neck patterns. With that we have something like a finger print for each giant otter. We are then sure that we do not count any otter twice, and wit the data of these surveys we get information about stability or changes in or between the otter groups.

In the lakes, the preferred areas of the giant otters, we carry out a habitat analysis built up by the following: Mapping the lakes with a rangefinder and a compass, taking down the vegetation type of the shore-line, measuring the conductivity and the visible depth of the water, making profile-transects with a computer sonar, investigating the fish population with gill-nets (fish-densities, species), mapping the campsites (marking places of the giant otters, sometimes with dens) and counting the number of fish-eating birds by day and caimans at night. Furthermore we collect faecal-samples for the later analysis. Beside this we make observations on behaviour, observing mainly from specially built hiding places or from a distance in the inflatable boat to minimise the observer influence. We use tele-lenses, video-camcorders, binoculars and taperecorders to get information to the hunting technique, the fishing success, the time budget or the social behaviour. In all the different investigation areas we look for the human influence and we ask local people like settlers, natives or gold-miners to get on idea of threats to the otters.

PRELIMINARY RESULTS

In the Manu National Park we counted 40 otters in two surveys in 24 large and smaller lakes (500 to 5000 m long, 40 to 200 m wide). We got the neck pattern of 34 animals. In the Tambopata area we counted 20 otters in two surveys in 7 lakes and we obtained neck patterns of 12 animals. It is possible, that the population density of giant otters inside the protected areas is near to the carrying capacity. This fits the otter habitat data: the conductivity of the water systems is low, but the density of fish is high. The problem is, that the otters are concentrated on the rivers and lakes, therefore their population density for the whole area is low, populations are often isolated, and the otters use the same areas as do people.

The otter groups stay for a long time (years), in the same areas. They have a main lake, where they spend most of their time and nearby waterbodies are visited periodically. The mean group size is about 4-5 animals. Sometimes the groups are up to more than 9, but then they divide. There are also solitary otters, which wander through huge areas and normally do not have contact with the groups.

The giant otters are extremely peaceful animals. We never observed real aggression between group members or between different groups. They hunt together and sleep together, and grooming and playing are important parts of their daily routine. We could not see a clear hierarchy in the groups, and our main study group is now led by two adult females.

The main problem for giant otters in protected areas like the Manu National Park seemed to be the uncontrolled or badly managed tourism. Tourism can be very disturbing and could force otters to leave their area. On the other hand, when tourism is well organised and when there are well-educated guides, tourism can be a promising argument to establish protected areas like national parks. Outside the protected areas hunting in low numbers is still going on. In the past 1.5 years we found 4 new giant otter pelts and obtained information of some more shot animals. It seems that a real pelt market does not exist. For all the hunters it was difficult to sell the pelts. Disturbance, habitat destruction and overfishing are the main factors what make survival for the otters difficult or impossible, even in areas with low human densities. We are still collecting data on these problems and building up a conservation plan for the otters in southeastern Peru. We hope that we are not to late.

REPORT

CONSERVATION ASPECTS OF THE ECOLOGY OF ASIAN SMALL-CLAWED AND SMOOTH OTTERS ON THE MALAY PENINSULA

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Abstract: Between April 1989 and June 1990 I made four six-week study visits to Tanjong Piandang, Perak, Malaysia where I studied otters in collaboration with Mr Burhannudin ("Bond") Mohd of the Department of National parks and Wildlife of Peninsular Malaysia. We mostly studied field signs and collected scats of both smooth (*Lutra perspicillata*) and small clawed otters (*Aonyx cinerea*) inhabiting the rice fields and fringing mangroves of the study site. With experience, smooth and small-clawed otters signs can be easily discriminated in the field. Although previous natural historians have considered mangroves important to smooth otters, the results of this study indicate their importance to small-clawed otters as well. More than 25 % of the remaining mangroves in Malaysia are under threat of conversion to aquaculture projects: a particular problem for the survival of otters, as this brings them into even closer contact with humans who view them as pests. The Kerian rice fields of Perak, Malaysia are also an important habitat for small-clawed and smooth otters. Asian rivers seem to contain fewer otter signs and probably fewer otters than wetlands, marshes and mangroves, so preserving pristine Asian river habitats like Hauy Kha Khaeng and Sungai Tembeling may not be enough to ensure the survival of good populations of otters. I suggest that to be most effective in our Asian otter conservation efforts we need to increasingly link up with our colleagues who are working to protect these fragile habitats.

Between April 1989 and June 1990 I made four six-week study visits to Tanjong Piandang, Perak, Malaysia where I studied otters in collaboration with the Department of National parks and Wildlife of Peninsular Malaysia. My colleague Mr Burhannudin ("Bond") Mohd. Nor is still studying otters throughout Malaysia and has incorporated some of his findings in a draft Action Plan for Otters in Malaysia. He can be contacted through the Department of Wildlife and National Parks, km 10, Jalan Cheras, 56100 Kuala Lumpur, Malaysia.

In Tanjong Piandang, Bond and I occasionally got glimpses of otters but mostly studied field signs and collected scats of both smooth (*Lutra perspicillata*) and small clawed otters (*Aonyx cinerea*) inhabiting the rice fields and fringing mangroves of the study site. I analyzed the prey remains in 112 smooth and 328 small clawed otter scats and looked for species, seasonal, and site-specific differences in the diets. I also surveyed otters in other locations throughout Malaysia and Thailand between 1985 and 1990. My complete findings from this field work and also from gas chromatatography work with captive otter scats are incorporated into my PhD dissertation and will be submitted to professional journals. In the meantime, those findings that can have immediate utility to our Asian otter survey and conservation efforts are summarised here.

Smooth Otters

Smooth otters are found in a number of Malay and Thai habitats, including mangroves, rice fields and rivers. These large otters are found singly, in pairs or in groups and their cubs are born year-round. Smooth otters are diurnal in most habitats and are often seen foraging, sprainting and grooming during daylight hours. In the rice fields of Tanjong Piandang smooth otters sometimes approach farmers working in the field. A group of these large otters can be quite intimidating.

Smooth otters are largely piscivorous, although they also eat rats, insects, snakes and a variety of other prey items. In the rice fields, their predation on the rice field pest rat (*Rattus argentiventer*) may serve a useful function to the rice farmer. Although I heard reports of their predations upon chickens and ducks, evidence was never observed and no bird remains were found in any scats of either otter species.

Small-clawed Otters

Small-clawed otters coexist with smooth otters in a number of locations, including the Huay Kha Khaeng river system and the Tapi River floodplain in Thailand and the rice fields and mangroves of peninsular Malaysia. At our study site, small-clawed otters were attracted to the chirps of baby smooth otters temporarily held inside our house. Zoos in Bang Pra and Pattani, Thailand display mixed groups of smooth and small-clawed otters in the same enclosure and they seem to be compatible even under such close quarters.

Small-clawed otters are nocturnal and crepuscular where they live near people in northern Malaysia. At night their chirps can be heard in the rice fields and they are occasionally seen in the early morning or around dusk. These otters are found singly or in groups of up to fifteen or so animals.

Small-clawed otters, like most otters, are generally brown. Occasionally cream-coloured small-clawed otters are found (Lekagul and McNeely 1977). I have seen such light coloured otters at the supermarket zoo in Bangkok and the field station at Surat Thani. A light coloured small-clawed otter was also reported with a group of brown otters near the southern substation of Huay Kha Khaeng. Some small-clawed otters, including one at Marine World in California, and some at the Bangkok Zoo, have hairy rhinaria. These otters are sometimes called "hairy-nosed" otters, but they are not the true hairy-hosed otters (*Lutra sumatrama*) that have not been located recently on the Malay Peninsula.

Small-clawed otters in Tanjong Piandang eat a variety of prey items, including crabs, fish, snakes and insects. Mudflat crabs are a year-round staple in their diet. In Tanjong Piandang there was no evidence of rice field crabs, but these crabs are a threat to rice crops in Thailand, Burma, Indian and Sri Lanka. Where rice field crabs do occur, small-clawed otters may serve a valuable function to farmers by preying upon crabs.

Asian Otter Survey Techniques

The scats of smooth and small-clawed otters are easy to locate because, like other otters, they are very particular in their choice of toilet sites. Unlike the situation in Europe (Mason and Macdonald), in Southeast Asia surveys of otters can best be conducted by boat. Along forested rivers otter signs are often located on any open, grassy or sandy banks, which the otters use for sunning and grooming. In marshes like Nung Tung Tong, Thailand, and otters use interior high islands of dry land to groom, den and leave their scats. In mangrove areas, the otters also seek the high, dry ground inland to leave their scent marks and dry their coats. In general, the search for otter signs in large wet areas can easily concentrate on any dry ground nearby, as these areas are important resting, denning, grooming and toilet sites for all resident otters.

With experience, smooth and small-clawed otters signs can be easily discriminated in the field. About half of the small-clawed otter toilet sites show signs of scat-smearing, a behaviour often seen in captivity. Smooth otter toilet sites never showed signs of smearing in this study. The tracks of small-clawed otters are also very distinctive, with long middle digits on the front paws and the absence of claw marks. Small-clawed otter tracks are smaller than those of smooth otters. Smooth otter tracks also usually show distinct claw impressions, and sometimes even the heavy webbing is evident. Occasionally, mongoose or monkey tracks might be confused with those of otters. Mongoose tracks are similar in size to those of small-clawed otters, but invariably the claw impressions were present. Crab-eating macaques that shared the study site also had five-toed tracks that were similar in size to large smooth otter tracks. Monkey tracks did not have webbing, and the toe impressions were reminiscent of long fingers.

Unfortunately Eurasian or hairy-nosed otters were never seen or reported in this study The tracks of these otters should be similar to those of smooth otters, but not as large. In areas where the four Asian otters are sympatric it may well be difficult to discriminate their tracks visually. More fieldwork is needed in habitats that are inhabited by Eurasian and hairy-nosed otters to find ways to discriminate their signs.

The Importance of Mangroves

The mangrove habitat is crucial to the survival of good otter populations in Southeast Asia. Although previous natural historians have considered mangroves important to smooth otters, the results of this study indicate their importance to small-clawed otters as well. In the study site, most of the prey of small-clawed otters came from the mangroves and associated mudflats. The smooth otters at the study site were more associated with the rice fields adjacent to the mangroves. In nearby Kuala Gula, however, a group of smooth otters lived in the mangrove fringe near the field station and smooth otters were observed swimming in canals through the mangroves during a pilot study in the area.

More than 25 % of the remaining mangroves in Malaysia are under threat of conversion to aquaculture projects (Malaysian Wetland Working Group, 1987). Aquaculture projects are a particular problem for the survival of otters, as this brings them into even closer contact with humans who view them as pests. Directly killing otters that are predating upon aquaculture stocks only leads to recolonization of the area by more otters, who will also eat the fish unless they, too. are destroyed. Killing otters due to perceived competition is a major threat for them throughout Asia (Foster-Turley and Santiapillai 1990). Few third World aquaculture projects can afford the chainlink fences necessary to keep otters from killing the fish or prawn stocks.

Rice Fields

The Kerian rice fields of Perak, Malaysia are an important habitat for small-clawed and smooth otters. The brushy cover along the dikes and between separate rice fields serves as denning grounds for both otter species. Both otters also use the piles of discarded, burnt rice hulls piled along the sides of the road as a drying medium for their coats. The smooth otter, especially, uses the irrigation ditches and canals as a hunting ground for their major fish prey species. The small-clawed otter in this study site relies mostly on the adjacent mudflats for their prey items.

Both small-clawed and smooth otters are adaptable to living in close association with people in rice fields and other rural areas. Their survival in these areas depends on the availability of suitable prey and islands of brushy cover where they can den and hide without human intervention. Eurasian and hairy-nosed otters may not be as tolerant of human activities, and this may account for their rarity throughout Southeast Asia. The uncontrolled use of persistent pesticides throughout the region may result in the disappearance of all rice field otters.

Rivers

Asian rivers seem to contain fewer otter signs and probably fewer otters than wetlands, marshes and mangroves. During this study relatively few otter signs were recorded during intensive many-day surveys along the Sungai Tembeling in Taman Negara, Malaysia and along the Huay Kha Khaeng, Thailand. In contrast, a single day in the marshes of Nung Tung Tong, Thailand or the rice fields and mangroves of Malaysia can reveal many signs of both small-clawed and smooth otters. Shariff (1984) also found that smooth otters were more abundant in the mangroves of Kuala Gula compared with the rainforest rivers of Taman Negara.

For this reason, preserving pristine Asian river habitats like Hauy Kha Khaeng and Sungai Tembeling may not be enough to ensure the survival of good populations of otters. Mangroves, marshes, rive fields and other wetland habitats instead seem most crucial to the conservation of otters in Southeast Asia.

Asian Wetlands Bureau

In conclusion, I suggest that to be most effective in our Asian otter conservation efforts we need to increasingly link up with our colleagues who are working to protect these fragile habitats. One such organisation is the Asian Wetland Bureau (AWB), IPT, University Malaya, Lembah Pantai, 59100 Kuala Lumpur, Malaysia (fax: 60 3 757 1225). Also, for Asian nationals only, the AWB is accepting proposals for small grants. I strongly urge all interested Asian otter specialists to contact this organization to develop projects that can be mutually supported.

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R E P O R T

PROGRESS ON CALIFORNIA OTTER RESEARCH: 1991

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Abstract: One milestone of 1991 was the completion of my study of otter behavioral development when 60-month-old Scarnose gave birth to her first pups. I finally observed the mechanism for female dispersion. This mechanism turned out to be intrasexual aggression, but unexpectedly this took the form of a near fatal attack on one of Scarnose's pups of one mother by her sister Junior. Followed up by a personal attack on Scarnose by her mother, Mama, this led to Scarnose leaving the area with her pups. Junior, who has already given birth, is positioning to replace Mama as matriarch. One of Mama's surviving female pups, One-Eye, fully integrated into the male Clan, but was also driven away by Junior. Also during 1991, Scarnose survived a near-fatal attack of mastitis, appearing moribund, but overnight opening the enormous abscess and draining it herself, and subsequently recovering. For the first time, a pup was observed voluntarily dispersing rather than being abandoned as is normal. Two new behaviors were added to the ethogram: sleep-nipping and closed-mouthed scream.

Every year that passes, I criticize myself for not having submitted my work for publication, yet every year, it seems, my otter subjects provide me with a dozen or more behavioral surprises that make me thankful I haven't yet committed to print! Fittingly, 1991 was undoubtedly the most eventful year in my ongoing 8-year observational study of the marine coastal otters (*L. canadensis*) at Trinidad Bay, California.

One milestone of 1991 was the ***completion of my study of otter behavioral development***. My goal was to follow the 2 females born in 1986 ("Mama Junior" and "Scarnose") through their entire behavioral development to their own parenthood, and that goal was attained in 1991. The year's Big Event, then, was when ***60-month-old Scarnose gave birth to her first pups*** (a year after her littermate sister first gave birth, and 2 years later than 'the literature' says females of this species become primipara).

In my longitudinal study of the social behavior of this population, one of the last major pieces of the puzzle fell into place in 1991, when I finally observed the ***mechanism for female dispersion***. This mechanism turned out to be ***intrasexual aggression***, as I had hypothesized, but the form this aggression took was not what I had expected.

In 1990, you might recall. Mama and her primiparous daughter, Mama Junior, joined their families together into a cohesive, 3-generational 'super-family'. This year, I was sure Scarnose was going to have pups too, and I thought, logically, that all of these related females would form a new, larger super-family. But it just was not to be.

In this summer of 1991, now that there were 3 mothers and 8 pups occupying the harbor, there resulted a flurry of aggression among the females, the like of which 1 had never witnessed before. These formerly 'loving' maternal relatives were now competitors, in obvious conflict.

Understandably, the new mother, Scar, was very protective of her 2 runty male pups, but apparently, she overdid it. Once, I saw Scar attack Mama when Mama approached Scar's family. To reassert her dominance, Mama then attacked Scar. They fought seriously for 30 seconds until Scar yielded, her brow sporting a fresh bite wound. I was stunned. I'd never seen a fight like that between a mother and daughter! Thereafter, Mama rejected her daughter totally, and attacked Scar on sight. Only 3 days later. Scar and her pups were forced to leave Trinidad harbor permanently.
The summer of 1991 was also notable for the frequency with which ***mothers bit pups that were not their own***. All mothers bit other mothers' pups, particularly in the presence of food. Junior bit pups the most, Scar the least. This punitive pup-biting continued until the pups were about 6 months old. These bites were sometimes quite severe.

In the worst incident, ***Junior almost killed one of Scar's pups*** (in Scar's presence!). This attack look place at 20:21: on 26 July, and was apparently triggered by an aggressive vocalization by one of Scar's pups directed at Junior. In response, Junior bit and tore at the pup with full weasel fury for 39 seconds. The attack was so ferocious, I believed at the time that I was seeing the actual killing of a pup. It was, by far, the single most aggressive . incident I have ever witnessed here.

First, Junior bit and seized the pup by the back of his neck and literally 'mopped the floor' with him, thrashing him back and forth on the ground. Then, maintaining her bite-hold. Junior clasped and covered the pup, worrying and pulling at his neck with terrific force.

It was only then - over 10 seconds into the attack - that Scar realized what her sister was doing to her pup. Scar put her face between Junior's and her pup, but Junior's rage was not assuaged. At 27 seconds, Scar started biting at her sister, but that only increased Junior's fury. By that time, I was certain the pup was dead. The pup hadn't vocalized at all since Junior first seized him, and the force of the biting and pulling was such that, if Junior actually had the pup by the cervical vertebrae, he could not possibly survive. What finally terminated the attack was when Scarnose mounted Junior. (I have observed that, among these females, mounting is an unambiguous act of ***appeasement and submission*** to the mounted female.) Junior's power acknowledged, she released the pup and dove away.

I was amazed and relieved to see that the pup had not been killed; Junior must only nave had the pup by his scruff. The only physical wound I could see was that the pup's lips were abraded raw pink. Behaviorally, however, the pup was severely traumatized, huddling immobile next to his mother, trembling, eyes wide, staring.

Scarnose took her pups away to a nearby mooring. Soon after, Mama swam by the mooring, and seeing her rejected daughter there, Mama lunged up screaming at Scar, bit her, then continued on her way. For Scarnose, this was clearly The End. With her mother attacking her personally (and gratuitously), and her sister now a deadly danger to her pups, Scar was forced to quit the harbor, and leave her mother and her sister, forever.

Mama had tolerated this daughter to continue to live in her maternal territory for 5 years, but when Scar finally became a mother, Mama rejected and banished her. Why, then, did Mama not reject her other daughter, Junior, when Junior became a mother last year? Perhaps by giving birth first, Junior proved herself the fitter of Mama's daughters, and was thus 'chosen' as Mama's favored offspring.

By the way, at no time did I see Junior attempt to displace Scarnose directly. The sisters were still on 'friendly' terms, it was only that Junior would not tolerate Scar's pups. I still can't get over Junior's savagery toward her own nephews! Seeing how Junior dealt with her own young kin, I cringe to think what fate would befall a strange female's pup (you can forget about adoption, folks!).

After Scar's banishment, Mama and Junior began the process of forming a new super family. In 1991, however, the super-family formed differently than it did the previous summer. In 1990, the super-family began to form only after Mama started 'allowing' Junior and pups to share Mama's den. Mama would then often leave her pups to be watched over by Junior. In 1991, once again, there came a time when Mama tolerated and sought out her daughter, but this time, Junior would take her pups away from a den if Mama's family occupied it. It was only when Junior started 'allowing' Mama's family to live with her family that the super-family began forming this summer. And not only that. Now, often, it was ol' Mom who was being left with Junior's pups to sit. In 1990, then, the super-family was formed on Mama's terms. This year, it was formed on *Junior*'s terms.

Currently, in the super-family of 1991, 1 of the pups (a female) belongs to Mama (she lost a male and a female pup in August), the other 3 (2 females & 1 male) are Mama's grandpups by Junior.

Aggression may have increased among the females this year, but aggression between the sexes decreased sharply. During 1991, ***there was a noticeable relaxation in the social segregation of the sexes*** operating in this population. This year I saw by far the highest number of amicable incidental interactions between adult members of the Family and Clan. Also, it has now been 2 years since I saw a serious fight between any adult females and adult males (excepting estrus). This tendency toward peaceful coexistence is probably due to the fact that, ***of the 12 otters resident at Trinidad in 1991, all but 3 were now known descendants of old Mama*** (the highest degree of relatedness I've observed in this population).

Despite the high level of interpersonal familiarity now present, however, the general social barrier between adult females and adult males remained rigidly intact. Witness: as of the end of 1991, it had then been 1,326 sessions (9/9/86) since I've seen an adult male and an adult female simply forage together, and 994 sessions (9/6/88) since I've seen playful behavior between adults of the opposite sex.

One of 1991's brighter stories was in keeping with this new harmony between the sexes: ***a yearling female became a completely accepted member of the male Clan***! For the first time since the litter of 1986, a female pup of Mama's survived into her second year of life. Just like the Sisters did after Mama left them as yearlings, little "One-Eye" joined the Clan for a short time (apparently, it isn't until males and females become adults that they stop mixing company). One-Eye, however, became a much more integral member of the Clan than the Sisters were.

Jus! by watching the way the males and One-Eye interacted, it was obvious that the males welcomed and encouraged the company of this little female. The males let her forage with them, share their food, groom and play with them, and den with them. One Eye was literally 'one of the gang'. It was truly extraordinary to see a year-old female accepted as a full member of this usually exclusively male social club. Twice, I even saw One-Eye leading the whole Clan as they swam into the harbor. Now, that was really something special!

Unfortunately, One-Eye is gone now, too. After Junior returned to the harbor with her new litter in late Spring, Junior began attacking One-Eye, and by mid-July, One-Eye had been run off, seemingly for good. She couldn't even live with her male buddies anymore. Junior tolerated the males to live at the harbor, but obviously not her own mother's younger daughter. I know One-Eye's OK, though. In early October, the super-family was absent from the harbor for about a week, and one day, here was little One-Eye, back for a visit! Evidently, Mama and Junior went to wherever it was that One Eye had set up her own home, and One-Eye was evicted during the super-family's stay.

(Incidentally, One-Eye *does* have both of her eyes. When she was 3 months old, she injured her left eye, which turned bluish white. That eye injury became her most noticeable identifying mark, and thinking she might've lost sight in it, I started calling her "One-Eye". After a few weeks, her eye healed with no apparent sight loss, but I kept the name, anyway.)

So it was in 1991 that 2 females were forced to disperse from Trinidad harbor. Scarnose was forced out principally by her mother. Junior, on the other hand, made war on her sister's pups and her mother's yearling daughter. In so doing, Junior effectively positioned herself to be the 'heir apparent' to her mother's maternal territory. This year, although Mama continued to be the obvious leader and matriarch of the super-family, it became just as obvious that the true 'power behind the throne' and 'enforcer' of the maternal territory was now Mama Junior.

Other highlights from 1991:

Scarnose battled a near-fatal attack of mastitis. Beginning about 14 July, Scar's right rear mammary gland developed an abnormal swelling. The infected mamma was swollen medially; the nipple hypertrophied. The mastitis progressed rapidly. In just 4 days, the infection very nearly took Scar's life.

From 15-18 July, Scar lost at least 1/4 of her body weight, lost the effective use of her hind legs, and became so lethargic that she was unable to feed herself or her pups. (I had to break my rule of non-interference and feed the pups, who were forced to live on one of the docks scavenging fish scraps left by the adult otters.) As she sickened, Scar even prevented her pups from living with her. Capturing and treating Scar was hopeless. By the time I recognized the gravity of her illness, she was already too weak to survive the stress of capture. No. As difficult as it was, all I could do was to remain the objective observer, and watch her slip away. It was sad. Scarnose was so moribund during the evening of 18 July, I was certain she would die that night.
Incredibly, however, the next day, Scar had opened the abscess herself, and over the next 2 days, she excavated out all the fatty tissue in that infected mammary capsule! The resulting wound was truly cavernous - a circular excision about 5 cm in diameter, and about 2 cm deep. Despite that frightful gouge in her belly, though. Scar was back in relatively good health less than 24 hours after she opened the abscess. The last time I saw her wound was 3 days before she was forced out, and it was doing very well - bright pink with no bleeding or sign of infection - and living as she does in a salt water habitat, Scar's wound was being irrigated constantly with a natural saline solution.

By 24 July, Scar had 100% of her energy back, and she was actively chasing down live fishes to present to her pups. I last saw Scarnose and her pups on 26 July. Unfortunately, since she probably took her family away for good, I may never know how her amazing self-performed surgery turned out. I was optimistic Scar would recover, though. She was always such a plucky little runt! (Actually, there is a chance I might get to see Scarnose this Spring around estrus when the adult females are 'on the move', away from' their usual home territories.)

Also in 1991,1 recorded the first instance of a ***pup achieving independence by voluntary dispersion***, as opposed to the usual process of ***maternal abandonment***. Junior's male pup from 1990 left the otherwise all-female super-family to join the male Clan in January 1991 - a full month before his mother left Trinidad harbor. Once again, in the current super-family of 1991, there is a male pup with no male siblings, and it appears this male ("Giant Pup") will leave the super-family early, too. As early as 10 December, I saw Giant accompany the males for an entire foraging trip, during which he also engaged in a long mutual grooming session with 2 of the males. Since foraging and grooming together are necessary requisites to the formation of affiliational bonds between otters of this population, it appears that Giant is already bonding with the Clan males - and vice versa.

Speaking of the Clan, ***of the 7 adult males in the Clan in 1987, only 2 remained in 1991***. One male that disappeared in 1991 was old "Moustache", the first Clan member I learned to identify by sight. Visibly aged, Moustache was likely the oldest otter in the population. It appears that distinction is now Mama's (I estimated that she was 10 or 11 years old in 1991).

Finally, some interesting new behaviors added to my ethogram in 1991:

"***Sleep-nipping***" was seen once when 4 males slept in a pile; an otter would suddenly nip the napper next to him. Nips tended to occur when an otter shifted position in the sleep-pile. Most times, a nipper had his eyes closed, as though 'half-asleep'. Nipping usually did not stir the one thus nipped, but once, a nipped otter nipped back (neither opened his eyes during the exchange of nips).

After Mama and Junior united in their super-family, a soft "***closed-mouthed scream***" of escalating pitch was sometimes emitted by a mother solicited for food by a pup that was not her own. The closed-mouth scream appeared to be a warning given in lieu of a punitive bite; this vocalization effectively deterred further solicitation by an errant pup. This type of screaming was also witnessed in another novel context. Only twice this year did I see adult females groom males. During one of these brief encounters, Junior, displaying obvious conflict, screamed softly into the male's fur as she groomed him!

REPORT

CATASTROPHES AND CONSERVATION: LESSONS FROM SEA OTTERS AND THE *EXXON VALDEZ*[1]

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[1]Science (in press)

Abstract: The *Exxon Valdez* spill is broadly perceived as an environmental catastrophe. However, expected catastrophic declines in the region's sea otter population cannot be demonstrated, not because they didn't occur but because the necessary information is lacking. Furthermore, efforts to rehabilitate oiled sea otters following the spill were extremely expensive and ineffective. Some improvements are possible with better planning. However, post-spill capture and rehabilitation probably can not be used to substantially reduce sea otter losses from future spills, and the use of such measures to conserve populations is unrealistic.

Catastrophes are sudden and widespread disasters, either naturally occurring or human-caused. When human-caused, these events elicit feelings of shock and anger, often leading to costly litigation over personal loss and environmental damage. Perpetrators of catastrophes spend vast sums of money ostensibly to prevent or undo the damage. Such expenditures are encouraged by law and public sentiment. It seems that people want to see the guilty party pay for environmental damage, the assumption implicitly being that funds expended result in harm prevented or undone. But is this assumption true? The following commentary considers a recent and well-known case-the effort to save sea otters after the *Exxon Valdez* oil spill. Despite immense expenditures, the emerging facts lead to two conclusions: 1. population losses were poorly documented, and 2. few animals were saved. These findings cast doubt on our ability to protect sea otters from future spills and lead to troubling questions about how to recognize and document the effects of catastrophic events, and, ultimately, the utility of highly visible and expensive efforts to save wildlife from perceived environmental catastrophes.

The *Exxon Valdez* Spill

On 24 March 1989, the T/V *Exxon Valdez* ran aground on Bligh Reef in northeastern Prince William Sound, spilling more than 45 million litres of crude oil (1). Catastrophic losses were expected and a monumental effort was made to save sea otters (2). The costs were high, but what were the benefits? Specifically, how many otters were killed, how many were saved, and how might a different course of action have improved these figures?

Effects of the *Exxon Valdez* spill on sea otters

The *Exxon Valdez* spill spread over a linear distance of more than 700 km and soiled an estimated 5300 km of shoreline (3). While cleaning-up and capturing oiled wildlife for rehabilitation, 878 sea otter carcasses were recovered - a minimal estimate of loss. However, many animals killed by the spill undoubtedly were not found. Losses have been estimated from pre- and post-spill surveys, although in my view these surveys shed little light on the population-level effect, mainly because the size and distribution of the population just prior to the spill is poorly known. This is because a comprehensive survey of Prince William Sound and adjacent waters was not done immediately after the spill but before oil dispersed into southwestern Prince William Sound and the northern Gulf of Alaska. Thus, although the *Exxon Valdez* spill undoubtedly killed many sea otters and may have reduced populations substantially, available data lack the power to demonstrate population changes.

Rescue and rehabilitation of oiled sea otters

In total, 357 sea otters were captured and delivered to rehabilitation facilities (2,4). Of these, 1 23 died in captivity. Thirty-seven of the 234 survivors were judged unsuitable for return to the wild and were transferred to aquaria and other permanent holding facilities; 25 of these animals were still alive 10 months later. The remaining 197 survivors were released by August 1989, 45 of them with surgically-implanted radios. Twenty-two of the instrumented animals were dead or missing the following spring, thus indicating relatively low post-release survival of the captured and treated animals (5).

At best, 222 sea otters (the 197 released and 25 living in captivity) were captured and rehabilitated. This represents about 18 % of the minimal number contaminated (878 found dead in the field and 357 brought to the rehabilitation facility). However, the percentage of contaminated otters that were successfully rehabilitated was lower than this. For one, many contaminated sea otters probably were never found. Available data suggest that only about one in five acute deaths were recovered (4). Second, some otters captured for rehabilitation were unoiled, and others were so lightly oiled that they may have fared better if left in nature to their own devices (6). About 70 % of the animals brought to the rehabilitation facilities were determined to be uncontaminated (61), lightly oiled (123) or of unknown status (68) (7). Finally, rescue efforts probably caused some mortality in and of themselves because otherwise healthy captive sea otters suffer a 5 - 10 % stress-induced mortality rate under the best of circumstances (4,8).

Cost of capture and rehabilitation

Capture and rehabilitation costs for sea otters alone was 18,3 million dollars (9). Assuming that 222 otters were saved (the maximum possible), costs exceeding $ 80 000 per animal.

Conclusions

The *Exxon Valdez* spill is broadly perceived as an environmental catastrophe. However, expected catastrophic declines in the region's sea otter population cannot be demonstrated, not because they didn't occur but because the necessary information is lacking. Furthermore, efforts to rehabilitate oiled sea otters following the spill were extremely expensive and ineffective. Some improvements are possible with better planning. However, post-spill capture and rehabilitation probably can not be used to substantially reduce sea otter losses from future spills, and the use of such measures to conserve populations is unrealistic.

How then should we prepare for and respond to environmental catastrophes of this kind? The *Exxon Valdez* experience suggests several points of possible general application. First, the effects must be properly documented, especially at the levels of populations, communities, and ecosystems. Such documentation is necessary if we are to know what a catastrophe was indeed a catastrophe. By no means is this clear for sea otters and the *Exxon Valdez*. Second, it is important to evaluate the need for and effectiveness of intervention on behalf of wildlife. If a species or population is not threatened with decimation or extinction by the event, and if methods are not available to protect or rehabilitate affected wildlife, should the time, money, and anguish be put forth to save a few individuals? Finally, in preparing for anticipated catastrophes, post-event mitigation should be used only as a line of last resort. Planning of this kind tends to lull the public and policy makers into a false sense of readiness. By far the more effective strategies are to reduce risks and to enhance threatened species or populations in anticipation of potential catastrophic loss.

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10. An earlier version of this paper was written for the Southern Sea Otter Recovery Team, an advisory group to the U.S. Fish and Wildlife Service. I thank T. Barnett, C. Benz, A. Ebeling, A. DeGange, D. Irons, R. Jameson, G. Rathbun, D. Reed, M. Riedman, S. Shaene. S. BanBlaricom, and T. Williams for discussion and comments. Opinions represent neither the policy of the Fish and Wildlife Service nor the views of Sea Otter Recovery Team members or those individuals acknowledged above.

SHORT COMMUNICATION

THIRD JOINT UNITED STATES - USSR CONFERENCE ON SEA OTTERS

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The Conference was held September 10 through 13, 1991, at Petropavlovsk-Kamchatskiy on the Kamchatka Penninsula, Russia. This biennial meeting is organised under the auspices of the Marine Mammal Project, U.S. - U.S.S.R. Environmental Protection Agreement. The meeting was co-chaired by LA. Popov of the Soviet side and G.R. VanBlaricom of the U.S. side. Six American delegates joined approximately twenty Soviet delegates to hear twenty-four contributed presentations on population distribution and dynamics, behaviour, foraging ecology, community ecology, pathology, conservation, and management of sea otters in U.S. and Soviet waters.

A principal focus of the conference as a coincident series of mass mortalities of sea otters in Soviet waters, observed during the 1990-91 winter. Die-offs were reported for the Commander Islands, the southern part of the Kamchatka Peninsula, and the Kuril Islands. The most dramatic event occurred at Bering Island in the Commander group, where the populations of sea otters apparently lost between 1000 and 2000 individuals (one-quarter to one-third of the previous number). A definitive cause has not been identified. Principal hypotheses include shortfalls in food supply and a possible environmental contaminant. Discussions of the issue did not produce a consensus.

Presentations on other subjects produced animated discussions among the delegates, as well. There was substantial interest in the following topics:

- Improvement of techniques for large-scale enumeration of sea otter populations;
- Harvest of sea otters by Native Americans in Alaska;
- The translocation of sea otters to new locations in California, and consideration of management alternatives for sea otters in the U.S.;
- Foraging ecology of sea otters throughout the North Pacific;
- Patterns of tooth wear in Soviet sea otter populations;
- Status and growth characteristics of sea otter populations in the Kuril Islands, along the eastern coast of the Kamchatka Peninsula, in the Commander Islands, in Alaska, and in California;
- Variation among individuals in patterns of foraging and maternal care in California sea otters;

- Discovery of recurrent cardiac pathologies in U.S. sea otter populations;
- Modification of nearshore benthic communities by foraging sea otters in California and in the Commander Islands.

The climax of the conference was an excellent excursion by helicopter along the southeastern shore of Kamchatka. Delegates were able to observe sea otters, killer whales, northern sea lions, and sea birds in coastal waters. Many examples of geothermal and volcanic activity were seen in the Kamchatka wilderness. During the return trip to the U.S., American delegates were able to visit the Natural History Museum at Khabarovsk. The Museum features a complete skeleton of the extinct Steller's sea cow.
Delegates agreed to recommend that the next conference be held in Alaska in 1993. Delegates also favoured a proposal to encourage participation by scientists from all "sea otter nations" (Mexico, U.S., Canada, U.S.S.R., and Japan), and from other nations as well, at the 1993 meeting. Additional information on the proposal will be provided in future issues of the Bulletin.

SHORT COMMUNICATION

SOUTH AFRICAN NATIONAL WETLANDS AWARENESS CAMPAIGN

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It has been estimated that if at the current rates of population growth and water consumption persist, South Africa will not have sufficient water to supply the needs of its people by early next century. At the same time soil erosion continues, and watercourses are becoming silted or polluted To draw attention to these problems a National Wetlands Campaign has been established with the help of the Southern African Nature Foundation, the Natal Parks Board, and the Wildlife Society of Southern Africa; with sponsorship by Renfreight, and co-sponsorship by Mazda Wildlife Fund and South African Breweries.

Historically, wetlands have been regarded as unproductive and even unhealthy wastelands. While an understanding of the value of wetlands and the associated investment in wetland conservation has perhaps grown, we continue to convert natural wetlands to intensive agricultural land or fill them with soil and rubble to provide space for industrial, urban and tourist expansion. Well managed, these productive ecosystems can help meet the needs of a rising population, while their degradation and loss can worsen the already intense pressures upon both rural and urban communities. Such considerations gain special importance in our developing country, where development investments have too often ignored the value of natural ecosystems.

There is little doubt that education is the key word. The national programme has been set up to focus on target wetland and river areas, and landowner communities surrounding sensitive wetlands, in order to nurture awareness and provide guidelines for correct management. User-group studies will focus on urban, agricultural, forestry and rural wetlands and rivers.

Much wetland loss is the result of ignorance of the true value of the resources concerned, or of how certain actions lead directly or indirectly to wetland loss. There is even less awareness of how these problems can be addressed. This campaign - essentially of an awareness and facilitatory nature, assists formal conservation agencies and non-governmental organisations with national, regional, or local programmes aimed at promoting wetland conservation in South Africa. The campaign will be directed at four principal audiences:- the general public, wetland owners and communities, school children, and the various agencies responsible for wetland legislation and protection.

SHORT COMMUNICATION

CURRENT RESEARCH ON THE CAPE CLAWLESS OTTER IN THE SOUTHWESTERN CAPE PROVINCE, SOUTH AFRICA

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During 1990 a pilot study was conducted to document the occurrence of *Aonyx capensis* in the Breede River, and to relate its presence in specific stretches of the river to physical aspects of the river itself, as well as land-use practices in the surrounding countryside. It became clear that *A. capensis* might be more widespread than previously thought, and that useful information can be obtained through walking the riverbanks, using canoes in inaccessible parts, and questioning farmers and other riparian users. Spraints were also collected seasonally along a 2 km stretch of riverbank along a tributary of the Breede River, viz the Knigna river, near the village of Montagu. Crabs (*Potamonaules* sp.) predominated in the diet of the clawless otters in this area throughout the year, although other prey items showed an increase in incidence in scats during winter.

During 1991 a more intensive study was launched on the diet, and possible prey selection, of *A. capensis* occurring below the Bulshoek Dam in the Olifants River, some 20 km N. of Clanwilliam. During a visit by Dr Hans Kruuk, Institute of Terrestrial Ecology, Banchory Research Station, Scotland, who will collaborate in the project, analyses of spraints from various other rivers, as well as from the study site, indicated that crabs - again *Potamonautes* sp. -predominate in the diet. As the eye-stalks of the crab eaten are often intact in spraints, a collection of crabs allowed correlation of eye-stalk length with carapace width and crab weight; consequently size-classes of crabs eaten can be ascertained. Spraints were collected on a seasonal basis and analyzed, and again crabs were found to predominate (percentage occurrence) throughout the year although fish were taken to a noticeable extent during winter. Sampling of crabs in the river was not thorough enough, however, to say if the otters selected for specific size classes of crabs, or whether size of prey taken merely reflects the relative availability of the size class.

Sprainting areas were noted and further studies will analyse prey selection in greater depth. All sightings of otters are noted to gain data on activity cycles, and in clue course individuals will be fitted with radios as the study area is very suitable for radio-tracking. Surveys of otter occurrence in other rivers is also in progress, to gain a better idea of otter distribution and abundance in this part of Africa.

REPORT

A NOTE ON *Lutra longicaudis* IN COSTA RICA

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Abstract: During a very brief visit to Costa Rica at the end of March 1991, we took the opportunity to see if we could find signs of *Lutra longicaudis*. Spraints were used to survey for otters. In Costa Rica logging continues but there is an excellent system of national parks where otter populations might be maintained. A full field survey is urgently required combined with awareness programmes in the parks, and Costa Rica is small enough for this to be practical.

During a very brief visit to Costa Rica at the end of March 1991, we took the opportunity to see if we could find signs of *Lutra longicaudis.*

Melquist (1984) in his survey of Latin American otters, based largely on interviews and questionnaires, reported that *L. longicaudis* was found in suitable habitat throughout Costa Rica and especially in Alajuela and the San Carlos River close to the border with Nicaragua.

On the Pacific side of the country we found signs from Guancaste region (north-west) to Carara, south of the resort of Puntarenas. Signs were found in mountain rivers flowing from the Monte Verde Cloud Forest Reserve to the mangroves of Puntarenas.

The spraints resemble those of *L. lutra* and the smell is almost identical. They were deposited on rocks, logs and broken masonry with accumulations of up to 15 found especially on boulders overhung with riparian vegetation. All sprainting sites were reminiscent of those used by *L. lutra.* Most spraints contained fish remains but crustaceans and amphibians had also been eaten. *L. longicaudis* is not confined to areas away from human populations. Spraints were found in the town of Canas next to the Inter-American Highway and in highly disturbed mangroves. On the Caribbean side there were signs at the Selva Verde Reserve where an American entomologist told us that he saw otters regularly during the day.

We were in Costa Rica at the end of the dry season and the effects of severe deforestation on water flow were very clear. Many of the rivers, for example south of Puntarenus, coming off deforested hills were completely dry. The rivers around the capital, San Jose, were grossly polluted but in other areas we visited they appeared to be clean.

Chehebar (1991) points out that because of the lack of access and the enormous size of most Latin American countries, comprehensive field surveys are almost an impossibility. However, much of Costa Rica could be covered in a field survey and a better understanding of otter distribution and status could be important to the long-term survival of *L. longicaudis* in Central America. For example, Melquist (1984) considered the species widespread in Panama but according to Chehebar (in Foster-Turley et al. 1990) it is not common and deforestation is proceeding rapidly. In Nicaragua the otter occurs in rivers flowing into the Caribbean but is extinct on the Pacific coast. For El Salvador there is no information on otter status or distribution but its chances of survival seem slim since it is predicted that, in about 10 years time, El Salvador will have lost all its forests and its water supply (Simons 1991). In Costa Rica logging continues but there is an excellent system of national parks where otter populations might be maintained. A full field survey is urgently required combined with awareness programmes in the parks. Melquist (1984) suggested that if the otter proves to be common in Costa Rica "a controlled harvest may be biologically acceptable". But as Chehebar (1991) points out, illegal trapping is still a real problem in Latin America. A legal harvest in a country like Costa Rica could not only threaten *L. longicaudis* but would greatly increase problems of controlling illegal trade in all otter species in Latin America.

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REPORT

AUTOMATIC REGISTRATION OF OTTER ACTIVITIES IN DENMARK

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Abstract: Direct observations and electronic infrared detectors were used to monitor otter movements 24 hours a day throughout the year. There was most activity at night, in Spring and Autumn, especially in the hours after dusk and the period before dawn.

Registration of otters is usually carried out by counting spraints at preselected localities. Since 1987 regular registrations of the otter's marking activity have been made along the Skals, a river system in Jylland. The area around the lake Hærup Sø was found to be of particular interest, as the number of spraints in this area was extremely high (150 - 200 on a 200 m stretch).

In many situations the necessity arises to acquire a more precise knowledge of variations in the animal's daily and seasonal activity than is obtained by the spraints alone. In an attempt to find out whether the large amount of spraints is a result of one or more individuals visiting the same place, the activity pattern was examined closely.

The registrations were primarily based on 2 methods:

7. Direct observations from a motorized vehicle; or more often, from a standing or seated position in the immediate vicinity of the activity scene.
8. Electronic infra-red barrier on an otter track, connected to a converted speed indicator. The date, hour and direction of the otter on passage can be read from the disk. Total price of the electronic equipment is DKR 10 000, or about DM 2500.
   The power source is 3 X 12V batteries placed in an insulated box under the speed indicator.

The equipment worked without failure even at temperatures as low as -15 °C. The time resolution of the disk is approximately 10 minutes, and the equipment will work for 8 days without inspection. The width and height of the infra-red barrier can be varied, thus allowing adaptation to registrations of fox, badger or deer.

The otter's activity (number of passages) appears to be firmly related to the sun's rising and setting times (corrections for summer time were made in September and March) (Fig. 1). The activity begins around dusk and continues until dawn. The electronic equipment was out of operation for some periods; however, the direct observations supplement the aggregated material very well.

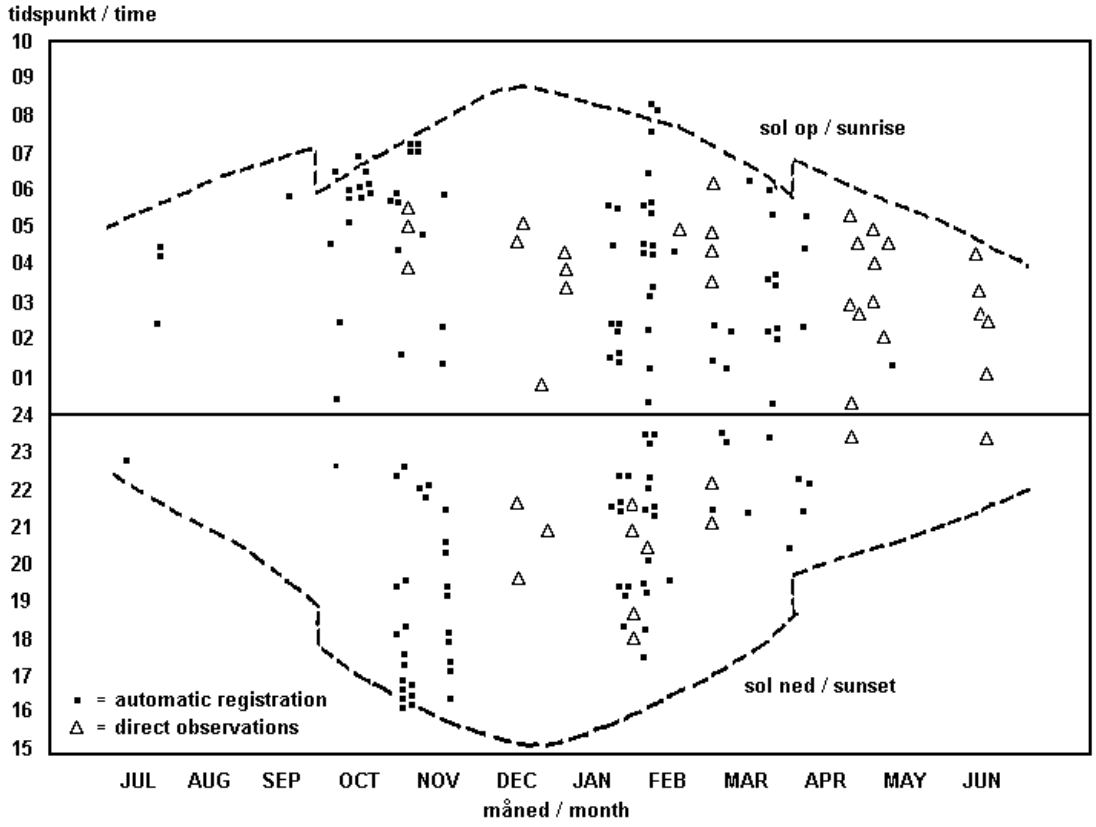

Figure 1: Otter movements correlated with solar transit

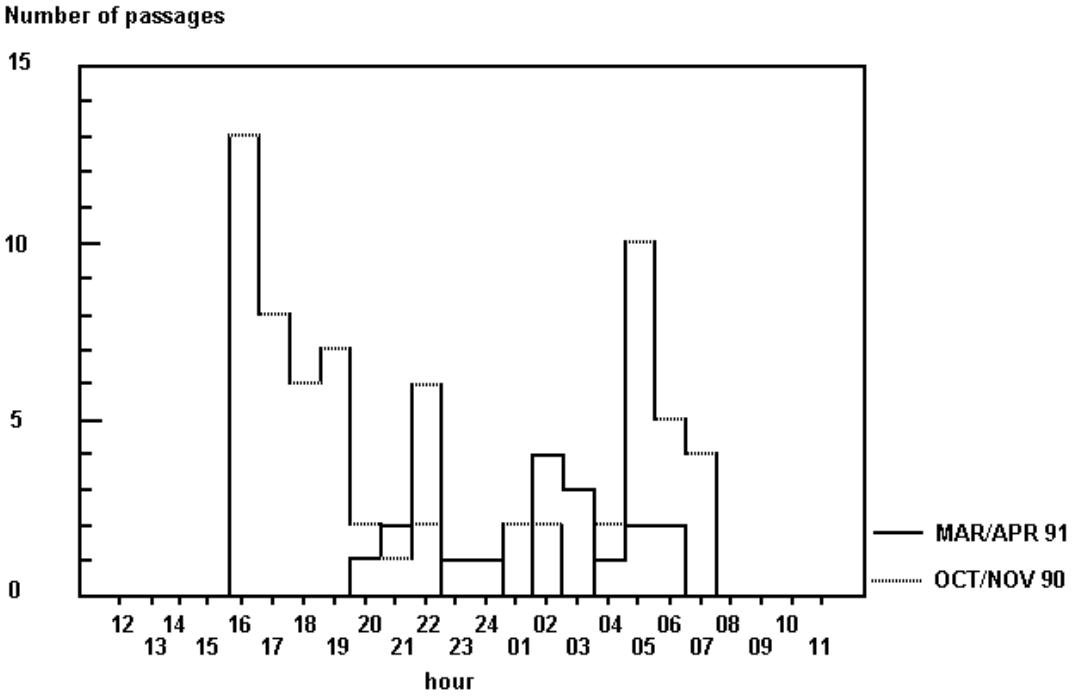

Figure 2: Otter movements in Autumn and Spring

The daily activity (number of passages) of otters in two different period, namely October/November 1990 (28 days) and March/April 1991 (30 days), are presented in Fig.2. In general there was a higher activity in October/November than in March/April, and for both periods the activity is highest in the hours after dusk and again in the hours before dark.

In connection with counting of spraints, it would be desirable to be able to convert the number and the frequency of spraints into number of individuals. Studies are in progress to illuminate this aspect, and to connect infra-red photoregistration to the above-mention equipment.

REPORT

CHILEAN OTTER GROUP: 1991 ACTIVITIES

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The programme is sponsored by the Frankfurt Zoological Society.

Abstract: A major publicity campaign to encourage people to "Save the Southern River Otter and its Habitat" was carried out. Workshops were organised in schools. A survey for *Lutra provocax* was carried out and the results are being used to plan future conservation work. Two illegal otter furs were confiscated. A photographic library is being established.

Diffusion

One of the activities was to diffuse the slogan "Save the Southern river otter and its habitat" throughout all of the tenth region. Therefore, there were 60 otter posters, 900 stickers, 2000 triptyches with information related to ecological preservation, 108 otter designed T-shirts and 10 informative ecological panels. All this material was distributed to students and public in general. Newspaper articles provided complete information about the otter protection program and its progress. Radio conferences were made in relation to the otter conservation program developed in the Panguipulli province (see below).

A great part of the diffusion activities was concentrated in the provinces where otters live. That means that the conferences were made for school students, policemen and National park and forestry guards who have direct relation to the otter environment.

Environmental Education

The educational program began making people aware of the existence and importance of the otter's protection. The object was accomplished by monthly radio conferences, public posters and the otter T-shirts display by a Panguipulli city basketball team. An environmental educational practical workshop for 7 to 1 2 year old students was developed at the Choshuenco Public school. This workshop was centred mainly on ecology and otter habitat protection. During the present year (1992) similar workshops will be organised in other nguipulli schools. At the same lime we are making a complete otter information centre in order to help other people in the development of otter protection work. The Group has a constant communication with students and scientists from other parts of Chile, and with Ecuador, Uruguay, Peru and Argentina.

Research Activities

A survey of the southern river otter *Lutra provocax* population was made between the 39° S and 44° S Latitude. With these results (Figure 1) the Group is working on the planning of future conservation activities.

In order to obtain information about the reasons that caused otter extinction in the past years, a study is being made of the habitat conditions and the human environment interference in places with and without southern river otters.

In two fresh water systems, Panguipulli lake and Todos los Santos lake with its respective rivers, the Chilean Otter Group is doing long term research. The objects are to know the spacing patterns, breeding and some information of the social organisation of the southern river otter population.

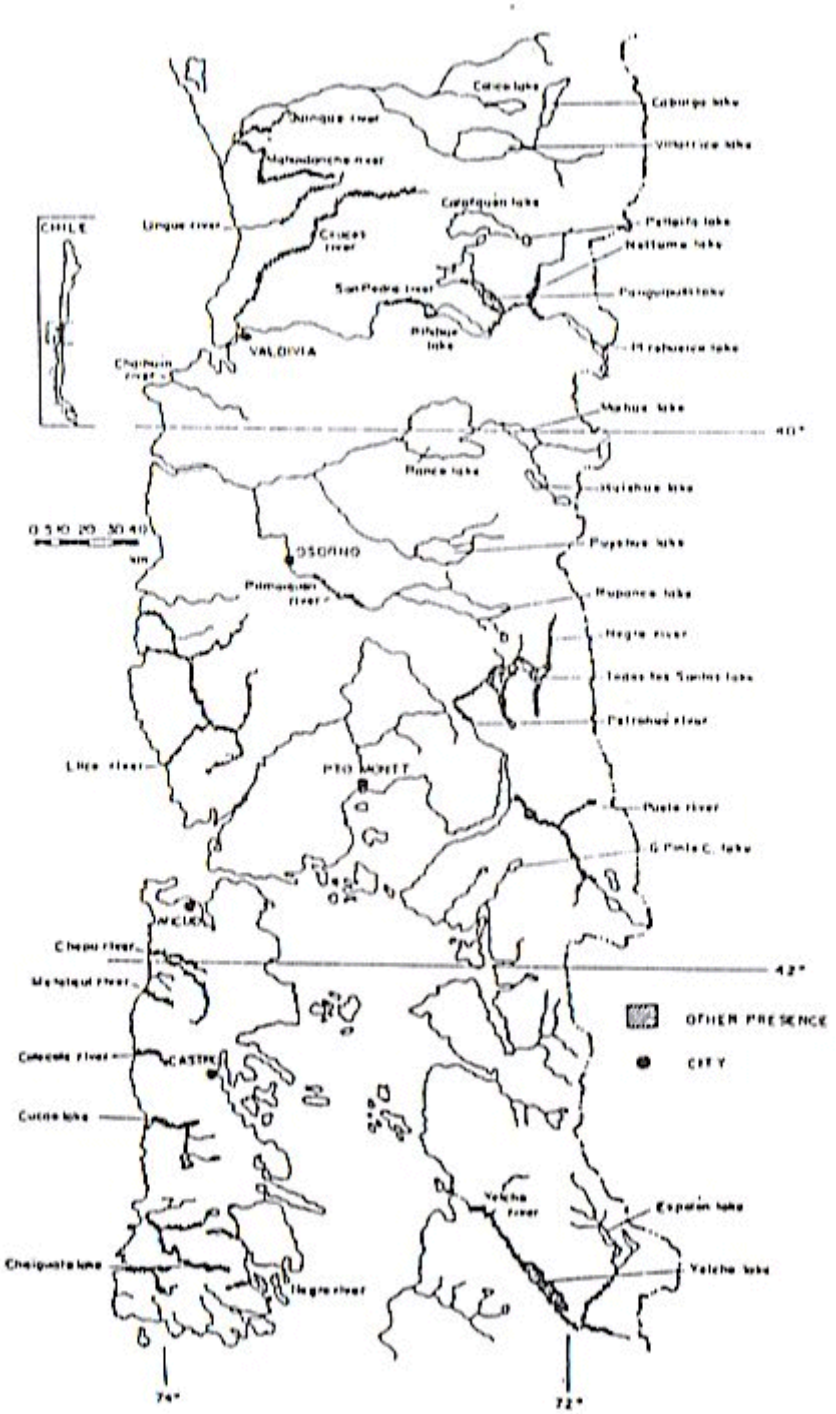

Figure 1.Results of survey for *Lutra provocax*

In relation to the marine otter *Lutra felina,* the Group was waiting for the summer weather before making a second count in the marine coast of the Valdivia province.

During 1991 the Group found two clandestine hunters and three traders with a total of 28 furs, two from river otters.

Photographs and videos are produced of all field activities to build up a photographic library.

SHORT COMMUNICATION

NEWS FROM INDIA

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Field study of river otters

A project entitled "Studies on distribution status and ecology of the river otter for their conservation in three ecologically different habitats in the eastern Ghats area" was sanctioned by Dept of Environment, Govt. of India and was put into operation during January 1991. Two ecologically distinct study areas (a fresh water river, Tungabhadra) in A.P. Karnataka border, and the other at Coringa estuary, have been selected. Two investigators one research associate, research scholar and a fieldsman are on the job. Recently it was reported from the Tungabhadra Field Station, that a fisherman died of severe injuries (scratches and bites) in an encounter with river otters of Smooth Indian Otter *Lutra perspicillata*. Though it sounds strange to believe, it did happen. One day as they usually do, the fishermen went and spread their net in the river. A cub was caught in the net and was brought to the shore, emitting continuous shrill cries. Soon a group otters gathered around the man and started biting and scratching, and finally rescued the cub. The fisherman subsequently succumbed to injuries.

Otter enclosure at Nehru Zoo

A new otter enclosure has been built at Nehru Zoological Park, Hyderabad. The enclosure has been built along the lines of those seen at the Otter Zentrum, Hankensbüttel, Germany. It is roughly circular, open, and constructed around a mound of boulders with water between land and viewers. The viewer side is sealed with a wide glass pane to minimise disturbance.

An otter (*Lutra perspicillata*) was seen resting at the entrance of a hole under a boulder when the zoo was visited at midday. It seems that the present enclosure is better placed than the previous one, where visitors could go around the entire enclosure leaving no privacy for the otters. The two animals that were in the old enclosure used to be on the run all day, and eventually died one after the other.

SHORT COMMUNICATION

STATUS OF OTTERS IN ISRAEL

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The otter *Lutra Lutra* population in Israel is small but stable. Since the survey by Macdonald, Mason & Shalmon (*Oryx*. October 1986), we obtained information (sightings, road casualties) that confirms the stability: The population in the Jordan River catchment is thriving, as these rivers are clean, for they supply drinking water.

The otter population in the coastal plain has been exterminated, as all the rivers in that area, except one, are polluted. If these rivers are cleaned they will be recolonized by otters from the Jordan River catchment. There is evidence (spraints, road casualties) of such unsuccessful penetrations, through the edge of the Jordan River Catchment (River Harod - River Kishon).

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PROCEEDINGS

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